Economic Development
Економски развој

JOURNAL OF THE INSTITUTE OF ECONOMICS - SKOPJE

Year. 25 No. 3/2023

Skopje, December, 2023

Economic Development

CONTENTS

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Skopje, December, 2023

Zoran Janevski, PhD

Editor-in-chief

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CLOUD COMPUTING AS A NEW PARADIGM FOR MACEDONIAN ACCOUNTING COMPANIES

Abstract

Accounting as a generator of a large amount of key information for a large number of stakeholders requires the use of reliable technology, methods and techniques for processing and storing relevant information. The unprecedented expansion of information technology of the last few years together with the emergence of the Internet, did not leave accounting immune to changes and introduced new paradigms in the way this profession is practiced. Cloud accounting and its collective impact is an example of such a new paradigm that is the focus of this paper. Cloud accounting is accounting where the accounting software, as well as the data, are located on a remote server that is not owned by a specific company. Cloud accounting software performs the same function as traditional accounting software, the only difference being its location, mobility and cost.

Keywords: **accounting, digitalization, cloud accounting, accounting software, efficiency.**

JEL Classification:M40,M41

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Introduction

Cloud technologies represent an evolution in the IT world and a response to the growing demands of the business community, which is constantly interested in a new, well-organized and secure IT infrastructure. Cloud, as one of the main IT trends, is increasingly more present today and enables a new use of information technology. The business world is constantly changing and becoming more competitive and sophisticated with the advancement of cloud technology, which is one of the biggest technological advances and trends at the moment. The cloud is a platform for making data available anytime, anywhere, from almost any device with an internet connection. The most well-known term for cloud technology is the English term cloud computing. The term "cloud" is an integral part of this phenomenon and one of its foundations, which is identified with accessibility, mobility and speed of data management. Cloud is a term for a computing service that stores data on the Internet, rather than storing them on local computers or other devices. It also includes computer services for online information processing. Cloud services are performed on special computers called servers. Hundreds of thousands of servers gathered together in data centers provide these services. Cloud services are designed to keep data secure and private, regardless of whether they are stored for a long time or are there only briefly. Cloud storage services usually offer a certain amount of free storage, available for a certain number of devices. Cloud technology can significantly improve the efficiency of business processes and reduce costs. There are many benefits to the application of this technology such as cost, scale and productivity.

Traditionally, accounting is performed using software that is locally installed on a computer. In contrast to this, cloud technology allows the use of software that is entirely in the cloud and operates exclusively on the internet. It is software for which, most of the time, a regular monthly or annual fee is paid, which frees those working in accounting from buying, installing and maintaining programs on individual computers. Instead, all employees regardless of which computer they are working on can connect and access the data they need. Traditional (on-premise) accounting uses traditional accounting software, which means software that is installed on a company's computer and used to keep business books and other administrative tasks. The data is primarily prepared and stored on these computers.

Cloud accounting is accounting where the accounting software, as well as the data, are located on a remote server that is not owned by a particular

company. Cloud accounting is a system that allows multi-user access and secure storage on the Internet or a remote server. Users send all the data to cloud providers where the same data is processed, stored and retrieved securely. Cloud technology enables business processes to be streamlined and adapted to the growth of the company.

Cloud accounting software performs the same function as traditional accounting software, the only difference is its location, mobility and cost. The main difference is that Cloud accounting software is "hosted" on remote servers and that business data is sent to the "Cloud", where it is processed, stored and where the user can "retrieve" it at any time. Therefore, for the operation of the cloud accounting software, only the Internet is required. Cloud-based accounting works by using secure web-based software to help streamline business processes. Small business owners and their finance teams can access all the key data from their locations, making collaboration and financial reporting easier. Users can access the software applications over the Internet or other networks through a cloud application service provider. With cloud-based software, a company does not have to set up individual desktops with software because everyone in the company can access the cloud on their own devices. From finance teams to receivables, remote teams or branches can access the same key data and financial records.

1. TERM AND CHARACTERISTICS OF CLOUD COMPUTING

The term "cloud" in cloud computing refers to computing resources that companies and users can access from remote locations, without needing to know where the hardware and software are physically located. Today, hardware and software resources located in locations beyond the physical boundaries of a company can be easily accessed through the Internet and a web browser. Accounting, as the language of the business world, serves every company from the very beginning of its operation, and with the advent of accounting software, the practice of accounting has improved significantly. Like other business sectors, accounting has also embraced cloud technology solutions to provide relevant information and a real-time overview of the business. Such solutions occupy a very important place in the optimization and improvement of all business processes of a company, which is why companies should not ignore them, but rather accept and apply them in business. Certain businesses that have already adopted cloud computing services have stated that

they have opted this choice because it helps reduce IT costs, the services are easy to use, information is secure, cannot be lost or stolen, and because it increased the mobility of their employees. Although an increasing number of companies are starting to apply accounting in the cloud, there are still companies and/or individuals who are skeptical about the introduction of this technology in their business.[3]

The main characteristics of cloud computing are:[4]

1. providing services at the request of the user,
2. broad network access,
3. pooling of resources,
4. elasticity and
5. measurable use.

- Providing on-demand services to users (on-demand self-service) allows users to independently select and manage the computing resources they need. In this way, users can choose the time of the service, as well as the size of the data storage space, independently, without the need to communicate with the service provider.
- Broad network access implies that the services are available over the network and can be accessed through standard devices such as mobile phones, tablets, laptops, etc.
- Pooling of resources – the computer resources of the provider are combined using the so-called Multi-tenant model, that allows several users to use the service at the same time, with different physical and virtual resources, which are assigned and removed at the request of the user.
- Quick elasticity – services can be started quickly and flexibly, sometimes automatically, in order to adapt resources to the current needs of users.
- Capacities available to users are often unlimited and can be accessed at any time.

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[3]Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A. & Zaharia, M. A view of cloud computing. Communications of the ACM, (2010). 53(4), 50-58.
[4]National Institute of Standards and Technology. The NIST Definition of Cloud Computing. Recommendations of the National Institute of Standards and Technology

- Measured use (Measured service). Cloud systems automatically control and optimize the use of resources. Resource usage can be monitored, controlled and reported, reports can be created that provide transparency for the service provider and the user.

Other features of cloud computing are:
- Easy payment structure - Cloud computing offers a Pay-as-you-go payment method that is billed based on usage basis.
- Automation - The ability of cloud computing to automatically install, update, automatically provision, configure and maintain a cloud service is known as automation in cloud computing. Improves efficiency and productivity with less human supervision.
- Security - Security plays a vital role in the prevention of cyber threats, data leakage and the privacy of sensitive information. Thus, cloud computing stores data in an encrypted form. And to limit access to files, proxies and mediation are used.
- Flexibility - Cloud computing is a fundamentally flexible IT solution, which gives businesses access to storage and software that scales to meet their real-time needs and achieve goals. Users have freedom when hosting their data on a cloud platform.
- Scalability - With the help of scalability, we can add or delete resources according to the people visiting our application. That helps us maintain the quality during expansion.
- Resource pooling system - In the resource pooling model of cloud computing, the service provider serves multiple clients simultaneously with scalable and temporary services. Resource pooling is done flexibly without any technical challenges.

In terms of the security of this technology, cloud accounting providers use encryption, rewriting the information in a secure, unbreakable code, to send and store data. Cloud solutions use the same type of security that is used to make financial data and online banking safe.[5]

Cloud accounting software offers the following security measures:
- safe premises,
- security personnel,
- automatic off-site backup server,
- regular security checks,

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[5]Mayevsky, M. The Clouds Economy.Chiron Academic Press, (2014) p. 174.

- software for high level digital security with input and output encryption,
- multiple segregated networks,
- multiple built-in user authentication methods,
- dedicated anti-malware staff,
- customer service and technical support and
- automatic updates.

