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Content

CONTROLLING AS A FUNCTION OF THE OBJECTIVITY OF ECONOMIC FORENSICS

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Abstract

Controlling and economic forensics are terms and tasks related to business entities in the market economy. In the transition from the contract economy to the market economy, these terms are still insufficiently present, both in practice and theory of economies in transition, including Croatia. Given that controlling and economic forensics represent new methodologically close knowledge, the purpose is to analyze the possibility of their cooperation and joint action. The research of the space and conditions for their commonality opened up the space of the form of activity of economic forensics related to the evaluation and judgment about the acceptability of the analyzed actions. At the same time, factors that are part of situations, knowledge, social responsibility, well-being, and legality, are essential for evaluation. For the findings and offered solutions of economic forensics to be credible, it is necessary to reduce the level of subjectivity to a minimum when it comes to work and conclusions. In accordance with the structure of the necessary knowledge, the successful collaboration of controlling and economic forensics is necessary, but it arises from the development of the system. Therefore, in an insufficiently developed system, a large space for subjectivity opens up. The aim of the research is to evaluate the connection between controlling and economic forensics, as well as the conditionality of controlling in the system and processes of economic forensics. To gain an acceptable insight and their connection, adequate methods were used, primarily sampling and inference from survey results. Research methods were also used to gain insight into the current state of controlling and economic forensics in Croatia, from which conclusions are drawn about their development, and then the connection. This research concludes that it is essential to influence the rapid development of knowledge about controlling and economic forensics with a serious approach to building a macro national system.

Keywords: *controlling, economic forensics, subjectivism in forensics, macro national system, economies in transition.*

1. INTRODUCTION

Controlling and economic forensics are two fields that emerge from a market-oriented economy. In transition economies, these two areas can often seem contradictory. It is important to note that their development and significance in business vary significantly between the developed economies of the European Union and the economies in transition, such as Croatia. Furthermore, the scope of economic forensics is limited by the increasing prevalence of controlling in its vast range of activities, knowledge, and applications.

Therefore, the purpose of this research is to clarify the roles and importance of controlling and economic forensics, as well as demystify their apparent opposition. Additionally, we aim to address the excessive subjectivity in the perception of economic forensics, which contributes to a lack of cooperation between the two fields.

Analyzing the fields of controlling and economic forensics reveals that they share many similarities in the knowledge and skills required. However, their distinct roles within a company highlight significant differences, both in terms of their internal focus and their external impact on management. Controlling is primarily focused on achieving organizational goals, while economic forensics emphasizes reaching those goals in a positive and socially acceptable manner.

As a result, controlling prioritizes the attainment of objectives, whereas economic forensics prioritizes the ethical methods used to achieve those objectives. Despite these differences in focus, both functions play important roles: controlling supports management, while economic forensics serves the interests of the company's owners, specifically the supervisory board. Ultimately, this distinction underscores the importance of collaboration and connection between the two areas.

In situations where cooperation between controlling and economic forensics fails to materialize and unacceptable actions occur; it falls upon economic forensics to render judgment. This introduces the element of subjectivity for the economic forensics' expert. Furthermore, the extent of this subjectivity is influenced by the development of the macro national system; in developed economies, these systems often have well-defined goals and are equipped to address various dilemmas. Given that these concepts are relatively new and not yet fully developed in economies in transition, both in theory and practice, they require clear definitions and explanations.

2. CONTROLLING AND ECONOMIC FORENSICS, CONCEPTUAL DEFINITION, ROLES, AND COOPERATION

2.1. Controlling in management

The perception of controlling and management varies significantly based on the development of management theory in different countries. Globalization has increased the need for communication among scientists, but language barriers often hinder necessary exchanges, particularly with the German language.

This is significant because German management scientists had a leading role in Europe and beyond within the European framework. The study and application of management on a global scale have evolved through cultural differences in the broader environment (The 4th biennial Global Economic Crime Survey). In addition to the European School of Management, notable approaches include the Japanese School and the classic American School of Management (Julfikar & Masud, 2017). It should be noted that the European School of Management is based on development controlling from the German School of Controlling, in which Deyhle is the most important name (Deyhle, 2003). The Chinese School of Management is also emerging, particularly due to China's impressive results, which some scholars attribute to the country's model of communist capitalism (Wurzel, 2021).

Each major management school has established its core functions: planning, organizing, leading, and controlling. Among these, controlling and planning are particularly emphasized and shaped by organizational culture (Luković et al., 2019). This research focuses on controlling, defined in various ways. However, all definitions essentially convey that controlling arises from the collaboration between managers and controllers (Horvath, 2006). The controller plays a crucial role in this process, equipped with specialized knowledge and skills to support management and foster a positive approach to business decisions. Within the management system, the controller integrates both the planning and controlling functions, thus creating a unique function of controlling planning. In this dynamic, the controller acts as a co-pilot, while the manager serves as the captain-pilot, making decisions and steering the company toward its objectives.

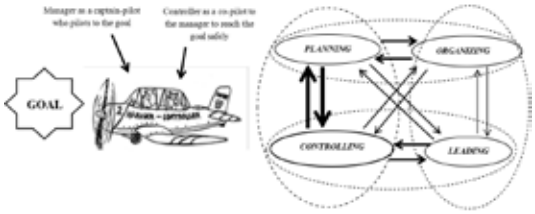

Figure 1. Planning and controlling in the P-O-L-C Framework
Source: Luković, T. & Lebefromm, In.: „*Controlling*, planom do cilja, Druga knjiga", Sveučilište u Dubrovniku, Dubrovnik, 2014.

The relationship between the controller and the manager takes place through cooperation in which the manager is responsible for all decisions and results, namely for the realization of the goal and the success of the business. At the same time, the controller is responsible for the orderly development of the planning and information process and, at the same time, has the task of harmonizing all processes in the company. His relationship with the manager takes place through a system of proposals and options according to the "if...then" system, which means that the controller offers solutions, and the manager decides which option to consider and directs all activities on the way to the goal. Therefore, Deyhle rightly calls the controller a "seller of plans and goals" (Deyhle, 2003).

Controlling is an essential management function that needs to be understood within the broader con-

text of management. The "Encyclopedia of Management" identifies four fundamental management functions: planning, organizing, leading, and controlling (Encyclopedia of Management, 2009, p. 445). It is important to consider two primary management approaches found in literature: the functional approach and the process approach (Luković et al., 2024, p. 184). These approaches complement each other and reflect the theoretical development of management in various contexts. A critical aspect of this discussion is the implementation of e-technology within the management system, which plays a vital role in the controlling function.

3. THE ROLES AND COMMONALITY OF CONTROLLING AND ECONOMIC FORENSICS

As increasingly noted in various studies, the global nature of entrepreneurship and cross-border investments often conflicts with the fundamental characteristics of local cultures, creating opportunities for criminal activity. It has been stated: "Given that corporate memories may be fairly short, E&C companies may derive even more benefit from establishing a consistent company culture that includes appropriate control systems. Project owners need to send out a strong message that fraudsters will be prosecuted" (The 4th biennial Global Economic Crime Survey, 2008, p. 6). This suggests that the decision-making process is influenced not only by the culture established by the company's board and management but also by the surrounding environment and the perceptions of good and poor decisions and actions.

As for controlling in the decision-making process, it operates from the moment the company's management sets goals and transfers them to management. After that, the top manager, in cooperation with the controller, develops objectives and sets a plan according to which the entire production or service process begins and takes place. In doing so, achieving the goal for management, but also for management, has become *conditio sine qua non* because the goal must be achieved, but the plan and objectives can be changed and adapted to changes, both within the company and even more so to changes in the market. This process is mainly under the constant pressure of achieving the goal, which becomes a potential problem when resorting to generally unacceptable actions. Such situations are hazardous for management, which, to survive, sometimes resort to illegal actions. Almost as a rule, such actions do not pay off in the long run because they compromise the company, which then results in a significant decline in business and large damages that can put the company's survival in question. There are numerous known examples of high damages threatening the company's survival, as well as other various situations. Thompson, A. A., & Strickland, A. J. (2001, p. 153) especially warn of the importance of costs that grow enormously at the moment of recognition of some legally unacceptable action.

