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EDITORIAL

After conducting the double-blind peer-review procedure and the improvement of the submitted manuscripts, the Issue 1 Volume 23 Year 2021 of the *Economic Horizons* scientific journal contains seven contributions apart from the Editorial, namely the four original scientific papers and two review papers and the review of the scientific conference.

Respecting the significance of innovations for economic successfulness, the coauthors *Sladjana Savovic, Dejana Zlatanovic* and *Jelena Nikolic* do research in the key aspects of the improvement of an enterprise's innovative potential. Pursuant to that, different possibilities of improving the innovative potential of enterprises are analyzed through technological acquisitions. Based on the conducted empirical research studies, the coauthors found that the acquisition of technologies and types of knowledge from external sources and the adjustment of external types of knowledge to the internally developed knowledge base led to the improvement of an enterprise's innovative potential, which confirmed the research hypothesis. Due to their significance, technological acquisitions are perceived as one of strategic options for the implementation of open innovations, which represent a contemporary paradigm in innovation management.

Analyzing the conditions of doing business of small and medium-sized enterprises, *Henry Osahon Osazevbaru* does research in the joint influence of the volatility of interest rates and the exchange rate on the performance of the Nigerian nonformal sector in the period from 1981 to 2018. The result of the empirical research confirmed the existence of a long-term relationship between the volatility of interest rates and the exchange rate, on the one hand, and the performance of small and medium-sized enterprises, on the other, which suggests that all the relevant variables move in the same direction in the long run, i.e. that the volatility of interest rates and the exchange rate positively influence the performance of small and medium-sized enterprises. The author suggests that the economic policy makers should adhere to the interest rate and exchange rate regimes that will encourage greater investments in small and medium-sized enterprises, which would positively reflect on their performance.

Based on the movement of the gross domestic product, the real effective foreign-exchange rate and the money stock, *Radovan Kovacevic*, applies the econometric model to analyze the adequacy of the level of the foreign-exchange reserves of the Republic of Serbia (RS). The research results show that the gross domestic product, the real effective foreign-exchange rate and the monetary aggregate M_2/BDP are the important determinants of the RS foreign-exchange reserve level, simultaneously emphasizing the role of the GDP growth. The author also indicates that, while determining the specific indicator of the adequate level of foreign-exchange reserves, the dividends realized by foreign investors and certain portfolio investment segments should also be taken into consideration. The research study concludes that the current level of the Republic of Serbia's foreign exchange is greater than their optimal amount which is recommended by the standard criteria for optimality.

Pursuant to the significance of information about an enterprise's business decision-making segment, the coauthors *Vladimir Obradovic, Marko Milasinovic*

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and *Jasmina Bogicevic* point out the necessity for disclosing those pieces of information in compliance with regulations. The paper examines the adequacy of information about the segments of the listed enterprises in the Republic of Serbia and in the Republic of Croatia with the aim of determining the connection between the volume of disclosed financial information about the segments and the size of the enterprise and the character of the audit house. The research study showed that disclosing information about the segments was not generally in compliance with the International Financial Reporting Standard Number 8 and also that joint-stock companies with a greater value of their total assets disclosed financial information about the segments in more detail. The amount of the disclosed information about the segments does not depend on whether the audit of financial reports is performed by major or other audit houses, either.

Starting from the attitude that the Law on Fiscal Responsibility is important for the better fiscal management of and ensuring fiscal discipline, the coauthors *Santosh Borkakati* and *Konthoujam Gyanendra* indicate the fact that a law like this is particularly significant for federal states, where local governments are frequently included in the activities resulting in fiscal indiscipline. Pursuant to the mentioned need and starting from the weaknesses in the fiscal responsibility domain, India adopted the Law on Fiscal Responsibility and Budget Management in 2003, after which (in 2005) a law like this was also enacted in the Federal State of Assam in order to achieve better fiscal management. Analyzing the dynamism of the fiscal variables prior to and after the enactment of the Law, the authors establish a fact that an improvement was made in the State of Assam in the fiscal responsibility domain after the introduction of the Law although there are sporadic fiscal shocks.

Analyzing how the economy works in the conditions of the pandemic caused by the Covid-19 virus, the coauthors *Hasnan Baber* and *D. Tripati Rao* do research in the influence of the lockdown and social distancing policies on economic activities in India. The research study conducted based on the data for the period from 1st January to 31st August 2020 shows that the decision on locking down India had as a consequence a gradual complete cessation in economic, social and religious activities. The obtained results reveal a significant negative influence of the social distancing policies on the economic activity and doing business, the stock market and the currency exchange rate. Simultaneously, the Indian Government's economic stimulus was unable to exert a positive influence on the stock market.

This Issue of the Journal contains *Dejana Zlatanovic* review of the International Scientific Conference entitled Contemporary Issues in Economics, Business and Management - EBM 2020 organized by the Faculty of Economics of the University of Kragujevac held online on 14th December 2020.

On behalf of the Editorial Board of the Journal and on my own behalf, I would first of all like to thank the authors of the contributions published in this Issue of the Journal. At the same time, my special gratitude goes to the reviewers, whose constructive and critical comments and suggestions intended for the authors of the submitted contributions have contributed to raising the quality of the published papers to a higher level.

Editor-in-Chief
Vlastimir Lekovic

Vlastimir Lekovic is a full professor of the Faculty of Economics of the University of Kragujevac, in retirement. He earned his Ph.D. at the Faculty of Economics of the University of Kragujevac in the scientific field of general economics and economic development. He teaches the teaching disciplines of Institutional Economics in the master's studies, and Scientific Research Methodology and Market Regulation Policy in the doctoral studies. The key areas of his scientific research interest are the economic system, the economic policy, and institutional economics.

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TECHNOLOGY ACQUISITIONS AS A SUPPORTING TOOL FOR IMPROVING COMPANIES' INNOVATIVE POTENTIAL

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In line with the open innovation paradigm, technology acquisitions which seek to gain access to new technologies and knowledge are becoming an important strategic tool for enhancing the innovative potential of companies. This research study is aimed at showing how technology acquisitions can help companies be more successful in making an innovation a reality. In that sense, various possibilities of improving companies' innovative potential after the implementation of technology acquisitions are analyzed in the paper. The challenges that companies are faced with in a period after technology acquisitions are explained and possible ways to overcome those challenges are indicated as well. The results of the conducted empirical research in the impact of technology acquisitions on a company's innovation are presented. The paper confirms the fact that the process of acquiring technology and knowledge from external sources and the harmonization of external knowledge with the internally developed knowledge base improve a company's innovative potential. Additionally, the research results show that acquisitions increase the likelihood of innovation in integration companies. Innovations are also made a reality much faster than they would be without the cooperation of companies.

Keywords: technology acquisitions, open innovation, knowledge transfer, performance, innovativeness

JEL Classification: G34, O36, L25

INTRODUCTION

The knowledge era has brought significant changes on global and local markets. The generation and application of new ideas, technologies and knowledge are the fundamental preconditions for the development of sustainable competitive advantage (Duksaite & Tamošiuniene, 2009). The ability to create new knowledge, take over and improve the existing third-party knowledge and implement knowledge in new innovative solutions is crucial for achieving long-term profitability. In order to create successful innovation-based strategies, companies need the resources and capabilities difficult to internally develop. Consequently, as a modern approach to innovation management, the open innovation model emphasizes

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the importance of internal and external knowledge for accelerating innovation, as well as the expansion of the market for the external use of innovation. Businesses need to use external and internal ideas, as well as external and internal opportunities, to market innovations (Chesbrough, 2006). Among various strategic opportunities for innovation development both inside and outside the company, acquisitions may be one of the most effective responses to the need for the rapid integration of innovative elements into a business model (Dezi, Battisti, Ferraris & Papa, 2018). Technology acquisitions are aimed at taking over the target company's knowledge base, technology and specific capabilities. Companies may strive for technology acquisitions to bridge the gap between the current situation and what they would like to achieve in terms of innovation and performance (Cefis & Marsili, 2015).

Taking into account the increasing importance of innovation for improving companies' competitive advantage (Porter, 1996) and the fact that innovation is one of the key drivers of sustainable development, understanding the effects of technology acquisitions on the improvement of companies' innovative potential is an important and current research area.

As an instrument to support the improvement of the companies' innovative potential, technology acquisition is the subject matter of the research study presented in this paper. Technology acquisitions are considered in this paper as one of the strategic options for the implementation of open innovations as a modern paradigm in innovation management.

The research objective is to show how technology acquisitions can help companies be more successful in making innovations a reality.

In line with the defined research subject and research objective, the main scientific hypothesis in the paper is that technology acquisitions improve companies' innovativeness.

In the paper, the qualitative methodology based on the study and descriptive analysis of a research problem is applied. The relevant literature is analyzed in order to theoretically understand the research subject. Theory is combined with the results of the empirical research in the impact of acquisitions on innovation. In this regard, a comparative method is used, i.e. a review of empirical research studies of the impact of acquisitions on innovation helps identify certain similarities and differences in the obtained results. In order to identify the connection between acquisitions and innovation, systemic thinking is used and appropriate conclusions are drawn by applying the synthesis method.

The paper is structured into four interrelated parts. First, the open innovation paradigm is presented and technology acquisitions are identified as one of the strategic options for making open innovations, especially inbound open innovations, a reality. Then, appropriate ways how technology acquisitions may help improve companies' innovative potential are discussed, as well as the challenges companies are faced with during knowledge transfer and the implementation of innovations. Finally, there is an overview of empirical research in the impact of technology acquisitions on innovation, certain theoretical and practical implications being included.

OPEN INNOVATION AND TECHNOLOGY ACQUISITIONS

Today's products rely on different technologies and the largest number of companies are unable to achieve a high sophistication level in a great number of different technologies. Hence, the exploitation of external ideas and technologies is becoming imperative. The open innovation model signifies the phenomenon by means of which companies make better use of external ideas and technologies in their business, simultaneously having the opportunity to give their own unused ideas and technologies to others to use. The paradigm shift from closed to open innovation is conditioned by a number of the factors characteristic of the knowledge-based economy (Erić-Nielsen, Stojanović-Aleksić & Zlatanović, 2019; Simić & Slavković, 2019), such as increasing labor mobility, growing the ability and competence of universities across the world and facilitated access to capital

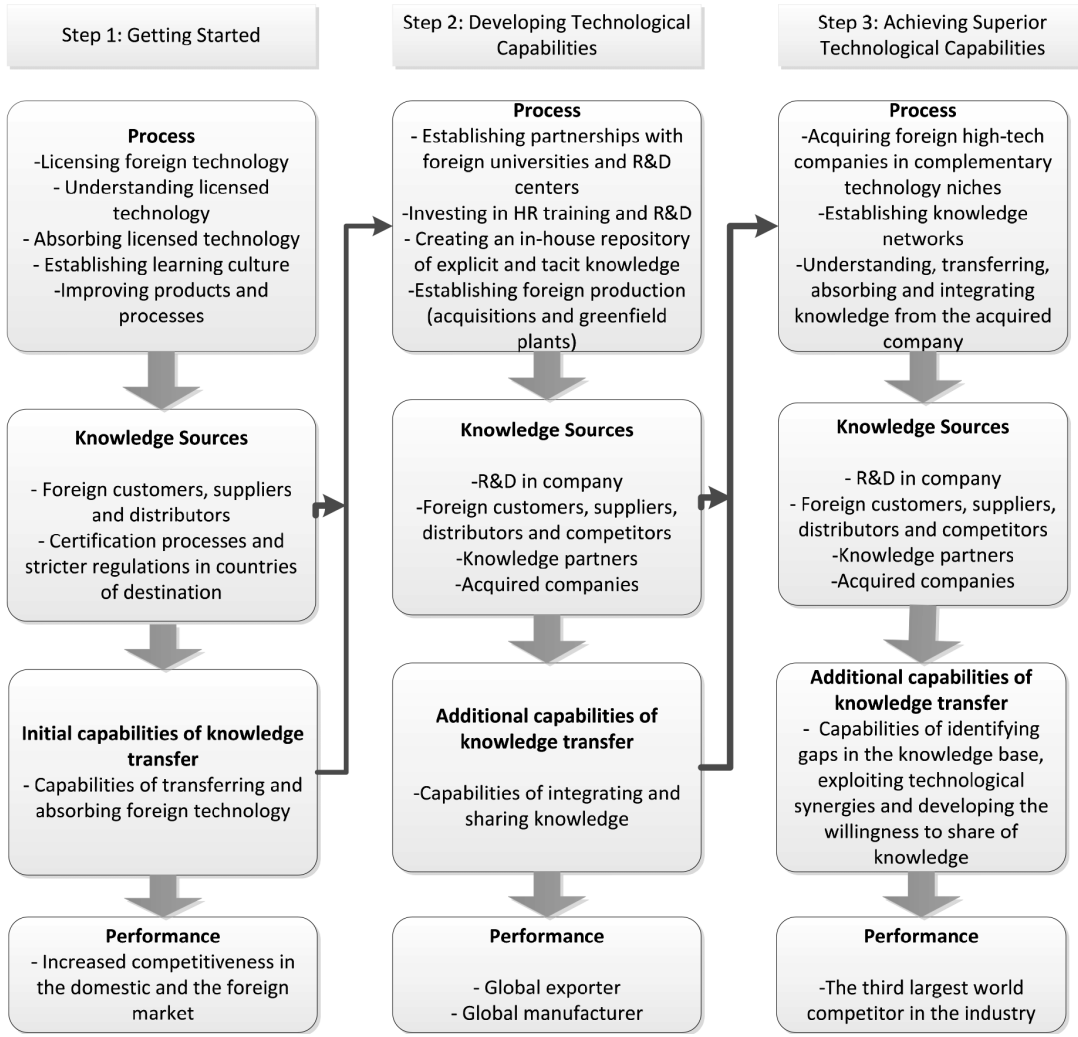

Figure 1 The phased improvement and development of the technological capabilities of a multinational company

Source: Authors, adapted according to Kogut *et al*, 2019

as well. At the same time, open innovation finds adequate support in the development of information and communication technologies, which has changed the way of connecting and communicating with individuals, groups and organizations. Even more so, changes in production, technologies, fast prototyping and flexible production at a low cost have led to a big change in the way of innovation understanding and creation. That is why it is necessary for innovation models to take into account new technologies that enable fast and extensive cooperation during the entire innovation process from the conceptualization phase to commercialization (Zlatanović, 2020). Of particular importance are the changes related to new technologies in the following three areas: the technologies that encourage creativity, the technologies that facilitate communication and the technologies that facilitate production (Trott, 2017).

Taking into consideration these changes, as well as the development of new concepts, H. Chesbrough and M. Bogers (2014) define open innovation as "a distributed

innovation process based on the designed process of managing knowledge flows outside the organization using financial and non-financial mechanisms, depending on the business model". These knowledge flows may include the use of the external sources of knowledge through internal processes, the use of internal knowledge through commercialization external processes or the use of both, i.e. pairing the external sources of knowledge and commercialization activities. That business model can be either explicit or implicit and describes not only the way in which value is created, but also the way in which all organizations involved treat and encompass the created value (Zlatanović, 2020).

Accordingly, the basic three types of open innovation can be distinguished (Chesbrough & Bogers, 2014):

- outside-in or inbound,
- inside-out or outbound, and
- combined open innovation.

Within the framework of inbound open innovations, various strategic options can be identified, such as obtaining licenses from other companies, university research programs, financing industry ventures, cooperation with intermediaries, suppliers and customers, the use of certain agreements, crowdsourcing, and the implementation of technology acquisitions. S. Mawson and R. Brown (2016) view technology acquisitions as the key strategic aspect of inbound open innovation. Technology acquisitions are a specific type of acquisitions focused on the acquisition of the target company's knowledge, technical expertise, employee skills and specific new technologies (Savović, 2018).

Before improving the knowledge base and technological capabilities through acquisitions, a company may initially absorb certain knowledge through licensing arrangements or through strategic alliances or partnerships. Figure 1 shows the phased improvement and development of the technological capabilities of a multinational company. In the first phase (the creation and improvement of technological capabilities), the company first licenses foreign technology and, thanks to the expansion of the knowledge base, improves its competitive advantage on the domestic market and the international market. In the second phase (the development of technological capabilities), it establishes partnerships with foreign universities and research and development (R&D) centers and acquires a foreign market in order to start production. In the final phase (the achievement of superior technological capabilities), it takes over a foreign high-tech company in an effort to become one of the three leading companies in the sector which it operates in (Kogut, de Mello & Rocha, 2019).

As acquisitions enable access to new products or resources, they have recently become the strategic means of accelerating innovation (Dezi *et al*, 2018). More precisely, acquiring technological know-how and employee skills is one of the key motives for acquisitions (Savović & Domanović, 2011). Therefore, acquisitions are tools for "expanding the knowledge base of the acquiring company and creating a new and innovative combination of the knowledge of integrated companies" (Vermeulen & Barkema, 2001; Björkman, Stahl & Vaara 2007).

OPPORTUNITIES FOR IMPROVING COMPANIES' INNOVATIVE POTENTIAL AFTER TECHNOLOGY ACQUISITIONS

Companies must continually build their core competences by adapting themselves to a changing environment. Hence, there is significant intensification of takeover activities in these industries in order to facilitate access to other companies' research and innovation capacities, which further results in the improvement of companies' knowledge base and innovative potential (Ferraris, Santoro & Dezi, 2017).

A review of the relevant literature reveals several alternative ways in which technology acquisitions may affect a company's innovative potential. Proceeding from the resource-based approach, technology acquisitions "can enhance innovative performance by increasing the knowledge base, technological know-how and technical capabilities of the acquiring company" (Ahuja & Katila, 2001). According to E. Cefis and O. Marsili (2015), "acquisitions can

encourage new organizational models and facilitate access to the research and innovation capacities of other companies, improving the knowledge base of the acquiring company and enabling it to access new technologies". Acquiring companies gain access to new, valuable knowledge, which may generate a new innovation when combined with their own knowledge.

Due to the asymmetry of knowledge that is often present, i.e. due to the fact that the acquiring company and the acquired company may have different knowledge bases, the "competence creation" process and the "competence exploitation" process are introduced. On the one hand, the acquiring company expects that it will contribute to the creation of the acquired company's competences by introducing new knowledge, simultaneously expecting that it will use the acquired company's competences by using its knowledge, on the other (Yang, Lin & Peng, 2007). The extensive flows of knowledge between employees in the acquiring company and in the acquired company allow employees to deepen their knowledge and way of thinking and improve their innovative ideas, which may then encourage radical innovation. Moreover, the knowledge acquired through acquisitions directly and positively affects the technological knowledge base necessary for the development of new products, thus raising the ability and willingness to experiment, be creative and develop new ideas and innovations (Xie, Wang & Zeng, 2018).

The effects of acquisitions on innovation depend on the degree of the relatedness of companies' technological knowledge bases. From the organizational learning perspective, the relatedness of the technological knowledge base may positively affect innovative performance. The positive effect is derived from the ability to better evaluate and use the related external knowledge compared to the unrelated, which is based on the idea that a company's absorption capacity mainly depends on the degree of the relatedness of knowledge in a specific area. M. Cloodt, J. Hagedoorn and H. Van Kranenburg (2006) emphasize the fact that, "if the knowledge base of the acquiring company is not sufficiently adapted to the knowledge that is taken over, the absorption process becomes more difficult". Hence, unrelated technological changes often require radical changes in organizational research, which may easily become counterproductive. However, these authors point out the fact that "technological knowledge which is too similar to the existing knowledge of the acquiring company will have little effect on post-acquisition innovative performance. A certain degree of differentiation in technological capabilities between companies can enrich the knowledge base of the acquiring company and create learning opportunities". If companies have complementary technology after the acquisition, they become more efficient in research and development. Specifically, after the takeover, companies try to reallocate resources to ensure existence in a number of technological fields and increase diversification based on the skills of the acquired companies (Fernandez, Triguero & Alfaro-Cortes, 2019). If merging companies have a complementary knowledge base, the positive effects of the acquisitions on innovation might occur due to the implementation of economies of scope (Fernandez *et al*, 2019). Economies of scope exist if the total cost of the production and sale of several products of a multiproduction company is lesser than the sum of the costs of the production and sale of the same products of the individual companies specializing in the production of each of those products (Sudarsanam, 2003). They arise because different knowledge bases complement each other, become richer and create a bigger potential for learning and creating new knowledge.

In addition, acquisitions may increase the overall R&D budget of the companies involved. Integrated companies may achieve economies of scale (due to the allocation of high fixed research and development costs) and engage themselves in big research and development projects, which otherwise they would be unable to do on their own. In this way, more attention is paid to the fundamental research leading to the development of more advanced technologies. Also, a larger budget allows an integrated company to enter a larger number of research projects, which affects the diversification of innovation risks. Finally, firms are rarely efficient in all the aspects of innovation management. Businesses are likely to use

a variety of innovation management techniques. The exchange of the best practices within an integrated entity will increase R&D productivity, i.e. several new technologies will be developed with the same budget (Man & Duysters, 2005).

CHALLENGES IN THE IMPLEMENTATION OF TECHNOLOGY ACQUISITIONS AND WAYS TO OVERCOME THEM

In certain areas, such as artificial intelligence, machine learning, data science, etc., experts are scarce and demand for them by far exceeds their availability. Hence, the takeover of technology and talent is one of the key motives for acquiring companies to consider start-ups and other less innovative companies. However, takeovers focused on human resources are among the riskiest and the most challenging. Any business in which human resources are significant assets is at risk that they may leave, thereby affecting the competitive position of a given company. Hence, the key challenge is to retain the talented employees who may have a negative attitude towards the new company. These are the individuals who have "passionately created technology that could change the world" (Krlkhaar, Loucks & Sguazzin, 2018) inspired by the leaders who have conveyed a vision with a strong emotional charge. After the acquisition, the leadership team of the acquired start-up may no longer be part of the new organization or may be assigned marginal roles. In such circumstances, employees lose motivation, are less committed to the work they do and think about leaving the organization, which has a negative impact on performance. E. Aminova (2016) points out the fact that, due to a lack of integrative decision-making, the conflict of cultures, as well as the management style, employees are demotivated, which negatively affects the degree and quality of product innovation. J. Krlkhaar *et al* (2018) refer to the results of the conducted research study, stating that innovators in the acquired companies generate 50% less patents compared to a comparative group of innovators in the companies not taken over.

An important prerequisite for the transfer of knowledge in such acquisitions implies that there is no loss of employees during the implementation of an acquisition. Thus, the possibility of knowledge transfer ceases if the key employees leave the organization, whereas retaining the key employees during the implementation of an acquisition makes knowledge transfer possible. In addition, technological know-how is often tacit knowledge and therefore cannot be easily transferred from one company to another. The transfer of hidden knowledge requires the voluntary cooperation of employees. The source of knowledge may be opposed to the sharing of essential knowledge for fear of losing power in the organization or due to a lack of trust in the knowledge recipient. Likewise, knowledge recipients may be unwilling to accept knowledge from a source due to a lack of interest or confidence in knowledge usefulness. As these forms of knowledge are difficult to transfer, a high degree of post-acquisition integration may be required in order to achieve the expected benefits of acquisitions (Puranam, Sing & Zollo, 2003; 2006)

The decision on the degree of the integration of the companies depends on the two key factors: differences in the business model (difference in products or markets between the acquiring company and the acquired company) and differences in the company size. As can be seen in Figure 2, the four integration approaches are distinguished (Krlkhaar *et al*, 2018). The tuck-in model is applied if there are large differences in the size of the companies, but they still have similar business models (the similarity of products and/or markets). In such transactions, the acquired company assimilates and drowns in the business of the acquiring company. This approach is characteristic of more than 90% of all acquisitions in the technology sector. Additionally, the bolt-on model is applied when there are large differences in the size of the companies and differences in business models as well. In this case, the largest part of the acquired company's business remains unintegrated. The bolt-on model can take various forms:

- "the acquired company becomes a fully non-integrated subsidiary,
- acquired company becomes the business unit

that retains most of its independence (and is responsible for its profitability),

- acquired company becomes a partially integrated division (activities such as information technology, human resources and finance are usually integrated, but R&D, sales and support activities remain separate),
- companies choose to use a hybrid approach focused on the target company's business and achieving synergies."

When companies are of a similar size and have similar business models, consolidation is applied. By consolidating the largest number of activities, the new entity strives to achieve economies of scale or preserve the key part of the value chain. Finally, transformation is applied when companies are of a similar size, but have different business models. In this approach, both companies are likely to achieve economies of scale by integrating certain operations due to their relatively large sizes. Since transformation requires significant changes, it is the most difficult to achieve. However, it may create the most value if done correctly.

It is necessary to successfully integrate two companies not only at the operational and procedural levels, but also at the level of human resources (Birkinshaw, Bresman & Hakanson, 2000; Savović, 2012), which, among other things, implies the creation of friendly knowledge-sharing atmosphere (Haspeslagh & Jemison, 1991). Here, synergy is the outcome of the integration of knowledge, not of knowledge itself (Grant, 1996). Hence, as A. Ranft and M. Lord (2002, 422) state: "It is not enough for the acquiring company to merely buy technology or capabilities and preserve them in that state; in order to create value, it is necessary to improve it and integrate by the end of the acquisition process, long after the acquisition process is complete". Synergy is created through learning effects as the acquisition provides an opportunity for both companies to the access knowledge areas located outside their organizational and cultural contexts (Zander & Zander, 2010). M. Hitt, R. Hoskisson, and D. Ireland (1991) state that large companies, such as Cisco Systems and GE, "have had significant success in implementing acquisitions and this success can be attributed in part to their ability to learn from acquired companies and to absorb and integrate new knowledge in order to build new skills".

Certain post-acquisition mechanisms may facilitate knowledge transfer between companies. These mechanisms include the informal socialization of the activities aimed at building trust and fostering close

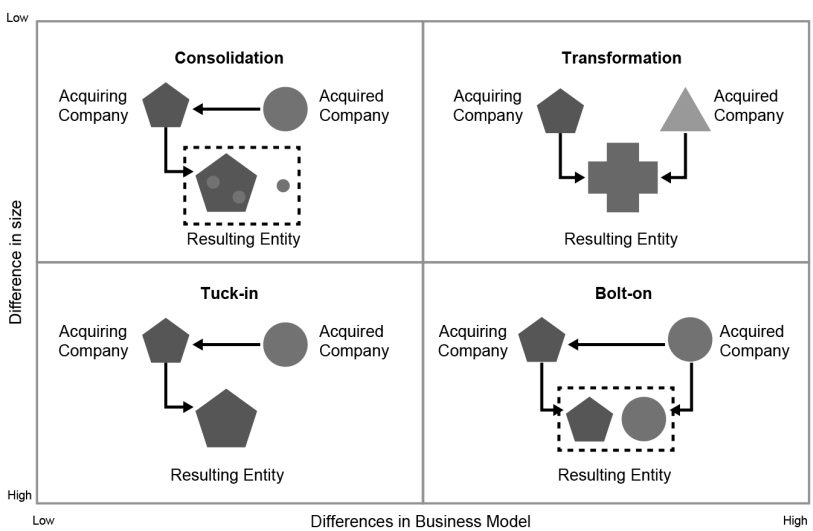

Figure 2 Integration approaches

Source: Krlkhaar *et al*, 2018

and open communication and formal mechanisms for company integration (Gupta & Govindarjan, 2000; Björkman, Barner-Rasmussen & Li, 2004). The informal socialization of activities, such as visits and trips, international commissions, teams and working groups or trainings involving participants from different units support knowledge transfer, especially when the goal is to share tacit (implicit) knowledge. Collective learning is particularly useful for the transfer of tacit and socially complex knowledge. The direct observation of everyday routines and interactions enables employees to learn and adopt tacit and socially complex aspects of the partner company's knowledge (Sarala, Junni, Cooper & Tarba, 2016).

The effects of formal integration mechanisms are sometimes mixed. On the one hand, it is important to create adequate incentives and rewards to motivate people to share knowledge (Gupta & Govindarjan, 2000; Ranft & Lord, 2002), whereas on the other, the imposition of a large number of rules and procedures for the implementation of formal company integration and the exercise of control over acquisitions may create resistance and dissatisfaction in the acquired company (Datta & Grant, 1990). T. Gerpott (1995) focuses on the successful integration of R&D activities after acquisitions so as to analyze the acquisitions of German companies. He points to the importance of "using management interventions designed to promote learning opportunities, reduce uncertainty for employees in the acquired company (e.g. meetings of small groups to exchange information), as well as reduce the degree of the centralization of strategic R&D decisions in the hands of the acquiring company."

THE INFLUENCE OF TECHNOLOGY ACQUISITIONS ON INNOVATION - AN OVERVIEW OF THE RESULTS OF THE EMPIRICAL RESEARCH

A scientific interest in studying the impact of technology acquisitions on innovations has recently been growing. However, the results of the existing research studies are all but uniform. Certain studies have found a positive effect on the innovative activities of combined companies (Ahuja & Katila, 2001; Cassiman, Colombo, Garrone & Veugelers, 2005; Cloodt *et al*, 2006; Zhao, 2009; Makri, Hitt, & Lane, 2010; Frey & Hussinger, 2011; Bena & Li, 2014; Wu *et al*, 2015; Jo, Park & Kang, 2016; Han, Jo & Kang, 2017), whereas others have found a negative impact (Hitt *et al*, 1991; Szücs, 2014). Table 1 provides an overview of the results of the empirical research studies of the impact of technology acquisitions on innovation.

The positive impact of technology acquisitions on the innovation of combined companies comes from the expanded knowledge base of the acquiring company and the more efficient reorganization of the innovative processes after the takeover as well. If a takeover includes the acquisition of high-quality knowledge from the acquired company, the positive effect on innovation performance is particularly relevant.

