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Economic Calculus and Weak Signals: Prevention Against Foggy Bottom

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Abstract:

Purpose: *Investment decisions are taken based on an economic calculation, considering the analysis of a diverse and partially unpredictable economic environment. Each enterprise's economic calculus is treated as a decision based on rationality and serves as an instrument to support the investment measure's selection. Despite different studies, there is a research gap in the usage of weak signals in economic calculus. Meanwhile, the spectacular collapses of well-recognised firms resulted from weak identification of coming failures.*
Approach/Methodology/Design: *The authors carried out an integrative literature review to generate new knowledge on the usage of weak signals in economic calculus insights in this paper have emerged iteratively.*
Findings: *Based on an integrative literature review, the authors offer the potentially radical generalisation that firms must use weak signal analysis during the process of economic calculus creation.*
Practical Implications: *The article brings several valuable information that can be the base material and reference to further research. Study results can be a starting point of discussion and analysis on each firm, both from the public and private sectors.*
Originality/Value: *The original study aims to initiate discussion and further research weak signal analysis in economic calculus. It is the first such research.*

Keywords: *Business economics, management, risk, uncertainty, public administration.*

JEL Code: *M1, M2, G0, Z0.*

Paper Type: *A research study.*

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1. Introduction

Contemporary companies are currently undergoing multifaceted changes that directly affect the efficiency of capital use and allocation. COVID-19 has influenced the resource allocation mechanism is one of the most critical factors determining business operations. It is recognised that companies are subject to constant adaptation due to the ongoing changes in their internal functioning. Besides, enterprises, being part of the external system, must assess how unstable situations constraint investment decisions.

The risk proliferation destabilises the paradigms of economic rationality, typical for an economy based on the price mechanism's priority role and significantly limits the possibility of economically efficient long-term resource deployment. Although many researchers pointed out different economic calculus factors and organisational development (Arrow *et al*., 1961; Rust, 1996; Castoldi and Bechini, 2010), there is a still research gap in the usage of weak signals in economic calculus.

This research conducted using methods and techniques appropriate for the discipline of management sciences. The paper proceeds as follows: First, the previous research on economic calculus and weak signals was reviewed. After that, the research method is discussed. Based on study results, one may offer the potentially radical suggestion that entrepreneurs must change the perception of the economic calculus as a stable economic tool and assume the existence of foggy economic horizons, which weak signals may only illuminate; otherwise, they may reach the foggy bottom, understood as serious economic failures. This paper ends the conclusion and opportunities for further research.

2. Literature Review

Contemporary company finance theory focuses on business entities' behaviour in allocating and using spatial and temporal terms and various environmental conditions. This interest is closely related to the management process, within which one may distinguish management goals; resources, the number of which is always limited; methods of the most appropriate use of resources to achieve the assumed goals (Rajkovic, 2020). There are many studies on the economic calculus of a company (Bosch and Newton, 1995; Donici and Încalțărău, 2010; Joly, 2016; Ziegler, 2017; Boettke and Piano, 2019) and study on different factors of business operations (Akerlof, 1970; Williamson, 1988; Billingsley and Smith, 1996; Bradley *et al*., 1984; Brennan and Kraus, 1987; Stewart and Hitt, 2012; Tabor *et al*., 2018; Dobrowolski, 2020; Dobrowolski and Sułkowski, 2020; Dobrowolski and Dobrowolska, 2020; Dobrowolski and Sułkowski, 2020a; Dobrowolski, 2021, 2021a; Dobrowolski *et al*., 2021).

However, still little is known about the usage of weak signals in economic calculus. Foresight uses weak signals is broadly presented in the literature (Ansoff, 1982;

Martin, 1995; Barker and Smith, 1995; Cuhls, 2003; Cuhls, 2008; Georghiou *et al*., 2008; Iden *et al*., 2017; Cuhls, 2019; Dobrowolski, 2020a, 2020b). Based on a literature review (Cuhls, 2003; Andriopoulos and Gotsi, 2006; Georghiou *et al*., 2008; Dobrowolski, 2020; 2020a; 2020b), one may argue that foresight is not economic planning. It can be seen as the link between past economic experiences, current and the future. Therefore, one may generalise that foresight is the overall process of understanding the financial situation generated by looking ahead.

Foresight includes identifying weak signals, which are understood as early signs of upcoming events (Mendonca *et al*., 2004; Hiltunen, 2008; Smith and Dubois, 2010; Saritas and Smith, 2011; Lambert and Sidhom, 2011; Hauptman *et al*., 2015; Dobrowolski, 2020; 2020a; 2020b). These warnings are too incomplete to permit an accurate estimation of their impact and to determine a complete response (Ansoff, 1982; Botterhuis *et al*., 2010; Dobrowolski, 2020; 2020a; 2020b). Financial weak signals can use to identify and prevent some economic failures; in other words, they may act as beacons to illuminate the foggy horizons.