One of the extreme situations that led to major scandals was the incompetence of the management of the Finnish company Nokia, as well as

another extreme situation involving fraud and corruption at the South Korean company Samsung. Here, the term "management incompetence" should be understood as essentially representing the absence of controlling and economic forensics. As a rule, corrupt activity, as well as poor business, are sooner or later discovered. For example, the "Report of the Association of Certified National Fraud Examiners", which refers to the analysis of Nokia, states: "The survey conducted revealed that, in general, the company loses 5% of its revenue in a given year as a result of false financial statements. India ranks second in the number of victim organizations reporting fraud cases" (Bhasin, 2012). The actual damage reported by Nokia is an average figure, as the precise amount caused by its expansion into various countries is difficult to determine. In the case of Nokia, the question arises regarding all parties involved in the decision-making process, particularly the controlling entity, which, while not formally accountable, holds significant responsibility in practice. At the same time, the system of forensic accounting and economic forensics as part of the controlling system in large companies has also failed. Here, we can highlight Speck's statement: "Involvement in corruption scandals damages the reputation and credibility of the work of the state and supervisory institutions. Weak supervision and controlling are often associated with poor institutional design of organizations at the macrolevel. Engaging in organizational reforms or improving the interaction between these organizations requires political will and sustained efforts in the fight for gradual improvement" (Speck, 2005, p. 20). Speck's conclusion warns of the explanation of the role of the macrosystem, which is ineffective without supervision and controlling, and its replacement by numerous laws is often counterproductive (Luković et al., 2022). The efficient macro and microsystems, accompanied by a robust knowledge acquisition framework at all levels, are essential for effectively combating corruption in economies in transition, particularly Croatia.

Also, the Samsung case points to the fact that any form of corruption is unprofitable in the long term, especially for the owner of the invested capital and then for the management that represents it. Corruption does occur in this context, highlighting the negative impacts of a lack of oversight. For instance, the ownership of the South Korean conglomerate Samsung has been transferred from father to son since the company's inception. When the scandal broke, the head of the company, Lee Jae-Yong, whose grandfather founded the company, stated that corruption scandals were discovered as a result of the company's nepotistic approach over the decades (New eBook GAN Integrity). The scandals damaged Samsung, which has been recovering from this for years, and the wrong approach to human resource management caused corruption as a result of nepotism.

Samsung and Nokia are just a few of the many examples in which the absence of responsible controlling and internal accounting forensics led to large business losses. The unfor-

tunate events were discovered in developed countries that did not have the necessary knowledge.

Therefore, neglecting the activities of controlling and economic forensics, especially their joint activities and cooperation, leads to great damage and problems. There are few works on the topic of adopting the principles of controlling in economic forensics. However, the analyses and research conducted so far conclude what is involved when talking about the controlling aspect of economic forensics. The tasks and role of controlling as a support for management are clear, as are the tasks of controlling in planning and harmonizing processes in the company. On the way to achieving the goal, controlling involves developing predictive analyses (Lebefromm, 1999) to forecast future events, particularly regarding upcoming business risks. As is known, there are four fundamental characteristics of controlling (Mayer & Weber, 1990, p. 35):

1. "narrow, oriented and focused (on the problem), way of thinking and working
2. complete orientation and focus in thinking and working on the realization of the company's set goal
3. complete orientation of thinking and working towards achieving the company's profit, with the assumption of ensuring long-term successful business
4. focus on thinking and working towards the company's future."

Therefore, in addition to a specific way of thinking related to the solution of the current problem, the realization of profit, but with the condition of ensuring long-term successful business operations while creating stability for the future of the company, are the fundamental conditions for successful controlling activities. From developmental perspective, controlling and economic forensics have similar phases forming through functions. Considering the course of formation of the five basic functions of controlling, as Horvath sets them, it can be concluded that the functions represent the course of development of controlling:

1. accounting and computing function
2. auditing function (internal auditing)
3. joint work and cooperation with external auditing
4. tax function
5. the function of interpreting results and information (Horvath, 2006, p. 21).

The development of controlling in a macro and micro environment begins with accounting and gradually develops, encompassing increasingly complex processes in the company. When observing the above phases of controlling development, these are almost the same phases as in economic forensics. The development of economic forensics begins with accounting, as with controlling, and ends with the interpretation of results. In practice, the interpretation of results appears as a need for knowledge, most often fraud, which means skipping three development phases. In this, the support of controlling can contribute to the work of economic

forensics, which operates from the accounting position. Therefore, economic forensics, activated in the context of fraud prevention, both internal and external, has tasks very similar to controlling, and PwC Luxembourg (2016, p. 5) states: "Our fraud and investigation experts combine investigative evidence gathering skills with supervisory methodologies to provide a range of investigative and advisory services. Our areas of research are:

- fraud investigation
- background investigation
- fraud risk management."

So, in economic forensics, monitoring methods or control methodologies represent the use of controlling methodologies. This means that economic forensics, when detecting fraud, primarily uses controlling methods.

In accordance with the operation in practice, the economic forensic scientist is satisfied with the findings from the past, both the background and the fraud risk management that took place in the processes. At the same time, controlling goes further and looks at the future and the consequences, whether fraud happened or could happen. In this sense, the controlling aspect of economic forensics raises the activities of economic forensics to a higher level, strengthens prevention, warns, and enters the "if...then" of the controlling. So, the controlling aspect of economic forensics with "if...then" warns as if to say: "Gentlemen, managers or government officials, if you do 'this and that', then you will have a problem with 'such and such'". This is why, in developed economies, controlling takes over the role of an internal auditor or some other supervisory entity in a company or state administration. However, in essence, it is the controlling aspect of economic forensics. As previously stated, and confirmed through the controlling aspect, the unity of controlling and economic forensics turns into a powerful tool for successful business and protection of the subject from possible risks of fraud and corruption.

3.1. Controlling and economic forensics in the Croatian surrounding

The system represents the basis for setting up meaningful and goal-oriented processes. It means that in regulated macro national systems, controlling needs to adapt to the system in which it develops and monitors processes on the way to the goal. At the same time, the macro national system of economies in transition is not developed. For instance, in Croatia, it is replaced by numerous laws. In such (un)systematic environment, the controller's work is complex, and there is a wide space for manipulation and options for harmful actions. Therefore, the economic forensic scientist has a significantly more difficult task of controlling and monitoring the processes that have already occurred. Therefore, in the process of supervision, the economic forensic scientist mainly deals with the analysis of already completed processes, while the controller, with an eye on the future, shapes, predicts, and then supervises the processes on the way to the goal. The procedures of economic forensics and controlling differ significantly, but there is also room for them to connect knowledge from

the past, present, and future. However, this is preceded by a process of their connection and gaining trust, on which they build future cooperation.