In order to assess the effects of technology acquisitions on innovation, G. Ahuja and R. Katila (2001) study the 72 companies in the chemical industry in Europe, America and Japan that participated in the acquisitions in the period from 1980 to 1991. They measure innovation by the number of the patents obtained in the period of one to four years after the acquisition. The authors distinguish between technology and non-technology acquisitions, and analyze the impact of the size of the knowledge base being taken over. The authors conclude that non-technology acquisitions do not have a significant impact on innovation. In technology acquisitions, they find that the absolute size of the knowledge base of the target company has a positive impact on innovation, while the relative size of the knowledge base of the target company (the relationship between the knowledge base of the target company and the acquiring company) has a negative impact on innovation. The authors conclude that, if they want to improve their innovative performance, large companies should focus on smaller target companies. Also, the authors show that the technological complementarity of the acquiring company and the target company leads to more efficient R&D activities.

Table 1 An overview of the results of the empirical research studies of the impact of technology acquisitions on innovation

Studies	Research objectives	Sample	Research results	Impact
Hitt *et al*, 1991	The impact of acquisitions on the intensity of R&D and the output of R&D (patents)	191 acquisitions during the period 1970-1986	Acquisitions had negative effects on the intensity of R&D and the output of R&D (the patents)	Negative
Ahuja & Katila, 2001	The effects of technology acquisitions on innovation	72 companies in the chemical industry (technical and non-technical acquisitions)	The positive effects of acquisitions of small technical firms on the acquiring companies' innovation	Positive
Cassiman *et al*, 2005	The effects of acquisitions on R&D activities.	31 acquisitions	The acquisitions of the companies with complementary technologies had a positive impact on R&D activities	Positive
Cloodt *et al*, 2006	The effects of acquisitions on innovation		Acquiring the knowledge that is too similar to the existing knowledge has a small effect on post-acquisition innovation performance	Positive
Zhao, 2009	The impact of technology acquisitions on acquisition decisions The impact of acquisitions on technological innovation		Acquisitions have an impact on the improvement of technological innovation	Positive
Makri *et al*, 2010	The impact of acquisitions on innovation		Acquisitions have a positive impact on innovation	Positive
Frey & Hussinger, 2011	The impact of acquisitions on the improvement of companies' technological capabilities	420 M&A during the period 1994-2000	Acquisitions improve companies' technological capabilities	Positive
Bena & Li, 2014	The impact of innovation activities on a decision on acquisition The impact of acquisitions on innovation	1762 acquisitions during the period 1984-2006	Innovation is an important driver of acquisitions Acquisitions have a positive impact on innovation	Positive
Szücs, 2014	The impact of acquisitions on intensity R&D	265 acquiring companies and 133 acquired companies during the period 1990-2009	If companies use the same technology, acquisitions have a negative impact on innovative performance	Negative
Wu *et al*, 2015	The effects of international acquisitions on innovative performance	222 Chinese MNCs	International acquisitions have a positive impact on innovative performance	Positive
Jo *et al*, 2016	The effects of technology acquisitions on innovation	212 technology acquisitions during the period 1993-2007	The acquisitions of small technical firms have a positive impact on acquiring companies' innovation	Positive
Han *et al*, 2017	The impact of acquisitions on the degree of companies' innovation	192 acquisitions by 162 high-technology firms during the period 2001-2009	Acquisitions have a positive impact on the degree of companies' innovation	Positive

Source: Authors

An analysis of the effects of technology acquisitions on the R&D process is the subject matter of a research study conducted by B. Cassiman *et al* (2005), who use information about 31 takeovers in order to focus on the role of the technological and market linkages between the acquiring company and the acquired company. They generate the data from a survey of company managers. The R&D criteria include changes in inputs (employees, laboratories, etc.), outputs (a higher speed of the development of technological knowledge, more patents, etc.), performance (higher productivity of R&D employees, increased R&D yield, etc.) under the influence of acquisitions. Their results can be summarized as follows: acquisitions in which companies have complementary technology increase the R&D activity, whereas quite an opposite conclusion applies to the acquisitions in which companies have substitute technologies. The efficiency of R&D is also higher when there are complementary technologies.

M. Cloodt *et al* (2006) emphasize the fact that acquiring the knowledge that is too similar to the existing knowledge has a small effect on post-acquisition innovation performance, given the high costs of the takeovers and transfers not accompanied by the enrichment of the existing knowledge base, which would create a potential for a new innovation. The authors conclude that a certain degree of differentiation in the technological capabilities of the company will enrich the acquiring company's knowledge base, create learning opportunities and improve innovative performance. Hence, in order to improve innovative performance through acquisitions, firms should avoid the takeovers of the firms whose knowledge bases are either too unrelated or too related. X. Zhao (2009) investigates whether technological innovation drives decisions on acquisition and how acquisitions affect technological innovation in the coming years. The author shows that, after a takeover is made a reality, the acquiring companies that were previously less innovative achieve a significant increase in the number of patents and market performance compared to the companies that were not involved in the acquisition processes. The author concludes that technology acquisitions could be one way to address innovation gaps.

M. Makri *et al* (2010) emphasize the fact that "the quality and originality of company innovations improve after mergers due to technological complementarity, as well as that technological similarity contributes to the emergence of economies of scale, while technological complementarity enables economies of scope". Analyzing 420 acquisitions in the period 1994-2000, R. Frey and K. Hussinger (2011) show that acquisitions improve companies' technological capabilities.

J. Ben and K. Li (2014) investigate the ex-ante effect of innovative activities on the implementation of technology acquisitions and the ex-post effect of technology acquisitions on corporate innovation. The research focuses on a sample of the 2621 acquisitions made a reality in the period 1984-2006 (the data are available for the acquiring companies) and 1762 acquisitions (the data are available for the acquiring companies and the target companies). The results of the research show that both acquiring companies and target companies are active in innovation, but have different innovation characteristics. In particular, acquiring companies have a big patent portfolio and low R&D costs, while target companies have high R&D costs and slow patent growth. The results indicate the fact that innovation is an important driver of acquisitions. When ex-post effects on acquisitions are concerned, the research results have shown that acquisitions have a positive effect on innovative activities.

X. Wu *et al* (2015) analyze 222 Chinese multinational companies with the aim to show how international acquisitions affect innovative performance. The results of the study reveal that, by taking tacit knowledge, multinational companies improve their innovative capacities, which has a positive impact on innovative performance. The authors conclude that it is necessary to establish the effective mechanisms that promote knowledge transfer, as well as organizational learning mechanisms, in order to improve innovative performance. G. Jo *et al* (2016) investigate how the acquiring company absorbs and assimilates the knowledge of the acquired company and creates innovations. The results of the research show a positive effect of the takeover of small technology

companies on the acquiring company's innovation. J. Han *et al* (2017) analyze the 192 acquisitions performed by 162 high-tech companies in the period 2001-2009 so as to confirm the positive impact of acquisitions on the degree of innovation after a takeover.

Certain studies show a negative impact of acquisitions on innovative performance. M. Hitt *et al* (1991) analyze a sample of the 191 acquisitions performed in the period 1970-1986 and find that acquisitions have a negative effect on the intensity of R&D, as well as the results of research and development activities, i.e. patents. The authors point out the fact that managers view acquisitions as a substitute for innovation. Hence, managers can take on the technology or products that are new to their company, but are not new to the market. Reducing R&D expenditure over time leads to a decline in innovation. In addition, a reduction in the relative number of patents after acquisitions suggests that acquiring companies do not take the full advantage of the technology taken over.

F. Szücs (2014) analyzes the impact of acquisitions on R&D intensity focusing on the example of 265 acquiring companies and 133 acquired companies in the period 1990-2009. The results of this study demonstrate the fact that, due to the reallocation of technological resources (R&D rationalization) and technological similarities, research and development decreases in both companies after the acquisition. Acquisitions negatively influence innovative performance if companies use the same technology, unless they achieve a top technological position after the takeover. In acquisitions not motivated by financial reasons or by the reasons of market dominance, integration costs may absorb the management and organizational resources that would otherwise be allocated to other activities (Cefis & Marsili, 2015). In these cases, acquisitions can be harmful to innovative activities and may have a negative effect on R&D.

CONCLUSION

In modern business conditions, the generation and application of new ideas, technologies and knowledge are fundamental prerequisites for company growth and for achieving long-term profitability. Relying on external knowledge and applying the open innovation model, companies can expand the base of possible ideas, improve the effect of internal scientific research activities and significantly improve innovation performance. In that sense, technology acquisitions are one of the main strategic levers for making open innovations a reality and improving companies' innovative capacities. There are several ways how the innovation potential can be improved through technology acquisitions. The knowledge transfer process between two companies, as well as the mutual learning process, increases companies' ability to experiment, be creative and develop innovations. A company's ability to take over, transfer and integrate the acquired knowledge base into its own knowledge base contributes to the creation of a sustainable competitive advantage. Companies with complementary knowledge can combine their specific strengths, which results in the development of the new technologies or products that neither partner would otherwise be able to develop on their own. In addition to that, acquisition integrates budgets for conducting research and development activities and increases the likelihood of developing more advanced technologies and innovative products.

The key challenges that companies are faced with after technology acquisitions are a possible loss of the key employees who may leave the company due to cultural conflicts or the nonacceptance of the new management style. Additionally, since technological know-how is largely the tacit knowledge that cannot be easily transferred, an additional challenge is to ensure an efficient transfer of this knowledge. As major organizational changes, acquisitions are characterized by a significant decline in confidence among employees. Therefore, only those companies that are able to develop a sense of trust and identity among employees with a newly combined company will be able to create an organization which encourages knowledge exchange.

The literature review of the effects of technology acquisitions on innovation shows that there are no consistent views, given the fact that there are the studies that have found a positive impact of

technology acquisitions on innovation, as well as the studies that have come to quite opposite conclusions. However, it can be seen that the studies that have shown a positive impact of technology acquisitions on the improvement of companies' innovative potential are dominant. So, the paper results in confirming the fact that the process of acquiring technology and knowledge from the external sources, as well as the harmonization of external knowledge with the internally developed knowledge base, improves the innovative potential of the integrated company. Additionally, the results show that acquisitions increase the likelihood of innovations in the integrated company. Also, innovations are made a reality much faster in relation to the situation where partners do not cooperate. Accordingly, it can be concluded that technology acquisitions contribute to the improvement of a company's innovative potential, which confirms the initial hypothesis.

The contribution of the paper reflects in the systematization of the knowledge of the effects of technology acquisitions on the improvement of a company's innovative potential. Given the fact that innovations will be one of the biggest strategic drivers of acquisitions in the coming years both in the world and in the Republic of Serbia, the results obtained and presented in this research study are important guidelines for the managers involved in technology acquisition processes. In fact, understanding possible ways to improve the innovation potential, as well as challenges in performing technology acquisitions, may help managers to adequately lead their companies through the process of change after technology acquisitions are made.

The research conducted in this paper is of a theoretical-methodological nature, which can be considered as a certain research limitation. Given the fact that technology acquisitions have only recently become relevant and that they will intensify in the coming years, however, building an appropriate theoretical basis for conducting future empirical research is of particular importance. In future empirical research, the effects of technology acquisitions on the improvement of the innovative potential of the companies in the Republic of Serbia could be analyzed in a methodologically valid manner. In addition to research in acquisitions as an instrument to support the improvement of companies' innovative potential, it is also important to explore the impact of innovations on encouraging acquisitions. This two-way connection between innovation and acquisition is an important area of potential future research.

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INTEREST RATE AND EXCHANGE RATE VOLATILITY AND THE PERFORMANCE OF THE NIGERIAN INFORMAL SECTOR: EVIDENCE FROM SMALL AND MEDIUM-SIZED ENTERPRISES

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This paper investigates the joint impact of interest rate and exchange rate volatility on the performance of the informal sector in Nigeria, focusing on Small and Medium-sized Enterprises (SMEs). The annual time-series data on the exchange and interest rates for the period 1981-2018 were obtained from where exchange and interest rates volatility data were computed. The data analysis was carried out using descriptive statistics, correlation, a unit root test, an Autoregressive Distributed Lag (ARDL) bound test for cointegration and the ARCH regression model. The results obtained by the ARDL bound test confirmed the presence of the long-term relationship between interest and exchange rates volatility and SMEs' performance, which suggests that all the variables of interest move together in the long run. Moreover, the ARCH regression model showed a positive impact of exchange and interest rates volatility on SMEs' performance. However, only exchange rate volatility was significant. Thus, policy makers should pursue the interest rate and exchange rate regimes that will encourage massive investments in SMEs. This, in turn, would increase the performance of SMEs. Also, the monetary authorities should implement the policies aimed at curtailing incessant volatility in the exchange rate and the interest rate so as to protect SMEs from the external perturbations of the movements of the exchange rate and the interest rate.

Keywords: cointegration, exchange rate regimes, foreign exchange, macroeconomic policies, monetarism, structural adjustment program

JEL Classification: O17, C22, E52

INTRODUCTION

The informal sector of any economy describes the economic activities largely unregulated by the government labor laws or taxation laws. It covers activities in agriculture, services, transportation, manufacturing, construction and commerce. This sector is always looked unto for economic sustenance by teeming job seekers. Globally, the sector is significant in improving countries' economies (Norhidayah & Dzurizah, 2020). In the case of Nigeria, the Bank of Industry (2018) states that the informal

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sector comprises the "enterprises that are not officially registered and do not maintain a complete set of accounts; and workers who hold job lacking basic social or legal protection and employment benefits." This sector raked in approximately 65% to the Gross Domestic Product (GDP) in 2017 (Bank of Industry, 2018). In connection with said, it is imperative for an intervention to be made in the sector in order to maximize its potentials.

In Africa, informal activities are not fully declared, which, however, has not stopped attempts at estimating their magnitude (Medina, Andrew & Cangul, 2017). The estimates of the proportion of the contribution made by the informal sector to the GDP across African countries is put at above 40% compared to less than 20% in developed countries (Benjamin, Mbaye, Diop, Golub, Haughton & Niang, 2012). For Ghana, M. A. Ocran (2018) submits that the size of the informal sector has maintained growth over the past decades from 14% of the GDP in the 1960s to 30% in the 2000s, with an upward trend being envisaged. There is also a general consensus among development studies on Africa that the informal sector occupies a prominent position in their economies. Informal firms in the areas of transportation, carpentry, wholesale and retail trade, to mention but a few, dominate some of the largest and high-growth sectors of the West African economies.

As reported by N. Benjamin *et al* (2012), the informal sector acts as the last resort for employment for those who have few opportunities in the formal sector. A chunk of the new jobs created is by the informal sector. In Burkina Faso, for instance, the informal sector contributes 80% of the total employment (Steel & Snodgrass, 2008). Employment in the informal sector is for the biggest part characterized by self-employment, which accounts for 62% in North Africa and 70% in Sub-Saharan Africa on average. Trade liberalization in Africa and the implementation of the structural adjustment program (as in Burkina Faso and Nigeria) accentuated a rise in informal enterprises. Clearly, while the informal sector is a veritable source of income, the question remains as to whether it is a sustainable source for long-term growth and income generation.

Undoubtedly, SMEs constitute the core of the informal sector. Therefore, any intervention undertaken to integrate the informal sector into the formal sector must focus on SMEs. Nigerian SMEs face a lot of challenges, ranging from poor infrastructures and multiple taxation to unbalanced government macroeconomic policies, which have made it difficult for Nigerian SMEs to favorably compete in the global marketplace and meaningfully contribute to the per-capita GDP. As opined by J. O. Adeniran, S. O. Yusuf and A. O. Adeyemi (2014), and corroborated by T. D. Edoko, S. C. Nwagbala and N. E. Okpala (2018), the issue of interest rate and exchange rate volatility (hereafter referred to as IERs) has been at the forefront of said challenges, which connotes that the volatility of IERs may portend a signaling effect on SMEs' performance.

O. Richard (2018) and W. A. Isola and E. P. Mesagan (2018) opined that the stability of an economy largely depends on macroeconomic dynamics, such as the exchange rate and the interest rate. The exchange rate refers to the price of a nation's currency in relation to another and plays a dominant role in any given economy as it affects the prices of imports and exports. The interest rate has also become an important part of economic discourse based on the fact that it facilitates the flow of funds from lenders to borrowers. The interest rate is a cost of borrowing and portrays what the borrower pays to the lender for using a credit.

Nigeria has gone through the diverse regimes of the exchange rate, ranging from the periods of no prescribed exchange rate during the period 1958-1959, the fixed exchange rate (which prevailed from late 1959 to June 1986) and the flexible exchange rate, which became effective in July 1986 and has been effective to date. Worthy of note is the fact that, while IERs vary, the exchange rate varies more quickly, usually on a day-to-day basis. Thus, IER volatility is the measure of the frequency at which the price of foreign exchange (forex) and interest rates changes over time.

PROBLEM STATEMENT

C. F. Okorontah and I. U. Odoemena (2016) submit that exchange rate volatility causes panic in the forex market, because the traders and users of forex are unclear about what to envisage in the market on a daily basis. They could lose money if the exchange rate tumbles beneath their expectations, which sums up the predicaments that SMEs are confronted with in obtaining the forex needed to run their operations. In a similar fashion, the interest rate affects demand for and the allocation of loan funds, consumption, investment levels, and government borrowing, which has heightened the concern that the Central Bank of Nigeria (CBN) has been showing for a number of years in regulating the interest rate at which SMEs borrow (Central Bank of Nigeria, 2019).

Notwithstanding the progress made in financial economics and management, the literature on the volatility of IERs and the performance of SMEs in Nigeria and elsewhere shows that there seems to be no consistency in the literature concerning the nature and direction of the relationship (Osakwe, Verter, Becvarova & Chovancova, 2015; Isola & Mesagan, 2018; Udoh, Gbande, & Acha, 2018). Even more so, separate analysis of the interest rate, on the one hand, and the exchange rate, on the other, have been carried out regarding SMEs' performance, a handful of studies having considered their joint effect. These studies have also used the nominal data about pertaining to the exchange rate or the interest rate on performance. This study extends the frontier of the analysis by not only looking at the combined effect of IERs on the performance of SMEs, but also the effect of their volatility on said performance. A volatility analysis provides us with an opportunity for the in-depth examination of the effects of macroeconomic variables on performance. The relevance of this kind of study cannot be overemphasized, since the vibrant informal sector is a *sine qua non* for the realization of sustainable economic growth in any country. On this note, this study is of countless importance to the Nigerian economy since the nation is moving towards diversifying the economy away from crude oil.

Clearly, the dependence of the Nigerian economy on the informal sector, where a chunk of SMEs are found, warrants investigation into whether interest rate and exchange rate volatility affects the performance of SMEs in Nigeria. Accordingly, the research goals of this paper are to:

- investigate whether there is a significant influence of the interest rate and the interest rate volatility on SMEs' performance, and
- ascertain if the exchange rate and exchange rate volatility have a significant influence on the performance of SMEs.

From the foregoing, the hypotheses of the study are as follows:

- The interest rate and interest rate volatility have no positive significant effect on SMEs' performance,
- The exchange rate and exchange rate volatility have no positive significant impact on SMEs' performance.

These hypothetical propositions are tested using the autoregressive conditional heteroscedasticity (ARCH) model on the time-series data of the variables.

The remainder of this paper is structured into the following sections: in Section Two, a review of the related literature is presented, and in Section Three, the focus is on the methods. The empirical result is given in Section Four, and Section Five is the conclusion of the study including some recommendations.

LITERATURE REVIEW

The perspectives of small and medium-sized enterprises

The term SMEs has no universal delineation. The benchmarks for categorizing an enterprise as small, medium-sized or large differ from one country to another contingent on whether the country is developed or developing. In the Nigerian context, the

term SMEs refers to enterprises with an aggregate capital employed of no less than 1.500.000 naira, but not exceeding 200.000.000 naira, together with working capital, yet excluding the cost of land, and/or with the workforce of no fewer than 10 and no more than 300 (Ojeyinka, 2019). Globally, SMEs are pivotal in the GDP growth and unemployment reduction, which is so because they can navigate through challenging and changing economic environments. They are a framework for the development of entrepreneurial initiatives, which is essential for making an economy competitive (Robu, 2013; Zygmunt, 2017; Cicea, Popa, Marinescu & Stefan, 2019).

In developing economies, one of the key impairments to the performance of SMEs is access to loan funds from financial institutions and its relative cost (Owualahi, 2004). In a similar fashion, J. A. Ojo (2004) claimed that those impairments (access to loan funds, the exchange rate and the interest rate) usually diminished the performance of SMEs. According to R. M. Dada (2014), it endangers the aggregate performance of the economy. Consequently, SMEs are in a shamble state whenever IERs mitigate their performance.

Exchange rate volatility and the performance of SMEs

The Nigerian economy is largely dependent on crude oil, and fluctuations in oil prices portend a dire signal for the economy. Dwindling oil prices on the international market affect a foreign currency transaction and exchange rate volatility, which may affect the performance of SMEs. According to B. S. Omotosho (2015), the exchange rate is the nucleus of any economic stabilization program, as it links the general price level of an economy with other countries.

The exchange rate has two elements, namely the domestic currency and a foreign currency, and can be quoted both directly and indirectly. According to F. S. Udoh *et al* (2018), direct quotation is the price of the unit of a foreign currency expressed in terms of the local currency, whereas indirect quotation implies the reverse situation. These elements of the exchange rate are quoted in values against the US dollar and against another country's currency (cross-rates). Exchange rates can be either fixed or flexible. Nigeria operates a flexible exchange rate, which pegs the domestic currency to the US dollar, this being aimed at reducing volatility or improving trade dealings with other nations, since its main export is priced in the US dollar. N. Mohammad, N. Morteza, and S. Nadia (2018) opined that movements in the exchange rate exerted an influence on the performance of firms. The channels through which this can happen are as follows: export prices relative to overseas competitors, the cost of external borrowing and the cost of imported inputs in relation to other production inputs.

F. S. Udoh *et al* (2018) assert that, when SMEs are unable to access forex, their performance declines. S. Suleyman (2014) also argues that the performance of SMEs worsens as they become susceptible to the manipulations of the exchange rate because of their feeble bargaining position. With the compelling need for imported inputs, the issue of exchange rate volatility will continue to pose as a drawback to SMEs.

Given the growing need to provide employment and sustainable living for the teeming and growing Nigerian population, the Government has made concerted efforts towards stimulating the performance of SMEs. These efforts are evident in the series of the CBN's and other agencies' schemes and initiatives aimed at providing funds to SME operators. According to the Central Bank of Nigeria (2019), SMEs are the fundamental drivers of growth via their contribution to employment generation and poverty reduction. This justifies the attention paid to SMEs by the Government and other stakeholders in the Nigerian development project. There is only a hope that this attention will yield the desired results.

Interest rate volatility and the performance of SMEs

In Nigeria, lending to SMEs has been a vital concern of not only the Government, but other corporate

bodies, such as the World Bank and the International Monetary Fund (IMF), and stakeholders in the country as well. The interest rate regime became effective in 1960, when the Nigerian Government had the sole authority to determine the interest rate via the monetary policies geared towards the development of and supporting the vital SME sectors of the economy (Ene, Agoke & Ene, 2015). This concern came as the Government's methodical policy intended to expand the economy. However, there was a sharp twist when the trade liberalization policy that culminated in the introduction of the structural adjustment program (SAP) in 1986 was embraced.

According to O. J. Ifeanyi and N. G. Chukwu (2014) and E. Tajudeen, O. Taofeek, O. Ayinde and A. B. Abdul-Ganiy (2017), the SAP gave rise to the liberalization of the financial sector, leaving the interest rate to the dictates of demand and supply, the risk appetite of financial institutions, and consumers' negotiating dominance. This no doubt affected SMEs (Udoh *et al*, 2018). S. Suleyman (2014) opines that the performance of SMEs deteriorates as they become susceptible to interest rate volatility due to their weak negotiating strength.

The theoretical framework

The theoretical base of this study is anchored to monetarist theory, which is predominantly linked to the Nobel Prize winning economist Milton Friedman. Monetarist theory states that economic growth and the behavior of the business cycle largely depend on changes in money supply. A variation in money supply impacts on the output and price levels. While a short-term impact is exerted on the national output, a long-term impact is on price levels. Monetarism emphasizes the role the Government has in controlling money supply. Hence, monetary policies are designed to affect the output of an economy, which effect is made through the interest rate that alters the cost of capital and hence the investments in the productive sector that can be undertaken (Mishkin, 2007).

O. A. Uchendu (2006) states that variations in monetary policies influence the activities carried out by SMEs through the three major channels. The first channel is through liquidity, where the nominal interest rate changes liquidity conditions in the short run. The second channel is the credit channel, which works through banks' operations. The third channel is the exchange rate channel, which works through the forex market. Monetary adjustment is induced by the forex flow between countries, as stimulated by differentials in IERs. However, this takes place quickly if an economy's financial market is developed (Udoh *et al*, 2018). Clearly, in order to augment the aggregate performance of the economy's constituents (both the formal and the informal sectors), the Government uses macroeconomic variables, such as IERs, to adjust the amount of money in the economy. Because markets intuitively move towards an unwavering point, an imperfectly set money supply may cause a market to behave intermittently.

An extant studies review

There is the robust literature on the volatility of IERs and the performance of SMEs in developed countries. However, there is a dearth of extant studies in developing Sub-Saharan Africa, particularly so in the Nigerian context. C. I. Enekwe, M. M. Ordu and C. Nwoha (2013) analyzed the fluctuations of the exchange rate and the performance of the manufacturing sector in Nigeria using the time-series data from 1985 to 2010. The regression results showed that foreign private investment (a proxy for the dependent variable) was positively and significantly affected by exchange rate volatility in the manufacturing sector. E. A. Akinlo and V. A. Adejumo (2014) tested the impact of exchange rate volatility on non-oil exports using the quarterly data spanning from 1986 (Q1) to 2008 (Q4). The error correction model (ECM) and the vector autoregressive (VAR) model revealed that exchange rate volatility positively and significantly affected Nigeria's non-oil exports.

C. N. Osakwe *et al* (2015) examined macroeconomic variables and growth in the SMEs in the Czech Republic. The study did not find a significant influence of the domestic credit granted by the financial sector on the growth of SMEs. It, however, reported a

positive association between economic growth and SME growth. In a similar fashion, L. O. Atarere, (2016) investigated the influence monetary policies had on the growth of SMEs in Nigeria. Worthy of note is the fact that this study was conceptual in nature and had no empirical base. Nevertheless, the study concluded that monetary policies significantly influenced the growth of SMEs. C. F. Okorontah and I. U. Odoemena (2016) explored the effects of the variation of the exchange rate on economic growth by means of the yearly time-series data obtained for the period 1986-2012. The OLS results and the ECM support no robust association between the exchange rates and economic growth .

E. S. Nsofo, S. M. Takson and S. U. Ugwuegbe (2017) investigated the extent to which exchange rate volatility influenced economic growth during for the period 1981-2015. The GARCH results revealed that exchange rate volatility and foreign direct investments had a negative impact on economic growth. F. S. Udoh *et al* (2018) examined the monetary policy on the growth of SMEs using the IER macroeconomic variables during the period 1986-2016. The ARCH regression results indicated that there was a significant impact of IERs on the growth of SMEs in Nigeria. In a related study, T. D. Edoko *et al* (2018) used the OLS framework and found the exchange rate to statistically explain the performance of SMEs.

O. Ipinnaiye, D. Dineea and H. Leniham (2017) examined the growth of the manufacturing SMEs in Ireland using the GMM estimation technique on the data of the census of industrial production for the period from 1991 to 2007. The results indicated that the macroeconomic environment directly and indirectly influenced the growth of a firm and also that that integrated with the characteristics and strategy of a firm.

T. E. Olatunji and O. R. Ibukun-Falayi (2018) evaluated the effects of the interest rate regulation on credit administration to SMEs during the period from 1994 to 2013. The results of the t-test and the analysis of the variance showed that the interest rate regulation had insignificant effects on credit administration to SMEs in Nigeria. W. A. Isola and E.P. Mesagan (2018) examined the effect of the monetary policy on the performance of SMEs in Nigeria, Gambia and Ghana using data from 1981 to 2016. The study found a positive effect of IERs on the SME output for Nigeria although only the exchange rate variable was significant. For Gambia, the exchange rate was positive, but not significant, whereas the interest rate had a negative and significant effect on the output. In the case of Ghana, the exchange rate had a negative influence on the output, but the interest rate was positive. However, neither variable was statistically significant.

A study by O. T. Ojeyinka (2019) ascertained the impact of exchange rate volatility on the performance of the manufacturing sector during the period 1981-2016. Yearly time-series data were used and the ARDL estimation technique was applied alongside the bound test for cointegration. The findings showed that exchange rate volatility positively and significantly influenced the performance of the manufacturing sector.

RESEARCH METHODS

The *ex-post facto* design was adopted in this paper. It was used since the study seeks to establish the dynamics connected with a certain occurrence by analyzing the past events of the already existing conditions, where the dynamics cannot be changed. The secondary data were obtained and computed from the CBN's Statistical Bulletin and the National Bureau of Statistics (NBS) during the period 1981-2018. The interest rate, the exchange rate, interest rate and exchange rate volatility, and investments in SMEs are the variables used in the study.