2. ADVANTAGES AND PROBLEMS OF USING CLOUD COMPUTING IN BUSINESS

The advantages of using cloud computing in business are numerous. Some of these benefits include the following:

- Costs: Cloud computing eliminates capital costs, costs of purchasing hardware and software, and managing data centers.
- Speed: Since most computing services are in the cloud, large amounts of computing resources can be provisioned within minutes.
- Scope: Cloud computing enables global availability, which means companies can get the right amount of resources in almost any geographic location.
- Productivity: Cloud computing eliminates the need to customize hardware, software and other long-term tasks, which increases the productivity of employees in enterprise IT teams.
- Performance: Given that cloud computing services operate on a global network of protected data centers, computer equipment is constantly updated and upgraded.
- Reliability: Cloud computing allows for data backup, and business continuity. Services based on cloud technology, thanks to the huge capacities that are available, they can quickly respond to the requests due to the increased demand for the service. Also, cloud service providers are in charge of maintaining the physical resources and the risks are fully transferred to them.

Unlike traditional software, cloud software is accessible from any computer, tablet or smartphone, from any location. To connect to the cloud software the

user only needs an internet connection. This means that information can be within reach, whether or not the user is in the office, on the road or at home.

Also, through this means of communication, the user can authorize other users, such as accountants, and give them access to financial data. Cloud computing increases collaboration between employees, and allows synchronization and work on shared documents and applications simultaneously. Companies that use cloud computing rent only the resources they need and continue to reduce the cost of doing business as well as the negative impact on the environment. Cloud accounting gives accountants instant and mobile access to financial information and completely changes the way accountants work.

Both traditional accounting software and cloud accounting solutions have their own advantages and disadvantages. Small and medium-sized enterprises typically have less complex IT needs and support than larger enterprises. Small and medium-sized enterprises are often happy to outsource IT delivery and operations to third parties.[6] On the other hand, for some companies, the use of traditional accounting software would still be more beneficial. These are, for example, companies that want tight control over their accounting data or companies that hold very sensitive financial information such as banks. The advantages of cloud accounting are: lower costs, security, availability, updates, automatic backup, copying and data recovery. The advantages of cloud accounting are obvious, but there are still potential risks that users of this software face, some of them are: Internet connection, security, reduced control.

In addition to the numerous advantages of using cloud computing in business, problems and challenges inevitably arise in the use of this technology. Problems with using this technology in business mostly concern the security of keeping business information. Cloud computing carries significant risks related to the privacy and confidentiality of data stored in the cloud.

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[6]Mayevsky, M. The Clouds Economy.Chiron Academic Press, (2014) p. 174.

3. CLOUD COMPUTING IN THE ACCOUNTING PROFESSION

Before addressing cloud computing in accounting, let's give a brief explanation of the importance of an efficient accounting system. An accounting system allows a business to analyze financial information. A well-designed system must meet the needs of processing transactions and controlling the drafting of financial statements. The accounting system simultaneously provides information to different levels of managers, managers in production, human resources, finance, marketing and logistics. The information helps managers plan and control operations as well as provide reports to stakeholders, creditors and government agencies. Too often, traditional accounting systems do not do this with adequate business support.[7]

In general, accounting systems can be divided into two groups:
1. an accounting system installed on local computers located within the company and
2. web accounting system installed on servers.

Web accounting software is based on Internet technologies where information is stored on servers or in the cloud. The cloud accounting system allows a company's accounting to function online. This is known as online accounting or in some circumstances as SaaS (software as a service) accounting software. Traditionally, accounting is performed using software that is locally installed on a computer. In contrast to this, cloud technology allows the use of software that is entirely in the cloud and operates exclusively on the internet. It is software for which a regular monthly or annual fee is usually paid and frees those working in accounting from buying, installing and maintaining programs on individual computers. [8] Instead, all employees regardless of which computer they are working on can connect and access the data they need.

For example, if an accountant needs to complete an important project that requires a large amount of data, and his computer does not have enough memory, he can upload everything to the cloud through an application that is managed by a server and whose capacity can be expanded. Another example

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[8]Dimitriua O; Mateia M, Cloud accounting: a new business model in a challenging context, Procedia Economics and Finance 32, Iasi,2015 p. 667

would be when the accountant's computer or other device needs to be formatted, which would erase all data. He/she can put all the documents, pictures, records and other information in the cloud and open them on a completely different device in a completely different place without any restrictions and losses.

Cloud accounting can be seen as a form of virtual accounting information system. The user can access the information through a laptop, tablet, mobile phone and other devices. An increasing number of companies are starting to apply this technology in their business, in almost all business functions. It allows for fast access and analysis of large amounts of data. The use of this technology in accounting also allows achieving lower costs and faster access to accounting information. Since accounting is directly related to money management and all information in this case is located on servers that are not owned by the company, there is a high level of concern for the security of the information. For example, if there is an interruption of the Internet connection, then access to the accounting information located on the cloud is disabled. Also, the company loses control over the accounting software, which is fully managed by the provider.

4. EMPIRICAL RESEARCH

In this section, we will present a micro-research that included respondents, top managers of 25 business entities, 7 of which are from the manufacturing sector and 18 from the service sector. The research was conducted according to the survey method. An online survey was used, and forwarded to the managers' email address.

The first survey question refers to the manager's familiarity with the concept of cloud computing in accounting.

The first question reads: *Are you familiar with the concept of cloud computing in accounting?*

Suggested answers:

- Yes.
- Partially.
- No.

The results obtained from the surveyed respondents are showcased in tabular and graphic form.

Table 1. Presentation of respondents' answers to the first question

Question asked: Are you familiar with the concept of cloud computing in accounting?		
Answers offered		
1. Yes.	2. Partially.	3. No.
Accountants' individual responses		
11	**6**	**8**

Chart 1. Presentation of respondents' answers to the first question
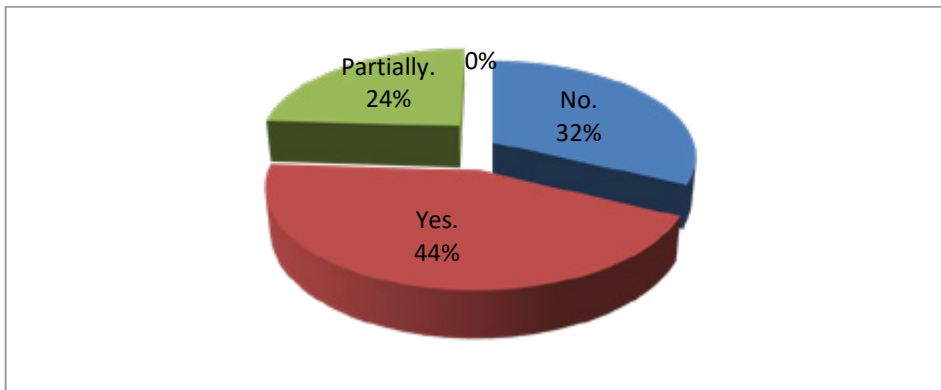
From the total number of respondents, 8 managers (32%) are not familiar with the possibilities of using these services in accounting, 6 managers are partially aware of this possibility (24%), while 11 of them (44%) are familiar with the application of this technology in accounting. Respondents who answered negatively to the first question did not have the opportunity to answer the remaining two questions, so only 17 respondents answered the second question.

The second question reads: Do you think that the use of cloud computing in accounting can contribute to greater operational efficiency?

Suggested answers:

- Yes.
- Partially.
- No.

The results obtained from the surveyed respondents are shown in tabular and graphic form.