Processes in transition countries, that is, countries that have abruptly transitioned from a socialist system to capitalism, and their economies have transitioned from a command economy to a market economy, rely on inheritance in terms of process. It means that in conditions in which the state, politics, and state administration have failed to build an effective macro national system, all subsystems operate similarly to those in the former socialist regime. Therefore, such systems are burdened with numerous factors that do not make them effective for the new concept of market, civic, and capitalist action. At the same time, it is known, and Thurow (1997) well predicted, that capitalism and the market economy have been left without competition, which has opened up numerous macrostrategic options for the operation of capitalism, from negative to efficient and positive. In such circumstances, the task of the state and the ruling policy is to solve this problem, which means building and stabilizing a macrostrategic model. However, building a macrostrategic model is a demanding and long-term task that brings together top experts in this interdisciplinary project. Therefore, as long as there is no macro strategic model in the country, the operational tasks of economic forensics require a high level of training of economic forensic experts. The high quality of education in economic forensics in countries in transition is emphasized by the fact of inherited corruption from the former socialist regime, but the results are far below expectations (Budak & Škrinjarić, 2024). Contrary to expectations, after Croatia acceded to the EU, the high perception of the prevalence of corruption has strengthened, as has the attitude that corruption is sometimes the only means to achieve the goal, primarily because (corrupt) institutions do not inspire trust in citizens (Budak & Škrinjarić, 2024, p. 167). The following question arises: What is the reason for this, or what are the reasons for the ineffectiveness of the fight against corruption?

It has been shown that corruption development is rooted in a challenging legacy tied to past corruption and the mismanagement of state property. When joining the European Union, Croatia was expected to fulfil the requirements of negotiating Chapter 23. Closing this Chapter depended on demonstrating a genuine commitment to combating corruption, enacting appropriate regulations, and, most importantly, effectively implementing these measures in practice (Grubiša, 2010; Vlašić & Łazowski, 2014). The journey of proving compliance and successfully closing Chapter 23 was lengthy, and the practical application of reforms fell short of expectations. In essence, Croatia's approach to fighting corruption became integrated with existing systems whose effectiveness remains questionable. This ineffectiveness stems from political unwillingness and a lack of proper education. Political will and a high level of knowledge are essential for developing a comprehensive anti-corruption system at the state level, which is currently lacking in Croatia. Meeting the conditions of political will and knowledge would promote controlling as an efficient and undoubtedly pos-

itive system leading a company to achieve its goal. Moreover, it means that slavery to the laws in countries in transition is still not acceptable, which is seen in the anti-corruption results as well as Croatia's rank on the list of corrupt countries. It creates an opportunity for marginal business and decision-making, which requires a high-quality assessment ability of economic forensics and the support and development of the whole society. The absence of the above, which especially refers to the controllers' activities, inevitably leads to unacceptable business activities.

4. MATERIAL AND METHODS

4.1. Methods and sample

The research that was conducted aims to confirm or reject the research hypothesis but, at the same time, to explain the connection between controlling and economic forensics. Numerous areas connect controlling with economic forensics. For example, controlling also has its place in national laws, where it helps in making the final court decision. As Schap states, the dilemma of the court in the process of assessing the estate after death opens up crucial dilemmas: "Legal status is an important issue in cases of death. (…) Controlling state law affects the calculations of forensic economics on whether it is a loss of the estate of what could be accumulated wealth or a loss, for example, directly for the surviving spouse" (Schap, 2010). The demands placed on controlling and economic forensics are increasingly complex, which means that along with the acquisition of new knowledge, a high level of use of digital support is also required. Using digital support, controlling, and economic forensics have more significant opportunities for knowledge and research. For example, controlling available information and auditing eliminates statistical discrimination of job candidates (Zitzewitz, 2012, p. 758). The need to connect controlling and economic forensics has also been noticed in Croatia, so Šestanović and Palac (2018, p. 43) emphasize the following in their work: "The controlling function and forensic accounting are complementary disciplines whose purpose is not only control but also planning and prevention of future events with evaluation of outcomes." Although these are the first works that carry several inaccuracies, it is positive that the connection between controlling and economic forensics has been recognized in Croatia. It is also worth highlighting short courses (course of Forensic Analysis, 2024) that aim to expand knowledge in controlling and economic forensics, but of particular importance for Croatia is the University Department of Forensic Sciences, the module Financial and Accounting Forensics in Split, which is the Croatian educational debut of this type.

This research, which is part of the research conducted at the University Department of Forensic Sciences Split, shows the scope of subjective assessment of situations that should have been resolved by the system or that cannot be resolved by law. The research that was conducted to define the link between controlling and economic forensics is based on the PAPI method (Paper and Pencil Interviewing). The research was conducted as a direct contact of the researcher with the respondents so that there would be no ambiguities when an-

swering the questions. A sample of 93 respondents was set for the research, and the research was reduced to simple YES or NO answers. However, as simple as it is, the decision itself is made more difficult by the condition that there is no MAYBE as an answer, which forces a clear answer in the 10 options provided. The processing used classical statistical methods, which contributed to the conclusion.

5. RESULTS AND DISCUSSION

5.1. Results and findings

In the conditions of economies in transition of EU member states, including Croatia, many problems have remained open and left to the excessive subjectivism of all actors in the processes. Court processes reflect this through lengthy and expensive trials, large differences in the reports of (mostly uncertified) experts, and the absence and non-use of specialized experts for economic crime and fraud. All this ultimately results in dubious verdicts. In the absence of a macro national Croatian system supported by laws and their supervision outside of politics and state administration, problems multiply, corruption is high, and threatens already modest business and other results.

Table 1. Survey on the assessment of possible situations faced by the economic forensic scientist in economies and countries in transition, absolute representation.[1]

		Number of answers		Structure (%)	
	SITUATION	**YES**	**NO**	**YES**	**NO**
1	I know how to do it, I do it right, I do it socially useful, I do it according to the law	15	78	16,2	83,8
2	I know how to do it right, I do it socially useful, but I don't do it according to the law	66	27	71,0	29,0
3	I know how to do it right, I don't do it socially useful (I don't care), I do it according to the law	45	48	48,4	51,6
4	I know how to do it right, I don't do it socially useful, I don't do it according to the law	75	18	83,8	16,2

[1] The question asked to the respondents is: Do you rate the situations listed from 1 to 10 individually as unacceptable? The answer YES indicates the opinion and determination of the forensic expert that the result is unacceptable, while the answer NO means that the result of the work of the manager or some other person is acceptable.

5	I know how to do it right, I don't do it socially useful, I do it according to the law	78	15	83,9	16,1
6	I know how to do it right, I don't do it socially useful, I do it according to the law	55	38	59,1	40,9
7	I don't do it right, I don't know if I'm doing it right, I don't do it socially useful, I do it according to the law	47	46	50,5	49,5
8	I don't do it right, I don't know if I'm doing it right, I don't do it socially useful, I do it according to the law	74	19	79,6	20,4
9	I don't do it right, I don't know if I'm doing it right, I don't do it socially useful, I do it according to the law	57	36	61,3	38,7
10	I know how to do it, I do it right, I do it socially useful, I do it according to the law	78	15	83,8	16,2

Source: The survey was conducted in December 2024 at the University Department of Forensic Sciences.

As can be seen, the 93 surveyed students, future economic forensic scientists, were clearly divided into three groups of answers and opinions. The first group of two situations, the first and the last, consists of attitudes about mostly correct and generally acceptable actions. It is primarily about two fundamental criteria: "I work according to the law" and "I don't work according to the law", as well as "I know how to do it" and "I don't know how to do it". The first criterion is the basic criterion of legal business, while the second criterion represents knowledge as a condition for successful work performance and refers to responsible or irresponsible work. However, the result is somewhat unexpected, because one would expect that in clear conditions of the first and last cases, the answers would be unique, namely 100%, which did not happen. A completely equal attitude is made impossible due to 16.2% of unexpectedly acceptable opinions, which provides space for a complex discussion. Furthermore, the results for situations 4, 5, and 8, which respondents are willing to accept with 16 – 20%, represent the combination of "I know how to do it" and "I don't know how to do it" as well as "I work according to the law" and "I don't work according to the law". The criterion "I don't do socially useful work" played a key role in situations 4 and 5, while in situation 8, the criterion "I work according to the law" was crucial. The remaining five situations out of ten given divided the respondents who, guided by the combination of the basic four criteria, divided themselves into two similar groups according to the (un) acceptability of the observed action/ situation.