SME investment was used as a proxy for the performance of the SMEs, which has already been used in prior studies (Okorontah & Odoemena, 2016; Nsofo *et al*, 2017; Olatunji & Ibukun-Falayi, 2018). Given the fact that this study assesses the effects of the volatility of IERs on the performance of SMEs, the ARCH methodology was adopted, the ARCH model being based on the ARCH(q) model, which

provides the variance of a series using its prior variance (Gujarati, 2003). Given the fact that the ARCH model estimates the current value of a variable as determined by its prior value(s), the study used the equations (1) and (2) for that estimation:

$$Y = \lambda_0 + \lambda_1 X_t + \mu_t \quad (1)$$

$$\sigma_t^2 = \alpha_0 + \sum_{q=1}^{k} \alpha_1 \mu_{t-q}^2 \quad (2)$$

Equation (1) estimates the mean volatility, whereas Equation (2) estimates the variance model. The ARCH model consists of the mean and variance equations estimated in the form of a simultaneous equation. Nevertheless, an emphasis is placed on the variance equation due to its fitness to the forecast volatility. σ_t^2 is the current volatility, α_1, the parameter gauging the effect of its lagged value (i.e. μ_{t-q}). Given the equations (1) and (2), the ARCH model is estimated as:

$$\sigma_t^2 = \lambda_0 + \sum_{i=1}^{q} \alpha_i \varepsilon_{ti}^2 + \sum_{j=1}^{p} \beta_j \sigma_{t-j}^2 \quad (3)$$

σ_t^2 is the current volatility, α_i, the parameter gauging the effect of the prior residual (i.e. ε_{ti}^2), while β_j is the effect of the variation in its lagged value (σ_{t-j}^2).

Thus, the functional form of the model for this study can explicitly be expressed as:

$$Smeinv = f(Intrate, Intratevol, Exchrate, Exchratevol) \quad (4)$$

where:

Smeinv = SME investments,

Intrate = the interest rates,

Intratevol = interest rate volatility.

Exchrate = the exchange rates,

Exchratevol = exchange rate volatility.

In order to estimate the equations (1) and (2), it is translated into equation (5):

$$Smeinv = m_0 + A_1 Intrate_{t-1} + A_2 Intratevol_{t-1} + A_3 Exchrate_{t-2} + A_4 Exchratevol_{t-2} + \epsilon_t \quad (5)$$

Given the fact that the study data are time series in nature and, moreover, that SME investments are expressed in billions of naira, while the other variables are expressed in percentages, SME investments were transformed into their natural logarithm in order to avoid an issue related to the scaling problem. In view of this, the equation (5) is recast as:

$$Lsmeinv = m_0 + A_1 Intrate_{t-1} + A_2 Intratevol_{t-1} + A_3 Exchrate_{t-2} + A_4 Exchratevol_{t-2} + \epsilon_t \quad (6)$$

In order to reach the percent volatility of the interest rates (*Intratevol*), the study computed percent volatility as:

$$Intratevol = (Intr_t - Intr_{t-1}) / Intr_{t-1} \quad (7)$$

where:

$Intr_t$ = the interest rates in the current period,

$Intr_{t-1}$ = the interest rates in the prior period.

In a similar fashion, the percent volatility of the exchange rate *Exchratevol* was computed as:

$$Exchratevol = (Exchr_t - Exchr_{t-1}) / Exchr_{t-1} \quad (8)$$

where:

$Exchr_t$ = the exchange rates in the current period,

$Exchr_{t-1}$ = the exchange rates in the prior period.

Econometric tests were conducted in order of precedence: the Augmented Dickey-Fuller unit root test; the cointegration, over-parameterized and parsimonious error correction and diagnostic and ARCH tests.

EMPIRICAL RESULTS

The examination of the descriptive statistics of the used data series is the first step in any empirical inquiry. This precisely examined the mean, median, kurtosis, skewness and Jarque-Bera statistics of the variables so as to gain an insight into the distributional properties and normality of the data. This result is shown in Table 1.

The evidence presented in Table 1 indicates some level of consistency in the data series as the mean and the median lie within the minimum value and the maximum value for all the variables. The mean values

are 2.97, 17.59, 0.005, 88.54 and -0.12 for *Lssmeinv, Intrate, Intratevol, Exchrate*, and *Exhratevol*, respectively, with the corresponding standard deviation of 0.74, 4.6, 0.21, 87.14 and 0.18, respectively. Likewise, the skewness, the kurtosis and the Jarque-Bera statistics jointly offer information on the normality of the data series. It can be seen that the null hypothesis of normal distribution cannot be rejected for all the variables (*Lssmeinv, Intrate, Exchrate,* and *Exhratevol*) based on the Jarque-Bera statistics, except for *Intratevol*, since the probability value is greater than 0.05. Thus, *Intratevol* satisfies the normality condition. This further leads to the assessment of the likelihood of multicollinearity among the variables in the model, as is presented in Table 2.

According to Table 2, there is no multicollinearity among the variables in the empirical model, since no interrelation among the pairs of the independent variables exceeds the value 0.8 (Jeroh, 2020). Moreover, none of the variables is negatively correlated with the performance of SMEs, which is not alarming as a decrease in the lending rate encourages investment, and positively affects the performance of SMEs by the extension. Additionally, a decrease in the exchange rates will positively affect the performance of SMEs, which follows the *a priori* expectation. Given the fact that there is no multicollinearity among the pairs of the independent variables, the unit root test was conducted via the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) unit root tests (Table 3) before estimating the ARDL.

The result of the ADF and PP unit root tests follows the expectations. All the variables (*Lsmeinv, Intrate, Intratevol, Exchrate, Exchratevol*) were stationery at the first difference order I(1), sets the pace for the next stage of the ARDL test.

Table 1 The descriptive statistics of the data series

Statistics	*Lsmeinv*	*Intrate*	*Intratevol*	*Exchrate*	*Exchratevol*
Mean	2.9662	17.5924	0.0005	88.5442	-0.1226
Median	2.6469	17.5250	0.0073	97.020	-0.0682
Maximum	4.0054	29.8000	0.6266	306.08	0.0612
Minimum	2.0712	7.7500	-0.4000	0.62000	-0.7629
Std. Dev.	0.7361	4.6264	0.2127	87.1369	0.1823
Skewness	0.2998	0.19405	0.54672	0.80295	-1.8651
Kurtosis	1.4073	3.6713	4.0356	2.9743	6.1188
Jarque-Bera	3.803	1.645	1.514	3.613	4.582
Probability	0.000	0.050	0.064	0.000	0.000
Obs.	38	38	38	38	38

Source: Author

Table 2 The correlation matrix of the data series

Variables	*Lsmeinv*	*Intrate*	*Intratevol*	*Exchrate*	*Exchratevol*
Lsmeinv	1.0000				
Intrate	0.0027	1.0000			
Intratevol	0.0793	-0.2789	1.0000		
Exchrate	0.7034	0.0799	0.0349	1.0000	
Exchratevol	0.3122	-0.2451	0.3574	0.1819	1.0000

Source: Author

In Table 4, the ADRL bound test method proposed by H. Pesaran, Y. Shin and R. Smith (2001) reveals that the computed F-statistics are greater than the upper critical bound I(1), thus indicating that the null hypothesis of non-co-integration is rejected. Consequently, the empirical result confirms the presence of the long-term relationship between IER volatility and the performance of SMEs in Nigeria. This result is further supported by the time-series line plots presented as Figure 1.

The result shown in Figure 1 demonstrates that the SME investment plots (*Lsmeinv*) and the exchange rate (*Exchrate*) move in a similar trend, whereas the variables of the interest rate, exchange rate volatility (*Exchratevol*) and interest rate volatility (*Intratevol*) move in the same direction, which is indicative of the fact that our empirical model is stable and does not suffer from structural variability over the study period. Finally, the ARCH result is presented in Table 5.

Table 5 captures the ARCH regression estimators for the performance of SMEs (*Lsmeinv*) and exchange rate volatility (*Exchratevol*) and interest rate volatility (*Intratevol*). The parameters for *Intratevol* and *Exchratevol* are 0.0227 and 0.1477, respectively. However, only the exchange rate is significant at the 1% level. The ARCH parameters are also statistically significant. Hence, the null hypothesis of no ARCH(1) effects is rejected, which clearly indicates the ARCH effect of IER volatility on the performance of SMEs in Nigeria. Additionally, the study finds that the effect of IER volatility on the performance of SMEs is both positive and significant (Wald chi2 (2) = 1084.74). Likewise, the effect of the first and second year lags in the exchange rate and the interest rate positively affects the performance of SMEs in Nigeria. Based on these results, the hypotheses of the study are rejected. These results are consistent with W. A. Isola and E. P. Mesagan (2018) and O. T. Ojeyinka (2019), but the same are contradictory to C. N. Osakwe *et al* (2015).

Table 3 The summary of the unit root tests (ADF&PP) and the trend

	ADF Test			*PP Test*		
Variables	Level	1st Diff.	Order	Level	1st Diff	Order
Lsmeinv	-0.249	-3.682***	I(1)	-0.258	-3.668***	I(1)
Intrate	-2.449	-3.682***	I(1)	-3.483	-3.668***	I(1)
Intratevol	-3.509	-3.682***	I(1)	-9.164	-3.668***	I(1)
Exchrate	0.872	-3.682***	I(1)	1.531	-3.668***	I(1)
Exchratevol	-2.850	-3.682***	I(1)	-4.715	-3.668***	I(1)

Note: * denotes 'statistically significant' at the 1% level; ** denotes 'statistically significant' at the 5% level; and *** denotes 'statistically significant' at the 10% level.

Source: Author

Table 4 The ARDL bound tests for co-integration

Variables	F-statistic	Co-integration
F(*Lsmeinv*, *Intrate*, *Intratevol*, *Exchrate*, *Exchratevol*)	6.23	Co-integration
Critical Values	Lower Bound	Upper Bound
1%	2.93	4.69
5%	2.56	3.86
10%	2.24	3.45

Source: Author

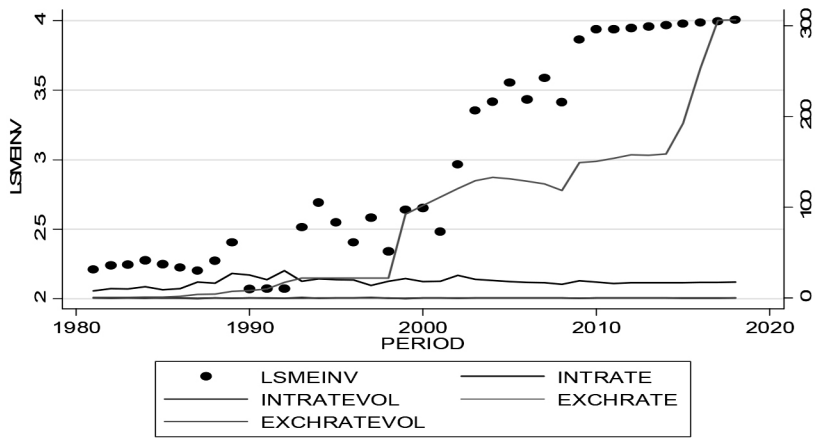

Figure 1 The time-series line plot of the variables used in the study

Source: Author

Table 5 ARCH regression

Sample: 1981 - 2018				Number of obs. = 38		
Distribution: Gaussian				Wald chi2(2) = 1084.74		
Log likelihood = 4.977193				Prob > chi2 = 0.0000		
			OPG			
	Coef.	Std. Err.	z	P > z	[95% Conf.	Interval]
Intrate	.0025001	.0015623	1.60	0.110	-.000562	.0055622
Intratevol	.0227908	.0706671	0.32	0.747	-.1157141	.1612958
Exchrate	.0088609	.0003206	27.64	0.000*	.0082326	.0094892
Exchratevol	.147745	.0523291	2.82	0.005*	.045182	.2503081
_cons	2.240598	.0404797	55.35	0.000	2.161259	2.319937
			ARCH			
L1.	1.623442	.6816684	2.38	0.017**	.2873966	2.959488
L2.	.8958968	.5386714	1.66	0.096***	-.1598798	1.951673
_cons	-.0000943	.0018317	-0.05	0.959	-.0036843	.0034957

Note: * denotes 'statistically significant' at the 1%;** denotes 'statistically significant at the 5% level; and *** denotes 'statistically significant at the 10% level.

Source: Author

CONCLUSION

In this paper, the effect of IER volatility on the performance of SMEs in Nigeria for the period from 1981 2018 was investigated. Yearly time series data were used. The data were analyzed using descriptive statistics, a correlation matrix, the unit root test, the ARDL bound tests for co-integration and the ARCH regression model. First, the ARDL bound test results confirm the existence of the long-term relationship between interest rate volatility and exchange rate volatility and the performance of SMEs, which is

symptomatic of all the variables moving together in the long run. Second, the ARCH model reveals that the impact of IER volatility on the performance of SMEs is positive and with a significant impact coming from the exchange rate and exchange rate volatility.

The significant value of the exchange rate implies that Nigerian SMEs react more to perturbations in the exchange rate and, consequently, the external factors that are outside the domestic economy. It shows that these SMEs use more of the imported inputs that require forex to acquire. Therefore, the thrust of policy is to redirect SMEs towards looking inward for inputs as a way to curtail their demand for forex. Policy makers should manage the interest rate and exchange rate regimes so as to encourage massive investments in SMEs. In addition, the monetary authorities should implement the policies aimed at curtailing the incessant volatility of the exchange rate and the interest rate.

Notwithstanding the efforts this study has made, the same is still limited by the number of the analyzed variables. For instance, only one measure of performance was used. To extend this discourse, it is suggested that further studies should use a mix of performance proxies in addition to the other macroeconomic variables, which will help to test whether the results are sensitive to the adopted performance measures.

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SERBIA'S FOREIGN EXCHANGE RESERVE ADEQUACY AND THE FACTORS INFLUENCING THEIR ACCUMULATION

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In this paper, the adequacy of foreign exchange reserves in the Republic of Serbia (RS) and the factors that influence their accumulation is analyzed by means of an econometric model. The relevant variables, such as the Gross Domestic Product (GDP), the Real Effective Exchange Rate (REER) and monetary aggregate M2/GDP are included in the analysis. The unit root tests applied in the research led to the conclusion that the timeseries were integrated of the order I(1). The cointegration test revealed that there was one cointegration equation. The regression model was estimated using the quarterly data for the period from 2002q1 to 2020q3. The estimated cointegration coefficients showed that the economic activity approximated in terms of the GDP had a significant influence on foreign exchange reserves accumulation, which is only followed by appreciation pressure on the dinar (approximated by the REER index) and money supply growth (estimated through the monetary aggregate M2/GDP). In addition to conventional factors, the analysis also points out specific factors and their impact on foreign exchange reserve accumulation in RS. The results of the research study show that foreign exchange reserves in RS are greater than the levels suggested by standard optimality criteria. The findings also suggest that it is necessary to take into account the dividends realized by foreign investors, as well as some segments of portfolio investment in assessing the specific indicator of the adequate level of foreign exchange reserves.

Keywords: foreign exchange reserves, gross domestic product, real effective exchange rate, money supply M_2, external debt, cointegration

JEL Classification: E52, F31, F32, F34, F37

INTRODUCTION

Globalization and liberalization in the world economy have led to growing involvement in world trade and international financial flows for the largest number of countries. In itself, this imposed a need for countries to have an adequate amount of foreign exchange reserves, which has only been reinforced by disruptions in the international flows of goods, services and capital in recent decades. The greater openness of a country also carries a higher risk of external disturbances. In order to dampen and soften

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said disruption, larger foreign exchange reserves are needed. In international finance, the "international reserves" term includes monetary gold, Special Drawing Rights (SDR), cash and deposits abroad, securities in foreign currencies and a country's reserves position with the International Monetary Fund (IMF). Considering that the National Bank of Serbia (NBS) uses the term "foreign exchange reserves" instead of the term "international reserves" in the same scope as the term "international reserves" (NBS, 2020, 110), the term "foreign exchange reserves" is used in this paper as in the NBS as a synonym for "international reserves". The question of the optimal level of every country's foreign exchange reserves has been attracting economists' attention for a long time. Many research papers and empirical research studies are dedicated to this topic. They can generally be divided into two groups. The first group contains the papers that investigate the optimal level of foreign exchange reserves (Frenkel & Jovanovic, 1981; Jeanne & Rancière, 2011; Aizenman & Sun, 2012; IMF, 2015). The second group includes the papers that investigate the factors influencing foreign exchange reserve accumulation (Bahmani-Oskooee & Brown, 2002; Rogoff, Hussain, Mody, Brooks & Oomes, 2004; Sula, 2011; Bruno & Shin, 2015; Bošnjak, Bilas & Kordić, 2020).

The subject matter of the research study conducted in this paper implies considering the adequacy of foreign exchange reserves in the Republic of Serbia (RS), taking into account the usual criteria from the literature on international economics. The motivation for this research stems from the fact that, in recent decades, Emerging Market Economies (EMEs) have shown a tendency to increase their foreign exchange reserves. The empirical research shows that the countries with larger amounts of foreign exchange reserves have found it easier to deal with external shocks due to financial crises (Davis, Cowley & Morris, 2018). Bearing in mind the impact of the 2008-2009 global economic and financial crisis on the world economy, as well as the effects of the COVID-19 pandemic on world trade and international capital flows, it is necessary to review and analyze the current level of foreign exchange reserves in RS.

The aim of this paper is to assess the extent to which Serbia's foreign exchange reserves meet international standards, taking into account relevant criteria. In addition to that, the research study is aimed at assessing the impact of those relevant factors on the accumulation of foreign exchange reserves in RS by applying an appropriate econometric model. The findings should serve as recommendations in the implementation of an adequate foreign exchange reserve policy in the future.

Starting from the research subject and goal, the research hypotheses are as follows:

H1: The GDP, the appreciation of the REER of the dinar and Serbia's money supply significantly affect the volume of foreign exchange reserves.

H2: The current level of Serbia's foreign exchange reserves is adequate according to the relevant indicators.

H3: The level of the openness of the economy and the foreign capital stock in the Republic of Serbia suggest a need for strengthening foreign exchange reserves in the future.

In accordance with the objectives of the research study, the basic indicators for the assessment of the adequacy of the current level of foreign exchange reserves in RS are analyzed in this paper. Bearing in mind the openness of the Serbian economy and the accumulated net-debt external position, as well as the cyclical trends of the world economy and the occurrence of crises, the emphasis is put on considering the impact of precautionary motives in creating foreign exchange reserves. Although these are traditional motives, international financial fluctuations (as a side effect of economic and financial crises) reaffirm the attractiveness of these reasons for the creation of an adequate level of foreign exchange reserves. Hereinafter, an econometric model is used as a satisfactory framework in order to analyze the impact of the selected variables on the accumulation of foreign exchange reserves in RS. The cointegrating equation is estimated by using the said model.

In addition to the Introduction, the paper is organized into three parts and the Conclusion. The first part is

a review of the empirical literature. The second part refers to the stylized facts about the accumulation of foreign exchange reserves in RS. In the third part, the data and methodology of the research study are described and the results of the applied econometric model are presented and discussed. In the Conclusion, the main findings of the research study and the implications for the future accumulation of foreign exchange reserves in RS are presented together with the limitations and directions for future research in this area.

LITERATURE REVIEW

The literature on the optimal level of foreign exchange reserves and the reasons for their growth in EMEs since the 1990s is quite extensive. Recently, the drivers of foreign exchange reserve accumulation and the indicators used to determine foreign exchange reserve adequacy have been reexamined. Foreign exchange reserves are mainly accumulated as a result of a country's certain goals, which include economic growth, the price stability, financial fluctuations prevention, export competitiveness protection (central bank interventions on the foreign-exchange market so as to prevent the appreciation of the national currency), foreign exchange management, and so on (Ho & McCauley, 2003; Aizenman & Lee, 2007; Magud & Sosa, 2010; Aizenman, Yin-Wong & Ito, 2014; Ghosh, Ostry & Qureshi, 2017; Jones, 2018; Arslan & Cantú, 2019; Hofmann, Song Shin & Villamizar-Villegas, 2019).

Although foreign exchange reserves bring significant benefits to a country, there is a substantial cost associated with a large amount of such reserves. D. Rodrik (2006) points out the fact that these costs arise because interest rates on foreign exchange reserves are lower than interest rates on foreign borrowings. Based on this difference, he finds that the cost of foreign exchange reserves in EMEs is close to 1% of their GDP (Arslan & Cantú, 2019, 11). However, E. Levy-Yeyati (2008) argues that the previous calculation does not take into account the fact that a smaller amount of foreign exchange reserves would raise interest rates on foreign loans, so that actual costs are lower than D. Rodrik's (2006) estimate. In addition to that, the foreign exchange reserves of EME central banks have significantly been diversified in recent years, aimed at increasing yields. In any case, the costs of insufficient foreign exchange reserves to defend a country's financial system affected by an external shock may be higher and more painful than the costs incurred due to the accumulation of foreign exchange reserves. Of course, it is necessary to determine the optimal level of foreign exchange reserves, taking into account a number of factors. O. Blanchard and G. Adler (2015) prove that central bank interventions on the foreign exchange market may help to mitigate the shocks in capital flows to the exchange rate and capital account.

M. Fratzscher, O. Gloede, L. Menkhoff, L. Sarno and T. Stöhr (2019) confirmed the effectiveness of central bank interventions in mitigating the exchange rate volatility although they do not provide convincing evidence of the impact of interventions on the exchange rate itself. New country-specific analyses are less convincing in proving the effectiveness of interventions. Using data on daily interventions in Brazil between 2011 and 2015, M. Janot and L. Macedo (2016) point out the fact that an unexpected intervention affects the exchange rate level to some extent, but it does not affect the exchange rate volatility. P. Agenor and L. Pereira da Silva (2018) emphasize the fact that, in countries with high financial dollarization, interventions on the foreign exchange market are motivated by financial stability. Therefore, they believe that interventions on the foreign exchange market can be understood as a part of the macroprudential package. J-P. Allegret and A. Allegret (2018) point out the fact that the accumulation of foreign exchange reserves increases the macroeconomic resilience of the domestic economy to external shocks. S. Davis, M. B. Devereux and C. Yu (2020) argue that intervention on the foreign exchange market can be used to avoid sudden stoppages in capital inflows in a small open economy with emerging markets. N. Popovska-Kamnar, M. Nikolov and A. Sulejmani (2016) analyzed the determinants of foreign exchange reserves in the Republic of Macedonia using the quarterly data for the period from 2004 to 2016. The empirical evidence in that paper of theirs, including

an ordinary least squares estimation, showed that there was a significant relationship between foreign exchange reserves, as the dependent variable, and reference interest rates, the unit value of imports, the nominal GDP and the exchange rate (euro/denar), as the independent variables. The authors concluded that the exchange rate had the greatest impact on the level of foreign exchange reserves.

M. Bošnjak *et al* (2020) applied quantile regression in doing research into the determinants of foreign exchange reserves in RS and Northern Macedonia. Based on the quarterly data for the period from 2005q1 to 2019q1, the authors showed that the appreciation of the REER of the dinar supported the increase in Serbian foreign exchange reserves, the relationship being significant in all the observed quintiles. They also found that the monetary aggregate M2/GDP had an impact on the growth of foreign exchange reserves in RS, whereas the impact the GDP exerted on the growth of foreign exchange reserves was not significant. Unlike RS, the empirical evidence for Northern Macedonia showed that the GDP level was a significant determinant of the level of foreign exchange reserves, whereas the impact of REER was mixed, individually by quantiles. The same methodology was applied by Bošnjak *et al* (2019) in their research into the factors that affected the accumulation of foreign exchange reserves in Croatia. The results showed that the GDP (at constant prices) and the nominal exchange rate against the euro (daily, at the end of the period) were the significant factors of international foreign exchange reserves in the Republic of Croatia. At higher levels of foreign exchange reserves, their elasticity increased. The authors found that the elasticity of Croatia's foreign exchange reserves to changes in the exchange rate lost its statistical significance at a level above the seventh decile.

STYLIZED FACTS

EMEs' foreign exchange reserves have been growing since the early 1990s. Their average level increased from 5% of the GDP in 1990 to 30% of the GDP in 2018 (Arslan & Cantú, 2019, 2). Central banks accumulate foreign exchange reserves for various reasons. As a rule, the crises of the 1980s to date have carried the risk of a sudden interruption of capital flows, which might cause disturbances in the financial system and significantly disrupt economic growth. During the 2008-2009 global financial crisis, the EMEs that held a relatively higher amount of foreign exchange reserves experienced a lesser depreciation of the national currency (Davis *et al*, 2018). The central banks that hold large foreign exchange reserves can efficiently use them in the times of stress so as to provide foreign exchange liquidity to domestic financial institutions and nonfinancial companies, all in order to alleviate the consequences of the reduced lending activity. Small open economies are particularly exposed to disturbances in foreign trade (Ghosh, Ostry & Tsangarides, 2014) and their capital account is sensitive to interruptions in the foreign fund inflow (Obstfeld, Shambaugh & Taylor, 2010; Borio & Disyatat, 2015; Alberola, Erce & Serena, 2016). Accompanied by the growth of capital flows over the past few decades, financial globalization has created a satisfactory framework for the rapid transmission of external shocks. Therefore, cautionary motives for increasing foreign exchange reserves have strengthened in EMEs, serving as a shock absorber which should absorb transient shocks to the balance of payments. A higher amount of foreign exchange reserves also acts as a deterrent to currency speculation.

L. Cabezas and J. De Gregorio (2019) point out the fact that speculation prevention was a strong motive for the increase in foreign exchange reserves during the 2000s. The reserves can discourage speculators even when they are not being used. An increase in foreign exchange reserves can also be seen as a strategy to prevent the appreciation of the national currency, thus preserving export competitiveness (Aizenman & Lee, 2007; Rodrik, 2008). This is especially important for countries with a trade deficit and a current account deficit. In doing so, each country defines the appropriate level of foreign exchange reserves based on several indicators. Numerous indicators of the adequate level of foreign exchange reserves are given in the literature. Each one of them starts from protection against individual risks. Foreign exchange reserves have the task to enable a country

to achieve satisfactory external liquidity and prevent disturbances in the domestic financial system in the cases of external or internal shocks. Using foreign exchange reserves to maintain financial stability, countries protect their banking sectors. This role of foreign exchange reserves is especially noticeable in the countries where foreign-owned banks play the dominant role in the banking system.

In this paper, several selected indicators are used to assess the adequate level of foreign exchange reserves in RS. Unless otherwise indicated, foreign exchange reserves in RS mean the net foreign exchange reserves of the NBS (the foreign exchange reserves of the NBS not including the foreign exchange reserves of commercial banks). If banks' foreign exchange reserves are included, then they are gross foreign exchange reserves. The dynamics of foreign exchange reserves and their relationship to the short-term debt and GDP of RS are shown in Figure 1.

The accumulation of Serbia's foreign exchange reserves is taking place in parallel with the growth of the GDP and an increase in the country's openness. At the end of September 2020, the NBS's foreign exchange reserves reached the equivalent of 13 billion euros (28.2% of the GDP in the third quarter of 2020, Figure 1; data are given in the Annex, Table A), which is almost three times greater than it was in 2005. The quantity of foreign exchange reserves is typically related to the value of the imports of goods and services, where the amount that covers the quarterly value of the imports of goods and services is the reference value. The value of this indicator for RS exceeds the usual reference value, with oscillations from 9.7 months in 2009 to 5.4 months in 2018 (this indicator focuses on the current account and is especially important in the countries with limited access to the international capital market). Although this indicator belongs to traditional foreign exchange reserve adequacy measures, it is still used by international financial institutions. The important indicator of foreign exchange reserve adequacy is their ratio to the GDP. In recent years, this indicator in Serbia has been around 30%, which coincides with the average realized value for EMEs (Arslan & Cantü, 2019, 2).

The ratio of foreign exchange reserves to the short-term external debt with remaining maturity is also one of the most broadly used indicators of foreign exchange reserve adequacy, being the measure

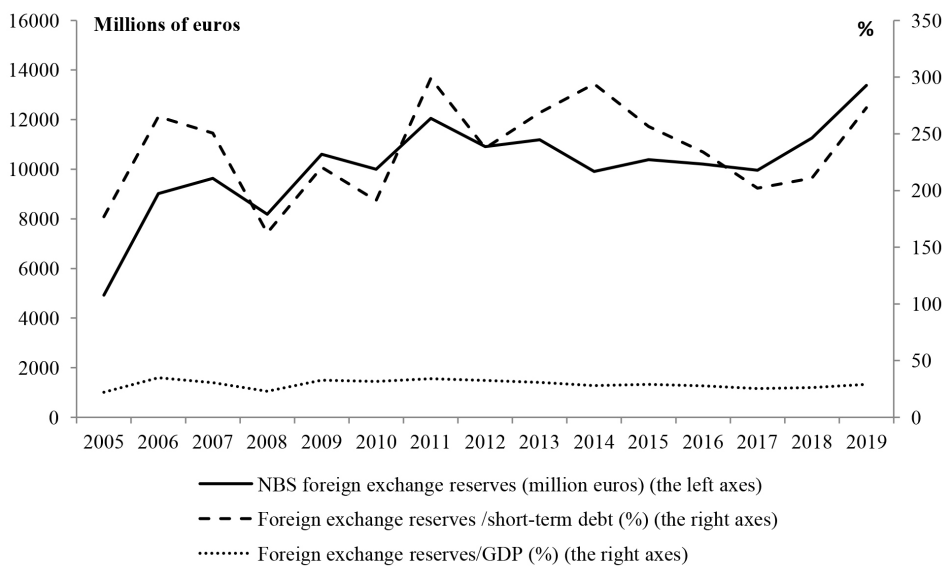

Figure 1 Serbia's foreign exchange reserves

Source: Author, based on: Table A (in Appendix)

of potential demand for foreign exchange on the foreign exchange market needed to repay a short-term external debt. The coverage ratio of 100% is considered as desirable. (Jeanne & Rancière, 2011, estimate that the optimal ratio of foreign exchange reserves to a short-term debt ranges from 90 to 100% if a sudden break in capital inflows is greater than 10% of the GDP.) This indicator of Serbia's external liquidity was around 270% in 2019, with a tendency to decrease in 2020. Its value indicates that Serbia's external liquidity is satisfactory, which facilitated the strike of the 2008-2009 crisis, certainly contributing to internal macroeconomic stability during the crisis caused by the COVID-19 coronavirus pandemic. In the cases of shocks abroad or disturbances in the country, a short-term debt may quickly 'leave' the country instead of the revolving in a usual manner, thus exerting pressure on the domestic currency. Therefore, keeping a short-term debt under control is an important prerequisite for external liquidity maintenance.