Table 2. Presentation of respondents' answers to the second question

Question asked: *Do you think that the use of cloud computing in accounting can contribute to greater operational efficiency?*		
Answers offered		
1.Yes.	2. Partially.	3.No.
Accountants' individual responses		
12	**5**	**0**

Chart 2. Presentation of respondents' answers to the second question
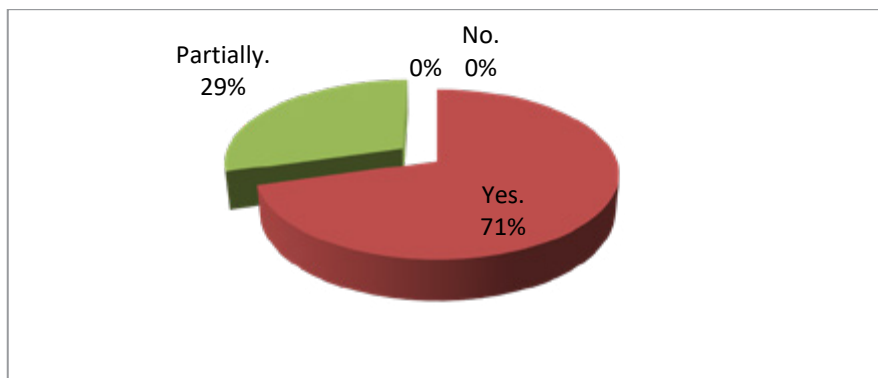
Most of them (71%) believe that the use of this technology can contribute to more efficient management in the company, while 5 respondents (29%) believe that this technology partially contributes to more efficient management (chart 2).

The third question reads: *What is the main problem in using cloud computing technology in accounting?*

Suggested answers:
- Misuse of accounting data.
- Reduced control over the accounting system.
- Reliability of technology.

The results obtained from the surveyed respondents are shown in tabular and graphic form.

Table 3. Presentation of respondents' answers to the third question

Question asked: What is the main problem in using cloud computing technology in accounting?		
Answers offered		
1. Misuse of accounting data.	2. Reduced control over the accounting system.	3. Reliability of technology.
Accountants' individual responses		
8	**6**	**3**

Chart 3. Presentation of respondents' answers to the third question
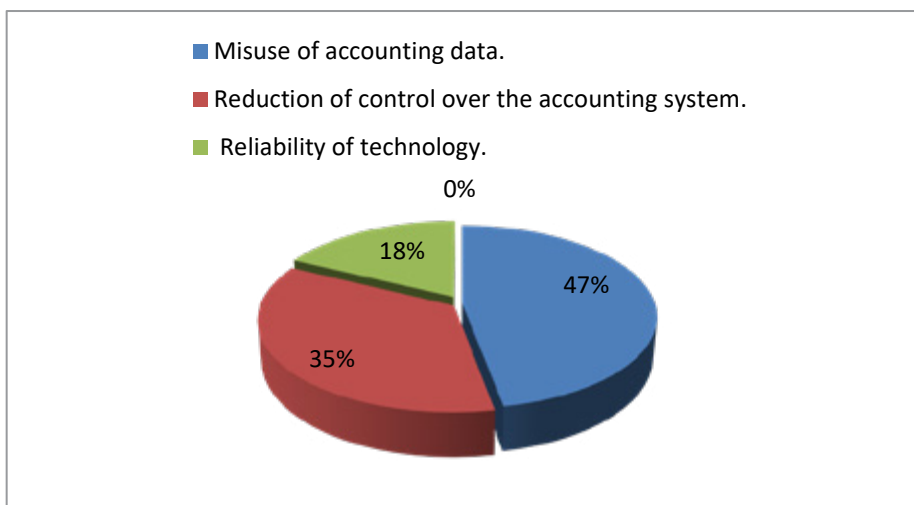
Surveyed managers are the main problem of the use of this service in accounting. Of the respondents, 8 managers believe that the main problem for the use of this technology in accounting is the possibility of misuse of accounting data (47%), 6 managers due to the reduction of control over the accounting system (35%) and 3 managers due to the confidentiality of the technology (18%).

Conclusion

Cloud technology is the right solution for a modern accounting information system, for efficient management of business processes and greater operational efficiency. The cloud accounting information system thus becomes a factor on the basis of which the competitive advantages of companies are strengthened. The main advantage of the cloud in accounting is the increasing the efficiency of the accounting system. Also, this technology leads to an increase in productivity, decrease in operating costs, an improvement of liquidity, profitability and other relevant financial indicators. Cloud computing in accounting brings a significant number of quality solutions, and they refer to: integrity in data entry, transparency in business, improved financial reporting, reduction of operating costs, reduction of administration in the execution of these operations, as well as better alignment of processes throughout the business.

Since accounting is directly related to money management, and in cloud computing the information resides on servers that are not owned by businesses, there is a high level of concern about the security of this information. The research we did showcased that managers identify this problem as the main one when it comes to the use of this technology.

Also, a reduction in control over the accounting software, which is entirely managed by the provider, has been recognized as one of the significant problems associated with this technology. The application of cloud computing in our country is at an extremely low level. The main reasons for this are: insufficient quality of the communication infrastructure and the complexity of the legislation. Larger companies are starting to apply certain IT solutions that are related to cloud computing, as opposed to small and medium-sized companies where it is still in the planning phase. The main reasons for this are related to mistrust and lack of information in the economy. It is of great importance that education and legal compliance in our country encourages users to implement this management system in companies.

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IMPORTANCE OF DIGITAL TRANSFORMATION FOR BUSINESS GROWTH: LOOKING OVER TODAY'S WORLD BUSINESS TRENDS

Abstract: In today's fast way of living and ever-changing business landscape, companies need to keep up with the latest technological advancements to stay competitive. Digitalization of all company management processes is associated with the fourth industrial revolution Industry 4.0. Traditional business processes are slowly disappearing, because new technologies take their place. Digital transformation is the process of integrating digital technology into all aspects of business, fundamentally changing how businesses operate and deliver value to customers. Digital technologies transforming internal processes and opening up opportunities for identifying and implementing new methods of distributing products and opportunities for monetizing services.
This paper aims to demystify the abstract term digital transformation and the development process, to stimulate critical thinking about a company's and how digital transformation changes entire way of doing business. Firstly, analyzes the main difference between digitization, digitalization and digital transformation, then it focuses on digital transformation of business models and trends in the business, digital technologies and how companies to achieve digital transformation. This paper enables to stimulate thinking about digital transformation and how to acquire business growth, what steps to take, what tools are available and what are the benefits that brings companies to success.

Keywords: *digital transformation, business, growth, digital technologies*

JEL Classifications: O33, O43, M21

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Introduction

The digital transformation is critical to the success of all modern companies. No one claims that transformation is simple but everyone agrees that digital transformation is multifaceted, complex, and filled with challenges that can make the head of even the most experienced business person spin. Many different paths lead to digital transformation and each company's journey is unique. For example, a company might introduce cloud computing or artificial intelligence to enhance its customer experience. Or it might redesign its supply chain to make better use of machine learning.

Digital transformation integrates digital technology into various areas in the companies, resulting in fundamental changes to how business operates and delivers value to its customers.

Digital transformation can cover various activities from automating manual processes to developing new digital services and products. The goal of digital transformation is to help businesses to stay competitive and relevant while embracing technology.

But digital transformation is a term that can have different meanings for every company and starting a digital transformation journey requires a new mindset.

It is important to mention that digital technology its increased use during Covid-19 because the pandemic has accelerated the implementation and application of new technologies, although technological advances have already changed the world over the past two decades.

Digital Technology can cut jobs, but it can create completely new professions and jobs. Digital technology allows companies to expand and be present anywhere, without being physically there with their own infrastructure.

In this vein, the main research topic in this paper is the digital transformation of business models and trends in the business, digital technologies and how companies to achieve digital transformation. Hence, the aim how to acquire business growth what steps to take using digital transformation.