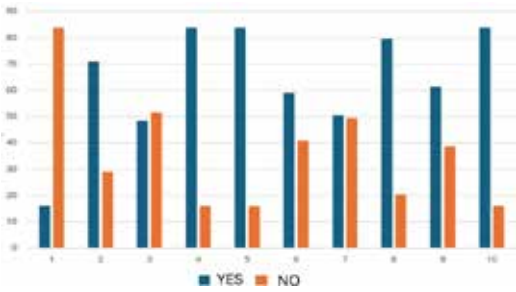

Figure 2. Structural overview of attitudes on the acceptability and unacceptability of acts according to 10 situations.[2]
Source: designed by the authors.

It should be considered that the respondents are in the middle of the process of training for economic forensics, which develops their specific judgments about situations. On the other hand, they observe the situation in the environment and the possibility of acting in a country that has not solved key life problems at the macro level but has left them to the laws. This fact is confusing, as shown by the results of this survey based on the macro situation and the Croatian reality. The environment in which economic forensics in Croatia must operate does not lead to improvement, especially not in terms of reducing corruption. The reason for this is the lack of prevention, so economic forensics is activated only after an unfortunate event and then finds itself under a series of pressures. At the same time, a high degree of subjectivity and inference burdens his work and findings, which negatively affects his credibility. This is why many criminal proceedings have been initiated in Croatia, which have ended without the expected result, ultimately resulting in great damage to the state, the accused, and then the acquitted subject.

5.2. Discussion

The expert link between controlling and economic forensics is functional, noting that both have their specific role in the process of action. The difference between controlling and economic forensics is important when observed in the context of a company's or institution's processes. Controlling is a management function, while economic forensics is a form of separate supervision. At the same time, controlling is a component of management, while economic forensics is more significantly associated with the owner and the company's supervisory board. In the context of cognition, knowledge, action, and role in a company, institution, and even society, both should be installed in terms of preventing unpleasant events. Controlling and economic forensics should completely distance from subjectivism due to the fact that unpleasant events in institutions and companies occur according to plan or arise as a result of management ignorance. It means that many dilemmas and variations of events need to be resolved beforehand.

The research that has been conducted shows a high degree of subjectivity that burdens the economic forensic scientist in the conditions of his work in a country that has not established a macro national system. The attempt to replace the macro national system with countless legal

[2] The abscissa from 1 to 10 are the situations listed in the same order in Table 1, and the ordinate is the percentage rating of the unacceptability of the situation.

solutions is wrong and, as a rule, results in negative actions and results.

The system and the link in terms of joint action of controlling and economic forensics using the possibilities provided by e-technology represent a powerful tool for positive action, both legally and socially acceptable. To achieve this in countries in transition, including Croatia, two conditions are needed: political will and the necessary level of knowledge. In the absence of one of them, the result is not favorable, while in the absence of both conditions, unfavorable conditions are created that ultimately result in the emigration of educated citizens.

6. CONCLUSION

Economic forensics has advanced in the developed member states of the European Union, while it is just beginning in countries in transition. It is very similar to controlling, which still has not found its place in management where it belongs. Knowledge and operation of economic forensics in countries in transition is at the first development level, that is, at the level of accounting analysis. At the same time, controlling has yet to come out of the interpretation of control and the mere comparison of planned and realized. At the same time, the analysis of the possibilities of economic forensics and controlling proves that these are two similar actions, indicating that economic forensics is closer to the owner of the invested capital and controlling to the management. What connects them is the similarity in the development of the necessary knowledge as well as the common goal of carrying out work successfully, legally, and socially acceptable. Despite certain characteristics that they may share, such as, for example, in controlling, it is imperative to achieve the goal, and in economic forensics, that business operations must not stray from the permitted domain, the joint work of controlling and economic forensics represents a powerful tool in a positive aspect of management and administration.

The degree of general development of the macro environment and culture significantly affects the success of economic forensics operations and decision-making. The research conducted in this paper proves that in economies in transition, where the fundamental issues of society and economy are not solved by the macro-national system, the attempt to replace them with laws is detrimental to the work of economic forensics. It is especially evident in the domain of options, which, in fundamental relations, knowledge, social responsibilities, social good, and legal business, unacceptably burden the economic forensic scientist with the need for subjective judgment. Given that this is a fact that cannot be resolved in the short term, the cooperation and support of controlling is crucial in economic forensics. Therefore, the implementation of controlling and economic forensics is essential for countries in transition to contribute to better work results, both in the economy and the state sector. Politics decide on this, while science and the profession have the task of offering solutions that are a condition for the establishment of a well-organized state that satisfies its citizens and reduces corruption to a minimum.

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F-SCORE AS INDICATOR OF FINANCIAL STATEMENT FRAUDS IN LARGE CROATIAN COMPANIES: ANALYSIS OF TRENDS AND EXPLANATORY FACTORS

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Abstract

The aim of this paper is to determine trends as well as explanatory factors of financial statement frauds at a sample of large Croatian companies. Financial statement fraud was measured by using F-score model developed by Dechow et al. (2011). Research covered three periods: pre COVID-19, COVID-19 and post COVID-19 period. Research results revealed that the highest risk of manipulations was detected in 2017 when F-score amounted 3.03, while the lowest value of the F-score was observed during the COVID-19 crisis year. Post COVID-19 period is characterized by increase in F-score but values in this period were not even close to those from the pre COVID-19 period. Analysis of explanatory factors reported how F-score, as indicator of financial statement fraud, was positively related to effective income tax rate and leverage variable, while negative impact was observed for the size variable. Research results suggest that F-score can be used as effective tool for fraud detection and therefore is strongly suggested for all interested stakeholders in fighting against frauds and making optimal business decisions.

Keywords: *F-score, financial statement fraud, fraud detection models*

1. INTRODUCTION

Financial statements represent the basic publicly available source of information on the financial position, financial performance and cash flows of companies. Therefore, financial statements must be prepared in accordance with the applicable financial reporting framework, and the information presented in these reports must be true, relevant and reliable. The reliability of financial statements and the information contained in them is of crucial importance for various users, and especially for investors, since their user decisions are based on this information. Therefore, financial reports should show information that is useful in the

business decision-making process for different users - investors, creditors and other internal and external users of information from these reports. A significant problem in making valid user decisions are frauds and fraudulent financial statements. Business frauds can be defined as "frauds that are committed by individuals against the organizations that employ them" (ACFE, 2022) and represent "the costliest and most common form of financial crime in the world" (ACFE, 2022).

Frauds in financial statements is the least common form of business fraud, however this form of fraud causes by far the largest losses. For example, ACFE's research for 2024 (ACFE, 2024) shows that fraud in financial statements was represented in 5% of analyzed cases, however, it caused a loss of USD 766,000 per case. In modern business conditions, companies face an increased risk of fraud, and frauds last longer, cause greater losses, and the number of listed companies involved in fraud is increasing (Grandstaff & Solsma, 2021). Trust in the financial reporting system and the information presented in the financial statements of corporations has been undermined since the Enron and WorldCom corporate scandals. The importance of preventive mechanisms in the fight against fraud, as well as the importance of detecting fraud as early as possible, has been emphasized for years.