In relation to the money supply M_1, the NBS level of foreign exchange reserves has been providing coverage for money supply over 160% in recent years (in 2015, the coverage was 250%, only to decrease and fall to 136% in the third quarter of 2020) (see the Annex, Table A). The downward trend in this indicator in 2020 is a consequence of the stronger growth of M_1, which can turn into increased demand for foreign exchange on the foreign exchange market. In the literature, the ratio of foreign exchange reserves and a broader money supply aggregate, M_2, is used as a measure of the adequate level of foreign exchange reserves. This indicator is the measure of potential demand for foreign exchange from domestic sources. It is considered as relevant for the countries with developed financial markets and open capital accounts. The optimal benchmark is usually 20% (Arslan & Cantú, 2019, 5).

At the end of 2019, foreign exchange reserves in Serbia provided coverage for the M_3 money supply with 55.7% (according to the NBS, foreign exchange reserves in the amount of 20% of the M_3 money supply are considered as optimal; NBS, 2019, 25). The maintenance of the current level of external liquidity is particularly important if the fact that the NBS sold 1450 million euros net on the foreign exchange market in 2020 in order to maintain its relative stability is appreciated. The role of foreign exchange reserves in the context of a flexible exchange rate is to maintain the country's financial credibility by reducing the costs of excessive dinar exchange rate volatility and mitigate the risk of a sudden capital outflow from the country, too. In order to preserve the value of foreign exchange reserves, the NBS increased the share of gold in foreign exchange reserves to about 13% at the end of November 2020 in addition to the diversification by currencies and instruments.

In order to more accurately assess foreign exchange reserve adequacy, the NBS has constructed the indicator called "the right measure for Serbia", the concept of which is a modification of the Greenspan-Guidotti indicator (Guidotti, Sturzenegger & Villar, 2004) and whose task is to take into account the specifics of the Serbian economy. According to this indicator, the level of foreign exchange that provides coverage for several potential sources of demand for a foreign currency (the short-term debt by remaining maturity, the current account deficit adjusted for net FDIs, 15% foreign currency and foreign exchange indexed and 5% dinar corporate and household deposits) is accepted as an adequate level of foreign exchange reserves (NBS, 2011, 17). At the end of 2019, this composite indicator amounted to 187.7%, which means that the level of Serbia's foreign exchange reserves was 87.7% higher than the required amount according to this indicator. Although this indicator is adjusted for the Serbian economy, it starts from the assumption that the net inflow of FDIs is a stable source of financing, because the amount of the current account deficit is adjusted by the amount of the net inflow of FDIs.

In our opinion, it would be more expedient to increase foreign exchange reserve adequacy by the amount of foreign investors' dividends instead of the corrected current account deficit with a net FDI inflow, because they can be repatriated quickly (for the time being, they are mostly reinvested in RS). There are also convincing reasons for the inclusion of a part of foreign portfolio investments in this indicator. Namely, in the case of an internal or external shock, a part of the total portfolio investments may be converted into

short-term capital to flee the country. These reasons justify the inclusion of these two aggregates together with the other above-mentioned components in the specific indicator of Serbia's foreign exchange reserve adequacy. The fact that, according to the O. Jeane and R. Ranciere (2011) model, the optimal level of Serbia's foreign exchange reserves at the end of 2019 was confirmed by all the five stress scenarios should also be noted. The optimal level of foreign exchange reserves in this model includes the size and probability of sudden stagnation in capital inflows, a potential loss of production and consumption, the opportunity cost of holding reserves and a risk aversion degree. Stress scenarios involve different sizes of shocks (NBS, 2011, 18). As a small open economy, Serbia is characterized by the existence of a current account deficit, which is primarily generated by a trade deficit (Figure 2). Given the structural nature of the trade deficit, it is not surprising that there is a correlation between economic growth and an increase in Serbia's trade deficit. Therefore, economic growth and the GDP affect foreign exchange reserves.

The Serbian economy has experienced growth in 'openness' since 2001, which coincides with the higher rates of economic growth and the increase in the trade deficit and the current account deficit until 2008. The growth of the economy based on the existing economic structure led to the broadening of the current account deficit, which had to lead to an increase in the foreign debt, with the dynamic inflow of Foreign Direct Investment (FDI). The underlying cause for the current account deficit is the trade deficit. These developments suggested an increase in foreign exchange reserves. Since the outbreak of the global economic and financial crisis of 2008-2009, Serbia's slow economic growth has led to a reduction in the current account deficit, while the economic openness has increased. The rest of the current account deficit is covered by borrowing from abroad, and nearly by net FDI inflows (Figure 3).

After rescheduling and the write-off with the Paris and London Clubs, Serbia's external debt began to increase in 2004. The growing trend of the external debt did not even stop in 2009, the economy having fallen into recession. The debt-to-GDP ratio also grew. The additional effect was an increase in the debt repayment as a percentage of the GDP. This fact will likely become more pronounced with the expected post-crisis increase in interest rates on the international capital market. An increase in foreign

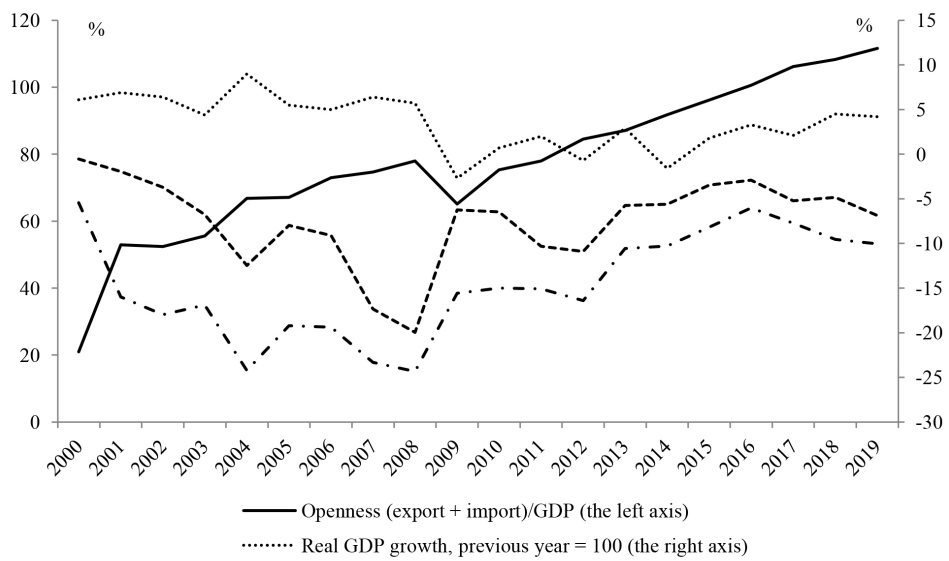

Figure 2 Serbia's current account balance and trade balance

Source: Author, based on: Table B (in Appendix)

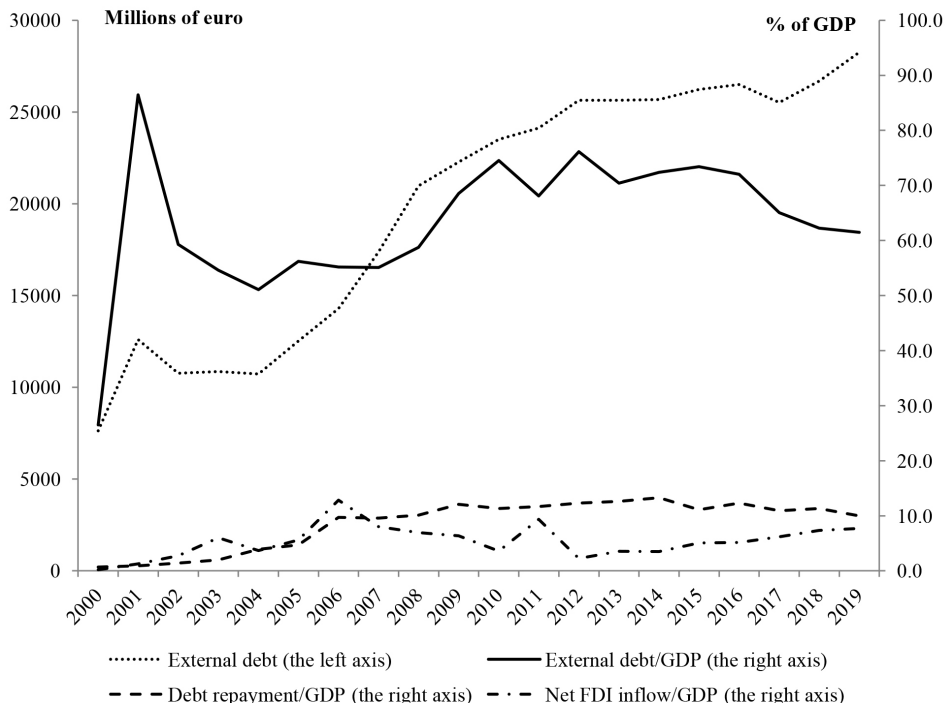

Figure 3 Serbia's external debt

Source: Author, based on: Table C (in Appendix)

debt servicing means higher demand on the foreign exchange market and increases in foreign exchange expenditures. Therefore, foreign exchange reserves should be sufficient to ensure the repayment of the external debt according to maturity.

FDI is a significant channel, through which capital comes into RS. The FDI net inflow is uneven with occasional jumps (Figure 3). Since 2012, there has been a growing relationship between the net FDI inflows and the GDP. The total net inflow of financial resources from abroad has enabled coverage for the current account deficit and the growth of foreign exchange reserves. Over time, the total amount of the external debt has increased, so that it is necessary to provide a satisfactory level of foreign exchange reserves to debt service payment in the future. In addition to that, the greater openness and liberalization of capital accounts increase sensitivity to sudden reversals in capital flows. Given the fact that foreign exchange reserves are expected to amortize sudden external shocks, their level should be harmonized with the scale of the potential capital withdrawal from RS. In crisis circumstances, foreign exchange reserves are responsible for financing the current account deficit, the orderly servicing of the public external debt to foreign creditors and preserving the stability of the financial sector. These tasks should be taken into account when assessing foreign exchange reserve adequacy. In the literature, the P. Guidotti *et al* (2004) rule is applied in order to assess foreign exchange reserve adequacy from the point of view of a country's ability to regularly service its external debt during the year.

Foreign exchange reserve adequacy should also be considered in the environment of possible future outflows conditioned upon the state of liabilities to foreign residents. Serbia's international investment position can be the starting point for assessing the level of its foreign exchange reserve adequacy. The data show that Serbia's net international investment position amounted to EUR -42.3 billion on 30th September 2020. The FDI stock in the country was EUR

40.9 billion (equity capital being about EUR 30 billion, which included EUR 7.2 billion of the reinvested profit) and the debt instruments of EUR 10.9 billion. The foreign resident's investment portfolio amounted to EUR 6.5 billion. Government loans were EUR 10.1 billion and government securities (bonds) amounted to EUR 6.5 billion.

The gross external debt stock in EUR was 30.7 billion as of 30th September 2020, the total external public debt stock in EUR was 15.1 billion (which is the general level of the Government, whereas the central government debt was EUR 14.9 billion), and the private sector's debt (the banks, companies and other sectors for which no guarantee was granted by the Government) was EUR 15.6 billion (the medium and long-term debts were EUR 13.1 billion, of which the banks accounted for EUR 2.3 billion and the companies accounted for EUR 10.8 billion, and the short-term debt was EUR 2.5 billion (the banks accounted for EUR 1.5 billion and the companies accounted for EUR 895 million). According to the FDI stock, it is noted that their net inflow generates additional potential outflows in the primary income account of the balance of payments, with possible increasing pressure on capital outflows. In this case, the NBS interventions on the foreign exchange market would lead to a decrease in foreign exchange reserves. This happened to EMEs before the outbreak of the global economic and financial crises of 2008-2009 (Menciger, 2009, 15). This is important for RS, keeping in mind the FDI stock in the country, as well as the volume of the portfolio investments that can be withdrawn from the domestic financial market in a short time.

EMPIRICAL ANALYSIS

Data description and the research methodology

The data about the dinar REER (consumer prices), foreign exchange reserves and the money supply aggregate M_2 were taken from the NBS website, whereas the data about the GDP at constant prices (chained values 2015) were taken from the website of the Statistical Office of the Republic of Serbia (SORS). The timeseries representing the relationship between M_2 and the GDP was calculated based on the chain values of the GDP, where the reference year was 2015. The analysis is based on the quarterly data for the period from 2002q1 to 2020q3. The data of the timeseries are logarithmic (natural logarithms), so that the estimated cointegration equation coefficients are elasticity coefficients. Following the studies (Obstfeld *et al*, 2010; Ghosh *et al*, 2014; Aizenman *et al*, 2014), regression analysis was applied in order to assess how precautionary motives and exchange rates affect Serbia's foreign exchange reserves.

The applied empirical model can be presented as follows:

$$ln(DRNBS) = \beta_0 + \beta_1\, ln(BDP) + \beta_2\, ln(REDK) + \beta_3\, ln(M_2/BDP) + \varepsilon \quad (1)$$

where the *FERNBS* dependent variable represents the NBS net foreign exchange reserves (excluding the banks' foreign exchange reserves), the GDP is the GDP at constant prices (the chained volume measures, reference 2015), and REER is the real effective exchange rate (calculated by using consumer prices). An index above 100 shows the appreciation of the dinar, and that below 100 shows the depreciation of the dinar. M_2/GDP is the ratio between the aggregate of the money supply M_2 and the GDP, and ε is a random error. The indicator M_2/GDP measures potential demand for foreign assets from domestic sources and is becoming increasingly important along with the development of the domestic financial market and the opening of capital accounts (Obstfeld *et al*, 2010).

Before the previous model was estimated (the model was estimated by using the EViews 12 statistical-econometric software package), the stationarity of the timeseries was checked. The following standard tests are used to check timeseries stationarity: the Augmented Dickey-Fuller (ADF) test (Dickey-Fuller, 1979), the PP (Phillips & Perron, 1988) test, the ERS (Elliott, Rothenberg, & Stock, 1996) test, and the KPSS (Kwiatkowski, Phillips, Schmidt & Shin, 1992) test. Since the majority of the unit root tests (the results are given in the Appendix, Table D) showed

that the series was integrated of order I(1), so we proceeded to doing the cointegration test using the S. Johansen (1991) test. The results are given in the Appendix, Table E. Based on the trace statistics and the maximum eigenvalue statistics, it was concluded that there was one cointegration regression equation. The cointegrating equation (1) was then estimated by using the two estimators: the Fully Modified Least Squares (FMOLS) (Philips & Hansen, 1990) and the Dynamic Least Squares (DOLS) (Saikkoken, 1992) estimators. The intercept and the trend are the deterministic components in the cointegration equation. A long-run covariance (Bartlett kernel, Newey-West fixed bandwidth 4.0000) was estimated. The estimated cointegration parameters of the regression equation are statistically significant. Autocorrelation in the residuals of the estimated equation is negligible, and the residuals do not have a unit root and are normally distributed. The B. E. Hansen (1992) parameter instability test showed that the estimated parameters were stable. Thus, the estimated model has satisfactory statistical properties.

Empirical results and discussion

In this section, the obtained empirical research results are presented. Table 1 provides the descriptive statistics of the variables used in this study.

Table 1 shows that the mean value of the observed variables is positive, except for the M_2/GDP ratio. The foreign exchange reserves and the M_2/GDP ratio have the largest standard deviation (0.26), which shows the dispersion of the timeseries. Based on the Jarque-Bera test statistics for the FERNBS and GDP series, the hypothesis of normal distribution at the 1% level, as well as for the REER series at the 5% level (but not at the 1% significance level) is rejected, whereas the M_2/GDP series is normally distributed at the 1% significance level. The skewness coefficients for all the four timeseries are less than zero, which indicates the fact that their empirical distribution is asymmetric to the left. The value coefficient of the kurtosis for the FERNBS and GDP series is greater than 3, suggesting that the tails of the empirical distribution of these series are heavier than the tails of the normal distribution. This is a consequence of the sharp increase in foreign exchange reserves until 2008

Table 1 The descriptive statistics of the observed variables

	FERNBS	GDP	REER	M_2/BDP
Mean	3.878965	6.003333	2.064133	-0.407600
Median	3.993701	6.020000	2.072985	-0.380000
Maximum	4.144761	6.120000	2.148603	0.090000
Minimum	3.050380	5.780000	1.948413	-0.900000
Std. Dev.	0.264920	0.071723	0.042059	0.256930
Skewness	-1.509808	-1.119420	-0.783465	-0.303860
Kurtosis	3.996558	4.014990	2.850156	2.176581
Jarque-Bera	31.59754	18.88314	7.742891	3.272949
Probability	0.000000*	0.000079*	0.020828**	0.194665
Sum	290.9224	450.2500	154.8100	-30.57000
Sum Sq. Dev.	5.193523	0.380667	0.130903	4.884968
Observations	75	75	75	75

Note: *p<1%; ** p<5%.

Source: Author

and subsequent slower growth. However, the value coefficient of the kurtosis for the timeseries REER and M_2/GDP is less than 3, which means that the tails are lighter than those of the normal distribution. The results of the estimation according to the equation (1) are given in Table 2.

According to both estimators, the estimates of the cointegrating parameters show that there is a positive relationship between foreign exchange reserves and the observed determinants. The estimated coefficients are statistically significant at the 1% level, except for the REER coefficient, which indicates it is statistically significant at the 0.10% level. The positive value of the GDP coefficient confirms that the GDP and foreign exchange reserves simultaneously grow (the finding differs from the assessment presented in the paper by M. Bošnjak *et al*, 2020). This relationship is expected because an increase in the GDP in an open economy leads to an increase in imports and exports, which requires an increase in foreign exchange reserves as a guarantee of ordinary foreign payments in the event of the balance of payments strike.

The GDP coefficient obtained according to the FMOLS model shows that 1% of the GDP growth leads to an increase in foreign exchange reserves by 2.1%. This finding coincides with the theoretical assumptions, also indicating the need to increase Serbia's foreign exchange reserves in line with the expected economic growth. The GDP growth also means residents' income growth, so that the growth of their demand for imports can be expected, as well as the growth of foreign exchange demand for tourist trips abroad and other reasons for staying abroad. Therefore, the GDP is an important factor for foreign exchange reserves accumulation.

The estimated REER coefficients also confirm the theoretical expectation that real appreciation leads to an increase in foreign exchange reserves. Real appreciation pressure on the dinar stemmed from

Table 2 The determinants of foreign exchange reserves in Serbia for the period 2002Q2-2020Q3

	FMOLS		*DOLS*	
Constant	Coeff. (Std. Error)	-10.70778 (2.694493)	Coeff. (Std. Error)	-9.216314 (2.643371)
	Prob. (p)	0.0002	Prob. (p)	0.0008
GDP	Coeff. (Std. Error)	2.094727 (0.508849)	Coeff. (Std. Error)	1.870496 (0.509928)
	Prob. (p)	0.0001	Prob. (p)	0.0005
REER	Coeff. (Std. Error)	1.316221 (0.720574)	Coeff. (Std. Error)	1.306247
	Prob. (p)	0.0721	Prob. (p)	0.0882
M_2/GDP	Coeff. (Std. Error)	0.913378 (0.354560)	Coeff. (Std. Error)	1.117044 (9.371815)
	Prob. (p)	0.0121	Prob. (p)	0.0037
Trend	Coeff. (Std. Error)	-0.008860 (0.003829)	Coeff. (Std. Error)	-0.010132 (0.004012)
	Prob. (p)	0.0237	Prob. (p)	0.0138
R^2	0.913966		0.927170	
Adjusted R^2	0.908979		0.923009	
S.E. of regression	0.074887		0.073508	
DW stat.	0.675840		0.544003	
S.D. dependent var.	0.248218		0.264920	
Long-run variance	0.014007		0.015417	
Observations (after adjustment)	74		75	

Source: Author

the foreign capital inflow through borrowing, portfolio investment and FDIs. The net capital inflows from all the sources larger than the negative current account balance put pressure on the foreign exchange market towards the appreciation of the dinar. The NBS interventions on the foreign exchange market amortized the surplus of foreign exchange supply, having converted it into foreign exchange reserves, thus preventing the excessive appreciation of the domestic currency. The estimates given in Table 1 show that the monetary aggregate M_2/GDP is also a significant determinant of Serbia's foreign exchange reserves. An increase in this aggregate is a precondition for an increase in demand for foreign exchange on the foreign exchange market, so that an increase in foreign exchange reserves (as a shock absorber) is expected to meet this potential growing demand. Therefore, all the three variables in the cointegrating regression equation affect the growth of Serbia's foreign exchange reserves. The regression coefficient estimates in Table 1 also represent the elasticity coefficients, testifying to the strength of the influence of individual factors on foreign exchange reserve accumulation. The elasticity coefficient for the GDP had the highest value, whereas the monetary aggregate M_2/GDP had the lowest. The coefficient estimates suggest that the accumulation of foreign exchange reserves was strongly affected by the level of the economic activity in the country.

CONCLUSION

Based on the findings, a conclusion can be drawn that the current level of Serbia's foreign exchange reserves is higher than their optimal amount defined according to the common indicators. The Johansen cointegration test shows that the GDP, REER and M_2/GDP variables are cointegrated with foreign exchange reserves. Therefore, these variables have a long-term impact on the accumulation of foreign exchange reserves. Based on the empirical research study carried out in this paper, several conclusions can be drawn.

First, the findings confirm that the GDP, REER and the monetary aggregate M_2/GDP are the important determinants of Serbia's foreign exchange reserves. In the estimated model, foreign exchange reserves show the greatest elasticity to changes in the GDP. Thus, the obtained empirical results confirm the fact that the GDP growth significantly affects an increase in foreign exchange reserves. The expected revival of the world economic growth in the period after the COVID-19 pandemic calming down could stimulate the growth of exports and the GDP in Serbia. However, domestic economic growth is generally associated with an increase in the trade deficit and the current account deficit. Such a scenario would require an increase in foreign exchange reserves as a guarantee for the smooth flow of current payments towards foreign countries. A possible increase in the current account deficit would require an increase in foreign exchange reserves to the level that would compensate for the absence of autonomous net capital inflows.

The empirical findings also confirm the fact that the influence of the appreciation of the REER of the dinar on the increase in foreign exchange reserves is significant, which actually means that the NBS intervention on the foreign exchange market was aimed at buying foreign exchange in order to prevent an excessive appreciation of the dinar as it might undermine the competitiveness of the country's export prices. The pressure exerted by the exchange market is derived from a net capital inflow. This finding confirms the importance of the NBS intervention on the foreign exchange market intended to prevent the appreciation of the dinar. Although these interventions represent but one channel for the implementation of an inflation-targeting regime, they do have an impact on foreign exchange reserves. Their accumulation facilitates potential interventions in the opposite direction in the event of an increased outflow of capital from the country due to some external shock. The net sale of the NBS foreign exchange on the foreign exchange market in 2020 confirmed the fact that an increase in the capital outflow and a decline in foreign exchange reserves was a possible option for the future.

The relationship between the M_2/GDP growth rates and foreign exchange reserves suggests that

the growth of this indicator creates satisfactory conditions for an increase in imports, and thus an increase in foreign exchange demand in order to pay for imports. Also, the growth of this indicator indicates the growing power of companies and individuals to buy foreign assets when confidence in the domestic economy is weakening. As this would lead to an outflow of capital from the country, a larger amount of foreign exchange reserves is needed to meet increased demand for foreign exchange, thus simultaneously preventing an excessive depreciation of the domestic currency. Avoiding an extreme currency depreciation can be a strong motivating factor for maintaining an adequate level of foreign exchange reserves. If a possible increase in domestic residents' investment in foreign assets is added to the said, their demand for foreign exchange may be even greater than that potentially caused by a sudden stop in capital inflows. Therefore, it can be said that the empirical research conducted in this paper has confirmed the first research hypothesis, according to which the GDP, REER and the monetary aggregate M_2/GDP are the significant determinants of foreign exchange reserves in Serbia.

Second, the fact that the existing amount of foreign exchange reserves in Serbia can be considered as satisfactory because it is even higher than the estimated adequate level according to the standard indicators of individual risks has already been pointed out. One of the most frequently used indicators for assessing the adequacy of foreign exchange reserves (monthly imports of goods and services coverage) is almost twice as big as the standardized quarterly amount. The other indicators also have the values greater than the usual thresholds, which has confirmed the second starting hypothesis of the presented research study. The current fulfillment of the optimality criteria, however, should not deceive monetary policymakers. Namely, the expected revival of economic growth has a potential to increase the imports of goods and services (the increase in the M_2/GDP ratio in 2020 also contributes to this), which may increase the trade balance deficit and thus the current account deficit as well, which would require an increase in foreign exchange reserves for prudent reasons compared to their current level.

Third, Serbia's external debt significantly increased in 2020 compared to the end of 2019. It is still, however, below 80% of the GDP, which can be considered as a high level of the external debt, which increases the annual debt repayment-to-GDP ratio. An additional cost of increasing the external debt is the mismatch between higher interest rates on the external debt and the lower rates of return on foreign exchange reserves. A potential rise in interest rates on the international capital market would increase the amount of servicing the external debt, which might exert additional pressure on an increase in foreign exchange reserves.

Fourth, the FDI stock in RS generates dividends greatly exceeding one billion euros annually. These amounts are being reinvested for the time being, but potential major disturbances on the world market or a disruption of internal stability might redirect dividends to repatriation, in which case there would be an increase in demand for foreign exchange on the foreign exchange market, which would require the NBS interventions in order to prevent excessive daily fluctuations of the exchange rate and enable normal cross-border capital flows. This means that this potential impact should also be taken into account in determining the optimal level of foreign exchange reserves. A possible further FDI net inflow into the Serbian economy would increase the foreign capital stock, with a tendency to increase the future outflow of dividends. The share of intercompany loans as a short-term source of capital in total capital flows is increasing, which is also a foreign exchange outflow at the time of repayment. Certainly, these capital flows should be taken into consideration when designing the optimal amount of foreign exchange reserves in RS. On the other hand, an adequate level of foreign exchange reserves that takes into account these capital flows can strengthen investors' confidence and increase investment and economic growth. The construction of the specific indicator of the optimality of foreign exchange reserves in RS, which would take into account a possible outflow of dividends some types of portfolio capital as well, is proposed in this paper.

The identified tendencies and factors of foreign exchange reserve accumulation suggest that it should

also be kept in mind that there are limitations of further borrowing abroad as a source to cover the current account deficit. However, if the net capital inflow is smaller than the current account deficit, then the difference must be covered from foreign exchange reserves, which would mean their rapid reduction. The question of what amount of foreign exchange reserves is available for interventions on the foreign exchange market also arises. Although it is not possible to precisely answer this question, it should be remembered that the assessment of foreign exchange reserve adequacy made in this paper is based on the NBS net foreign exchange reserves (excluding the banks' foreign exchange reserves). However, it is useful to keep in mind the fact that, according to the IMF criteria, a certain amount of the NBS foreign exchange reserves are the so-called permanent foreign exchange reserves, which may only be spent in an extremely critical situation, which fact actually means that the amount available for interventions on the foreign exchange market is equal to the difference between the NBS net foreign exchange reserves and the level of the permanent foreign exchange reserves. Increasing the exports of goods and services is a way to achieve a moderate trade deficit and Serbia's current account deficit, which, with a low level of short-term external indebtedness, can significantly reduce the pressure on increasing foreign exchange reserves for prudent reasons. However, the growing stock of total foreign capital in the Republic of Serbia is putting pressure on increasing foreign exchange reserves only for prudential reasons. The effects of these factors are intertwined and require the accumulation of foreign exchange reserves at an adequate level in changing circumstances. We should always bear in mind the fact that foreign exchange reserves are accumulated at a favorable time and allow the NBS to spend them when bad times have come, thus increasing economic resilience.

The fact that the results of the empirical research study conducted in this paper agree with similar analyses available in the literature (Magud & Sosa, 2010; Sula, 2011; Bruno & Shin, 2015; partly Bošnjak *et al*, 2020) and that they confirm the initial hypotheses can be highlighted. The findings have both theoretical and practical implications. The theoretical contribution is contained in the recommendations for assessing the level of foreign exchange reserve adequacy in Serbia, taking into consideration foreign investors' dividends and a part of foreign portfolio investments, in which way another specific sensitivity indicator derived from the stock of foreign capital in the Serbian economy would be constructed. The empirical findings also have a practical dimension. Namely, they send messages to policymakers that additional borrowing from abroad should be handled with caution, because the repayment-to-GDP ratio increases, demand for an increase in prudent foreign exchange reserves increasing as well. Given the fact that holding reserves generates high opportunity costs, it is necessary that specific economic policy measures should be implemented in order to increase exports and reduce the trade deficit and the current account deficit.