1. LITERATURE REVIEW

The primary aim of digital technologies is to solve challenges concerning effectiveness and efficiency.[1] According to Hess, Benlian, Matt, and Wiesbock

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[1]Heavin, C., & Power, D. J., "Challenges for digital transformation–towards a conceptual decision support guide for managers", Journal of Decision Systems, 27, 2018, 38–45.

companies that do not rapidly develop and implement digital technologies strategies are unlikely to keep pace and compete in the new digital reality.[2]Any change is difficult to implement in companies, and up to 70% of large companies changes fail.[3] It is also known that companies are slow to respond to change, decreasing the likelihood of companies adopting digital technologies and implementing digital technologies strategies.[4]

Digital technologies represent a substantial challenge not only for individual companies, but also for national economies.[5]

To become a digital nation, i.e. a country in which governments, companies and citizens live in a digital society that interacts and creates value benefitting all stakeholders, national governments can/must learn from the experiments conducted in smart cities, and the experiments of entrepreneurs in particular.[6]

The rigorous study of digital technologies is generally still at an early stage, and the studies conducted on it are too often overly optimistic about it.[7]

Some studies have explored how companies need to adapt and upgrade their internal capabilities to succeed in their digital transformation efforts.[8]

More specifically, a number of studies have explored the changing role of managers and the adoption of new figures, like that of chief digital officers.[9] Other studies highlighted the demanding role of top managers in the digital age and concluded that they engage in three key actions: understanding digitalization, setting the formal context for a digital transformation, and leading change.[10]

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[10]Wrede, M., Velamuri, V. K., &Dauth, T., "Top managers in the digital age: Exploring the role and practices of top managers in firms' digital transformation", Managerial and Decision Economics, 41(8), 2020, 1549–1567.

2. DIGITIZATION, DIGITALIZATION AND DIGITAL TRANSFORMATION

The term digitization describes all changes in the business model of a company that result from the integration and increasing practice of digital technologies. Digitization is the process of translating analog data and information into digital form (scanning a document or photo and storing it on a computer).

Digitalization is the use of digital technologies to change companies processes and projects, such as skilling employees to use new software platforms. The basis for digitalization is digitization. Digitalization refers to enabling or improving processes by leveraging digital technologies and digitized data, increases productivity and efficiency while reducing costs. Digitalization improves an existing business process or processes but doesn't change or transform them. That is to say, it takes a process from a human-driven event or series of events to software-driven.

Tilson et al. describe digitalization as "a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural".[11]

Digital transformation for most companies, requires a shift away from traditional thinking and toward a more collaborative, experimental approach. These new ways of approaching work reveal new solutions which, in turn, can spur company growth at the fundamental level, improve customer experience and drive employee innovation.

Consequently, digital transformation is then seen as the system-level restructuring of economy, institutions, and society.[12]

Digital transformation provides an opportunity to create radical new products, services and thus unimagined opportunities, which are created by the combination of different technological trends such as cloud technologies, artificial intelligence, big data, and many more.[13]

Digital transformation requires the combination of digitization and digitalization to create adapted or new business models and to transform a company efficiently and effectively in the digital age. The essence of digital

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[11] Tilson, D., Lyytinen, K., & Sørensen, C., "Digital infrastructures: The missing IS research agenda. Information Systems Research", 21(4), 2010, 748–759

[12] Unruh, G., & Krion, D., "Digital Transformation on Purpose", MIT Sloan Management Review, 2017,p.7

[13] Rachinger, M., Rauter, R., Müller, C., Vorraber, W., &Schirgi, E., "Digitalization and its influence on business model innovation", Journal of Manufacturing Technology Management, 30(8), 2018, 1143–1160.

transformation is the changing of business processes enabled or forced by digitalization technologies.

These three terms many people confuse, but they are not interchangeable and are no synonyms. They ich represented different processes and concepts that can help transform the way the business works (Picture 1).

Picture 1: Difference between digitization, digitalization, and digital transformation
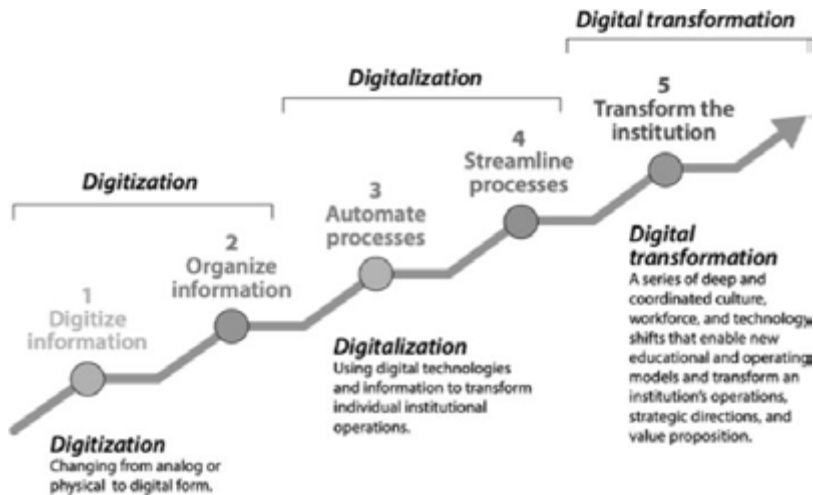
Source: Reinitz, B., "Consider the Three Ds When Talking about Digital Transformation." Retrieved 30th March, 2022

3. DIGITAL TRANSFORMATION OF BUSINESS MODELS

Digital transformation can be seen as changing a company's entire way of doing business. Companies marketed new ideas and technology potential mostly through their business models. Technologies receive their economic value when they are marketed in any way via the business model. If the technology is marketed differently, this can lead to different results. As a result, is needed some understanding to be able to implement changes through digital technologies. For that is necessary to enable a successful digital transformation.[14]

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[14]Tripathy, M., "The role of professional skills in digital transformation for organizational effectiveness", International Journal of Scientific and Technology Research, 8(10), 2019, 498–501.

Companies are subject to environmental change because competitors constantly challenge market-dominating companies that redefine incumbent market conditions and industries over time. As a result of that, established business models often become inefficient and obsolete, so the cycle continues, and they are replaced by new ones. Developments such as the mobile devices, rise of on-demand, or the increasing influence of analytics, are, among others, responsible for a digital transformation of business models.[15]

Consumers now can obtain different information via the Internet and can choose from a variety of channels. In order to maintain a certain level of competitiveness, companies constantly need to innovate their business models to remain consistent and, above all, to succeed in today's digital world.[16]

Every company if it uses digital transformation it could have the following benefits, challenges and solutions (table 1):

Table 1: Benefits, challenges and solutions the digital transformation could bring to the business

Digital Transformation Benefit	Increased Efficiency	Enhanced Customer Experience	Improved Data Management	Increased Agility	Greater Innovation	Improved Collaboration	Competitive Advantage	Reduced Risk
Digital Transformation Challenge	Resistance to change, lack of technical skills, and system compatibility issues.	Lack of customer data, insufficient resources, and inadequate technology infrastructure.	Data security concerns, poor data quality, and limited data integration capabilities.	Lack of organisational agility, slow decision-making processes, and resistance to change.	Limited access to resources, unclear business objectives, and lack of technical expertise.	Resistance to change, lack of collaboration tools, and poor communication.	Limited access to resources, lack of technical expertise, and resistance to change.	Cybersecurity threats, regulatory compliance requirements, and data privacy concerns.
Digital Transformation Solution	Automate processes, streamline workflows and reduce manual work for increased efficiency and reduced costs.	Use data analytics and targeted marketing strategies to provide better and personalised customer experiences.	Collect, store, and analyse data effectively to gain insights into customer behaviour, market trends, and business performance.	Reduced Time-to-Market. Quickly adapt to changing market conditions, customer needs, and emerging technologies to stay ahead of the competition.	Develop new products and services, improve existing ones, and enter new markets.	Facilitate collaboration and communication within and between teams, enhancing productivity and fostering innovation.	Offer unique products and services, respond to customer needs quickly, and operate efficiently for sustained competitive advantage.	Improve compliance, enhance cybersecurity, and ensure data accuracy and privacy for reduced risks.