There are several methods for identifying weak signals-first, scanning and monitoring. Horizon scanning analyses potential financial challenges and likely future developments for a company or an area (Jackson, 2013; Amanatidou *et al*., 2012). There is also social scanning available. Pang (2010) underlines that such scanning consisting of aggregating and analysing publicly available content created by someone and shared on blogs and other social software platforms. Researchers may use modelling, clustering, and interpretation for weak signals identification, assuming a need to create the required model for analysis and form and interpret groups of similar signals (Thorleuchter and Van den Poel, 2012). Expert's opinions obtained, among others, using heuristic methods can also help identify weak signals. The usage of software enables data analysis to identify weak signals (Rossel, 2011; Yoon, 2012; Dobrowolski, 2020; 2020a; 2020b).

3. Material and Methods

The authors carried out a literature review related to weak signals and economic calculus. One may assume that a literature study as the primary research method can be perceived as research limitations. However, one can argue that literature research is a valuable source of evidence, not only in a preliminary study. Minor references in the literature on the weak signals in the economic calculus may indicate that such a solution may not have been fully researched. Besides, critical analyses of the information gathered may enable identifying gaps in current knowledge and creating a starting point for further research and reviewing controversy areas. Following Russell (2005) arguments that the integrative literature review has many benefits, including evaluating the strength of the scientific evidence, identifying gaps in current research, identifying the need for future research, bridging between related areas of research work, and considering Whittemore and Knafl (2005), Torraco

(2016) assumptions the authors carried out an integrative literature review to generate new knowledge on the usage of weak signals in economic calculus.

4. Research Results and Discussion

Economic calculus is a characteristic of an enterprise in a market economy geared to maximise its monetary income. However, individual, and organisational decision-makers choose satisfactory rather than optimal alternatives (Marengo, 2020), which results from different constraints. Fourgeaud and Perrot (1990) consider that, to examine the rationality of a given investment project, the economic calculus should collect information on the investment project and assess the consequences of the project's implementation on the overall variables considered. Given the isolated sustainability variables, the economic calculus' price parameters, which consider the high volatility of investment capital, should be considered. Besides external factors, one may determine endogenic constraints, in which managers' personal traits play a crucial role.

The research stream shaped by Fiedler (1981), Schumpeter (2003) and Kningt (2013) is focused, among others, on factors that influence the ability to make situationally determined decisions. The wrong way to solve decision-making problems is only intuition and not economic calculus. It may lead to the fact that a given decision will be the most beneficial only by chance. Meanwhile, business needs real facts and strong analysis. Under known conditions, it is possible to identify variables that affect economic calculation. It is worse when the experience is insufficient to predict the functioning of the organisation. The appearance of huge computers with poor computing parameters was a harbinger of the cameras' market collapse using traditional photographic films.

On this basis, it should be noted that to be useful in an uncertainty environment, the economic calculus in a company must include the comprehensive weak signal's analysis. One may assume that the economic calculus should include two opposite processes in firms: negentropy and entropy. Besides, a company must continuously consider various variables (Mintzberg *et al*., 2009).

The necessity of weak signals' concept implementation in economic calculus is more visible if one assumes that economic calculus's substance is to measure inputs and outputs with a time factor, compare alternative combinations of results and information and choose alternatives. The problem of selecting various production factors is formulated as follows: for each of the three elements (construction, technology, organisation), the combination of production factors necessary to manufacture a given product can be determined. The number of available inputs is limited. Each variety of production factors can be attributed to information - the effect of these factors' consumption and monetary units' results. Efficiency functions (target function) can be defined as the relationship between outputs and inputs. Once these assumptions have been considered, the problem is to choose the three elements

that would maximise the value of the organisation's objective function at a given factor size and time frame.

The analysis of these assumptions leads to identifying the company's economic calculus as an instrument of development by selecting the most favourable option from the adopted criteria' point of view, after preliminary multi-optional analysis of the available proposals. There are two variants of economic calculation. In the first variant, the need for the greatest effect/maximum efficiency is assumed; if there are means, the goal must be maximised. In the second option, the principle of least investment/savings of resources applies; if there is a goal, the investment should be minimised. The combination of both variants is the optimisation variant, which consists of finding the optimum operation. At the optimum point, increasing inputs is unprofitable or achieving greater effects is impossible, considering economic and other factors that affect these factors.

Using the economic calculus of an enterprise is possible when the effects and outlays incurred in connection with business activity are measurable. It is possible when outputs and outlays are expressed in the same units of measurement. It seems that from consumers' and capital market perspective, money enables achieving maximum formal rationality (Tobias and Shin, 2009). From such a perspective, one may seek out weak signals in financial trends and Chinese Juan as a potential global currency. It seems impossible now, but the growing market and constant growing economic dependence of many countries from the Chinese market create new economic challenges (Nye, 2010; Layne, 2018; Bersch and Koivumaeki, 2019).