The paper also has several limitations. First of all, this research study is limited in that the structure of foreign portfolio investments in the domestic economy is not included in the analysis. Namely, it is known that, in the case of a crisis, a significant amount of these investments can be converted into short-term capital with a tendency to leave the country. It is not necessary to particularly prove how big pressure this would be on foreign exchange reserves, so their adequacy should be assessed taking into account this factor as well. In addition to the said, the cointegration equation does not directly include the variable representing the openness of the economy, so it can be assumed that the inclusion of this variable would affect the estimates of the other parameters, which could be addressed in future research by including a larger number of variables in the econometric model. Also, future research should take into consideration a potential outflow of dividends when assessing foreign exchange reserve adequacy. The limitation of this paper reflects in the fact that the structural analysis of foreign exchange reserves is not taken into account, which could indicate potential weaknesses due to excessive reliance on a single currency or certain instruments in the allocation of foreign exchange reserves. Therefore, future research should assess the effects of Serbia's foreign exchange reserve management on the level of foreign exchange reserves.

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APPENDIX

Table A Serbia's foreign exchange reserves

	NBS foreign exchange reserves (EUR million)[1]	Foreign exchange reserves - months of the imports of goods and services	Foreign exchange reserves/GDP (%)	Foreign exchange reserves/short-term debt (%)	Foreign exchange reserves/M_1[2] (%)
2005	4922	6.1	22.1	177.0	290.3
2006	9020	9.0	34.8	265.1	356.1
2007	9634	7.5	30.5	250.6	306.7
2008	8182	5.4	22.9	162.6	300.4
2009	10602	9.7	32.6	220.6	393.4
2010	10002	8.4	31.7	191.2	416.6
2011	12056	8.8	34	299.0	429.6
2012	10915	7.7	32.4	237.3	402.1
2013	11189	7.6	30.7	268.6	330.4
2014	9907	6.6	27.9	294.0	278.1
2015	10387	6.7	29.1	256.4	250.2
2016	10205	6.2	27.8	234.0	207.3
2017	9962	5.4	25.4	202.1	176.2
2018	11262	5.4	26.3	210.9	168.0
2019	13378	5.7	29.1	272.9	174.1
2020 Quarter 1	13115	5.5	28.1	249.4	165.3
2020 Quarter 2	13956	6.2	30.2	259.6	147.1
2020 Quarter 3	13030	5.9	28.2	205.2	136.2

Note: [1]The cash equivalent of all the categories that fall into the NBS foreign exchange reserves (gold, special drawing rights, cash and deposits abroad, securities). A broader category of foreign exchange reserves (gross foreign exchange reserves) also includes the foreign exchange assets of banks on the basis of required reserves and on other bases in addition to the NBS foreign exchange reserves; 2Money supply M1 includes cash in circulation and demand deposits. Foreign exchange reserves/M1 -the ratio of foreign exchange reserves and money supply at the end of the observed period; Foreign exchange reserves/imports of goods and services (in months) - the ratio of foreign exchange reserves at the end of the observed period and the average monthly import of goods and services during the last 12 months; Foreign exchange reserves/short-term debt - the ratio of foreign exchange reserves and the short-term debt as per remaining maturity at the end of the observed period.

Source: NBS

Table B Serbia's foreign trade in the Balance of Payments and the real GDP

	Real GDP growth rate, the previous year = 100 (%)	Openness (exports + imports of goods and services/GDP) x 100 (%)	Goods and services (balance) / GDP (%)	Current account (balance) / GDP (%)
2000	6.1	21.0	-5.4	-0.5
2001	6.9	52.9	-16.0	-1.9
2002	6.4	52.4	-18.0	-3.7
2003	4.4	55.6	-16.9	-6.8
2004	9.0	66.8	-24.2	-12.5
2005	5.5	67.1	-19.2	-8.0

2006	5.0	73.0	-19.4	-9.1
2007	6.4	74.7	-23.3	-17.3
2008	5.7	78.0	-24.3	-20.0
2009	-2.7	65.1	-15.6	-6.3
2010	0.7	75.3	-15.0	-6.5
2011	2.0	78.0	-15.1	-10.3
2012	-0.7	84.5	-16.4	-10.9
2013	2.9	87.1	-10.6	-5.8
2014	-1.6	91.8	-10.3	-5.6
2015	1.8	96.2	-8.2	-3.5
2016	3.3	100.6	-6.0	-2.9
2017	2.1	106.2	-7.7	-5.2
2018	4.5	108.3	-9.5	-4.8
2019	4.2	111.6	-10.0	-6.9

Source: NBS

Table C Serbia's external debt

	External debt (EUR million)	External debt/GDP (%)	External Debt/Exports of goods and services (%)	Debt service/GDP (%)
2000	7626	26.5	341.7	0.7
2001	12609	86.4	468.2	0.9
2002	10768	59.3	344.7	1.4
2003	10857	54.6	282.2	2.0
2004	10720	51.1	239.6	3.9
2005	12520	56.2	234.9	4.7
2006	14291	55.2	205.7	9.7
2007	17382	55.1	214.3	9.6
2008	20982	58.8	218.9	10.1
2009	22272	68.6	276.9	12.1
2010	23509	74.5	247.1	11.3
2011	24123	68.1	216.5	11.7
2012	25645	76.1	223.6	12.3
2013	25644	70.4	184.0	12.6
2014	25679	72.4	177.7	13.3
2015	26234	73.4	166.8	11.1
2016	26494	72	152.4	12.3
2017	25526	65.1	132.2	10.9
2018	26682	62.2	126.0	11.3
2019	28254	61.5	121	10.0
2020 I quarter	28738	61.4	121.6	7.5
2020 II quarter	31024	67.0	138.1	6.2

Note: The external debt/exports of goods and services - the ratio of the stock of the external debt at the end of the observed period and the value of the annual exports of goods and services; External debt/GDP - the ratio of the debt at the end of the observed period and the GDP.

Source: NBS

Table D The unit root tests

Variable	Test		Determinis. component	Statistics	Prob. (p)	Included observation	Nonstat. (NS), Stationary (S)
LnFERNBS	ADF	Level	Constant	-4.502589	0.0005	74	S
			Con.& trend	-3.217764	0.0890	74	NS
		1st dif.	Constant	-7.844045	0.0000	73	S
			Con.& trend	-8.220783	0.0000	73	S
	PP	Level	Constant	-4.582933	0.0000	73	S
			Con.& trend	-3.219582	0.0886	74	NS
		1st dif.	Constant	-7.844957	0.0000	73	S
			Con.& trend	-8.287871	0.0000	73	S
	KPSS	Level	Constant	0.842104		75	NS
			Con.& trend	0.532519		75	NS
		1st dif.	Constant	0.948597		74	NS
			Con.& trend	0.150959		74	S
	ERS	Level	Constant	250.0618		75	NS
			Con.& trend	106.4255		75	NS
		1st dif.	Constant	9.307744		74	NS
			Con.& trend	8.256552		74	NS
LnGDP	ADF	Level	Constant	-2.758031	0.0697	70	NS
			Con.& trend	-3.697111	0.0290	70	S
		1st dif.	Constant	-3.244606	0.0215	70	S
			Con.& trend	-3.446021	0.0536	70	S
	PP	Level	Constant	-3.125008	0.0290	74	S
			Con.& trend	-5.171691	0.0003	73	S
		1st dif.	Constant	-17.25767	0.0001	73	S
			Con.& trend	-15.73426	0.0001	73	S
	KPSS	Level	Constant	1.007101		75	NS
			Con.& trend	0.236531		75	NS
		1st dif.	Constant	0.307597		74	S
			Con.& trend	0.134366		74	S
	ERS	Level	Constant	410.8190		75	NS
			Con.& trend	156.7380		75	NS
		1st dif.	Constant	42.85301		74	NS
			Con.& trend	102.9402		74	NS
LnREER	ADF	Level	Constant	-2.190552	0.2115	72	NS
			Con.& trend	-2.189091	0.4881	72	NS
		1st dif.	Constant	-7.151703	0.0000	72	S
			Con.& trend	-7.162933	0.0000	72	S
	PP	Level	Constant	-2.747717	0.0710	74	NS
			Con.& trend	-2.720853	0.2316	74	NS
		1st dif.	Constant	-6.239871	0.0000	73	S
			Con.& trend	-6.235144	0.0000	73	S
	KPSS	Level	Constant	0.662136		75	NS
			Con.& trend	0.204765		75	NS
		1st dif.	Constant	0.179422		74	S
			Con.& trend	0.067781		74	S
	ERS	Level	Constant	41.85519		75	NS
			Con.& trend	22.92765		75	NS
		1st dif.	Constant	0.536310		74	S
			Con.& trend	1.463019		74	S

LnM_2/GDP	ADF	Level	Constant	-0.650387	0.8519	74	NS
			Con.& trend	-2.183604	0.4913	74	NS
		1st dif.	Constant	-3.208590	0.0235	70	S
			Con.& trend	-3.183164	0.0962	70	NS
	PP	Level	Constant	-0.609668	0.8614	74	NS
			Con.& trend	-2.285391	0.4363	74	NS
		1st dif.	Constant	-10.17816	0.0001	73	S
			Con.& trend	-10.03011	0.0000	73	S
	KPSS	Level	Constant	1.133599		75	NS
			Con.& trend	0.165305		75	NS
		1st dif.	Constant	0.162970		74	S
			Con.& trend	0.158353		74	S
	ERS	Level	Constant	275.2033		75	NS
			Con.& trend	14.10366		75	NS
		1st dif.	Constant	6.474479		74	NS
			Con.& trend	13.18598		74	NS

Source: Author

Table E The Johansen cointegration test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.425922	78.98528	63.87610	0.0016
At most 1	0.273011	39.02594	42.91525	0.1161
At most 2	0.156901	16.06921	25.87211	0.4870
At most 3	0.051158	3.780916	12.51798	0.7736
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Characteristic value	Trace statistics	Critical value 0.5	Probability**
None*	0.425922	39.95933	32.11832	0.0045
At most 1	0.273011	22.95673	25.82321	0.1143
At most 2	0.156901	12.28830	19.38704	0.3888
At most 3	0.051158	3.780916	12.51798	0.7736

Note: Both tests indicate 1 cointegrating eq(s) at the 0.05 level; *denotes the rejection of the hypothesis at the 0.05 level; **the MacKinnon-Haug-Michelis (1999) p-values.

Source: Author

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SEGMENT DISCLOSURES IN THE FINANCIAL STATEMENTS OF STOCK COMPANIES IN THE REPUBLIC OF SERBIA AND THE REPUBLIC OF CROATIA

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Information about the segments of a company is an important basis for making business decisions. In order for decisions based on segment information to be adequate, that information should be communicated in accordance with regulations. This paper is aimed at examining the adequacy of the segment information of listed companies in the Republic of Serbia and the Republic of Croatia and determining whether the volume of disclosed financial segment information is related to the company size and character of the audit firm. The research reveals that, in general, the disclosure of segment information is not fully in line with the International Financial Reporting Standard 8 - Operating Segments and that the joint-stock companies with a higher value of their total assets disclose financial segment information in more detail. However, there is no statistically significant difference in the amount of the segment information disclosed between the companies whose financial statements are audited by large audit firms and those that are the clients of other audit firms.

Keywords: segment reporting, International Financial Reporting Standard (IFRS) 8, stock companies, Belgrade Stock Exchange, Zagreb Stock Exchange

JEL Classification: M41, M42

INTRODUCTION

Segment reporting has been the subject of theoretical and empirical studies since the mid-20th century after it was concluded that consolidated financial statements could not respond to the increased need for information due to the growing importance of mergers and acquisitions of companies and their diversification (Medved, Milutinović & Tadić, 2016), whereby it was noted that consolidated financial statements would be incomplete without segment information (Chen & Znah, 2003). Therefore, segment reporting has been developed as a complement to consolidated reporting, with the aim of providing

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a better insight into the activities of a group of the legally independent entities that make up the economic whole (Weetman, 2010). However, segment information not only increases the informative value of consolidated financial statements, but the informative value of individual financial statements also increases when segment information is disclosed as well in addition to the information about the whole disclosed in those statements. Segment reporting is one of the key pragmatic aspects of international accounting (Bogicevic, 2013).

I. Medved *et al* (2016, 213) state that the main goal of segment reporting, referring to meeting the information needs of the internal and external stakeholders of a company, is achieved in a way that such reporting, among other things, contributes to:

- reviewing the success or failure of the segments and their contribution to the success or failure of the whole,
- planning and controlling revenues, expenses and results, thus analyzing the cost-effectiveness and profitability of those segments,
- motivating managers and other employees to achieve company goals through achieving segment goals, and
- identifying the merits or responsibilities for the success or failure of the segments.

The disclosure of information about segment operations improves the expressive power of financial statements, i.e. the basis for decision-making by the users of those statements (Stojanović, 2018). Segment reporting facilitates risk assessment and increases investor security (Malinić, Milićević i Stevanović, 2019). Although business activities are characterized by a constant exposure to risks (Jovkovic, 2019), risks do not have to be evenly distributed within an entity, but the risk types and levels may differ between segments. Segment reporting may reduce information asymmetry (Kajüter & Nienhaus, 2017), which may have an impact on lowering the cost of capital for companies.

The importance of segment reporting is also evidenced by the fact that one of the earliest documents of the International Accounting Standards Committee - International Accounting Standard (IAS) 14, Segment Reporting (Stojanović, 2018) - is dedicated to this problem. Nowadays, segment reporting is regulated by the International Financial Reporting Standard (IFRS) 8, Operating Segments, which is based on the management approach, i.e. on the point of view that externally reported segments should coincide with internally reported segments, which means that the segments adequate for internal stakeholders are also adequate for external financial statement users (Obradović, 2008). This means that the management approach allows external financial statement users to view business processes "through the eyes of management" and, therefore, more realistically predict the management decisions that significantly affect the future cash flows of the company (Financial Accounting Standards Board, 1997, paragraph 60). However, a lack of the management approach reflects in the fact that the quality and quantity of disclosed segment information depends on the human characteristics, expertise and ambitions of the management (Turčić, 2012). Segment information communication is brought into close connection with the agency problem (Berger & Hann, 2007), so that, as the persons responsible for preparing financial statements, company managers may be motivated to report incomplete and inadequate segment information (Wang & Ettredge, 2015). In addition to said, the current IFRS 8 is a flexible document, which leaves significant room for variations in segment reporting practices. For the above reasons, the practice of segment financial reporting is an important research area.

The practice of financial reporting on the segments of the joint-stock companies listed on the Belgrade Stock Exchange (BSE) in the Republic of Serbia (RS) and the Zagreb Stock Exchange (ZSE) in the Republic of Croatia (RC) is the subject of this paper. In these two neighboring countries, one of which is a European Union member country (RC) and the other is not (RS), all the listed companies are required to follow full International Financial Reporting Standards, which include IFRS 8, when preparing general-purpose financial statements.

The paper is aimed at examining the degree of the harmonization of external financial segment reporting practices with IFRS 8 and whether the company size and the character of the external auditor have an influence on the volume of financial information about segments disclosed in notes to financial statements or not and the degree of such an influence. Given the flexibility of IFRS 8, the paper should also find out whether there are national specifics in segment reporting or not.

According to the stated aim, the paper tests the following research hypotheses:

H1: Listed companies do not disclose adequate segment information.

H2: There is a positive relationship between the listed company size and the amount of the financial information about the segments disclosed by a company.

H3: The financial statements of the listed companies audited by large international audit firms contain more extensive financial information about segments than the financial statements of the listed companies audited by other audit firms.

The hypotheses are tested using the quantitative scientific methodology that includes descriptive statistical analysis, correlation analysis, and group comparison analysis. In addition to that, a significant role in the research is played by the method of comparison in terms of comparing the practice of financial segment reporting between the companies in the RS and the companies in the RC and the results of the empirical research conducted in the paper with the previous research studies conducted in the same country and in other countries.

The following chapter is the Literature Review, dedicated to the literature extant in the field of research, including the results of the previous research studies of the factors affecting the volume of segment information disclosed in general-purpose financial statements. The research methodology and the research sample are described afterwards. The last section of the paper, i.e. the results of the empirical research conducted in the RS and the RC are presented and interpreted, and this section is followed by the concluding remarks and the limitations of the research study, as well as the directions for future research in the considered area.

LITERATURE REVIEW

The International Accounting Standards Board (IASB) issued IFRS 8 in 2006, designating 1st January 2009 as the effective date (with the option of earlier application). IFRS 8 arose in the context of the convergence between IFRSs and the U.S. Generally Accepted Accounting Principles (GAAP) with a slight modification of the Statement of Financial Accounting Standards (SFAS) 131, Disclosures about Segments of an Enterprise and Related Information, published in 1997 by the U.S. Financial Accounting Standards Board (FASB), which was later codified in that country as ASC (Accounting Standards Codification) 280, Segment Reporting.

IFRS 8 significantly differs from its predecessor IAS 14. The most significant difference reflects in the way of identifying reporting segments - the risk-return approach represented in IAS 14 was replaced with the mentioned management approach based on the way of organizing segments within a company for business decisions and performance evaluation. It should not be concluded that internal organization was neglected in IAS 14. It was suitable for external reporting purposes only if it was based on a production or geographical basis (Obradović, 2008), while, according to IFRS 8, it is suitable for the same purposes regardless of whether it is based on any of the mentioned bases or not. In addition to enabling the users of financial statements to view business processes from a management perspective, N. Nichols, D. L. Street and A. Tarca (2013) say that, in relation to IAS 14, the management approach created the preconditions for:

- increasing the number of reporting segments and the amount of disclosed segment information,

- providing timely segment information at relatively low marginal costs,
- increasing diversity in measuring segment performance, and
- a greater consistency of external information about segments with analyses performed by managers.

The IASB (2013) states the following expected benefits of IFRS 8:

- achieving convergence with the U.S. GAAP,
- the better forecasting of an entity's cash flows,
- better information about the risks considered as significant by management, and
- a more frequent disclosure of information, as it is already available.

On the other hand, the IASB expected the following shortcomings to come to light:

- the inconsistency of segments between entities due to differences in the internal structure,
- the insufficient comparability of information over time in the conditions of frequent internal reorganizations,
- a scarce information base for geographical analysis, and
- non-uniform measurement in relation to the same type of segment information between entities.

A significant change also relates to the way segments are marked. Namely, instead of the terms "business segment" and "geographical segment" contained in IAS 14, IFRS 8 uses a single term "operating segment." However, unlike the IAS 14 that required the two-dimensional segmentation of entities (based on products/services and geographical areas), IFRS 8 represents one-dimensional segmentation. According to IFRS 8, the operating segment is the component of an entity:

- that generates revenues and is exposed to the expenses based on the operating activities which may arise from transactions with other components,
- whose results are regularly reviewed by the chief operating decision-maker (CODM) in the context of performance evaluation and making decisions on resource allocation, and for which specific financial information is available.

It can be seen from this definition that not each component of a company is an operating segment. Namely, a part of a company can be considered as an operating segment in the spirit of IFRS 8 only if it has the characteristics of a profit or investment center, as a relatively independent and functionally capable unit whose manager has authority and responsibility for revenues, expenses and a result (the profit center) or (in addition to the above said) for capital investments (the investment center) (Malinić *et al*, 2019). For example, the research and development (R&D) function associated with generating expenses, not revenues instead, cannot be an operating segment (Hoyle, Schaefer & Doupnik, 2016). In addition to this, not each operating segment has to be a reportable segment at the same time, according to IFRS 8 and IAS 18, which preceded it, as well. IFRS 8 allows essentially similar operating segments, such as retail chain stores (Djukić, 2002), to merge for external reporting purposes, also requiring that the significance of operating segments for external financial statement users should be examined, with the consequence that a company's general-purpose financial statements may not always contain information about all the operating segments of the company.

According to IFRS 8, an entity should explain the substance of its reportable segments through nonfinancial and qualitative information, providing information on the factors for their identification and the types of the products and services which they generate revenues on. The key portion of segment disclosures under the same standard, however, is financial (monetary) information, as listed in Table 1 (compared to the information disclosed in accordance with IAS 14). Table 1 shows that, according to IFRS 8, many pieces of financial information are conditional in the sense that they are disclosed in notes to financial statements only if they are available to the CODM, which is a significant difference compared to IAS 14. Therefore, the volume of disclosed information

may significantly vary from one company to another (Obradović and Karapavlović, 2016a). Although cash flow statement information is crucial for the assessment of past performance and the prediction of future performance for many financial statement users (Knežević, Mitrović i Ilić, 2016), the disclosure of segment cash flows is not considered in IFRS 8, which J. B. Hoyle *et al* (2016) explain by the fact that this information is often not generated for internal needs, either.

Generally speaking, if relevant financial reporting standards are followed when financial statements are prepared (provided that they are of a good quality - Obradović and Karapavlović, 2016b), financial statements will be a reliable basis for making business decisions (Milošević & Kikanović, 2014). Numerous studies indicate that there is significant room for improving the quality of financial reporting in both the RS and the RC. A survey conducted by V. Obradović and N. Karapavlović (2016a) on a sample of the 500 listed and non-listed companies in the RS in 2013 finds that a relatively small number of companies disclose segment information, which is usually incomplete, and that financial information is often not accompanied by adequate quality explanations. The study conducted by I. Medved

Table 1 Financial segment information in accordance with IAS 14 and IFRS 8

Character of information	IAS 14	IFRS 8
Result	Yes	Yes
Assets	Yes	Yes[1]
Liabilities	Yes	Yes[1]
Depreciation and amortization	Yes	Yes[1]
Revenues from external customers	Yes	Yes[1]
Revenues from transactions with the other operating segments of the same entity	Yes	Yes[1]
Material noncash items other than depreciation and amortization	Yes	Yes[1]
Interest revenue and interest expense	Recommended	Yes[1]
Material items of income and expense	Recommended	Yes[1]
Investment in associates and joint ventures accounted for by the equity method	Yes	Yes[1]
Interest in the profit or loss of associates and joint ventures accounted for by the equity method	Yes	Yes[1]
Income tax expense or income	Yes	Yes[1]
Reconciliations of the total of the reportable segments' revenues, profit or loss, assets, liabilities, and other material items to the entity's corresponding amounts	Yes	Yes
Capital additions	Recommended	Not specified
Other profitability measures	Recommended	Not specified
Information about cash flows	Recommended	Not specified
Information about products and services (revenues for each kind or group of similar products/services)	Not specified	Yes[2]
Information about geographic areas (revenues and noncurrent assets)	Not specified	Yes[2]
Information about major customers (revenues for each customer and the identity of segments/group of segments that generated those revenues, but not the identity of the customer)	Not specified	Yes[2]

Notes: 1 - Information is disclosed only if it is available to the CODM, 2 - Information is not disclosed if it is not available and if the costs of its generation would be unacceptably high.

Source: Authors, based on: Lucchese & Di Carlo, 2016, 101.

et al (2016) also confirms the fact that the financial statements of companies in the RS reveal the scarcity of segment information. The studies show that the companies in the RS do not sufficiently respect the relevant standards that deal with the other disclosure areas, namely the disclosures of related parties (Jakšić, 2010), biological assets (Mijić, Spahić i Vuković, 2010; Savić and Obradović, 2020), income taxes (Vučković-Milutinović & Lukić, 2013; Vržina, Obradović & Bogićević, 2020), property (including the investment one), plant and equipment (Obradović and Karapavlović, 2014; Karapavlović, Obradović & Milutinović, 2018), and intangible assets (Obradović, 2018). A survey conducted by D. Spasić and K. Denčić-Mihajlov (2014) reveals that the companies listed on the BSE, disclose 64.34% of the information required by the standards on average. The companies in the RC have a longer tradition in applying IFRSs compared to the companies in the RS. Namely, IFRSs (initially only IASs) have been applied in the RC since 1993 (Mamić-Sačer and Ramač-Posavec, 2012), whereas in the RS, they have been applied since 2003 (financial institutions) and 2004 (other profit-oriented entities). However, the studies show that there is room for improving the quality and transparency of the annual financial statements of the listed companies in the RC (Pervan, 2006; Pivac & Čular, 2012; Pervan, 2013; Pivac, Vuko & Čular, 2017; Vržina *et al*, 2020). The first research hypothesis is defined based on all the foregoing.

Numerous researchers have been trying to determine which factors encourage the preparers of financial statements either to disclose or not to disclose segment information. J. Prather-Kinsey and G. K. Meek (2004) find that large companies disclose more information in their financial statements than small ones. A. Prencipe (2004) and M. M. Alfaraih and F. S. Alanezi (2011) state that large companies are characterized by a more complex organizational structure, greater experience, and the availability of extensive resources, including modern information and communication technologies, as well as a greater responsibility to shareholders and the desire to attract new investments, which means that they will communicate more extensive information about their segments. In their explanation of the reasons why large companies report more extensive information about their segments, M. Chavent, Y. Ding, L. Fu, H. Stolowy and H. Wang (2005) state that, due to the established system of internal reporting, these companies have lower costs of generating segment information, while small companies are trying to protect themselves from the competition by hiding important information. P. Dumontier and B. Raffournier (1998), A. Prencipe (2004), L. Patelli and A. Prencipe (2007); P. N. Pardal and A. I. Morais (2011); M. M. Alfaraih and F. S. Alanezi (2011); E. Leung and A. Verriest (2015); V. Obradović and N. Karapavlović (2016a), R. A. Mateescu (2016) and P. Amado, F. Albuquerque and N. Rodrigues (2018) also confirm the fact that large companies disclose more extensive information about their segments. Based on the foregoing, the second research hypothesis is defined.

P. Dumontier and B. Raffournier (1998), J. Prather-Kinsey and G. K. Meek (2004), E. Bonsón and T. Escobar (2006); M. M. Alfaraih and F. S. Alanezi (2011) and R. A. Mateescu (2016) find that the companies whose financial statements are subject to audit by the so-called "Big Four", namely Deloitte, PricewaterhouseCoopers (PwC), Ernst & Young (EY) and KPMG, disclose more information in their financial statements than the companies that are not the clients of the "Big Four." P. Dumontier and B. Raffournier (1998) point out the fact that large audit firms use their independence from clients to influence them to fully comply with relevant standards when preparing financial statements, thus protecting their own reputation, and that, thanks to good international training and continuous professional development, employees at large audit firms have greater professional competences for auditing the financial statements prepared based on IFRSs compared to employees in small audit firms. J. A. Souza, A. S. Neto, G. C. Benedicto and D. J. Mendonça (2016) point out the fact that large audit firms do not accept audit arrangements with the firms that disclose a small amount of information in their financial statements, segment information included. The third research hypothesis is defined based on the foregoing.

RESEARCH METHODOLOGY AND THE SAMPLE

The empirical research was carried out on a sample of the 360 companies listed on the BSE on 1st August 2020 and the 100 companies listed on the ZSE on the same day, the financial statements of the said companies being publicly available at the time of the research. The analysis of the structure of the sample of the companies in the RS according to trading segments shows that the ordinary shares of the four companies are included in the Prime Listing (the bonds of one of them are listed on the Open Market), the ordinary shares of the three companies are included in the Standard Listing (the preferred shares of one of them are listed on the Open Market), the ordinary shares of the 18 companies are traded on the Open Market, while the ordinary shares of the remaining 335 companies are traded through the Multilateral Trading Platform (MTP). The financial statements of the 95 of the 455 companies listed on the BSE (all the 95 companies being on the MTP) and the two of the 102 companies listed on the ZSE were not available. The data about the companies listed on the mentioned stock exchanges were taken from the official internet presentations of these stock exchanges. The notes to the individual and consolidated financial statements of the observed companies for 2018 were used as a source of information about segments, whereas the data from the balance sheets and audit reports for 2018 available on the official website of the Serbian Business Registers Agency and the Croatian Financial Agency were also used for the purposes of the research study. The fact that the financial statements of as many as 20% of the companies listed on the BSE are not publicly available shows that timeliness, as one of the enhancing qualitative characteristics of financial statements (the essence of which is the availability of necessary information when users need it to make economic decisions - Frank, 2020) was violated, and that the current financial reporting regulations (the Accounting Law, the Capital Market Law, the Rulebook on the Conditions and Manner of the Public Disclosure of Financial Statements and Keeping the Register of Financial Statements) were not complied with, which, as B. Savić and N. Obradović (2020) point out, raises the question of the attitude of the authorities in the RS towards the protection of the public interest.

The research hypotheses were tested in the following manner:

- the first hypothesis was tested by comparing the provisions of IFRS 8 with the segment information disclosed by the observed companies in their notes to their financial statements;
- the second hypothesis was tested by means of Pearson's and/or Spearman's correlation coefficient(s), whereby the Cohen guidelines (Pallant, 2007) were taken for the purpose of determining the correlation strength, and the total Balance Sheet assets at the end of 2018 were used as the basis for measuring the company size;
- the third hypothesis was tested by comparing the data for the companies whose financial statements were audited by the "Big Four" and those whose financial statements were audited by other audit firms using the nonparametric Mann-Whitney U group comparison test, applied because it was determined that, in each of the considered cases, the empirical distribution of the variables deviated from the normal, which means that the condition for the application of the parametric t-test was not met.

The second and the third research hypotheses were tested at the level of individual public capital markets (the BSE and the ZSE) and at the level of both markets observed together. Statistical data processing was performed using the IBM SPSS Statistics Version 24.