Source: https://virtuslab.com/blog/why-digital-transformation-important/#why-digital-transformation-is-important-for-business-growth

The companies of all types and industries it is not enough to use as many technologies as possible in the digital technologies, but to find a specific denominator to be able to generate an optimal advantage. The strategy must

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[15]Rachinger, M., Rauter, R., Müller, C., Vorraber, W., &Schirgi, E., "Digitalization and its influence on business model innovation", Journal of Manufacturing Technology Management, 30(8), 2018, 1143–1160.

[16] Linz, C., Müller-Stewens, G., & Zimmermann, A., "Radical Business Model Transformation: Gaining the Competitive Edge in a Disruptive World", Kogan Page, 2017.

present clear vision for the development of the company to be supported by means of the unlimited possibilities of technological trends. There is no valid approach to digital technologies, as it is different for each company and therefore creates a certain complexity.

On picture 2, is presented the different aspects the company decides how and to what extent it wants to apply digital technologies. The transformation will be new for the company as well as for the customer, for the industry and competition. In digital transformation, technologies are used to initiate new services or applications and skills such as collecting, analyzing and sharing data are important to assess different opportunities. These possibilities are crucial for initiating new processes in the company's business model, according to Schallmo & Williams. These include space, time, quality and finance, which can consequently bring about the digital transformation.

Picture 2: Digital Transformation of Business Models

Objective Dimension: *WHICH objective dimensions initiate the Transformation:*
- Time: e.g. faster services deliveries, faster production
- Finance: e.g. cost savings, revenue increase
- Space: e.g. networking, automation
- Quality: e.g. product quality, relationship quality, process quality.

Procedure: *HOW Transformation occurs:*
- Sequence of tasks and decisions which are related to each other in a logical and temporal context
- Use of technologies/enablers to generate new applications/services
- Acquisitions and exchange of data including analyses and use for option calculations.

Transformation Degree: *HOW intense is the transformation:*
- Incremental (slight)
- Radical (fundamental)

Reference Unit: The Transformation is new for *WHOM:*
- Customers
- Own business
- Partners
- Industry
- Competitors

Objects: *WHAT is transformed:*
- Individual Elements (e.g. processes, customer relationships, products)
- Entire Business Model
- Value Chains
- Value Creation Networks

Source: Schallmo, D. R. A., & Williams, C. A., "Digital Transformation Now! Guiding the Successful Digitalization of Your Business Model", Springer Briefs in Business, Springer, 2018, p,13

4. DIGITAL TECHNOLOGIES-BUSINESS TRENDS

Processes and products that used to be physical are now digital. Processes in companies were once heavily dependent on paper document flow, and now digital technologies allow remote interaction and other social processes, speeding up decision-making and saving time. Almost everything can now be digitized by receiving digital data, for example, using sensors and further processing of this data can generate valuable additional information.

Usually, the following data types are used for this:
- Social data (facebook posts and tweets can be tracked to understand brand attitudes) - positive or negative;
- Customer data-to understand customer behavior and characteristics, which can then improve the presentation of the product to the target audience;
- Sensor data - infrastructure management, improve logistics, help design smart cities and model new ways of working;
- Interactive data (for example analyze smart cities, understanding where people are going, how they move around the city) - can help optimize planning and design.

According to the research published by Statista research department an exponential development of the ma digital transformation is assumed based on values from 2017 until 2025. In 2023, spending on digital transformation is projected to reach 2.16 trillion U.S. dollars. By 2025, global digital transformation spending is forecast to reach 2.92 trillion U.S. dollars (graph 1). Based on this research, digital transformation growth is due to several contributing factors.

I. the recent COVID-19 pandemic, which has increased the digital transformation tempo in organizations around the globe in 2020 considerably.
II. customer demand and the need to be on par with competitors.
III. utilizing technologies for digital transformation render organizations more agile in responding to changing markets and enhance innovation, thereby making them more resilient.

Graph 1: Spending in digital transformation technologies and services world wide web from 2017-2025 (in trillion U.S dollars)

Source: Statista- https://www.statista.com/statistics/203935/overall-it-spending-worldwide/
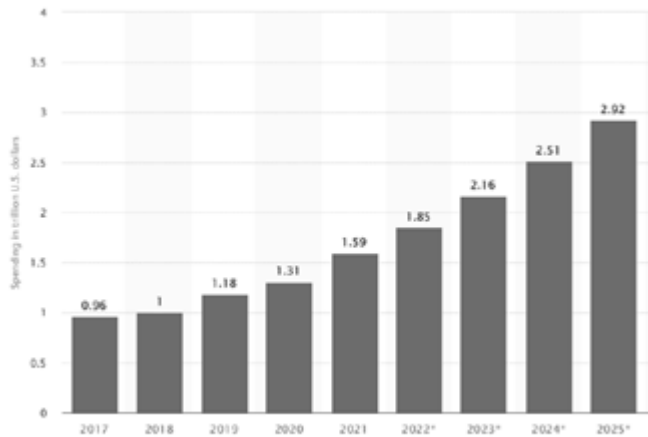
According to Gartner's View from the Board of Directors Survey, a striking 66% listed digital technology initiatives as their top priority, compared with 29% that identified customer engagement as their next most important focus area.[17]

Companies expect to achieve mid to advanced implementation using business trends like:

- o Data science is a relatively new field that has appear as the result of digital transformation. It's about using data to solve business problems and create value for companies and people who use it are well introduced in statistics, computer programming, and other quantitative disciplines. They analyze data and turn them into meaningful insights.[18]
- o Artificial Intelligence/ Machine Learning –is gradually gaining traction in our lives and is being advertised by numerous industries as the transformative technology of the digital age. Without a doubt, this is one of the technologies that is having the greatest impact in the business world (picture 3) and it is not a decision of whether to use it, but when and where it is implemented in their business. It allows companies to take advantage of automatic and continuous learning (Machine Learning), i.e, it simulates human intelligence based on experience, to

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[17] https://www.gartner.com/en/data-analytics/role/chief-data-analytics-officer
[18] Kostin, K., "Foresight of the global digital trends", Strategic Management, 23(2), 2018, 11–19.

innovate and to redesign business processes. Automation in process chains, facial and voice recognition for access control or automatic payments are just some examples of uses that artificial Intelligence is facilitating.

o Cloud Computing-One of the biggest aspects of digital transformation is the migration of in-house computing infrastructure to the cloud. The cloud is the foundation for a digitalized business model and its process. Everything is networked with everything else. The cloud's automated processes make it possible for companies to exploit new ways of doing business and business models (picture 3). The cloud is the place where digital natives like Spotify, Amazon, Uber, etc. have been able to build disruptive businesses by taking advantage of its flexibility, scalability and affordability. Amazon Web Services, Google Cloud and Microsoft Azure are some of the most reliable, scalable and inexpensive cloud computing services available.

o Blockchain was initially invented more than a decade ago to facilitate the notion of cryptocurrency, particularly Bitcoin.[19] A digital, de-centralized approach to tracking transactions chronologically in real-time and for the digital world, it counts as a kind of revolution since it enables new perspectives in terms of security, productivity and efficiency. Blockchain technology is a disruptive decentralized technology, incorruptible and without the possibility of being manipulated, which guarantees transfer activities and data exchange in a transparent and secure manner, guaranteeing user privacy. According to PWC[20], 77% of financial institutions are expected to adopt blockchain technology as part of a production system or process (picture 3).

o Mixed reality – Mixed reality combines virtual and augmented reality to create the immersion of virtual content as if it was in the real world. In other words, it is possible to interact with holograms, transforming our workplace into a unique experience that allows us to integrate objects, people and places from the physical and digital worlds to create virtual prototypes, perform less invasive surgeries in the medical field or help services for businesses remotely.