All stakeholders are being more aware of fraud risk and pay more attention on analysis of financial statements reliability and quality. Use of different forensic accounting models like Beneish M-score, and F-score can be of great help for different stakeholders in detecting potentially manipulated financial statements. These models definitely have certain limitations like failure to capture all aspects of financial fraud, their reliance on financial statements and inability to account for changes in different aspects of corporate governance especially during times of crisis (Arum et al., 2023) but despite these limitations they are widely used by academics and practitioners in detecting financial statements frauds. One of most common models in detecting financial statement frauds, F-score model is based on seven ratios which combined together can help in determining whether certain company is potential fraudster. Saleh et al. (2021) state how "F-score model has already been shown to be important in identifying fraud variables and hence highly appreciated in identifying false financial statements". This model was developed by Dechow et al. (2011) and cer-

tain company is detected as potential fraudster in situation when calculated F-score exceeds critical value of 1.00. On the other hand, if the value of the F score is below 1, it is concluded that the reports have not been manipulated. Greater values indicate higher probability of frauds and misstatements in accounting numbers.

In this paper F-score model was tested on a sample of large Croatian companies in period 2017-2023. Research sample was divided into three subsamples in order to get insight in trends and movements of F-score in the pre COVID-19, COVID-19 and post COVID-19 periods. Also, explanatory factors which include effective income tax rate (EITR), indebtedness (LEV) and company size, where added in analysis. According to results the highest risk of manipulations was detected in 2017 when F-score amounted 3.03. During the COVID-19 crisis year the level of financial statement manipulation decreased and F-score was 0.56. This value was lowest in the whole observed period and could be explained by fact that significant part of companies counted on receiving government subsidies during the crisis and expected increased supervision from government authorities which reduced incentives for manipulating financial statements. Analysis of factors that influence the level of F-score revealed that F-score was positively related to effective income tax rate and leverage variable while negative influence on the level of financial statements fraud was measured for the size variable.

The conducted research contributes to a better understanding and recognition of possible manipulations in financial statements, which benefits different stakeholders, regulators and even the authorities themselves. One of main implications of this paper is to give guidelines for all interested stakeholders for detecting potential financial statements frauds and related risks. For example, financial analysts, investors and auditors could expand their analytical techniques and add fraud detection methods in their analysis which can result in detecting potential frauds more promptly and finally in better capital allocation. Also, authorities may benefit from detecting companies that are not best “candidates” for receiving government supports which contributes to better allocation of government funds. Another significant contribution is that it explores the impact of different variables (tax rate, leverage and size) on prevention and detection of frauds in financial statements. To our best knowledge this if first study that employed F-score to detect financial frauds as well as factors that influence frauds on a sample of Croatian companies. Also, this study expands the literature on the impact of different corporate governance factors or factors that may relate to theory of fraud triangle/fraud diamond on financial statements frauds.

Paper is structured as follows. After first, introductory part of the study, theoretical background and previous research in this area is presented. The third section provides insight in research design while fourth section brings research results. Concluding remarks are presented in the last chapter of the paper.

2. THEORETICAL BACKGROUND

2.1. Accounting theories and frauds

The positive theory of accounting deals with the analysis of managerial choices, and within this theory, the debate about intentions and incentives for earnings management and manipulation of financial statements is developed. The positive approach to accounting has its origins in the concept of economic consequences and agency theory as well as in various contractual relationships that the company has stand out as motives for unfair practices in financial statements: relationships with creditors (debt contracts), employees (compensation contracts) or political costs. According to the concept of economic consequences, accounting policies can affect the value of a corporation (Scott, 2003, 259), while agency theory explains the behavior of managers in corporations in which the functions of ownership and management are separated. In this sense, this theory assumes that managers behave in accordance with their own interests and that managers in corporations will be guided by their own interests and maximize the value of the corporation if it is in accordance with their personal preferences. Agency theory explains earnings management through managers' opportunistic intentions (Jensen & Meckling, 1976). Lisboa & Kacharava (2018) state how during difficult, crisis times these intentions are even more important and „firms need to exhibit a „good picture" in order to sustain their relationship with stakeholders in periods of turbulences". Earnings management can be defined as „a strategy used by a firm's manager to deliberately manipulate company's earnings in order to reach a particular target for various purposes" (Lisboa & Kacharava, 2018). Healy & Wahlen (1999) explain that earnings management appears when financial information is modified in a way it influences the decisions of stakeholders. Moreover, they point out how earnings management practices weaken the reliability of financial reporting process as well as quality of financial information. Information asymmetry, as one of the consequences of the separation of management and ownership functions, can also lead to fraud in financial statements. According to Putra (2022) fraud in financial statements occurs because management is under constant pressure to improve performance, increase company value, and increase stock prices.

Times of crisis certainly represent a great challenge for management and represent an additional motive for engaging in questionable accounting choices and the application of earnings management practices. Filip & Raffounier (2014) point out that there are reasons for both more intensive and less intensive use of earnings management in times of crisis. In these challenging times, there are a number of challenges and motives that increase the risk of manipulation in financial statements, which increases the caution of various users of financial statements and raises doubts about the quality of financial reporting, that is, about the quality of information presented in financial statements. Different authors have identified alternative motives that en-

courage earnings management practices in times of crisis. For example, managers engage in earnings management because they want to maintain the trust of stakeholders, which has been shaken in times of crisis (Gorgan et al, 2012). A significant incentive for managers can also be the fear of stock prices falling, which negatively affects their compensation (Charitou et al., 2007). Also, as incentive for earnings management the managers' effort not to violate debt financing agreements can be pointed out (Filip & Raffounier, 2014).

On the other hand, it is possible to see the reasons, as well as the research that confirms it, which influence the reduction of earnings management during the crisis. Cimini (2015) points out that although investors expect an increase in earnings management, the motives (incentives) for such management behavior may decrease during the crisis. Increased monitoring by creditors, auditors and other stakeholders is cited as one of the main reasons affecting the decrease in earnings management (Filip & Raffounier, 2014). Also, the government authorities try to help companies that are in difficulties to overcome crisis periods by means of various supports, which is a significant motivation for managers to present a realistic financial result with the aim of obtaining more government support.

2.2. Hypotheses development

Recent studies related to frauds and earnings management were mostly focused on impact of last crisis caused by COVID-19 pandemic on fraudulent behavior. It should be noted that no consensus was reached on the impact of the crisis on earnings management and also there is "no complete agreement either on the use or the purpose of earnings management in difficult times" (Garfatta et al, 2023). Some studies report an increase in earnings management in times of crisis, which indicates the fact that managers are motivated to maintain the trust of investors in times of crisis and to show better financial result. For example, Lisboa & Kacharava (2018) analyzed the impact of the great financial crisis of 2008 on earnings management. The authors conducted a comparative analysis of Portuguese and UK companies in the period 2004 to 2014. According to the results, the financial crisis has a positive effect on the tendency to increase financial results, while the size and indebtedness of the company stand out as two significant characteristics in explaining earnings management. Cimini (2015) conducted a comparative study on a sample of EU countries over the period 2006–2012 and examined impact of the 2008 financial crisis on earnings management. According to results, abnormal accruals, as a measure of earnings management, were higher before crisis period than in the crisis period. Similar results were reached by Filip & Raffounier (2014) for the European Union observed as a whole. However, single countries such as Austria, Belgium, France, Norway and Portugal have shown increased earnings management during the 2008–2009 financial crisis.

The impact of the crisis caused by the COVID-19 pandemic on earnings

management was investigated by Yasar and Yalcun (2024). They conducted research on a sample of 938 listed companies from four European countries: United Kingdom, Italy, Spain and Turkey in the period from 2016 to 2020. According to results in the year of pandemic observed companies engaged more in earnings management which negatively affected usefulness and reliability of financial statements in this period. Lassoued & Khanchel (2021) detected increase in earnings management after pandemic on a sample of 15 European countries. Results reported by Liu and Sun (2022) for U.S. have shown how companies were more engaged in income-decreasing earnings management which indicated how they used a pandemic year for performing a big bath in their financial statements. Similar results were obtained for Polish public firms (Lizinska & Czapiewski, 2023) as well as for Tunisian companies (Garfatta et al, 2023).