RESEARCH RESULTS

The review of the notes to the financial statements of the sample companies for 2018 finds that the segment information was disclosed by the 20 joint-stock companies listed on the BSE (namely by the two whose ordinary shares are included in the Prime Listing, the two whose ordinary shares are included

in the Standard Listing, the three whose ordinary shares are in the Open Market and the 13 whose ordinary shares are on the MTP), which makes 5.56% of the sample part that refers to the companies in the RS (360 companies). Of the joint stock companies in the RS observed by the survey conducted by V. Obradović and N. Karapavlović (2016a) referring to the year 2013, 12.81% (26 out of 203) disclosed segment information. The presented facts indicate a decrease in the frequency of segment information disclosure by the joint-stock companies in the RS although this frequency was modest even before the decline. The frequency of segment information disclosure is very low for the companies on the MTP - accounting for only 3.88%. This frequency is at the level of 28% in the companies belonging to the other trading segments. Segment information for 2018 was disclosed by the 51 joint-stock companies listed on the ZSE, which accounts for 51% of the observed companies in the RC. The fact that the notes to the financial statements of many companies (especially in the RS) do not contain segment information can be explained by a lack of segmentation for internal reporting and the insufficient motives of the financial statement preparers to disclose this information due to insufficient incentives from the environment, primarily by the auditors (Obradović and Karapavlović, 2016a).

Although, according to IFRS 8, the entities that disclose information about operating segments are required to disclose the basis (factors) for their identification, the three entities listed on the BSE (15% of the entities that disclose segment information) did not do it. The same shortcoming was observed in the ten companies listed on the ZSE, which makes up 19.6% of the companies that disclose segment information. However, the names of the segments generally provide a basis for concluding which factor was used in their identification. In the RS, the segments were identified on the basis of the products/services in the 18 listed companies (90%), and on the basis of the geographical areas in the two of them (10%). In the RC, the segmentation in the 36 (70.6%) listed companies is based on products/services, whereas in 15 (29.4%), the segmentation is based on the geographical areas. The segmentation based on products/services can be said to be dominant in both observed countries, this dominance being more pronounced in the RS. In addition to that, 55% (11 out of 20) of the companies in the RS and 47% (24 of 51) of the companies in the RC do not disclose information about the types of the products and services from which each reporting segment derives revenues, as is required by IFRS 8.

Table 2 shows that the number of the reporting segments, excluding those marked as "others", ranges from 2 to 7 for the companies in the RS and from 1 to 10 for the companies in the RC. The notes to the financial statements of one company in the RS provide that it consists of three operating segments, but the information about the revenues, results and assets is only presented for the two segments, because the information about the two segments is presented together, for the reason of which fact the company could be treated as a two-segment one. One company in the RS first lists and describes six segments, and then, due to the aggregation of some segments, presents the information for the other three segments. One company in the RS identifies two reporting segments, of which the one is further divided into two and the other into eight sub-segments (these are different types of insurance provided by the insurance company). One company in the RC identifies two reporting segments, one of which is further broken down into four, and the other into two sub-segments. The average number of the segments is 3.1 in the observed companies in the RS and 3.3 in companies in the RC.

The volume of the disclosed segment information varies in both countries. Two companies in the RS report only one piece of financial (monetary) information about the segments - revenues, while one company reports as many as 47 different pieces of financial information, including derived information (the information derived from the other presented information), and the average number of the disclosed pieces of financial information is 12.7. In the RC, one piece of financial information is disclosed by the three companies, while one company discloses as many as 48 different pieces of financial information. The average number of the pieces of financial information

Table 2 The number of the reporting segments in the joint-stock companies in the RS and the RC

Number of segments	RS		RC	
	Number of companies	Share	Number of companies	Share
1	0	0.00%	4	7.84%
2	10	50.00%	19	37.25%
3	5	25.00%	16	31.37%
4	1	5.00%	3	5.88%
5	2	10.00%	2	3.92%
6	1	5.00%	2	3.92%
7	1	5.00%	1	1.96%
8	0	0.00%	0	0.00%
9	0	0.00%	1	1.96%
10	0	0.00%	3	5.88%
Total	20	100.00%	51	100.00%

Source: Authors

about the segments (9.70) is somewhat lower in comparison with the observed companies in the RS.

Table 3 shows that almost the same percentage (about 20%) of the companies in the RS and in the RC (4 out of 20 in the RS, and 10 out of 51 in the RC) do not disclose segment results within the segment information although it is required by IFRS 8. On the other hand, some companies disclose more than one layer (level) of the result - 6 of these companies are listed on the BSE, and 18 are listed on the ZSE. Table 4 shows that income after taxes (a net profit or a net loss) is the most common measure of segment performance in the joint-stock companies in the RS, whereas it is the operating income in the observed companies in the RC.

Out of the 19 companies in the RS that disclose segment revenues, only nine clearly break them down into internal and external components, i.e. into revenues from other segments and revenues from external customers. Segment revenues are disclosed by the 49 companies in the RC, and the 18 of those companies break them down into internal and external components. Three companies in the RS show both income and expenses based on interest, and one shows the net interest. There are three companies in the RS that show both interest income and interest expense, and one showing net interest. Both interest income and interest expense are shown by the three companies in the RC, while six companies show net interest. Segment asset information is identified in the notes to the financial statements of the 15 companies in the RS, with one company disclosing the current assets and one company disclosing the noncurrent assets (the other 13 only disclose the total assets). Out of the 23 companies in the RC that disclose segment assets, there are eight that break them down. It is noticeable that the companies in the RS disclose segment assets more often than the companies in the RC, while the situation is reversed in the case of the liabilities. One company in the RS shows the sum of the segments' equity and liabilities, but does not state which part of that total relates to the liabilities. One company in the RS also discloses the amount of the segments' equity, and two companies in the RC do the same. Despite the fact that IFRS 8 requires that the basis for the calculation of internal transactions should be disclosed, there are only one amongst the observed companies in the RS and four companies in the RC that do so. Three companies in the RS and seven companies in the RC show the reconciliation of the segments' results, revenues, assets and liabilities with the relevant information related to the whole. Table 3 shows that the frequency of the disclosure

Table 3 The frequency of segment information disclosure

Character of information	Number of companies in RS	Number of companies in RC
Result	16 (80%)	41 (80%)
Assets	15 (75%)	23 (45%)
Liabilities	5 (25%)	22 (43%)
Revenues	19 (95%)	49 (96%)
Interest revenue and interest expense or net interest	4 (20%)*	8 (16%)*
Depreciation and amortization	6 (30%)	24 (47%)
Material items of income and expense	8 (40%)	20 (39%)
Interest in the profit or loss of associates and joint ventures accounted for by the equity method	1 (5%)	2 (4%)
Income tax expense or income	5 (25%)	9 (18%)
Material noncash items other than depreciation and amortization	3 (15%)	4 (8%)
Investment in associates and joint ventures	0 (0%)	0 (0%)
Capital additions	1 (5%)	10 (20%)

*Banks are not included because interest income and expense are operating income and expense for them.

Source: Authors

Table 4 The measures of segment profitability

The final type of result disclosed	RS	RC
Operating income	5	16
Income before taxes	3	3
Income after taxes	7	14
Other measures	0	5
Unclear	1	3

Source: Authors

of information about depreciation and amortization and capital additions is higher in the RC than in the RS. On the other hand, the companies in the RS more often disclose significant noncash revenues and expenses, i.e. the revenues and expenses that did not lead to cash flows in a given period (Material noncash items other than depreciation and amortization).

Information about revenues by products and geographical areas is provided by the seven companies in the RS and the two companies in RC. There are four companies in the RS and 16 in the RC that only report revenues by geographical areas. Three companies in both the RS and the RC report the revenues broken down by the products/services sold. In addition to the revenues by the geographical areas, the six companies in the RC report their assets by the geographical areas which the companies operate in, whereas five companies show capital additions by the geographical areas.

Information about the major customers with the amount of the revenue generated from those customers (mostly aggregate amounts) is disclosed by the five observed companies in RS, but only two disclose the identity of the segments that generated those revenues. There are three companies that disclose the identities of their major customers (which

is not required by IFRS 8). Seven companies in the RC provide information about the major customers, none of them, however, reporting which segments generated those revenues, and two also provide the names of the major customers.

Based on the above-mentioned, it can be concluded that:

- within the general information about the segments, a number of the companies do not disclose the factors based on which the segmentation was performed, nor the products that contribute to the generation of the segment revenues,
- not all companies report the achieved result of the segment, and
- a very small number of the companies disclose the basis for the measurement of internal transactions and the reconciliation of the segment information with the information on the whole as well.

The mentioned shortcomings related to the disclosure of the segment information of the companies in the RS and the companies in the RC show that IFRS 8 is not consistently applied, i.e. that the companies do not disclose all the information required by this standard in their notes to the financial statements, which on its part results in the acceptance of the first research hypothesis. The insight into the audit reports related to the financial statements of the sampled companies does not reveal the auditor's observations on the inadequacy of the segment information, which fact, together with the presented results of the empirical research, indicates the auditor's insufficient commitment to the segment information. The presented results also suggest that external segment reporting is significantly more common in the companies in the RC than in the companies in the RS, and that the companies in the RS report more pieces of financial information about segments on average as well.

As for the relationship between the company size and the volume of the disclosed financial information about the segments, it was found that:

- there was a strong and statistically significant positive correlation (rho = 0.743, p = 0.000) for the companies in the RS (based on Spearman's correlation coefficient, since the empirical distribution of the variables deviated from the normal),
- there was a medium and statistically significant positive correlation (r = 0.308, p = 0.028; rho = 0.462, p = 0.001) for the companies in the RC (based on Spearman's and Pearson's correlation coefficients applied taking into account the central limit theorem, according to which the distribution of variables in a sample with more than 30 observations tends to a normal distribution),
- there was a strong and statistically significant positive correlation (rho = 0.523, p = 0.000; r = 0.501, p = 0.000) for the companies in both the RS and the RC observed together (based on Spearman's and Pearson's coefficients).

These results suggest that, as the size of joint-stock companies increases, the volume of financial information about the segments they disclose increases, too. In other words, in both the RS and the RC, larger companies disclose more financial information about segments in the notes to the financial statements compared to smaller companies. Therefore, the second research hypothesis is accepted. The influence of the company size on the volume of disclosed information is more pronounced in the RS than in the RC.

As for the relationship between the character of the audit firm and the volume of the disclosed financial information about the segments, it was determined that:

- on average, the companies in the RS that were the clients of the audit firms belonging to the "Big Four" had disclosed 20.30 pieces of the financial information about segments, whereas those that were the clients of the other audit firms had disclosed 9.04 pieces of such information; according to the results obtained by having done the Mann-Whitney U test, however, the difference between the volume of the financial information disclosed by the clients of the "Big Four" (Md = 12,

n = 7) and the clients of the other audit firms (Md = 6, n = 13) was not statistically significant, although it had a medium intensity (U = 22.00, z = -1.89, p = 0.067, r = 0.42);

- on average, the companies in the RC that were the clients of the audit firms belonging to the "Big Four" had disclosed 10.12 pieces of the financial information about segments, whereas those that were the clients of the other audit firms had disclosed 8.24 pieces of such information; according to the results obtained by having done the Mann-Whitney U test, however, the difference between the volume of the financial information disclosed by the clients of the "Big Four" (Md = 8, n = 39) and the clients of the other audit firms (Md = 5, n = 12) was not statistically significant (U = 185.00, z = - 1.09, p = 0.275, r = 0.15);
- on average, when the companies in the RS and the RC were observed together, the clients of the "Big Four" had disclosed 11.67 pieces of the financial information about segments, and the clients of the other audit firms had disclosed 8.44 pieces of such information; according to the results obtained by having done the Mann-Whitney U test, however, the difference between the volume of the disclosed information by the "Big Four" clients (Md = 8.5, n = 46) and the clients of the other audit firms (Md = 6.0, n = 25) was not statistically significant (U = 428.50, z = -1.769, p = 0.077, r = 0.21).

The presented results show that "Big Four" clients in both the RS and the RC disclose more information about segments compared to other companies, and the difference between these categories of companies is more pronounced in the RS. However, this difference is not statistically significant in the RS and the RC, which means that there is not enough evidence to conclude that the third hypothesis is fulfilled.

CONCLUSION

The comparative analysis of external financial segment reporting in the RS and the RC suggests that there are national specifics in the given area of financial reporting, which is to be expected given the flexibility of IFRS 8. This conclusion is indicated by the findings:

- external segment reporting is significantly more common in joint-stock companies in the RC than in joint-stock companies in the RS,
- that the frequency of the disclosure of some segment information that are of a conditional character (such as information on assets and liabilities) significantly varies between the observed countries, and
- that the segmentation based on products/services and the segmentation based on geographical areas have different shares in these countries (although the segmentation based on products/services is dominant in both countries).

The research study has revealed that approximately every eighteenth company whose securities are listed on the public capital market in the RS, i.e. on the BSE, discloses segment information in the notes to the financial statements. On the other hand, this is done by approximately every other company whose securities are listed on the public capital market in the RC, i.e. on the ZSE, which may be a consequence of stronger incentives to disclose segment information coming from financial statement users, primarily investors and creditors, as well as a more developed segmentation of companies for internal reporting in the RC compared to the RS.

Segment information need not be an integral part of the notes to financial statements. No disclosure is made if a company is not segmented for the purposes of internal reporting. If such information is disclosed, it should be in accordance with IFRS 8. The research study presented in the paper, however, reveals that numerous companies in both the RS and the RC disclose information with a deviation from IFRS 8 because some mandatory information is missing, which leads to the conclusion that the information needs of the participant on the capital market and external auditors do not provide sufficiently strong incentives to disclose detailed and quality information about segments. Therefore, the state institutions responsible for financial reporting, capital market organizers, professional accounting organizations, external auditors, and financial statement preparers

as well should pay more attention to segment information in order to improve the information base for making economic decisions, especially investment and credit decisions.

The research study also confirms the fact that the volume of financial information about segments increases with an increase in the value of assets in both the RS (especially there) and the RC, i.e. that larger companies disclose more detailed information compared to those of a smaller size, which may be due to the higher level of the development of the internal reporting system in larger companies and stronger incentives to disclose detailed and quality information which larger companies are exposed to due to their generally greater public accountability. However, no statistically significant relationship between the type of the audit firm and the number of disclosed financial information about segments found by previous research studies conducted in other countries was identified in the RS and in the RC, either, which means that there are no sufficient grounds to state that, compared to other audit firms, large and reputable international audit firms encourage companies in the RS and the RC more to disclose quality segment information and select their clients based on the quality of disclosure.

The key limitation of the paper pertains to the relatively small sample of companies, especially in the RS, which is a consequence of the relatively modest application of financial segment reporting in practice. Therefore, the results of the research study, especially those related to the RS, should be accepted with some reserve. The paper raises a number of issues in the area of segment financial reporting. Future research in this area should focus on examining the impact of the other factors (such as the ownership structure of the company, the number of the supervisory board members, the number of the supervisory board independent members, profitability, the indebtedness level, etc.) on the volume of disclosed segment information and their impact on both mandatory segment information and conditional information. Further research should also pay attention to nonfinancial information about segments, the reasons why many companies (especially in the RS) do not report segment information in their financial statements, as well as the impact of the segments' business on the environment they operate in.

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FISCAL RESPONSIBILITY LAW AND SUBNATIONAL FINANCE IN INDIA - AN ANALYSIS OF ASSAM'S FISCAL SCENARIO

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Fiscal responsibility law has become an important instrument for better fiscal management and ensuring fiscal discipline, particularly so in the federal countries where their subnational governments often indulge in fiscal indiscipline. In 2003, India adopted the Fiscal Responsibility and Budget Management Act for rule-based fiscal discipline, and the states of India were also asked to adopt their own fiscal rule legislation in line with the legislation adopted by the central government. As a fiscally weak Indian state, Assam enacted the Assam Fiscal Responsibility and Budget Management (AFRBM) Act in 2005 for better fiscal management. The paper attempts to examine the impact of the AFRBM Act on the fiscal performance of the state by analyzing the dynamics of the fiscal variables in the pre- and post-AFRBM Act periods. The study finds that the state has improved its fiscal condition after the introduction of the AFRBM Act, even though it has remained prone to fiscal shocks.

Keywords: fiscal rules, subnational finance, fiscal deficit, fiscal stability

JEL Classification: E62, H30, H61, H70

INTRODUCTION

The fiscal rule legislation has become an important fiscal reform measure in recent decades. Countries around the world, such as Australia, the United Kingdom, Brazil, Canada, Mexico, the United States and so on have adopted the varying levels of fiscal rules. Fiscal rules are the law provisions intended to put constraints on the government with respect to the fiscal policy (Grembi, Nannicini & Troiano, 2016). Fiscal rules may come in various forms, but they all have the common feature of imposing numerical limitations, such as the ratio of a debt to the GDP, a limit to a fiscal deficit and so on. Governments have the tendency to spend more, which often leads to fiscal deterioration and creates serious fiscal instability at times. The theoretical background of fiscal rules implies the fact that there is a deficit bias and a common pool problem (Wyplosz, 2012). Governments shift the burden of a

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debt to future generations and politicians have the tendency to provide public largesse. The support for fiscal rules rests on the premise that they can help oblige policymakers to commit themselves to a sound fiscal policy (Tapp, 2013). Fiscal laws may restrict decision-makers from adopting politically beneficial policies and improve budgetary outcomes. The use of fiscal rules to maintain fiscal discipline and fiscal consolidation has been advocated by organizations such as the IMF (2009) and the OECD (2011).

Since the 1980s, India has been experiencing the gradual deterioration of the fiscal condition of both the central government and the state governments, the fiscal scenario having become particularly troublesome in the 1990s, when the states were experiencing sharp fiscal deterioration with the rising deficits and debt burden (Lahiri, 2000; World Bank, 2004; Singh, Prasad, Sharma & Reddy, 2017). The fiscal deficit of the Centre, which was 5.7 percent in the period 1980-81, grew to 7.8 percent in the period 1990-91. The fiscal deficit of all the states, which amounted to 2.57 percent of the GDP in the period 1980-81, rose to 3.30 percent in the period 1999-91, and 4.72 percent in the period 1999-2000, and the combined fiscal deficit of the Centre and the States in the period 1999-2000 stood at 9.5 percent of the GDP (Reserve Bank of India, 2005). The outstanding debt of the states increased from 19.4 percent of the GDP in the period 1990-91 to 23.1 percent in the period 2000-01, and interest payment to the total expenditure of the states also rose from 13 percent to 21.6 percent (Rao, 2004) over the same period.

In response to the worsening fiscal condition, the Government of India has undertaken major fiscal restructuring since the 1990s through reforms in direct and indirect taxes, expenditure restructuring, the disinvestment of the undertakings of the public sector and debt management (Chakraborty, Mukherjee & Amarnath, 2009). Fiscal reform measures were also initiated by the states through reforms in the states' taxes, restructuring expenditure, reducing government subsidies, a reform in the power sector and so on. The most significant fiscal reform measure, however, was the Fiscal Responsibility and Budget Management (FRBM) Act[1], enacted by the Government of India in 2003. Like the Maastricht Treaty[2] and the United Kingdom's Golden Rule[3], the FRBM Act required that the Central Government of India should keep the budget deficit of the Government and the public debt within specified limits (Maurya, 2013). The underlying motive was that the fiscal rule measures adopted through the legislation were more likely to be followed than the fiscal correction measures through executive action. The FRBM Act of 2003 mandated that the Central Government of India should reduce its fiscal deficit to 3 percent of the GDP and eliminate the revenue deficit completely by 2008-09 (Singh *et al*, 2017). The state governments were asked to enact their own fiscal rule legislations in line with the FRBM Act. Like the other states of India, Assam adopted its own version of the FRBM Act and implemented the Assam Fiscal Responsibility and Budget Management (AFRBM) Act[4] in 2005 in order to improve and stabilize the fiscal position of the state.

This paper attempts to find the impact of the AFRBM Act on the fiscal performance of the State of Assam. The remainder of the article is structured into five sections. Apart from the Introduction, Section Two is a presentation of a literature review. The data and the methodology are discussed in Section Three. Section Four is an analysis of the state's revenue, expenditure, debt and deficit indicators. The last, Section Five, ends the paper providing appropriate remarks.

LITERATURE REVIEW

Many cross-country and country-specific studies have found a strong association between fiscal rules and better fiscal results (Guichard, Kennedy, Wurzel & Andre, 2007; IMF, 2009). S. Krogstrup and S. Wälti (2008) found that fiscal rules improved fiscal discipline by keeping the budget deficit in check. However, it may also have a negative impact on beneficial productive public investment. S. Tapp (2013) found a significant relationship between a fiscal regulation and fiscal results for the Canadian provinces. He observed that the stronger the fiscal rules, the better the budget outcome. F. Heinemann,

M. D. Moessinger and M. Yeter (2018) observed a significant constraining impact of fiscal rules on fiscal variables. They found the effect of fiscal rules more on the deficit indicators than on a debt, expenditure or revenue. Grembi *et al* (2016) found fiscal rules to be effective when accompanied by an enforcement mechanism and when governments demonstrate serious commitment. So, they suggested that designing fiscal rules should take into account political incentives in rules enforcement. A. Sacchi and S. Salotti (2015) studied the relationship between the discretionary fiscal policy and the macroeconomic stability of the 21 OECD countries for the period 1985-2012 and found that the adoption of strict fiscal rules could mitigate the problem of the output-destabilizing effect of the discretionary fiscal policy.

Some other authors are, however, skeptical about the effectiveness of fiscal rules. C. Wyplosz (2012) argued that fiscal rules might be ineffective in achieving fiscal discipline due to various policy and enforcement problems. G. Kopits (2012) opined that fiscal rules might compromise the fiscal sovereignty of states and rigid fiscal rules might do a lot of harm at the times of economic crises. L. Feld and G. Kirchgässner (2001) found that the existence of fiscal regulations in the Swiss Cantons did not have an impact on budgetary performance. M. U. Bergman and M. Hutchison (2015) observed that fiscal rules were only effective when governments work efficiently, whereas the same were less effective in developing countries, where the governance quality was low. M. Halac and P. Yared (2018) opine that fiscal rules are not an unmixed blessing and that there is an ongoing trade-off between commitment and the flexibility of fiscal rules. Tighter fiscal rules can limit policymakers' distorted incentives, but they cannot spell out policy measures for every single shock or contingency. Flexible rules will allow policymakers to efficiently deal with the unforeseen contingencies, whereas flexibility may lead to fiscal indiscipline. So, the more flexible the rules are, the higher the risk of fiscal distortion, and the more stringent the rules, the lesser the ability to respond to the possible contingencies. Therefore, the enactment of a fiscal responsibility legislation is not sufficient. It has to be effectively implemented so as to ensure fiscal discipline and fiscal consolidation (Sawhney, 2018). According to A. Afonso and J. T. Jalles (2019), fiscal rules help bring down the costs of public borrowing and lower the levels of the public debt to the GDP. W. H. Reuter (2015) argues that, even though fiscal rules are often not sincerely adhered to, they do serve as a benchmark to the government, which a fiscal policy is focused on.

There have been mixed reviews of the effect of the FRBM Act on the fiscal improvement of the Indian Central Government and State Governments. R. K. Pattnaik (2016) observed that, although the fiscal rule legislation had a positive effect on the fiscal position, on the one hand, the performance of such fiscal improvements was disappointing both in the Centre and in the States, on the other. Although the major deficit indicators had shown a declining trend after the implementation of the FRBM Act, no significant effect had been made on the fiscal deficit, and the ratio of the debt to the GDP had only marginally declined. They found a declining trend in capital expenditure against an increasing trend of revenue expenditure instead. B. M. Misra and J. K. Khundrakpam (2008) found that the improvement of the deficit indicators in the post-FRBM Act period was mainly due to the high growth rate of the Indian economy, which had improved revenue collection. Singh *et al* (2017) found that the Central Government had not sincerely followed the fiscal regulations, particularly not so since the 2008 global financial crisis, and that the FRBM Act had been stalled four times since its introduction in 2003. Despite what, though the FRBM Act had shown a positive effect on the fiscal indicators, it had led to an increase in the off-budget liabilities which might increase the burden of the debt in the future.

Examining the impact of the fiscal rules on the states' finance, A. S. Simone and P. B. Topalova (2009) found that the FRBM Act had helped the states improve the fiscal situation and that the fiscal rules had been effective in controlling the debt and the expenditure. S. Badaik (2017) studied the effect of the FRBM Act on the Indian states' finance, having found that the legislations on fiscal responsibility were effective in reducing the revenue deficit, as well as the fiscal deficit, of the Indian states. He, however, suggested

that an institutional states' fiscal performance monitoring mechanism should be developed. S. Raju (2008), P. Chakraborty and B. B. Dash (2013), N. K. Maurya (2013) and other authors found that the fiscal responsibility rules had helped the states improve their fiscal conditions. The Economic Survey of India for 2016-17, (Government of India, 2017) noted that the fiscal improvement of the states could not outrightly be solely credited to the fiscal rules. A large number of the exogenous factors, such as higher GDP growth, increased transfers from the Centre, reduced interest payments, etc. had helped the states reduce the deficits. With respect to Assam, P. Dutta and M. K. Dutta (2014) and N. A. Barua, N. Goswami and N. P. Dutta (2013) found improvements in the state's fiscal situation after the enactment of the AFRBM act, even though the state remained heavily dependent on central transfers.

According to the literature review, fiscal rules are found to be necessary in order to keep reminding policymakers of the fiscal responsibility although the effectiveness of and compliance with the fiscal rules are contested. The discussion allowed us to formulate the hypothesis of the conducted analysis, implying that fiscal responsibility rules have a positive impact on fiscal performance.

DATA AND METHODOLOGY

In the present study, Assam's fiscal scenario for the period from 1990-91 to 2016-17 is examined, dichotomizing it into the pre-AFRBM Act period (from 1990-91 to 2004-05) and the post-AFRBM Act period (from 2005-06 to 2016-17). The study was carried out by examining the dynamics of the fiscal variables in the observed period by using simple statistical measures.

The study is entirely based on the data obtained from the secondary sources. The relevant data were collected from the various statistical reports and publications of the Government of India, the Government of Assam and the Reserve Bank of India. The data on revenue, expenditure, the debt and the deficit were obtained from the Statistical Handbook of Assam (the issues from 1991 to 2016), published by the Directorate of Economics and Statistics, the Government of Assam; the Report of the Comptroller and Auditor General of India on the State of the Finance of Assam (the issues from 2002 to 2017); the Handbook on Statistics on Indian States (2018), published by the Reserve Bank of India. The data on the Gross State Domestic Product (GSDP) of Assam were obtained from the Central Statistical Organization of the Government of India.

RESULTS AND DISCUSSION

Assam's AFRBM Act was enacted for the main purpose of arresting the deteriorating fiscal situation of the state and consolidating the fiscal position. The Act only notes the aims of reducing the debt and the deficit, simultaneously intending to improve revenue collection and expenditure rationalization. Therefore, the impact of the AFRBM Act was examined by analyzing the trend and composition of the state's revenue, expenditure, debt and deficit.

Revenue trend

The Indian states' revenue receipts are broadly categorized into own revenue receipts and central transfers. The states' tax revenue and nontax revenue constitute the states' own revenue, whereas central transfers comprise the states' share in the central taxes and grants-in-aid from the Centre. In the post-AFRBM period (from 2005-06 to 2016-17), the state's revenue receipts grew slightly higher at a compound annual growth rate (CAGR) 13.65 percent compared to the pre-AFRBM period (from 1990-91 to 2004-05), when the CAGR was 13.08 percent (Table 1). The growth trend of the different components of revenue reveals that the growth rate of the state's own-tax revenue significantly fell in the post-AFRBM period, which contributed to the fall in the growth rate of the state's own revenue. The state's share in the central taxes, however, markedly increased at the CAGR 18.72 percent during the post-AFRBM period against

the CAGR 12.64 percent during the pre-AFRBM period. The post-AFRBM period witnessed a fall in the growth rate of own revenue, on the one hand, and an increase in the growth of central transfers, on the other.

The composition of Assam's revenue receipts shows that the share of the state's own revenue in the state's revenue receipt was only 39.26 percent in 1990-91, only to have declined to 33.38 percent in 2016-17 (in the post-AFRBM period - Figure 1). Accordingly, the share of the central transfers went up from 60.74 percent in 1990-91 to 66.62 percent in 2016-17. In comparison with all the other states, the State of Assam had a much lower share of own tax and own revenue in revenue receipt, which reflects the fact that, on revenue side, Assam was highly dependent on the transfers from the Centre, which dependence increased in the post-AFRBM period.

During the post-AFRBM period, the state's own-revenue buoyancy and own-tax buoyancy deteriorated. The average own-tax buoyancy and own-revenue buoyancy during the pre-AFRBM period were 1.12 and 1.39, respectively, which declined to 1.03 and 1.05, respectively, during the post-AFRBM

Table 1 Assam's revenue receipt trend: Pre- and post-AFRBM periods (%)

Period	Tax revenue	Non-tax revenue	Own revenue	Share in central taxes	Grant-in-aid	Central transfers	Total revenue receipt
*CAGR pre- AFRBM period	14.25	10.11	12.83	12.64	13.71	13.24	13.08
*CAGR post- AFRBM period	12.73	10.45	12.07	18.72	10.27	14.56	13.65

*CAGR = Compound Annual Growth Rate

Source: Government of Assam, 1991-2016; Reserve Bank of India, 2018

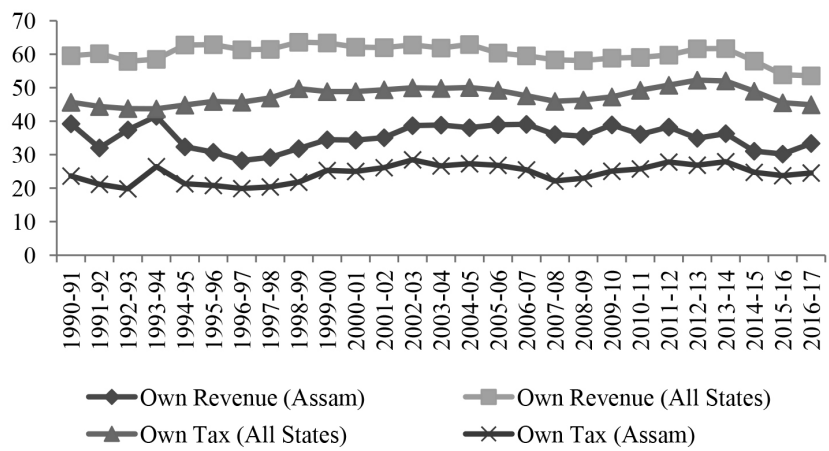


Figure 1 The contribution of the state's own tax revenue and the state's own revenue in revenue receipt: Assam and all the states (In percentage)

Source: Government of Assam, 1991-2016; Reserve Bank of India, 2018

period (Table 2). However, the Own Tax/GSDP and Own Revenue/GSDP ratios showed an improvement in the post-AFRBM period (Figure 2).