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[19]Hellwig, D., Karlic, G., & Huchzermeier, A., "Entwickeln Sie Ihre eigene Blockchain", Entwickeln Sie Ihre eigene Blockchain, Springer Gabler, 2021.
[20]https://www.pwc.co.uk/blockchain.html

Picture 3: Progress in implementing next generation technologies

■ 2021
■ 2022
■ 2023

AI — 25%, 61%, 78%

BLOCKCHAIN — 15%, 37%, 69%

THE CLOUD — 78%, 80%, 91%
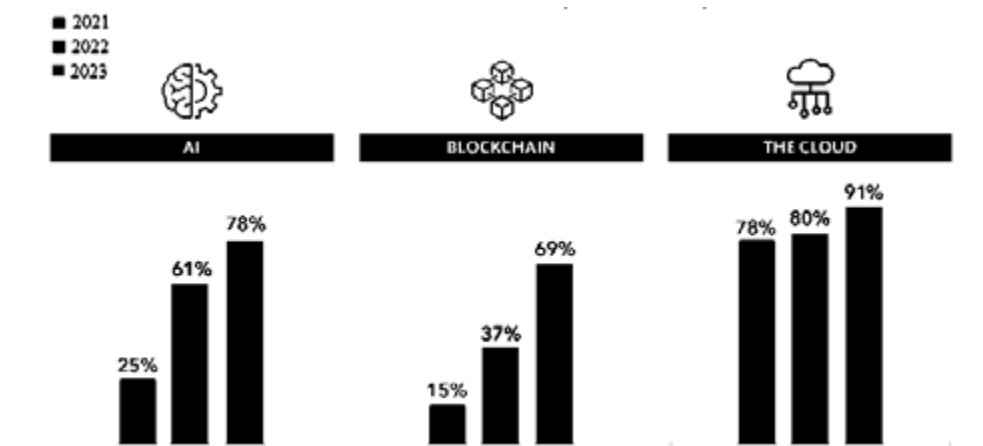
Source: Broadridge, "Fast-tracking digital transformation through next-gen technologies", How leading firms are accelerating growth, Broadridge Financial Solutions, Inc., Broadridge and the Broadridge logo are registered trademarks of Broadridge Financial Solutions, Inc, 2022

5. HOW TO ACHIEVE DIGITAL TRANSFORMATION

Digital transformation it requires a customized approach that is tailored to the specific needs and goals of each business and company is not a one-size-fits-all process. However, there are some common steps for businesses to start their digital transformation journey:

1. to develop a comprehensive digital strategy that outlines the objectives and goals of the transformation, as well as the specific processes and technologies that will be used. Data Analytics is driving tool for the future of businesses, it is an important component of any digital transformation strategy. It is essential for companies to collect, process, analyze and share data in order to make better decisions. The data analytics process includes collecting data from various sources, processing the data into a form that can be analyzed, and then analyzing the data in order to help to make decisions. Data Analytics helps companies according into their customers' needs and wants in making better decisions.

2. to build a strong digital culture with a focus on innovation, agility, and continuous learning. Digital transformation requires a cultural shift so businesses must build a culture that embraces digital technologies and encourages risk-taking and experimentation.

3. Businesses must identify and invest in the right technologies that will support their digital transformation goals, whether it's cloud computing, big data analytics, or artificial intelligence. Also, they must invest in the necessary infrastructure and resources to support these technologies.
4. to align business processes with technology because digital transformation is not just about implementing new technologies - it's about aligning business processes and operations with technology to drive efficiency and innovation. This may require retraining, restructuring and new ways of working.

Digital transformation can be a response to changes in the market or competitive landscape, or it can be driven by a desire to improve productivity and efficiency. In many cases, it will involve a combination of both. Whatever the reason for use a digital transformation, it is important to have a clear strategy and objectives in mind from the outset to achieve the best.

Conclusion

Today's explosion of data and connected devices, it should be a world of opportunity for businesses, rather than a threat, and that is based on a cultural shift that focuses on the value of data analysis. Companies who will accept this will get the most benefit from their data, now and in the future.

Despite recent developments (Covid 19), research on the topic of digital technologies is still in an early stage. The paper contributes to our understanding of the theory of business models and how digital technologies have been used to facilitate business model innovations. Also, this paper enables to stimulate thinking about digital transformation in the area business growth of the companies. Highlights the benefits, challenges, solutions and tools from authors and countries that have contributed to the development of the topic so far. To achieve the overall aim of this paper, it focuses on digital transformation of business models and trends in the business, digital technologies and how companies to achieve digital transformation that they will use in future practice and future empirical research.

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ANGELO MANARESI [1]

THE IMPACT OF THE INTEGRATION OF DIGITAL MARKETING IN THE COMPANY STRATEGY OF FRANCHISES

Abstract

This article explores the long-term effects of integrating e-commerce into franchise networks. The study involved conducting semi-structured interviews with franchisees and franchisors in Italy. Short-term acceptance of e-commerce by franchisees is often influenced by power imbalances or contractual inertia. However, in the long term, franchisees are less likely to invest in franchise chains that do not involve them in e-commerce. Franchisors face the challenge of choosing between profit-sharing with franchisees or investing more in directly operated stores. It's noted that redirecting ownership could diminish the entrepreneurial value of franchising, which is vital for economic development, especially as multi-unit franchising becomes more prevalent internationally.

Keywords: digital marketing, franchising, e-commerce, entrepreneurship

JEL classification: M2, M3

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Introduction

Many franchisors introduced e-commerce platforms, assuring franchisees that it wouldn't negatively affect their businesses. Initially, this promise held true as e-commerce was small, with limited data and customer usage. However, as e-commerce grew significantly over time, franchisees began to worry about encroachment and their role in traditional retailing, feeling they might become mere instruments for franchisors to profit from e-commerce.

Research has addressed how to manage these concerns in the working relationship between franchisees and franchisors, that is caracterized by unbalanced power and that makes franchisees accept franchisor's decisions. Some research has already been done about how franchisors could communicate with them to prevent these perceptions from hurting the working relationship (Kremez, Frazer, Thaichon, 2019). What hasn't been explored yet is the long-term impact on store networks and franchisee willingness to invest. In the long run, franchisees feeling excluded from the e-commerce side of the business could lead to a shift in ownership, with more stores becoming directly operated. Currently, the percentage of directly operated stores is low, but this article examines the conditions that could change this balance and what franchisors should do to avoid the need to invest much more money in the channel.

1. FRANCHISING, ECONOMIC DEVELOPMENT AND SMALL BUSINESS ENTREPRENEURSHIP

Even countries with very different size and economic structure, like Italy and North Macedonia, share an important element in economic development. For example, in both Italy and the Republic of North Macedonia, according to the statistical offices of each countries, small businesses account for the largest share, with a percentage of more than 95% of active business entities and a fundamental role in economic development.

Unlike manufacturing companies that can cluster in industrial areas, service-oriented businesses, such as retail, need to establish multiple locations to be close to their customers. Clustering is achieved through vertical coalitions, often involving a leading company (franchisor) that licenses its format and brand to smaller retailers (franchisees). Franchisees play a vital role in representing small business entrepreneurship in retail. Franchising is seen as a means to enhance skills and promote entrepreneurship in retailing, recruiting both industry experts and newcomers as franchisees.

2. THE EVOLUTION OF A NETWORK OF STORES AND THE INTEGRATION WITH DIGITAL MARKETING

Many academic theories and approaches tried to explain why and how retail evolve (McArthur, Weaven, Dant, 2016). One of the few things we are sure about is that there is some kind of constant change in the structure and behaviour of retail companies in order to adapt to new competitive and technological opportunities, market changes, regulation constraints. If we take a retailing life cycle approach and consider how companies try to adopt technology innovation and match it with evolving customer behaviour, we then get to the conclusion that even for brick and mortar retail companies e-commerce is not an option: instead, it is a necessary and invevitable condition for most companies to operate and survive in nowadays mass markets. Thus, even companies that have an already established distribution channel structure, such as companies that have been developing and operating for many years a plural form of channel of both directly operated stores and franchised stores should develop some kind of e-commerce. In such a company an omnichannel approach should be developed, that is to say that the e-commerce should be integrated with the rest of distribution outlets and not just added to them.