Particular attention should be paid to the problem of risk when selecting the directions of capital allocation. The risk is an integral part of the concept of economic development. Each capital allocation is characterised by a certain degree of risk (Rammel and den Bergh, 2003). In particular, the threat manifests itself in investment processes, where the scale of the lack of information results from a time gap between the moment of capital commitment and the possibility of its recovery. It can be assumed that risk is an objective factor accompanying every entrepreneur who acts. The differentiating factor for a socio-economic actor is the type of risk, the intensity of its impact, and consequences. Due to the management process's uncertain situations, the lack of understanding of weak signals becomes a risk factor that should be strongly emphasised. The entrepreneur's risk conditions are considering different decision-making options and choosing the most optimal and satisfactory option from sustainable development objectives (Gramling and Schneider, 2018).

It is worth noting the convergence between the risk aptitude approach and the set of human personality traits that determine the entrepreneur's behaviour in specific situations (Le Blanc *et al*., 2020). In an entrepreneur's functioning, one can underline the future indefiniteness, the field of influence of which expands with the extension of the time horizon. In such a situation, investment decisions are associated with an

increased uncertainty level (Aven and Renn, 2009). An entrepreneur must decide about the future based on strategy and operational plans convincing stakeholders that experience creates the bridge to the future. Meanwhile, uncertainty refers to situations with the unknown probability distribution of future management conditions (Aven and Bouder, 2020).

Analysing the effectiveness of investments, one can propose the definition of foggy business horizon and differences between current and future business operations. The uncertainty raises two types of problems for any business. Firstly, the risk increases the difficulty in estimating future results. Secondly, it significantly impacts the investment projects' value. In conclusion, it should be concluded that entrepreneurs must change their current attitude and be more focused on internal and external weak signals.

5. Conclusion

The economic calculus is not a panacea for solving all decision-making problems. It becomes necessary to consider also other complementary methods, such as weak signal analysis. All methods used should limit practice solving decision only on intuition. Going towards rationality, an entrepreneur manages the risk. However, in many cases, an entrepreneur making an investment decision on the allocation of capital is faced with a problem of uncertainty rather than risk. Especially in the current pandemic situation, the risk-based methods in the economic calculation may not be sufficient in the management process. The high unpredictability of individual parameters means that financial decisions' risk remains extremely high. This undoubtedly hampers economic calculus.

In a competitive economy, economic calculus data are generally obtained from the market. The entrepreneur does not have all the necessary information to calculate the projected effects of his decisions. Considering the issues raised in the article concerning the weak signals, it seems that solving the problem should consider all dimensions and levels of financial management. If companies make decisions based on external data over which they cannot fully influence, attention should be focused on the unfavourable environment for economic choices created by the operation of the market mechanism and a specific type of state monetary policy as a weak signal. The consequence of this assumption is to pay attention to exogenous factors influencing the resolution of allocation problems at the micro and macro-level. Among the exogenous factors, some issues can be mentioned, but the economy's institutional set-up has a decisive influence on analysing the problem. This arrangement is essential in creating a business framework for entrepreneurs.

The literature studies enable the following conclusions to be drawn, which may form the basis for further research investigations: 1) In the assumptions of sustainable economic development, the issue of weak signal analysis and its effects on capital allocation should be described in more detail in the literature; 2) Factors determining

the level of assumed investment effects on making decisions are often difficult to forecast. Thus, the volatility of conditions determining the achievement of sustainable development objectives when making entrepreneurial decisions is burdened with high uncertainty; 3) The use of an economic account is possible when the investment calculation parameters are probabilistic. Otherwise, the calculations are subjective inference. To avoid uncertainty, weak signal analysis is necessary.

The authors conducted research using the integrative literature review and did not carry out interviews and data analysis to assess whether entrepreneurs are familiar with the weak signal methodology. The preliminary research conducted by one author confirmed that Polish entrepreneurs did not fully recognise weak signal identification as an instrument of reducing foggy business horizon. However, it was a too homogenous and small sample size of studied entrepreneurs to formulate solid generalisations. Thus, the authors need to show modesty towards the generalizability of findings and encourage future researchers to tests whether research findings hold in other countries and firms.

This article can be useful for practitioners and can form a source for an inquiry process at any firm, thus contributing to a better contextual diagnosis of the stage where the firm is building the quality of its economic calculus.

It may be interesting to receive all internal documents and test the relations between weak signal analysis and firms' financial outcomes because subjective assessment may show some skewness (Meier and O'Toole 2013; Gieske *et al*., 2020). Future research can also seek to tweak out which behavioural constraints, particularly impact analysis of the weak signal in business activities, to understand better how to better such analysis fit the business needs and expectations.

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