Thus, the improvement on the revenue side of the state budget in the post-AFRBM period is a result of growing central transfers. The revenue effort of the state towards fiscal consolidation did not improve in the post-AFRBM period, but the state's dependence on central transfers rather increased.

Expenditure trend and composition

The total expenditure of the state is broadly categorized into revenue expenditure, capital outlay and the disbursement of loans and advances. The expenditure trend (Table 3) shows that the state's expenditure increased at a higher pace during the post-AFRBM period compared to the pre-AFRBM period. The annual growth rate of the total expenditure, however, broadly fluctuated during both the pre-AFRBM period and the post-AFRBM period. Negative growth rates were recorded in 2005-06 and 2015-16, namely 12.38 percent and 8.39 percent, respectively, whereas a significant increase was recorded in 2004-05 and 2009-10, namely 45.49 percent and 43.43 percent, respectively (Figure 3). So, the state's expenditure demonstrated pronounced volatility with occasional shocks. The expenditure-to-GSDP ratio also demonstrated a rising trend in the post-AFRBM period.

Of Assam's total expenditure, the revenue expenditure alone accounts for almost 90 percent

Table 2 The tax and revenue GSDP ratios and tax and revenue buoyancy Pre- and post-AFRBM periods

Period	Own tax - GSDP ratio	Own revenue - GSDP ratio	Revenue receipt -GSDP ratio	Own-tax buoyancy	Own-revenue buoyancy
The average of the pre-AFRBM period	4.23	6.24	17.69	1.12	1.39
The average of the post-AFRBM period	5.06	7.18	20.06	1.03	1.05

Source: Authors

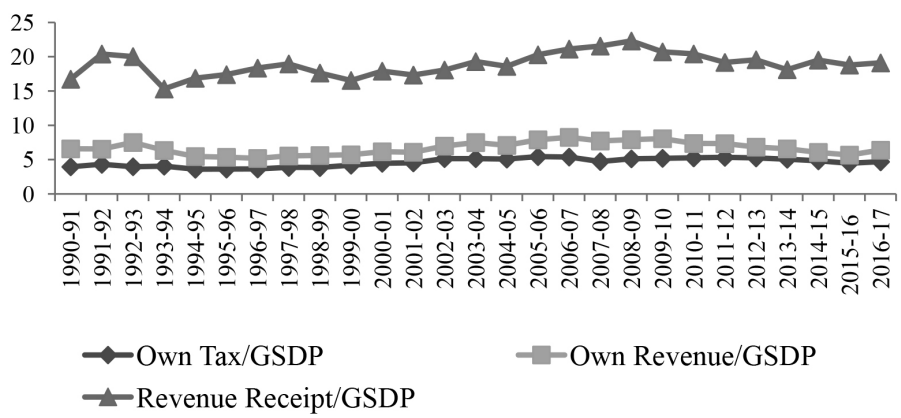


Figure 2 Assam's own tax, own revenue and revenue receipt as a percentage of the GSDP

Source: Authors

(Figure 4). Although a marginal decline in the share of the revenue expenditure was noticed from 2005-06 to 2009-10 immediately after the AFRBM act, the share of the revenue expenditure rose again and remained at around 90 percent of the total expenditure. The capital outlay share remained single digit for the largest number of the years in the pre- and post-AFRBM periods. The share of the disbursement of loans and advances was minuscule and insignificant, accounting for less than 1 percent of the total expenditure for the largest part of the pre- and post-AFRBM periods.

The main factors responsible for the relentless growth of the revenue expenditure are public servants' salaries, interest and pension (retirement benefits), which are called a committed expenditure. The revision of public servants' salaries and wages that takes place at an interval of 10 years according to the recommendation made by the Pay Commission, constituted by the Government, is the most important reason for the increase in the committed expenditure and a sudden jump in the revenue expenditure. The committed expenditure that accounted for 84.52 percent of the revenue expenditure and 102.06 percent of the revenue receipt in 1999-2000 significantly fell in the post-AFRBM period to 58.80 percent and 58.97 percent, respectively, in 2016-17 (Figure 5). The interest payment that accounted for 16.61 percent of the revenue expenditure in 1999-2000 considerably declined to 6.00 percent in 2016-17.

Table 3 Assam's total expenditure trend - in the pre- and post-AFRBM periods

Year	Revenue expenditure	Capital outlay	Disbursement of loans and advances	Total expenditure
CAGR pre-AFRBM period	12.69	16.83	12.68	13.23
CAGR post-AFRBM period	15.07	15.90	15.12	15.15

Source: Government of Assam, 1991-2016; Reserve Bank of India, 2018

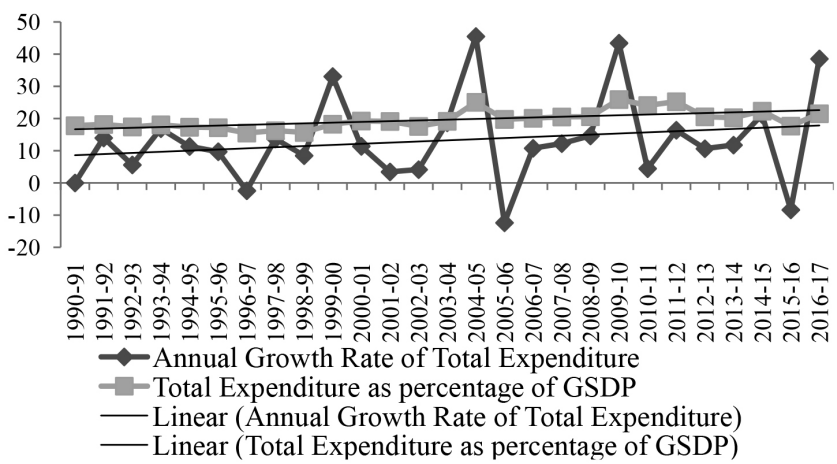


Figure 3 The total expenditure as a percentage of Assam's GSDP and the annual growth rate of the total expenditure

Source: Government of Assam, 1991-2016; Reserve Bank of India, 2018

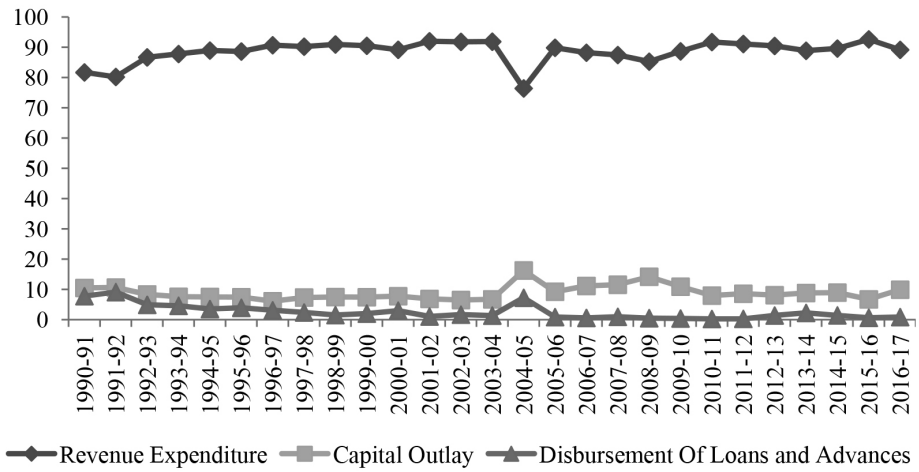


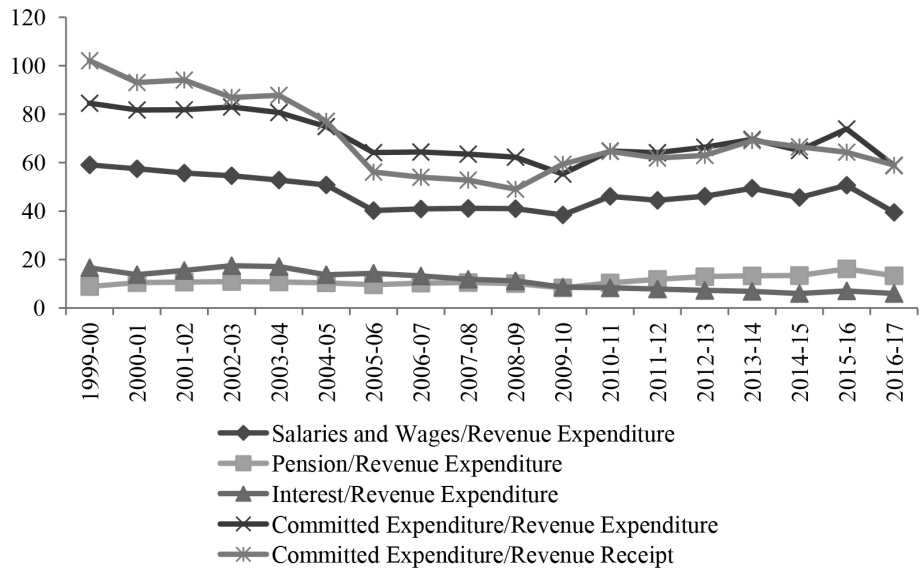
Figure 4 The composition of the total expenditure (in percentage)

Source: Government of Assam, 1991-2016; Reserve Bank of India, 2018

Deficit and debt indicators

The trend of Assam's fiscal deficit, revenue deficit and primary deficit reveals that these deficit indicators remarkably improved during the post-AFRBM period (Figure 6). In the pre-AFRBM period, Assam incurred a moderate fiscal deficit to a huge fiscal deficit, except in 1993-94, when a marginal fiscal surplus was reported. In 1999-2000, Assam incurred 3.34 percent of the revenue deficit and 5.48 percent of the fiscal deficit mainly due to the implementation of the recommendations made by the Fifth Pay Commission on the revision of salaries and wages. However, with the implementation of the AFRBM Act and the fiscal stabilization measures, Assam recorded a revenue, fiscal and primary surplus immediately in 2005-06. The state's government's fiscal restraint allowed the state to earn surpluses in the revenue, fiscal and primary deficits for the next few years, which, however, were distorted in 2009-10 as the state incurred a revenue deficit of 1.92 percent, a huge fiscal deficit of 5.78 percent and a primary deficit of 3.16 percent of the GSDP. The primary reason for this sudden spike in deficits was again due to the implementation of the revision of the salaries and wages according to the recommendations made by the Sixth Pay Commission. From 2010-11 to 2016-17, the state contained the fiscal deficit to a moderate level, incurred a very marginal revenue deficit only in 2016-17, and also earned a primary surplus for a few years. Thus, in the post-AFRBM period, the deficit indicators remarkably improved from 2005-06 to 2008-09, and the state succeeded in achieving a certain degree of fiscal stability thereafter, except in 2009-10.

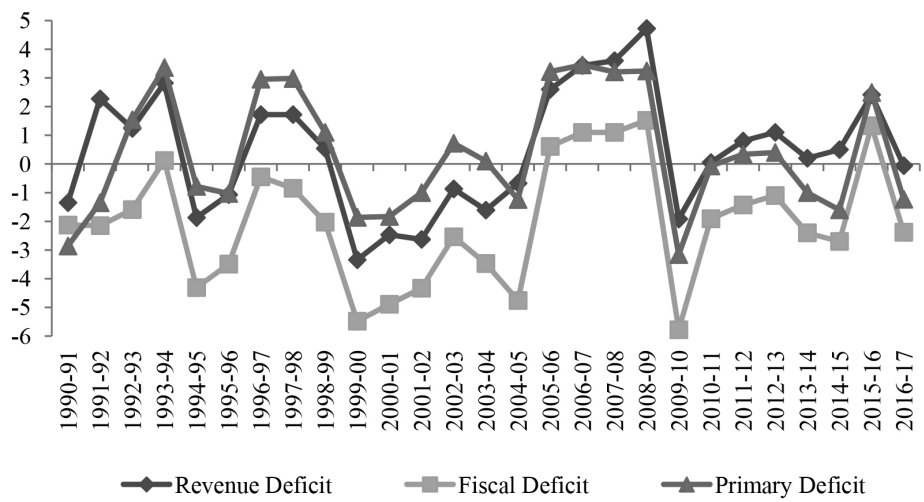
The state's debt-GSDP ratio fell from 40.87 percent in 1990-91 to 24.88 percent in 1999-2000, only to increase again to 31.92 percent in 2004-05 (Figure 7). After the introduction of the AFRMB Act, Assam's debt-GSDP ratio steadily declined from 30.13 percent in 2005-06 to 18.54 percent in 20016-17. The interest-payment-to-the-revenue-receipt-of-the-state ratio, which was 19.75 percent in 1999-2000, steadily declined to 6.02 percent in 2016-17. These ratios are well below the level of the debt-GSDP ratio of 25 percent, and the interest-revenue receipt ratio of 10 percent recommended by the Fourteenth Finance Commission of India (2014). Thus, in the post-AFRBM period, the debt-GSDP and interest-revenue receipt ratios significantly fell, and the state was able to consistently improve those ratios.



Note: The state data about the salaries and wages are available starting from 1999-2000.

Figure 5 The ratios of the committed expenditure and its components in the revenue expenditure and the revenue Receipt (%)

Source: Comptroller and Auditor General of India, 2002-2017; Government of Assam, 1991-2016



Note: A surplus (+) and a deficit (-)

Figure 6 The trend of the deficit indicators (%)

Source: Reserve Bank of India, 2018

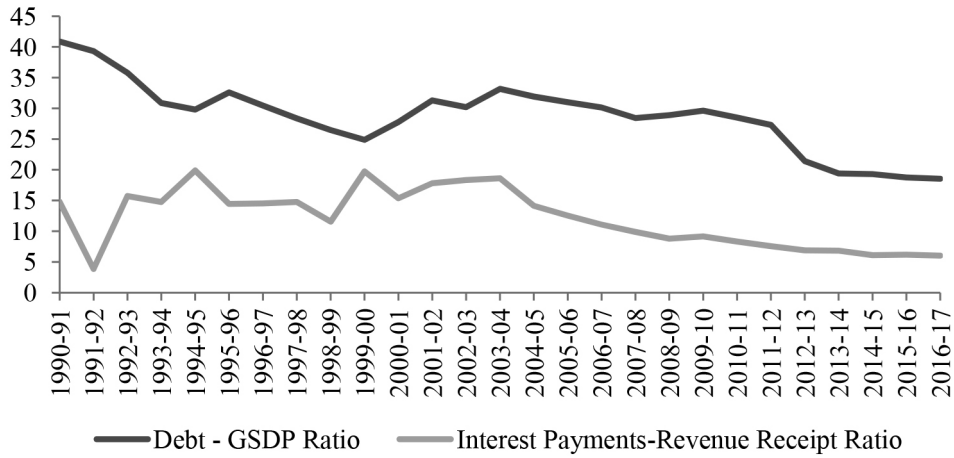


Figure 7 The debt-to-GSDP and interest-to-revenue-receipt ratios

Source: Reserve Bank of India, 2018

CONCLUSION

The discussion enables us to conclude that the AFRBM Act immensely helped the state to improve the state's deteriorating fiscal situation, and also achieve some degree of fiscal stability. The state was able to make a commendable improvement of its deficit and debt indicators. During the post-AFRBM period, the states' key fiscal indicators almost remained within the boundaries set by the AFRBM Act of 2005 and the AFRBM (Amended) Act of 2011.

Although the fiscal improvement in the post-AFRBM period was being supported by the increase in revenue, that increase was partly a result of significant growth in central transfers. The growth rates in the state's own revenue and the share of the own revenue in the total revenue fell in the post-AFRBM period. With the falling tax-GSDP ratio and increasing dependence on central transfers, it was hard to assert that the revenue side of the state budget improved in the post-AFRBM period.

On the expenditure side, the revenue expenditure still accounts for almost 90 percent of Assam's total expenditure. Although the initial years of the post-AFRBM period showed contraction in expenditures, the total expenditure expanded more during the post-AFRBM period. However, it should be noticed that the share of the committed expenditure in the revenue expenditure and the ratio of the committed expenditure to the revenue receipt significantly declined in the post-AFRBM period, providing the state with some degree of the fiscal space.

The state's capital expenditure did not improve through the study period, only accounting for one-tenth of the total expenditure. Thus, the development capital expenditure suffered, which might be due to the fiscal deficit targets of the AFRBM Act. The debt-GSDP ratio and the interest payment-revenue receipt ratio being low, the state can take borrowings in order to step up the capital expenditure. Achieving fiscal targets by squeezing developmental expenditure will lead to a more adverse situation. There is a need for a further study to be carried out so as to investigate various sectoral expenditures in order to fully understand the expenditure implications of the AFRBM Act.

The findings of the study are in line with S. Guichard, M. Kennedy, E. Wurzel and C. Andre (2007), the IMF (2009), S. Krogstrup and S. Wälti (2008) and the others claiming that there is a positive association between the fiscal rules and better fiscal outcomes.

ENDNOTES

[1] The FRBM Act of 2003 set the elimination of the revenue deficit and the limitation of the fiscal deficit to 3 percent of the GDP by March 31, 2009. In 2009, however, the FRBM Act was suspended for the periods 2009-10 and 2010-11, because of the global financial crisis. In 2011, the FRBM Act was amended by the revised fiscal road map. In 2013, the FRBM Act was again amended, and the revenue and fiscal deficits target dates were revised to March 31, 2015. Again, the Act was amended in 2015 and the target dates were further revised further to March 31, 2018. The Government of India formed a committee in 2016 in order to review the operation and functioning of the FRBM Act.

[2] According to the Maastricht Treaty, the European Union member countries can raise their public debt only up to 60 percent of the GDP and the budget deficit may not exceed 3 percent of the GDP.

[3] Since 1997, the UK had operated the Golden Rule that had only allowed borrowing in order to fund capital spending. The Golden Rule was abandoned in 2009.

[4] The Assam Fiscal Responsibility and Budget Management (AFRBM) Act of 2005 was being implemented starting from April 1, 2005, with the goal of eliminating the revenue deficit by 31 March, 2009 and reducing the fiscal deficit to 3 percent of the GSDP by 31 March, 2009. The AFRBM Act was amended in 2011 by the revised fiscal road map. According to the AFRBM (Amended) Act of 2011, the revenue deficit was to be eliminated by 2011-12 and was to contain the fiscal deficit within 3 percent of the GSDP by 2010 and thereafter and maintain it at that level.

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THE PRICE OF THE LOCKDOWN - THE EFFECTS OF SOCIAL DISTANCING ON THE INDIAN ECONOMY AND BUSINESS DURING THE COVID-19 PANDEMIC

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The decision on immediate lockdown in India put economic, social and religious activities to a grinding halt. The paper examines the impact of the lockdown and social distancing policies on economic activities in India, using a multivariate econometric model for the data collected in the period from 1st January to 31st August 2020. While the social distancing policy is captured in terms of internal movement, domestic travel and international travel restrictions, its effect on the economic activity and the business activity is captured through stock prices, purchasing managers' index and the exchange rate. Confirmed COVID-19 cases and related deaths are also used as the independent variables. The results reveal a significant negative impact of social distancing policies on the economic activity and the business activity, the stock market and the exchange rate. Furthermore, the economic stimulus provided by the Government could not bring a positive influence on the stock market.

Keywords: lockdown, economy, finance, COVID-19, social distancing, India

JEL Classification: E65, E62

INTRODUCTION

A pandemic is a widespread outbreak of an infectious disease capable of causing immense morbidity and mortality throughout the world *en masse,* having yet a potential cataclysmic economic, social, and political impacts. COVID-19 is perceived as a local virus infection emanated from China, which rapidly spread across the world and turned into a pandemic. The 1918 influenza pandemic, also known as the Spanish flu, which had resulted in an estimated 20 million death toll due to respiratory infections, is the closest parallel to the COVID-19 (Beach, Clay & Saavedra, 2020). Besides, resulting in the short-term scarcity of labor, the spiraling costs of production, duress on public resources and social security systems, pandemics also have a long-term "hysteresis" effect in terms of a permanent loss of a potential output

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and a higher unemployment rate. Due to increased global travel and urbanization, the likelihood of such pandemics has exponentially increased over the past century. A precedent to the COVID-19 (SARS-2) outbreak was the SARS-1 that had emerged as a major international threat in 2003. The first COVID-19 was reported in Wuhan, the Hubei Province of China, on 31st December 2019 (WHO 2020), since when the disease has affected around 98.8 million lives and has resulted in 2.19 million deaths so far (WHO 2021)[1]. On 30th January 2020, the WHO declared a global health emergency, the sixth time in history that such an emergency was declared. On 11th March 2020, the WHO declared this virus a pandemic, based on the fact that it had been spreading all over the world, which had disrupted normal life with severe social and economic repercussions.

The "new normal" of social distancing, prohibition on mass gatherings, shutting down business outlets, travel restrictions and the reverse migration of daily wage earners from urban pockets to rural homes has made the economic situation worse (Horowit, 2020; Larry Elliot, 2020; Ozili & Arun, 2020; Baber, 2020), while working from home has shown some significant improvement in workers' productivity (Bridgman, 2016; Etheridge, Wang & Tang, 2020). M. M. Alsan, M. Westerhaus, M. Herce, K. Nakashima and P. E. Farmer (2011), as well as A. Sumner, C. Hoy and E. Ortiz-Juarez, (2020), argue that COVID-19 will increase the number of the ultra-poor, i.e. income earnings below $1.90 a day, by 80 million, thus posing a serious challenge to the UN sustainable development goal of ending poverty by 2030, while high-income countries usually enjoy a lower mortality rate and longer life expectancies, experiencing in turn higher economic growth (Bhargava, Jamison, Lau & Murray, 2001; Haacker, 2004). Therefore, the COVID-19 pandemic that poses hurdles to national health programs (Gopalan & Mishra, 2020) needs to be paid attention to so as to make health and education equally accessible to the underserved and marginalized populations in India (Chaudhary, Sodani & Das, 2020).

Countries have taken measures intended to slow down the spreading of the virus. Social distancing norms intended to reduce the harm of the infection have been considered as an effective strategy in the early stage of the spreading of the virus, especially in the absence of vaccines (Reluga, 2010). These social distancing norms include closing schools, shopping malls and workplaces, and restrictions on organizing meetings and gatherings and holding public events (Fong, Gao, Wong, Xiao, Shiu, Ryu & Cowling, 2020). The norms are applied differently in varied settings. For instance, while formal workforce with guaranteed income will follow social distancing norms and stay at home, numerous informal workforce will have to make a Herculean choice between starvation and going out to work (McKee & Stuckler, 2020). Lockdown was the most efficient way for countries to slow down the spreading of the virus or achieve a decrease in the transmission of the virus. The effective reproduction number, Re, also called Rt, is the number of the people in a community who can be infected by an individual at any specific time. Some countries announced lockdowns early in anticipation of the health crisis, whereas others have never opted for lockdown. In the beginning, strict and complete lockdown was implemented, which implied restrictions on citizens' movements outside the boundaries, which some countries successful in keeping the Rt below 1 relaxed over time.

India reported its first case on 30th January 2020. The pace of the outbreak was not as grave as in China, or as in the US and European countries, but the pace still called for caution. The Government found itself faced with Sophie's Choice: they had a choice to either shut down the economy in order to contain the spreading of the virus and decrease the damage done and save lives at the cost of livelihoods, on the one hand, or defer lockdown in order to save the economy from distress and a looming crisis, on the other. The Government's sudden announcement of the complete lockdown on 25th March led to a slowdown in the economic production activities of urban centers and the reverse migration of a large population from the production activity urban center to rural areas. Consequently, manufacturing came to a grinding halt in the key sectors, such as construction, real estate and info-tech, which reflected in the collapse of the industrial stocks listed in the Bombay Stock Exchange Sensitive Index (BSE Sensex) in the aftermath. Against

these ongoing developments, the impact of social distancing policies, travel restrictions on domestic and international flights, a surge in COVID-19 deaths and confirmed infected cases on the economic activity and the business activity, the stock market and the exchange rate (the Indian Rupee price of a US Dollar) in India are analyzed in the paper.

LITERATURE REVIEW

Compared to the Global Financial Crisis (GFC) of 2008 and other crises, the economic consequences of the COVID-19 pandemic are considered as more severe. P. K. Ozili and T. Arun (2020) opine that the economic impact of this pandemic is more severe than the GFC of 2008, with an estimated global loss of jobs of 24.3 million. In the past, major public health crises, such as SARS in 2003 and influenza A (H1N1) in 2009, exerted a systemic negative influence on international trade and economy (Madhav, Oppenheim, Gallivan, Mulembakani, Rubin & Wolfe, 2017). However, N. Fernandes (2020) disapproves of the comparison of the COVID-19 pandemic with other global crises, including the GFC of 2008, given the fact that:

- it is a severe global pandemic,
- it affects all income segments,
- interest rates are at their record low,
- simultaneous demand and supply are shocking, and
- there are international integration and interdependency.

W. Ding, R. Levine, C. Lin and W. Xie (2020) estimate that an average increase in the spreading of COVID-19 over two months has resulted in a 12 percent drop in global stock prices. K. Kanitkar (2020) estimated that, due to the COVID 19 lockdown, the Indian economy would lose about 10-31percent of the estimated GDP for the years 2020-2021. H. S. Gopalan and A. Misra (2020) warn that India may face severe economic repercussions with an increase in poverty, the broadening of socioeconomic disparities and health care challenges. However, R. Baldwin and B. Weder di Mauro (2020) suggest that India may be shielded from economic contagion as it does not depend on the global supply chain too much.

India's lockdown strategy was hastily prepared and made the vulnerable population more exposed to economic shocks, although the desired effect of flattening the curve was achieved during the first phases of the lockdown (Lancet, 2020). Through a blend of the control actions that include restriction on movement and the closure of factories and workplaces, India tried to "flatten the curve", i.e. "*reduce the number of COVID-19 cases in order to prevent the clogging and collapse of the healthcare system*" (Sengupta, & Jha, 2020). While the COVID-19 pandemic may have an adverse effect on growth (Lokhandwala & Gautam, 2020; Sardar, Nadim, Rana & Chattopadhyay, 2020), only attributing to COVID-19 for economic distress may not be a fair assessment given the fact that the Indian economy has already been slowing down for over the last eight quarters from 8.2 percent to 4.2 percent between Q4 2017-18 to Q4 2019-20 due to the twin secular decline of the consumption and investment rates prior to COVID-19 (Dev & Sengupta, 2020; Rao, 2021a). However, the COVID-19 pandemic shook the informal sector which had been recovering from the slowdown post demonetization and the introduction of the goods and services tax (Ray & Subramanian, 2020). The losses predicted due to the countrywide lockdown are estimated to exceed $ 4.5 billion per day (Gopalan & Misra, 2020).

Since early June, the lockdown has gradually been relaxed. However, in high-risk zones, i.e. the "containment" areas, restrictions are still intact. Citing the hardships faced by various economic groups, the Government of India announced an economic stimulus package called "Atmanirbhar Bharat" (Self-Sufficient India), which includes the front-loading of payments, direct benefit transfers to elderly people and widows, providing employment to migrant workers, funds for construction workers and direct food distribution (Dev & Sengupta, 2020).

DATA AND METHODOLOGY

In this section, whether the lockdown and the social distancing policies affected economic activities or not is empirically examined. The data were collected for the period from 1st January to 31st August 2020. This period of seven months includes pre-pandemic economic activities, restrictions, and stock prices. The period was divided into the pre-lockdown period, the period during the lockdown, and the post-unlockdown period. The lockdown and unlockdown periods were further divided into different phases, depending upon the severity of the restrictions. The highest restrictions were those in the lockdown-1 period (25th March 2020-14th April 2020), during which period people were not allowed to move out of their homes or place of stay. The lowest restrictions were those in the lockdown-4 period (18th May 2020-31st May 2020), during which period people were allowed to move and restaurants were allowed to operate kitchens for the home delivery of food items. The main objective of the study is to examine the impact of the social distancing policies on the performance of economic/business activities and the stock market in the lockdown and unlockdown phases.

The data on the stock market related to the Opening Price (OP), the Closing Price (CP), the Lowest P (LP) and Highest Price (HP) of the listed industrial stocks obtained from the BSE SENSEX[2]. The data of the currency values for the period from 1st January to 31st August were extracted from Yahoo finance. The estimations included the natural logarithm of each price data in order to reduce the observed skewness in the distribution of the stock price data. On the days when the stock market was closed, the values of the last working day were used for the measurement. The Purchasing Managers' Index (PMI) was also extracted for this given period. The PMI is an indicator of the prevailing direction of economic trends in the manufacturing and service sectors. It is derived from the monthly surveys of the private sector companies. The PMI can be used as a proxy for the level of general economic/business activities (Ozili & Arun, 2020).