Research for UK listed companies also revealed how "quality of companies' financial reporting has been lower during the pandemic" (Hsu & Yang, 2022, 1) meaning that observed companies were more engaged in earnings management practices during pandemic period. Research on impact of COVID-19 on earnings management for Korea was performed by Kim et al. (2024). They investigated if there is a difference in earnings management practices among private and public companies during crisis. Empirical results revealed a decrease in earnings management in public companies while no change was detected in companies from private sector. Ali et al. (2022) performed a research on a sample of 5,519 companies from G-12 countries and report that companies were less engaged in earnings management during COVID-19 crisis. From all abovementioned it can be concluded how results on the impact of COVID-19 pandemic on earnings management are mixed and further research could contribute further clarification of this question. It should also be noted that most of the papers investigated the impact of the pandemic on earnings management, which can be used as a proxy for fraud in financial statements. When the analysis of existing research focuses on the application of the Beneish M-score or F-score model as a tool for detecting manipulations in financial statements, the literature is rather scarce.

One of the rare studies was conducted by Siregar et al. (2023) who analyzed applicability of Beneish M-score in fraud detection during COVID-19 pandemic on a sample of 53 manufacturing companies whose shares were listed on Indonesia Stock Exchange. According to results number of companies classified as manipulators increased in the observed period (2019-2021) while number of those classified as non-manipulators decreased. Also, Dimitrijević et al. (2024) performed a study on a sample of travel agencies form the Republic of Serbia and reported that there is increased risk of fraud during the pandemic period. Paolone et al. (2015) examined impact of financial crisis on earning management on a sample of Italian companies.

Authors used Beneish model for detecting accounting manipulations and compared results for two periods: pre-crisis period (2005-2008) and crisis period (2009-2012). Results indicate that earnings management decreased during crisis period compared to pre-crisis period so authors conclude how "firms have greater propensity to manipulate and hide wealth creation during non-crisis period to obtain tax savings and restrain the distribution of wealth (Paolone et al. 2023). As seen from the above presented papers results regarding trends in earning management and financial statement frauds are mixed. Also, recent research in this area focused on impact of COVID-19 crisis on earnings management and frauds while post-COVID-19 period was not in the focus. Therefore, we suggest the first hypothesis as follows:

H1: Financial statements frauds in large Croatian companies increased in the post-COVID-19 period.

Different factors and company's characteristics can motivate managers and give impetus for earnings management and financial statements frauds. Hereafter are presented some of the papers related to factors affecting frauds as well as those papers that were relevant in the context of hypothesis development.

Borrowing costs can have effect on earnings management and debt contract hypothesis has crucial place in positive accounting theory. It is assumed that more indebted companies are more engaged in earnings management because they want to maintain their crediting terms as well as to ensure future financing. This hypothesis was confirmed by Lazzem & Jilani (2017). They performed a research on a sample of French firms during a period from 2006 to 2012 and examined the influence of leverage on earnings management practices. Research results are in line with debt covenants hypothesis showing that firm leverage is positively related to earnings management practices. Similar results were obtained by Franz et al. (2014) who also concluded that companies close to violation of debt contracts are more involved in earnings management practices. It should be pointed out how in this stream of research results are also mixed since some authors (for example Lisboa and Kacharava 2018) found that more indebted companies are less engaged in earnings management due to fact that they are strongly controlled by creditors and therefore have less opportunities for earnings management.

Company size presents one of the factors influencing earnings management practices. Research in this area is still mixed due to fact that some authors confirmed that large companies are more engaged in earnings management than smaller ones while others obtained opposite results. For example, Paiva et al. (2019) state how larger firms are expected to engage less in earning management practices due to fact that they are under greater regulation and have better internal control systems which intimidate fraudulent behavior. Similar results were obtained by Lisboa and Kacharava (2018) for UK sample where larger firms are less engaged in earnings management and provide higher qual-

ity of information because they want to keep their reputation. Opposite results were obtained at a sample of large companies from Portugal. Namely, results showed that large companies are more involved in earnings management which can be explained by greater agency problems (Jensen & Meckling, 1976) or by pressure for meeting investors' expectations. Similar results were presented by Turegun (2018) who showed that large companies listed at Borsa Istanbul in Turkey are more engaged in earnings management than small firms.

Among factors that may motivate companies for engaging in earnings management tax incentives can be pointed out. Healy and Whalen (1999) emphasized how tax system and tax rates present significant factor influencing company's financial result and therefore present a significant motive for engaging in earnings management practices. Different authors (Coppens and Peek, 2005., Marques et al., 2011., Wali, 2021., Bai et al., 2021.) where dealing with this issue and came to conclusion that tax payments have influence on financial statement manipulations. For example, Bai el al. (2021) performed a research on a sample of listed companies from China and according to results anticipated reductions in tax rates have influence on earnings management practices. Companies that expect future tax reduction use different forms of earnings management in order to move profits to future periods and present lower income in periods with higher tax rates. Similar results were obtained by Wali (2021) who performed extensive study on a sample of companies from Netherlands and Germany in period from 2000 to 2018 and results showed how "corporate income taxes are a significant incentive" for earnings management (Wali, 2021). Research on a sample of Portuguese private firms was performed by Marques et al. and results also confirm that tax payments present significant incentive for earnings manipulations. Tax incentives for earnings management are pointed out also by Coppens and Peek (2005) who state how private firms that operate in countries with high tax burden engage in earnings management with purpose of tax reducing.

Based on all above mentioned second hypothesis was developed:

H2: Company characteristics such as size, leverage and tax rate have significant impact on financial statements frauds on a sample of Croatian companies.

3. RESEARCH DESIGN

3.1. Sample description

Our research sample incorporates data from large Croatian firms, which were available in the Orbis database in June 2024. Based on the described selection criteria, the initial research sample includes data for 2,316 large firms for each year in the period 2017-2023. Due to the separate analysis of pre-COVID-19, COVID-19 and post-COVID-19 periods, we decided to divide data into three separate subsamples:

- 2017-2019 (pre-COVID-19 sample)
- 2020 (COVID-19 sample)
- 2021-2023 (post-COVID-19 sample).

In this paper, the authors considered only 2020 as a crisis year due to the fact that in this year the impact of the COVID-19 crisis on the Croatian economy was enormous. More precisely, data on Croatian economy reveal that GDP plummeted by 8.3 percent due to the coronavirus crisis (Trading Economics, 2025). During 2021, Croatia decided to apply less restrictive Covid-19 measures (compared to other EU countries), which resulted in strong growth in tourism, as well as other sectors. Consequently, a strong recovery in economic activity was recorded and GDP growth in 2021 reached 12.6 percent, which was significantly higher than the EU average growth (6.3%). Data on Croatian economy recovery in subsequent years (GDP growth of 7.3% in 2022 and 3.3% in 2023) resulted in the opinion that the entire period 2021-2023 is characterized as a post-crisis period for the purpose of this research.

This study focuses on the analysis of financial statements fraud, which is measured with the F-SCORE proxy variable (Dechow et al. 2011). Since some of the companies did not have all the variables required for F-SCORE calculation or variables required for the calculation of regression model independent variables (Table 2) it was necessary to eliminate all observations with missing data. After the elimination of observations with missing data, our research subsamples by period of analysis incorporate the following number of observations:

- 2017-2019 (4,607 observations)
- 2020 (1,772 observations)
- 2021-2023 (5,923 observations).