The real challenge for most existing retailers is integrating digital channels with the existing retail structure. Any kind of change in the franchisor company strategy, that is nowadays usually related to digital transformation of the business model, should be evaluated not only for what regards the relationship with customers, but also for its impact on the franchisor-franchisee relationship, that has a mediating role between company activity and business results.

In literature, researchers discussed about the two different main roles of distribution channels, communication and sales (Lusch, 1979). Since the digital marketing strategy of companies almost always include an internet site for e-commerce, both roles are performed.

This double role has always been one of the strong reasons for monobrand stores: their mission is not only developing sales (that multibrand stores could do well, even if they tend to have a passive attitude in the market, as they wait for customers and use each brand opportunistically), but also creating a brand experience and attracting the right customer segments to the brand. But franchisees are now worried about franchisor's e-commerce getting sales from them. In that case, if a transactional website built and operated by the franchisor jeopardize and cannibalize sales of franchisees, such franchisees could be relegated to one of the two roles, the communication role, that does not produce profit but just costs for them.

According to EU legislation, such as that about vertical agreements (2022/720) and similar previous regulations, franchisees can operate a web site with some restrictions imposed by franchisors such that franchisees have to follow (even in the e-commerce) the pre-defined elements of the business format and cannot actively promote their e-commerce business out of their territory, so using it as an additional service for their customers. The logistic and cost complexity of running e-commerce properly are very high, with the consequence that franchisees do not nowadays tend to develop independent e-commerce very much. Different outcome is that on the side of franchisors, that were slow in adopting e-commerce but then, as we said, almost inevitably, decided to develop that new channel. This makes it such that territorial exclusivity granted with contractual clauses to franchisees gets "invaded" from the activity of franchisors. E-commerce channel sells products to customers who might be in the area where franchisees operate or could have been in touch with franchisees before.

3. ENCROACHMENT AND PROPOSED SOLUTIONS

The issue of encroachment has always existed even before e-commerce: when the franchisor or other franchisees open additional units in a particular area, existing franchisees often react negatively. This happens because when a franchise network grows, commercial areas become closer to each other: even if a certain franchisee X had been granted some kind of territorial protection in a town, the opening of another store Y in the closest town might be perceived by X as a source of danger of sales cannibalization.

E-commerce activity run by the franchisor increased this problem, because that system goes and operate with customers who can gravitate (live or work or shop) in the same area where a franchisee already operate: "through e-encroachment, a franchisor can capture franchisees' sales as if it were opening a huge company-owned outlet covering all territories" (Cliquet and Voropanova, 2016).

Semistructured interviews with 20 franchisees and 4 franchisors were done to analyze the possible solutions to prevent enroachment problems and conflicts between franchisor and franchisees.

The survival basis for the franchise network is that the transactional e-commerce website should sell the products to consumers at the same price as the stores, in order to avoid what franchisees would consider unfair price competition within the channel. It seems that this lesson has been learnt by all franchise companies, and all operators, both franchisees and franchisors, agree on that2.

The following taxonomy of possible degree of involvement of franchisees in the development of e-commerce were developed when analyzing the results from the interviews:

1) The first option is a centralised e-commerce that allows customers to shop on line and receive the product at home, charging them some money for the delivery. This would make the e-commerce product more expensive than the product purchased in a shop. This is what supermarket companies usually do.
2) A second option is a centralised e-commerce that makes customers do a "clic" (buy on line) and then collect (free of charge) at a franchised store. In this latter case the franchisee would benefit from the sale:
2a) in one way, if the sale is then accounted for in his name;
2b) or in another way, less interesting in the short term, that is to say that the franchisee would have the opportunity to get to know one more customer and eventually try to sell something else either that day or in the future.
3) A third option is a centralised e-commerce that allows customers to decide weather to 1) get the home delivery (not free of charge) or 2) clic and collect
4) A forth system that we have observed is a "centralised-decentralised" e-commerce, that gets franchisees involved in the system as the central web sites

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2 Of course things get more complex and very much conflictual when the franchisor also sells to multibrand e-distributors in wholesale channels, but in this paper we do not analyze this case, as we focus on monobrand networks where there are franchised stores and, in most cases, some directly operated stores.

diverts the contact to a decentralised web site (the web site which is managed by the closest franchisee to the customer home).

5) A fifth system that we have seen in the literature (but not observed directly, as it very complex and does not seem to be very popular neither among franchisors nor among franchisees) consists of giving franchisees the opportunity to be a shareholder of a new company dedicated to e-commerce (Terry, 2022).

6) One last option that have not yet been developed, but that is under investigation from a certain number of companies is about managing a centralised franchisor's e-commerce that, just for the e-commerce sales treats franchisees of the area from which customers come from (if there is a franchisee in that area) as some kind of agents, who will be granted a certaing percentage of the value of the sales; this would be a reward for the activity of brand promotion developed over time from franchisees who have been operating for many years in the area. This would align goals of franchisees with those of the franchisor and make franchisees perceive that they are part of the same business as the franchisor. Franchisees would perceive that they do not have to pay for the costs of e-commerce while obtaining some kind of "passive" (not doing any additional activity) profit. This would not make the issue of encroachment completely disappear (because the reward given to the franchisee would usually not reach the percentage of profit that would be gained by the franchisee on each sale), but it would create some more ground for synergy and channel cooperation.

4. THE CASE OF MULTI-UNIT FRANCHISING AND THE DEVELOPMENT OF E-COMMERCE

The case of multi-unit franchising started being analyzed in the literature as more and more franchisors followed this pattern of development, with franchisees running more than one store of the same network; researchrs tried to understand the degree to which multi-unit franchising was more or less efficient or effective than single-unit franchising, that was the iconic mom-and-pop franchising, where a franchisee would run one store and maintain maximum focus and the eyes of the owner on the store, with benefits from the point of view of agency theory (Kaufmann and Dant, 1996).

After more than a couple of decades since mult-unit franchising was analized as a specific form of franchising development, we can say that it has become the dominant growth mechanism for established franchising networks; in comparisor with single-unit franchising, multi-unit franchising has advantages from the point of view of both efficiency (costs) and effectiveness (revenues).

Multi-unit franchising can be developed both as a gradual sequential development or as a licence to develop a territory. In the former case, typical of Europe, franchisor decide to allow or even offer to open a new store to existing franchisees. Of course this system has the advantage of being able to select the best franchisees over time; franchisors can offer new growth opportunity to the franchisees who perform better from the different points of view, such as sales, efficiency, consistency with brand and franchisor's strategy. Over time this can be considered a very robust, even if slow, way to make the franchise network grow.

Differently from a sequential expansion, multi-unit franchising could be implemented as a licence to develop a territory; this is typical of US, where fast development is considered one of the most important matters and where there are strong investors that look at franchising not only as a way to run an entrepreneurial small business, but also from the point of view of investing money in large asset creation and management.

Whatever process through which multi-unit franchising is generated, it guarantees a lot of benefits that make it both very efficient and effective:

-Inventory management: when a franchisees run more than one store, a common inventory and wharehouse can be created. The cost of inventory can go down and the customer service (availability of the right product at the right time) can be improved.