Three explanatory variables were used to capture the social distancing policies, namely the following: restrictions on internal movement (RIM), domestic travel restrictions (DTR), and international travel restrictions (ITR). The restriction in internal movement (RIM) was computed from the data on the following variables: the closing of schools, the closing of workplaces, cancelling public events, restrictions on public gatherings and restrictions on public transport. The economic support (ES) packages announced by the state governments and the central government were also used as the explanatory variables. Confirmed COVID-19 cases (CC) and Confirmed COVID-19 deaths (CD) were also used as the independent variables. To minimize the observed skewness in the CC and CD data distribution, the natural logarithm of the values of these variables was taken into consideration.

The data for the RIM, ITR, DTR, ES, CC, and CD variables were collected from the Oxford COVID-19 Government Response Tracker (OxCGRT) database[3], which is the database that monitors the government's policy responses during the outbreak. The OxCGRT collects publicly available information on the 19 indicators of the government's responses (see Appendix A), these indicators being of the following three types: ordinal, numerical, and text. Ordinal indicators measured policies on a simple scale of severity/intensity. The most stringent government policy being in place in a country was represented by the highest ordinal value. For instance, the "closing of schools" indicator was measured by using the following options and the coding "0-no measure", "1-closing recommend", "2-closing required (only some levels or categories, e.g. only high schools, or only public schools)" and "3-closing at all levels required". So, the values pertaining to closing schools ranged from 0 to 3. Every index is composed of a series of individual policy response indicators. For each indicator, a score was created by taking the ordinal value and adding an extra half-point if the policy was general, rather than targeted, wherever applicable. The labeling of "targeted" meant a specific geographical region or whether they were a "general" policy applicable to the entire country. Then, the rescaling of each of these variables was performed by their maximum value so as to create a score between 0 and 100, with a missing value equal to 0. These scores

were then averaged in order to obtain the composite indices of all the eight containment indicators (C1-C8). The closing policies were measured on the ordinal scale. A total of four indicators (E1-E4) recorded economic policies, such as income support to citizens or the provision of foreign aid. Two indicators (E1 and E2) were measured on the ordinal scale, whereas the other two (E3 and E4) were measured on the numerical scale. The numerical scale indicators measured a specific number, typically the value in US$. These indicators were only reported on the day they were announced. A total of five indicators (H1-H5) recorded health system policies, such as the COVID-19 testing regime or emergency investments in the healthcare. These indicators were also measured on the ordinal and numerical scales.

The data were classified into the three major indices estimated from the 19 indicators (see Appendix A). These indices were reported on a scale from 1 to100, where 1 implies "the weakest response by the government" and 100 means "the strongest response of the government" for the given indicator. Overall, the government policy response can be grouped into the four general headings, namely:

- the Overall Government Response: the overall government response indicators during the period of the pandemic, which varied depending on the situation,
- the Containment and Health Index: testing the strategy, contact tracing, emergency funds in healthcare, the awareness of the public and investment in the vaccine development,
- Economic Support: Government support to the economy through debt relief for households/ businesses, fiscal measures and income support to households/businesses (discount coupons), and
- the Stringency Index: the application of lockdown and movement strictness. It includes the closing of schools, workplaces, markets and events.

The data were simply scoring the responsiveness of the government on different fronts and their effectiveness. A higher score in an index does not mean that the country's response is better than those which generate a lower score. The countries that never applied lockdown and effectively managed the pandemic may generate a lower score because of the absence of the lockdown measures.

The period of seven months was calibrated in the following manner: the pre-lockdown period (from 1st January 2020 to 23rd March 2020) was attributed the value 0, the lockdown-1 period (from 25th March 2020 to 14th April 2020) was attributed the value 1, the lockdown-2 period (from 15th April 2020 to 3rd May 2020) was attributed the value 2, the lockdown-3 period (from 4th May 2020 to 17th May 2020) was attributed the value 3, the lockdown-4 period (from 18th May 2020 to 31st May 2020) was attributed the value 4, the unlock-1 period (from 1st June 2020 to 30th June 2020) was attributed the value 5, the unlock-2 period (from 1st July 2020 to 31st August 2020) was attributed the value 6. Finally, in a fashion similar to the earlier multivariate model constructions by S. Akter (2020); P. K. Ozili and T. Arun (2020); T. Hale, A. Petherick, T. Phillips and S. Webster, (2020) and W. C. Koh, L. Naing and J. Wong (2020), a multivariate model for empirical estimation was constructed by using the ordinary least square regressions as follows:

$$ECi = C + RMi + ITRi + DTRi + ESi + CCi + CDi \quad (1)$$

$$SPi = C + RMi + ITRi + DTRi + ESi + CCi + CDi \quad (2)$$

$$INRi = C + RMi + ITRi + DTRi + ESi + CCi + CDi \quad (3)$$

where,

C = the constant

EC = the level of general economic activities

SP = the log vector of the stock market variables: OP (the opening price), CP (the closing price), LP (the low price) and HP (the high price)

INR = the log vector of the rupee value against the dollar: INR/USD

i = a weekday.

EMPIRICAL RESULTS AND DISCUSSION

In Table 1, the descriptive statistics of the observed variables are presented. The mean value 2.79 in the lockdown signifies that the lockdown was in place during the largest number the days. The mean values of the confirmed cases and the confirmed deaths are 518017 and 11351, respectively, which is alarming and among the highest in the world. The value of the rupee ranged between 70 and 76.94, having achieved the lowest value against the dollar from the inception after independence in 1947. The ANOVA results suggested no significant difference among the pre-/lockdown/unlock phases against the dependent variables: the PMI, the rupee value and the stock market indices, as shown in Table 2. Also, no significant differences are noticed in the confirmed cases and the reported deaths during these six pre-/lockdown/unlock phases, which fact signifies that the stock market showed no significant change during these phases, although there was a sharp bearish trend in SENSEX from 2nd December 2019 to 25th March 2020. However, no significant difference was found in different phases. The confirmed cases and the deaths did not show any lockdown and lock effects, either. The Pearson two-tailed correlation is given in Table 3. All the correlations are significant at the 1-percent and 5-percent significance levels, except for those between the PMI and the confirmed cases and the confirmed deaths.

The empirical results of the study are presented in Table 4. The restrictions on internal movement have a negative significant influence on the opening, closing, lowest and highest values of the stock prices. The impact of the restrictions on movement is highly negative on the economic activities. The restrictions forced people to stay back at home. Many migrant workers left for their hometowns amidst the shutdown in factories and industries. The economic output decreased, which led to a reduction in economic activities. The restrictions on movement have a strong positive impact on the rupee-dollar value. The

Table 1 Descriptive statistics

Variables	Observations	Mean	Minimum	Maximum	Std. Deviation
Lockdown	244	2.79	0	6	2.51
PMI	244	36.21	5.4	57.5	17.8
ES	244	54	0	75	31.78
RIM	244	1.72	0	2.83	1.06
DTR	244	1.37	0	2	0.92
ITR	244	2.79	0	4	1.47
CC	244	518018	0	3621245	895592.74
CD	244	11351.25	0	64469	17448.9
Open	244	35854.24	26499.81	42263	4255.11
High	244	36187.91	27462.87	42273.87	4071.97
Low	244	35436.29	25638.9	41850.29	4436.34
Close	244	35832.53	25981.24	41952.63	4229.04
INR/USD	244	74.31	70.8	76.94	1.82

Source: Authors

Table 2 The one-way ANOVA sample test

Dependent variable	Factor	*F*	Sig.
PMI	Pre/Lockdown/unlock	219.430	.000
Open	Pre/Lockdown/unlock	76.886	.000
High	Pre/Lockdown/unlock	98.472	.000
Low	Pre/Lockdown/unlock	65.746	.000
Close	Pre/Lockdown/unlock	85.599	.000
INR/USD	Pre/Lockdown/unlock	145.082	.000
Confirmed Cases	Pre/Lockdown/unlock	107.055	.000
Confirmed Deaths	Pre/Lockdown/unlock	187.534	.000

Note: RIM = restriction on internal movement. ITR = international travel restrictions. DTR = domestic travel restrictions. ES = economic support. CC = confirmed COVID-19 cases. CD = confirmed deaths.

Source: Authors

Table 3 Pearson Correlation

	PMI	ES	RIM	DTR	ITR	CC	CD	Open	High	Low	Close	INR/USD
PMI	1											
Economic Support	-.682**	1										
Restriction on internal movement	-.645**	.942**	1									
Domestic travel restrictions	-.720**	.928**	.970**	1								
International travel restrictions	-.668**	.908**	.933**	.940**	1							
Confirmed Cases	.072	.384**	.534**	.397**	.439**	1						
Confirmed Deaths	.050	.432**	.585**	.447**	.476**	.990**	1					
Open	.732**	-.697**	-.574**	-.659**	-.647**	.244**	.230**	1				
High	.766**	-.708**	-.592**	-.686**	-.664**	.238**	.224**	.992**	1			
Low	.702**	-.676**	-.544**	-.624**	-.622**	.258**	.247**	.996**	.988**	1		
Close	.742**	-.690**	-.569**	-.662**	-.646**	.249**	.237**	.988**	.997**	.990**	1	
INR/USD	-.570**	.953**	.955**	.905**	.869**	.526**	.577**	-.566**	-.576**	-.545**	-.558**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Authors

Table 4 The effect of social distancing on the stock market, the currency value, and the economic activity

	Opening Price (OP)	Closing Price (CP)	Lowest Price (LP)	HighestPrice (HP)	INR/USD	Economic Activity (EC) or PMI
RIM	-.956*** (-6.870)	-.754*** (-5.401)	-1.013*** (-6.592)	-.741*** (-6.020)	0.732*** (7.586)	-.968*** (-3.845)
ITR	-.220*** (-3.741)	-.212*** (-3.586)	-.268*** (-4.117)	-.185*** (-3.548)	-.195*** (-4.629)	.022 (.204)
DTR	.365** (3.467)	.157 (1.490)	.536*** (4.609)	.081 (.870)	-.256** (-3.386)	-.256 (-1.342)
ES	-.415*** (-6.546)	-.401*** (-6.303)	-.466*** (-6.650)	-0.378*** (-6.734)	0.643*** (14.120)	0.084 (0.736)
CC	-1.965*** (-12.639)	-1.984*** (-12.708)	-2.024*** (-11.780)	-1.916*** (-13.916)	-.060 (-.539)	-1.538*** (-5.464)
CD	2.857*** (16.969)	2.846*** (16.840)	2.934*** (15.767)	2.770*** (18.582)	0.138 (1.140)	2.207*** (7.242)
R^2	0.959	0.958	0.949	0.968	0.979	0.857
Adjusted R^2	0.919	0.919	0.901	0.937	0.958	0.735
Observation	244	244	244	244	244	244

Note: RIM = restriction on internal movement. ITR = international travel restrictions. DTR = domestic travel restrictions. ES = economic support. CC = confirmed COVID-19 cases. CD = confirmed deaths. ***, ** represent statistical significance at the 1-percent and 5-percent levels. The T-statistics are reported in parenthesis.

Source: Authors

positive impact signifies the deprecation of the rupee against the dollar, which is highly influenced by the restrictions on movement. The higher the restrictions on people's movement, the lower the economic activity and the fall in the value of the stock indices. With the heightened global risk aversion due to weak growth and COVID-19 uncertainty, India witnessed one of the highest foreign portfolio outflows with the selloffs of US$ 16 billion in the fourth quarter of the year 2020 itself. The international travel restrictions have a mild negative significant influence on the opening, closing, lowest and highest values of the stock prices, whereas international travel restrictions have a negative significant impact on the rupee-dollar value, which implies demand for the rupee increased amidst the travel restrictions and increased the currency in circulation (RBI, 2021). Furthermore, the opposite influence of the restrictions on movement and the international travel restrictions on the rupee value can be explained by the fact that the restrictions on movement were gradually eased and were almost nil by the end of August. However, the international travel restrictions are still in place, except for the air bubble agreement with 24 countries so far. Tourists and businessmen exchange their currency for the rupee before and during travel, such trips being mostly avoided during the pandemic. Surprisingly, international travel restrictions have no influence on general economic activities, which is contrary to our expectations as trade deals are preceded by business visits to and from India. The restrictions may have motivated domestic companies to produce essential items during this pandemic, such as masks, sanitizers and medicines. In fact, India witnessed a current account surplus of US$ 19.8 billion, with a sharp contraction in the trade deficit during the first quarter of 2021 compared to the deficit of US $15 billion in 2020, during the same quarter (RBI, 2021).

While the domestic travel restrictions have a positive significant influence on the opening prices of the BSE SENSEX listed stocks, with an insignificant impact on the closing prices, the domestic travel restrictions have a negative impact on the rupee-dollar value. However, the domestic air travel restrictions have an insignificant influence on the general economic activities. The results obtained suggest that the economic support announced both in terms of a monetary stimulus by the RBI (the Central Bank of India) and the fiscal stimulus package by the Government of India negatively influences the opening, closing, lowest and highest values of the stock prices, which is in contrast to an earlier study by B. N. Ashraf (2020a), who studied the stock market index of 77 countries from January to April 2020 and found that economic support did not have any influence on the stock prices. Furthermore, a positive influence on the deprecation of the rupee against the dollar was also found in the study presented in this paper. Since economic support has no significant impact on economic activities, the economic stimulus could have lifted positive sentiments in the financial and foreign exchange markets only. Moreover, together with a disruption in the local supply chain, the monetary stimulus led to a rise in the inflation level and hence in the deprecation of the exchange rate. The Government of India announced a $22.6 billion (around one percent of the GDP) economic stimulus, which includes direct cash transfers and food security measures intended for millions of the poor hit by the lockdown during the COVID-19 pandemic. G. D. Sharma, G. Talan and M. Jain (2020) stated that that economic package had not covered some important sectors, such as tourism or transportation horticulture, and found it to be wanting to induce spending in the lower-income group (Rao, 2021b).

The coefficient of the confirmed COVID-19 cases has a strong negative influence on the opening, closing, lowest and highest values of the stock prices and a negligible negative influence in the case of the rupee-dollar value, which is indicative of a surge in the confirmed cases having a negative impact on the stock prices as previously suggested by B. N. Ashraf (2020b). The rupee value also depreciated as the cases surged and the lockdown was simultaneously eased. Expectedly, a strong negative association between the rise in the confirmed cases and the economic activities was detected. The confirmed death cases positively influence the opening, closing, lowest, and highest values of the stock prices and have an insignificant impact on the rupee-dollar value. The confirmed death numbers have a high negative influence on the economic activities. Until 25th March, the stock prices had been trembling and there had only been 9 confirmed death cases, whereas thereafter the stock prices started recovering, and the death rates started increasing as well. The value of the adjusted R^2 is above 90 percent for the stock prices and the INR/US$ value, and 73 percent in the case of the economic activities, which means that much of the variation in these prices and values is explained by the social distancing policies examined in this study. The variations in the stock prices, the exchange rate and domestic economic activities can largely be explained by the restrictions imposed on internal movement, domestic and international travel, economic stimulus packages, and a surge in the number of cases.

India imposed a complete lockdown on 25th March 2020. People were instructed to practice social distancing and stringent restrictions were imposed on people's movement. Only the essential services such as hospitals, electricity, and water supply were open. All shops, offices, schools and factories were shut down and work from home was advised throughout the country. All international flights were suspended for an indefinite period on 20th March and domestic flight restrictions were imposed on 24th March. The stock market had already been on a downward spiral since 28th February, given the fact that the largest parts of Asia, Europe and the US were seriously afflicted with the spreading of the virus and the infection, given the tightened financial integration, the stock markets exhibit simultaneous booms and busts across the world (Morales & Andreosso-O'Callaghan, 2012). H. Liu, A. Manzoor, C. Wang, L. Zhang and Z. Manzoor (2020) found a cross-market association during the crisis. Most countries in Southeast Asia are commercially integrated with China (Sun & Hou, 2019). China constitutes 16 percent of the world economy as compared to 3 percent in 2003. Therefore, any shock in the Chinese economy has deep ripple

effects on the world economy (Fernandes, 2020). Supply shocks and pandemics spread and depress investor sentiments, thus affecting their funding judgment, eventually exerting an impact on stock prices. In the midst of COVID-19, several stocks of reputed companies plunged more than 80 percent within a few days, some stocks having witnessed the biggest one-day fall around the world (Fernandes, 2020). In a similar vein, a strong negative impact of this pandemic on the stock prices was found in comparison with the previous financial shocks due to demonetization and the implementation of the Goods and Services Tax (GST).

CONCLUSION

In the paper, the influence of the social distancing policies implemented during the lockdown and the unlockdown periods on the economic activity and the business activity, the stock market and the exchange rate in India was analyzed. A significant negative impact of the largest number of the social distancing policies on the economy, the stock prices and the exchange rate was detected. Even the financial support announced by the Government was unable to uplift investors' sentiments. The domestic and international travel restrictions have a positive impact on the economic activities, which may be so due to a sharp fall in imports. The lockdown that helped flatten the curve and provide the space-time to brace up the health infrastructure by itself has an economic price of its own. India is presently witnessing the largest daily cases in the world. The decision to unlock, however, may be justified for the two reasons: first, it was made in order to keep the economic engine running, and second, it intended give a chance to more than 400 million poor people living below the poverty line to survive. The shutting down of various shops and factories triggered the reverse migration of laborers from the urban centers of production activities to rural areas. At the present time, as many as 400 million workers in the informal economy, constituting around 90 percent of India's workforce, are exposed to the risk of falling deeper into poverty. The Indian Prime Minister announced a $270bn stimulus package intended to boost the battered economy after the week-long lockdown in order to curb the coronavirus pandemic. This mediation is declared to be a drive towards building an Atmanirbhar Bharat (Self-Reliant India). However, much of the initial fiscal package was in terms of the liquidity support and a credit guarantee, and the actual fiscal expenditure turned out to be below 1.5% of the GDP (Rao 2021b). The Nobel laureate economists Abhijit Bannerjee and Esther Duflo contend that the Indian Government needed to support the poor (Biswas, 2020). M. K. Singh and Y. Neog (2020) suggested certain measures other than the fiscal measures including cash transfers to informal workers in order to enhance spending, free testing on COVID-19, an increase in the scale of the amount of direct benefit transfers, such as Jan Dhan Yojana, MGNREGA, PM-Kisan and the pension scheme and the proper functioning of "mandies" (the agricultural products market), all in order to revive India's economy. Small, open economies and emerging markets have much bigger fiscal needs to offset the costs of the COVID-19 crisis (Cakmakli, Demiralp, Kalemli Ozcan & Yildirim, 2020). The lockdown was eventually relaxed so as to restart the economy as the choice was left to the virus and starvation. However, the imposition of the strict lockdown had battered an already slowing down economy. In the case of the largest part of the specifically targeted sectors, such as construction, tourism, trade and hotels, economic support may be required in order to sustain economic revival and prevent a permanent loss in potential output growth, too.

ENDNOTES

[1] https://www.worldometers.info/coronavirus/ updated on 23-Jan -2021

[2] SENSEX word is a combination of Sensitive and Index. The Sensex comprises of 30 leading stocks which are drawn from sectors and are traded actively in the exchange market.

[3] https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker

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Conference review

CONTEMPORARY ISSUES IN ECONOMICS, BUSINESS AND MANAGEMENT - EBM 2020

14th December 2020, Faculty of Economics, University of Kragujevac, Kragujevac, the Republic of Serbia

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The current COVID-19 pandemic has imposed numerous and different challenges and problems, conditioning the need for new theoretical-methodological and practical answers, as well as changes in the way how modern organizations function. In order to provide relevant answers to the growing uncertainty, complexity and dynamism of the modern business environment, the Faculty of Economics of the University of Kragujevac organized the 6th International Scientific Conference entitled *Contemporary Issues in Economics, Business and Management* (EBM 2020), which was held online, on 14th December 2020, via the Zoom communication platform. Although initially planned for 9th and 10th October, the aforementioned circumstances caused by the pandemic influenced the conference to be postponed and organized online. Despite the specific circumstances in which it was held, the 6th International Scientific Conference EBM 2020 gathered a large number of participants, 80 of whom directly participated in the Conference via the Zoom communication platform and 20 listeners who watched the Conference via the YouTube channel used to broadcast the Conference. The Conference brought together the authors from the country and from abroad (Great Britain, Norway, Belgium, Poland, Russia, Slovenia, Greece, Portugal, Ukraine, Bosnia and Herzegovina, China and India). The Conference was opened by Petar Veselinovic, a full professor and the Dean of the Faculty of Economics, as well as by Violeta Domanovic, a full professor and the female president of the Program Committee. The work of the Conference was organized through one plenary and four parallel sessions. The moderator in the plenary session was Dejana Zlatanovic, an associate professor at the Faculty of Economics, University of Kragujevac, and the female president of the Organizing Committee.

Three keynote speeches by eminent professors in the field of management, accounting and finance were given at the EBM 2020 Scientific Conference. These are professors from the renowned European universities: Middlesex University London (Great Britain), Norwegian School of Economics (Norway) and Ghent University (Belgium).

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Given the growing uncertainty of the modern business environment, Nathalie van Meurs (Middlesex University London) addressed the issue of organizational behavior and the impact of formalization on organizational behavior in her keynote presentation entitled *Navigating Uncertain Times: How Organizations Can Stimulate and Strengthen Innovation and Collaboration Among People*. The presented research results included 7537 employees from 267 organizations in 17 countries, such as Belgium, Brazil, Canada, Egypt, Indonesia, Kenya, Lebanon, Malaysia, New Zealand, Nigeria, Philippines, Poland, Saudi Arabia, Taiwan, Turkey, United Arab Emirates and Great Britain. The obtained results show that the formalization effects are greater in the contexts characterized by the high uncertainty of norms and, consequently, smaller in the contexts with the lower uncertainty of norms. Some practical implications of this research relate to the need for organizations operating in uncertain environments with lesser economic, institutional and political stability to redefine their organizational practices so as to provide support to and a structure for employees. For example, if there is uncertainty about macro-employment laws due to policy changes, the company that makes clear statements on its roles and actions can instill confidence in its employees and encourage them to express their opinions.

F. Gjesdal's keynote speech entitled the *Conceptual Frameworks of Accounting* was a critical reflection on the conceptual framework of financial reporting. Starting with the questions such as how well the accounting profession performs its role and whether it effectively provides financial markets with the optimal information content or not, professor Gjesdal concludes that the conceptual framework should clarify the process of drafting an accounting standard, the information that a standard maker would ideally want, and some compromises that must be made. At the same time, this presentation indicated that reaching the necessary compromises would slow down the use of fair value-based accounting. Also, by identifying the appropriate limitations of the existing conceptual framework of financial reporting, it was concluded that those preparing the financial statements could not find solutions to accounting policy issues in the current conceptual framework and that the new conceptual framework of financial reporting should be based on a limited set of the principles ruling out the need for a number of additional rules.

Finally, alternative investments as instruments of portfolio diversification and Commodity Trade Advisors' (CTAs) ability to achieve superior returns during the financial crisis were considered in M. Frömmel's keynote speech entitled *The Crisis Alpha of CTAs: Weathering Financial Storms*. Most CTAs follow trends and invest in a broad range of asset classes, including fixed income, currencies, equity indices, energy, metal, as well as soft commodities (primarily agricultural products). Using a single data set, he showed that CTAs achieved positive returns in most sectors in crisis conditions thanks to their ability to adapt to a turbulent market environment. The results indicate that CTAs provide protection against losses in times of crisis and provide investors with greater portfolio stability.

After the keynote speeches, the Conference participants presented their papers in the following four thematic areas:

- Key Issues in Management and Marketing,
- Globalization and Regionalization,
- Accounting and Business Finance, and
- Applied Informatics and Quantitative Methods in Economics and Management.

As many as 40 papers and three abstracts were accepted for presentation at the conference, of which 33 papers were actually presented. The conference was dedicated to contemporary topics in the field of management and economics, and experiences were exchanged and the results of research in the previous period were discussed in the presented papers. At this conference, a number of papers were devoted to the current challenges of the impact of the COVID-19 pandemic on economics, business economics and management.

Within the framework of the first session entitled the *Key Issues in Management and Marketing*, 12 out of the 15 accepted papers and abstracts were presented, and the session was attended by about 30 participants. Apart from the authors of the papers, the session was also attended by the other participants, such as the keynote speaker at the conference, Professor Nathalie Van Meurs. The participants presented a number of the relevant conclusions related to contemporary business challenges. Respecting the importance of innovation and entrepreneurship in modern circumstances, a number of the authors discussed

the relevant organizational factors influencing innovation, as well as institutional support for technological entrepreneurship, such as regulation in this area, financing ventures and key programs, and also discussed and pointed out the importance of entrepreneurial skills and continuing entrepreneurial education, simultaneously analyzing relevant innovation activities in the Southeast European countries through the European Innovation Scoreboard (EIS). Also, the conclusions refer to the fact that, in the case of the application of knowledge dissemination individual subprocesses, experts attach different meanings to certain standards of behavior. The importance of students' and graduates' digital competences (especially during the current pandemic), the importance of information literacy for the socioeconomic development of society and the employability of the workforce, as well as the need to build appropriate communication capacities in the so-called emergencies, were highlighted.

The authors discussed and pointed out the importance of the social responsibility concept by considering the connection between the social responsibility concept and human selfishness, also identifying the public sector employees' perceptions of and attitudes towards social responsibility. The specifics of measuring performance in the public sector were also identified, and the conclusions show that public sector organizations, especially organizations in the field of energy, predominantly rely on traditional financial indicators in their reports. The analysis of consumer behavior during the pandemic shows that, in these circumstances, consumers favor local brands, predominantly buying products intended for health, with a focus on the so-called conscientious shopping.

Within the *Globalization and Regionalization* session, 8 of the 15 submitted papers and abstracts were presented. The presented papers discussed a wide range of the current topics, which dealt with some of the most important and current issues of economic growth and development at the national level, and in the region of Central and Southeast Europe, i.e. the Eurozone. Specifically, the issues of economic development, economic growth, the application and impact of information technologies, the characteristics of macroeconomic, monetary and financial policies, the innovative capacity of national economies, competitiveness, employment and, in general, the importance and role of regulatory policies in improving the performance of national economies were discussed. In the conclusions, the participants of the session agreed that the further development of national economies and the Central and Southeast European countries would depend on the ability of the state actors to create effective and efficient public policies and the timely response and adaptation of economic entities to market and state incentives in order to provide a long-term increase in the competitiveness, sustainability and development of national economies in general by applying modern technologies and digitalization, and by the growth of innovation capacities.

Within the *Accounting and Business Finance* session, all the 7 accepted papers were presented. The issues were discussed in relation to the possibilities of applying activity-based costing in the IT sector that have intensively been growing during the COVID-19 pandemic and the possibilities of monitoring the development of the role of the controller. Simultaneously, their role today was analyzed and the relationship between the controller and the manager was described, all in order to offer an answer to the question - Who is actually the controller? Also, changes in accounting policies were identified as the main reasons for the restatements of previously published financial statements in order to create comparable information. The role of the situational approach in the foreign currency translation process was emphasized given their implications for the liquidity and profitability of multinational companies. Whether comprehensive income is statistically significantly different from net income as a consequence of including net other comprehensive income was discussed, the ownership structure of companies in Serbia was analyzed with the aim of identifying owners from the so-called tax havens, and the effects of the ERP software implementation on customer satisfaction and organizational performance were identified.

Within the framework of the parallel session entitled *Applied Informatics and Quantitative Methods in Economics and Management*, all the six papers were presented. About 20 participants took part in the session. The papers discussed and identified the possibilities of applying artificial intelligence in research, the business intelligence models based on machine learning, the factors that determine the degree of success in fighting the pandemic caused by the COVID-19 virus, the approaches to the business process integration, as well as blockchain

technologies - protocols and a possibility of including these technologies in the electoral process in democratic political systems.

By presenting the results of the latest research and the relevant conclusions reached in their research, the Conference participants had the opportunity to point out the current changes in theory and practice in an effort to adequately respond to the various challenges of the modern business environment, especially the challenges related to the current COVID-19 pandemic. We believe that the Conference provided a good opportunity for the researchers to exchange ideas, provide answers to various challenges in the field of economics, business economics and management, and strengthen international academic cooperation as well. According to the said number of the papers and the participants, the Conference can be said to have fulfilled its purpose despite the pandemic circumstances which it was held in.

Dejana Zlatanovic is an associate professor at the Faculty of Economics, University of Kragujevac, Republic of Serbia, where she earned her PhD degree in the field of management and business administration. She teaches the courses of Innovation Management and Management Science (in the bachelor studies), Business Negotiation, New Product Development and Management in the Public Sector (in the master studies), as well as Methodology of Scientific Research and Critical Managing the Problem Situation (in the PhD studies). Her research interest is focused on innovation management, systems approaches to management, business negotiation, innovativeness in higher education and corporate social responsibility.

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Introduction: Manuscripts submitted to the Editor-in-Chief of the journal should be original, unpublished, and they must not be in the review process by any other journal. Manuscripts should be written in the standard grammatical and stylistic **Serbian** and **English**, i.e. only in **English**, for the authors whose native language is not **Serbian**. Authors are advised to comply strictly with these journal requirements. All manuscripts are subjected to double-blind review process.

Submitting manuscripts: Authors should submit their manuscripts electronically. Authors should attach **three files**: one containing the following information: title, author or authors' names, their age, institutional affiliation, and addresses (e-mail, postal address, telephone number); the other containing the manuscript should include the following: title, abstract, key words, the central part of the paper, figures, tables, graphs, acknowledgement (if there is), references, appendices (if there are), endnotes (if there are); the file with the Author's Statement of the Originality of the Manuscript.

Length of the submissions: Manuscripts should contain between 5,000 and 7,000 words.

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