3.2. Research variables description

According to the seminal paper of Dechow et al. (2011) F-SCORE represents a proxy variable for financial statements fraud detection. That paper provides three alternative models but we focus on model No. 1, which requires a three-step procedure. Firstly, it is necessary to apply the following formula with each company's characteristic (seven F-SCORE elements from Table 1 to calculate predicted value:

$$\text{Predicted value} = -7.893 + 0.790\times\text{RSST} + 2.518\times\Delta\text{REC} + 1.191\times\Delta\text{INV} + 1.979\times\text{SOFTASSETS} + 0.171\times\Delta\text{CASHSALES} - 0.932\times\Delta\text{ROA} + 1.029\times\text{ISSUE} \quad (1)$$

Model No. 1 is dominantly based on variables from financial statements, while only one element (ISSUE) requires additional information about the issuance of company securities.

Table 1: Description of F-SCORE proxy for financial statement frauds

F-SCORE element	Measurement
RSST accruals	(ΔWC* + ΔNCO** + ΔFIN***)/ Average Total Assets$_t$
ΔREC accruals	Δ Accounts Receivables/ Average Total Assets$_t$
ΔINV	Δ Inventory / Average Total Assets$_t$
SOFT ASSETS	(Total assets$_t$ - PPE$_t$ - Cash and Cash Equivalents$_t$) / Total Assets$_t$
ΔCASH SALES	Sales$_t$ - Δ Accounts Receivable
ΔROA	(Earnings$_t$/Average Total Assets$_t$) – (Earnings$_{t-1}$/Average Total Assets$_{t-1}$)

ISSUE	1 or 0 (1 if the company issues securities during year t; 0 otherwise)

*Working Capital = (Current Assets-Cash and Short-term Investments) – (Current Liabilities - Debt in Current Liabilities)

**Non-current Operating Assets = (Total Assets - Current Assets - Investment and Advances) – (Total Liabilities-Current liabilities - Long Term Debt)

***Net Financial Assets = (Short term investments + Long term investment) – (Long term Debt + Debt in current Liabilities + Preferred Stock)

Source: Dechow et al. (2011)

In the second step of F-SCORE calculation, the predicted value from formula 1 is transformed into probability according to formula 2:

$$\text{Probability} = \frac{e^{\text{Pred. value}}}{(1 + e^{\text{Pred. value}})} \qquad (2)$$

Finally, in the third step probability from the formula 2 is divided by the unconditional expectation of misstatement to calculate F-SCORE (0.0037). The unconditional expectation represents the ratio between the number of misstatement companies and the total number of companies.

In accordance with the existing theory and earlier studies, the second part of this research aims to explore the determinants of the manipulation of financial statements. Therefore, the following company characteristics from Table 2 are used as potential independent variables of the regression model:

Table 2: Description of independent regression model variables

Variable	Acronym	Measurement
Effective income tax rate	EITR	Income tax expense$_t$ / Earnings before tax$_t$
Company indebtedness	LEV	Total Debt$_t$/Total Assets$_t$
Company size	SIZE	Ln (Total Assets$_t$)

All required statistical analyzes for analysis of F-score trends and influential factors were performed with statistical software IBM® SPSS® 23.

4. RESEARCH RESULTS

4.1. F-SCORE trend analysis

As mentioned earlier, one of the main goals of this research is to determine the level of manipulation in the financial statements of large Croatian companies. Manipulations in financial reports are measured using the F-SCORE, and Figure 1 shows the movement of the average F-SCORE level in the period 2017-2023. Figure 1 indicate that in period 2017-2020 average value of F-SCORE had negative trend, decreasing from value of 3.03 (high risk of manipulations in 2017) to value of 0.56 (normal risk of manipulations in 2020). Conducted t-test for mean comparison (Table 3) reveals that decrease of F-SCORE mean in period 2018-2017 cannot be characterized as statistically significant (p=27%; t=1.096), while decreases in periods 2019-2018 and 2020-2019 are statistically significant at 1% level.

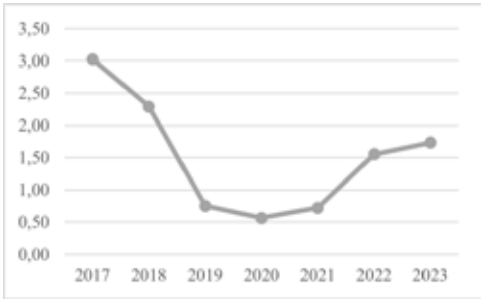

Figure 1. F-SCORE average value in period 2017-2023
Source: author's calculations

It is interesting to observe that F-SCORE did not have an increase during the COVID-19 crisis year – 2020, just in contrast the level of financial statement manipulation has decreased to the lowest value of 0.56 in the whole period of analysis. Such findings on the negative effect of the COVID-19 crisis on accounting numbers manipulations are in line with the findings of Cimini (2015) and Lisboa & Kacharava (2018). Filip & Raffounier (2014) explain such company behavior by increasing stakeholder monitoring during the crisis. Such behavior was probably especially emphasized in Croatian companies facing a significant decrease in revenues and cash flows who met the criteria for receiving COVID-19 subsidies. Receiving government subsidies probably increased the risk of supervision of accounting records from government authorities and reduced incentives for financial statement manipulations.

Table 3. T-test for F-SCORE mean comparison

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.
F-SCORE mean diff. 2018-2017	Equal variances assumed	3.027	0.082	1.096	3,830	0.273	0.738
	Equal variances not assumed			1.094	3,675	0.274	0.738
F-SCORE mean diff. 2019-2018	Equal variances assumed	43.213	0.000	3.611	3,907	0.000*	1.538
	Equal variances not assumed			3.573	1,984	0.000*	1.538
F-SCORE mean diff. 2020-2019	Equal variances assumed	19.717	0.000	3.414	3,950	0.001	0.190
	Equal variances not assumed			3.414	2,930	0.001	0.190
F-SCORE mean diff. 2021-2020	Equal variances assumed	10.815	0.001	-3.545	3,950	0.000*	-0.158
	Equal variances not assumed			-3.545	3,496	0.000*	-0.158
F-SCORE mean diff. 2022-2021	Equal variances assumed	20.930	0.000	-2.684	3,942	0.007	-0.831
	Equal variances not assumed			-2.679	2,022	0.007	-0.831
F-SCORE mean diff. 2023-2022	Equal variances assumed	0.039	0.844	-0.408	3,906	0.683	-0.181
	Equal variances not assumed			-0.408	3,898	0.684	-0.181

*p<0.0001
Source: author's calculations

The first year after the COVID-19 crisis resulted in a statistically significant increase of F-SCORE (p<1%), while the average value was still below the threshold of 1.0, indicating an average normal risk of manipulations in 2021. The subsequent rise of F-SCORE was substantial and statistically significant (p<1%), while the mean value for 2022 was 1.55. Such a value of F-SCORE is interpreted as a risk of financial statement manipulation above the normal level. In the last year of analysis - 2023, F-SCORE reached an average value of 1.73, but this increase was not statistically significant (p<68%).

Since our research sample consists of predominantly private firms tax incentives for accounting manipulations represent an important factor. Post COVID-19 period is characterized by the increase in demand for different goods and services and increased prices. Inflation of consumer prices in the period January 2020 to December 2023 amounted to 24.1% according to official data of DZS[3].

[3] https://web.dzs.hr/calcinfl.htm

Many companies exploited consumer optimism, increased their selling prices and consequently reported increased profitability. Thus, for example, in our sample average value of ROA in 2020 was 5.07%, while in subsequent years return on assets was in constant increase (Figure 2) reaching 7.67% in 2023.

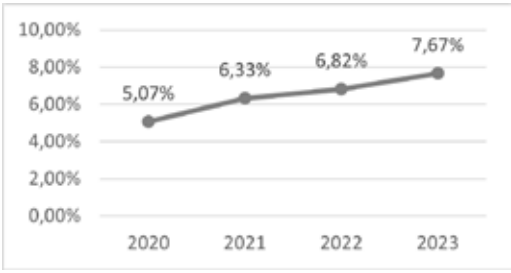

Figure 2. ROA average value in period 2020-2023
Source: author's calculations

In addition, it is important to mention that the Croatian government introduced an "Additional corporate income tax" with a rate of 33% for large companies (revenue of more than 39.8 mil. EUR) for 2022 profits. Additional corporate income Tax liability existed if 2022 taxable profits were 20% or more than average taxable profits in the period 2018-2021. Such legislation in tax-oriented business environment created a strong impetus for the accounting shenanigans and observed strong increase of F-SCORE in 2022.

4.2. Regression analysis

After the trend of the manipulation of financial statements over time has been determined, the second part of this research aims to discover the factors that influence the level of F-SCORE. Descriptive statistics for the dependent variable (F-SCORE) and independent variables (EITR, SIZE and LEV), after removing the outliers (cases with 2 standard deviations above or below the mean of any variable value) are shown in Table 4. Descriptive statistics are presented separately for the pre-COVID-19, COVID-19 and post-COVID-19 periods of analysis.

Table 4. Descriptive statistics for dependent and independent variables

Model 2017-2019 (N=4,607)				
	Min.	Max.	Mean	Std. Dev.
F-SCORE	0.000	1.757	0.501	0.345
EITR	-15.754	47.807	15.154	9.913
LEV	4.338	121.538	56.660	25.358
SIZE	6.979	11.577	9.271	1.045
Model 2020 (N=1,772)				
	Min.	Max.	Mean	Std. Dev.
F-SCORE	0.016	5.465	0.507	0.546
EITR	-64.013	94.613	12.455	12.278
LEV	0.009	140.567	56.069	26.404
SIZE	6.613	12.229	9.414	1.162
Model 2021-2023 (N=5,923)				
	Min.	Max.	Mean	Std. Dev.
F-SCORE	0.000	8.462	0.742	0.901
EITR	-105.976	140.777	14.892	14.271
LEV	0.000	158.979	56.293	26.966
SIZE	1.413	16.180	9.715	1.285

Source: author's calculations

The dependent variable (F-SCORE) represents a proxy variable for financial statement fraud and it was calculated following Dechow et al. (2011) model No. 1. The F-SCORE variable has a minimum around zero for all three periods, while the maximal value was 8.46 in post-COVID-19 period. EITR as expected had the smallest average value

(12.5%) in COVID-19 period due to low profits in 2020, while averages were higher in pre-COVID-19 (15.2%) and post-COVID-19 period (14.9%). The average value of leverage was moderate amounting to 56.7% during the pre-COVID-19 period, with a small decline to 56.1% in COVID-19 year - 2020 followed by a small increase to 56.3% in the post-COVID-19 period. The SIZE is calculated as the natural logarithm of total assets with means in the range from 9.3 (pre-COVID-19 period) to 9.4 (COVID-19 period) and 9.7 (post-COVID-19 period).

Obtained F-ratio values from Table 5 confirm that all estimated models have a good data fitting since all F-ratios are significant at the 0.001 level. The explanatory power of estimated regressions measured by adjusted R^2 ranges from 2.8% (post-COVID-19 period model) to 5.0% (pre-COVID-19 period model) and 5.7% (COVID-19 period model). Calculated Variance Inflation Factors (VIF) for independent variables are below 5.0 for all regression models indicating that there is no problem of multicollinearity. Moreover, an insight into the correlation matrix of independent variables for all regressions did not reveal any value above 0.8 or below -0.8. D-W test (Durbin-Watson) values are around 2.0 indicating there is no autocorrelation of residuals in all estimated regressions.

Table 5. Pre-COVID-19, COVID-19 and post-COVID-19 regression models

	Model 2017-2019	Model 2020	Model 2021-2023
Constant	0.927*	1.057*	1.226*
	(0.050)	(0.111)	(0.096)
EITR	0.003*	0.004*	0.003*
	(0.001)	(0.001)	(0.001)
LEV	0.001*	0.003*	0.004*
	(<0.0001)	(<0.0001)	(<0.0001)
SIZE	-0.057*	-0.080*	-0.076*
	(0.005)	(0.011)	(0.009)
Model significance:			
F ratio	81.152	36.445	56.848
Sig.	< 0.001	< 0.001	< 0.001
Adjusted R^2	0.050	0.057	0.028
Durbin-Watson (D-W)	1.9268	1.9761	1.9649
N	4,607	1,772	5,923

Notes: *p < 0.01. Standard errors are presented in parentheses.
Source: author's calculations

Having in mind that our sample incorporates mainly unlisted, private companies we expected that income tax incentives would be an important factor for financial statement manipulations. Postponing of income tax payments increases short term cash availability and liquidity, while permanent income tax avoidance increases company profitability and equity value. Therefore, we expected that companies with higher income tax burdens (higher EITR) would have higher levels of financial statement manipulations measured by F-SCORE. Estimated coefficients with EITR variable were statically significant and positive in all regressions confirming tax aggressive behavior of large Croatian firms. The influence of income tax payments on financial statement

manipulations is consistent with findings from papers of Healy and Whalen (1999), Coppens & Peek (2005), Marques et al. (2011), Wali (2021), Bai et al. (2021), etc.

Obtained regression coefficients with leverage variable (LEV) strongly confirm positive accounting theory regarding the influence of company indebtedness on financial statement manipulations. Namely, signs for the leverage variable in all regression were positive indicating that companies that are more indebted have higher F-SCORE. Such empirical finding is in line with numerous earlier studies, which revealed the positive influence of company indebtedness on financial statement manipulations (Franz et al., 2014; Lazzem, & Jilani, 2017). More leveraged companies have stronger incentives to report better accounting numbers in order to secure preserve current crediting terms or to ensure future credit financing. Controlling for the company size resulted with statistically significant, but negative sign with SIZE variable. This finding indicates that company size negatively influences level of financial statements manipulations measured. That finding is not in line with findings of Turegun (2018) and Githaiga et al. (2022), but it is comparable with findings of Lisboa & Kacharava (2018) and Paiva et al. (2019). According to Paiva et al. (2019) larger companies attract more stakeholders interest and consequently it is more difficult and costlier to hide financial statement manipulations in larger than in smaller firms.

5. CONCLUSION

Frauds in financial statements are not a new phenomenon, they exist for many years and academia and the accounting/auditing profession try to develop models for detecting and preventing such frauds. Through this research, the F-Score was used as a proxy variable for fraud in financial statements for a sample of large Croatian companies and a U-shape curve was discovered for this fraud indicator over the period 2017-2023. Namely, the highest F-score value was in 2017 (3.03), while the lowest value of F-score was in the year of COVID-19 2020 (0.56). The post-COVID period increased F-Score to the value of 1.55 (2022) and 1.73 (2023), the reasons for which can be found in the increase in profits and the avoidance of paying income tax. This was also confirmed through regression analysis, as it was revealed that the EITR (Effective Income Tax Rate) is statistically significant and has a positive effect on the F-Score in all three periods of analysis. According to positive accounting theory, it is revealed that a higher degree of indebtedness also positively affects the level of manipulation of financial statements. Contrary to that, the company size variable has a negative sign and reduces the level of F-Score.

The results of this research have several practical implications for stakeholders such as investors, bankers, tax authorities, etc. Namely, when making various business decisions (equity investment, loan approval, tax audit, etc.), users of financial statements should also assess the degree of risk of fraud in financial reports, for

which F-Score can be useful. At the same time, they must keep in mind that in Croatian business environment the F-Score is positively affected by a higher income tax burden and level of indebtedness.

This research has its limitations, and it can be emphasized that it was carried out on a sample of large companies, and in conclusion cannot be directly applied to the SME sector. Furthermore, only the F-Score was used as an indicator of fraud in financial statements, while future research could test Beneish's M-Score and similar proxy variables for financial statements fraud.

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