-People management: the cost of training can be lower, as a lot easier are the systems to do training on the job and job rotation in a multi-unit franchising than in a single-unit franchising. Also, it is a lot smoother the way to cope with uncertainty and unplanned events, such as salespersons being sick or on maternity leave; in those cases, a mult-unit franchising can ask someone working at a store to go and work for some time at another store, without any need to sign new contracts or beaurocratic process, as it would be in the case of a single-unit franchisee. All this seems to be a much stonger set of people management elements in favour of multi-unit franchising, contrary to what researchers thought at the beginning of academic analysis on that kind of franchising: there was some scepticism on the ability of multi-unit franchisees to avoid the agency costs, that

were one of the reasons considered at the root of franchisors' willingness to franchise the business. Within a number of stores of 4-8 stores, this seems not to be an issue.

-Cooperation attitude: about this matter, a debate in literature was not solved; on the one hand, entrepreneurs willing and able to risk the amount of capital associated with the development of large territories could be expected to have a more balanced power relationship with the franchisor and resist the influence strategies of the franchisor, being thus more reluctant to relinquish control on decisions about price, product range, location,.. (Kaufmann and Lafontaine, 1994). Other studies indicate that multi-unit operators are more willing to cooperate with franchisors, being more similar to them, for example in terms of agency problems and size: multi-unit franchisees "…are are surprisingly content to concede to franchisors' requests and accept their advice, perhaps because they encounter the same management issues as their principals (i.e., franchisors), which serves to further strengthen their incentives alignment" (Dant and Gundlach 1998, quoted by Kaufmann and Dant, 1998, p.14).

-Ability to understand market trends: multi-unit franchisees are entrepreneurs who have multiple stores and more interactions with the market, allowing them to form a more balanced perspective on trends and customer behavior. They are less influenced by isolated events in a single location, unlike single-unit franchisees, and should be listened to more attentively by franchisors. Additionally, they are better equipped to evaluate the long-term impact of e-commerce on their businesses.

Franchisors introduced e-commerce in recent years, initially with minimal impact on franchisees' sales. They portrayed it as a small operation, and due to the power imbalance, franchisees didn't strongly oppose it, even when franchisors centralized e-commerce and retained all profits. However, in recent years, the long-term effects on encroachment have become apparent, especially in large franchising networks with stores across many locations. Interviews with franchisors and franchisees highlight the need to consider different forms of franchising when launching e-commerce.

Multi-unit franchisees are much more worried about the encroachment between e-commerce and their (many) stores. The probability and the impact of franchisor-franchisee conflict can be much stronger in case of multi-unit franchisees; also, we know that the aftermath of manifest conflict can continue for very long (Winsor, Manolis, Kaufmann, Kashyap, 2012): so, it must certainly be avoided.

Multi-unit franchisees are more willing and open to engaging in various forms of collaboration between franchisors and franchisees regarding e-commerce. Consequently, franchisors with a high percentage of stores managed by multi-unit franchisees need to urgently devise strategies to involve franchisees in the e-commerce framework

5. THE OWNERSHIP REDIRECTION ALTERNATIVE AND E-COMMERCE DEVELOPMENT IN FRANCHISING

One of the two most popular explanation for franchising, together with the agency theory, was the resource scarcity hypothesis: according to this explanation, franchisors would not have the resources to develop fast a network of stores, so they would look for franchisees to do so. According to that theory, over time, in case of business success, franchisors would have taken back operation from franchisees and would directly operate (expecially the most profitable stores of the network) to obtain the full profit margin from the business and not just a franchise fee. This in fact does not extensively happen: most of the times, when franchisors decide to transform a franchised location into a directly operated store the reason is that the franchisee left or was not consistent with the franchisor format and with the brand strategy. In most other cases, franchisors continue to expand the network with the same pattern (pilot directly-operated stores and franchised stores), also trying to grow out of the national borders when possible. A strong reason is that franchisors want to keep on growing in the competitive environment and be able to defend a competitive position (which in most cases means getting stores everywhere and not just getting more profit from existing stores). Investing more resources in already operating stores would means slowing down that kind of growth.

And in fact even opposite cases has been found (Baroncelli and Manaresi, 1997) where some franchisors divested some of the pilot stores or some of the directly operated stores, to franchise them after launching the business in some specific location, to let franchisees manage better (agency theory explanation).

Thus, what we infer from our interviews is that franchisors in most cases do not see ownership redirection towards directly operated stores as the preferred solution for their company growth, but just as an extreme way in case franchisees leave or act not consistently with the business format.

In the short term, well-structured systems like franchising remained largely unaffected by the introduction of centralized e-commerce, primarily due to the stability provided by five-year contracts and the fact that single-unit franchisees often lacked immediate alternative projects. Additionally, multi-unit franchisees had substantial business operations that couldn't be easily transitioned to other ventures in a short period.

Interviews with franchisees revealed in the longer run a reduced willingness to continue investing when franchisors operated centralized e-commerce without involving franchisees.

Franchisees perceive that e-commerce has already or will eventually impact their sales, even if the evidence is challenging to prove definitively. Initially, franchisors asserted that centralized e-commerce would enhance brand visibility and benefit franchisees. Nevertheless, in the long term, especially after events like the COVID-19 pandemic that made e-commerce even more popular, questions arise about the role of physical stores, as customers sometimes visit stores to inspect products and then make online purchases. Many franchisees now fear their role will be reduced to that of showrooms with associated costs but insufficient corresponding revenues. This concern is especially pronounced among multi-unit franchisees who possess the resources and expertise to contribute positively to e-commerce development while maintaining and growing their brick-and-mortar store networks.

Conclusion

Multi-unit franchisees are more aware of the need to get someway involved in e-commerce and have more resources and skills to participate in the mechanisms to make e-commerce an opportunity for both the franchisor and franchisees.

The theoretical alternative to getting franchisees involved in e-commerce is a new wave of franchisors' direct investment in the store network needed to avoid losing market presence. But for different reasons franchisors might not be in the position to do so, expecially those whose business addresses mass segments that need capillarity of the distribution network3: the reasons are some lack of resources and a frequent specialization in manufacturing or product management rather in retailing.

If we take an general economic development perspective, an ownership redirection towards more direct investment into brick and mortar operations from franchisors (that would cease franchising to become retailers) would decrease the contribution of franchising to small business entrepreneurial development. The most important reason for which franchising has always been included in European Union block exemption regulation, being granted the possibility to do exclusive and selective distribution, is that it stimulate the diffusion and develpment of entrepreneurial activity, that is one of the bases for economic development of any country.

The power sources that franchisors should use to retale to franchisees and get them involved in e-commerce should not just be rewards and coercion, that create more tension and could make conflict become manifest, but the other three categories of the French and Raven taxonomy, such as expertise, identification and legitimation. This means that a percentage of the e-commerce business due to the business development activity of a franchisee in a territory, that would generate a perceived "passive" income for franchisees, might not be enough. The system to get franchisees involved would be better in preventing conflict if the power sources used were related to develop more business together, for example generating new capabilities and sales for the stores due to e-commerce relations with customers. And this latter involvement system would be very well accepted by multi-unit franchisees, as it would be more consistent with the nature of the entrepreneurial activity and attitudes of multi-unit franchisees.

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[3] The most relevant companies operating luxury businesses have long ago (from the beginning of the nineties) taken the decision to sell products with the maximum level of control on the strategy and retail operations, that is to say that they almost always run directly operated stores and have cut franchising.

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MILA MITREVA *

THE IMPORTANCE OF INSURANCE COMPANIES FOR THE CAPITAL MARKET DEVELOPMENT AND ECONOMIC GROWTH IN NORTH MACEDONIA

Abstract

In this paper, through regression analysis the effect of the insurance sector on the economic growth and the capital market in N. Macedonia was analyzed for the period 2014-2022. The main variables used in the analysis were GDP, Stock Market Capitalization, Bond Market Capitalization and Assets of Insurance Companies. Hence, considering the participation of 1.54% of the insurance sector in the N. Macedonian GDP, as well as the asset allocation of the insurance companies, the obtained results were according to the expectations. On one hand, the insurance companies showed negative effect on GDP, which may be due to the very low participation in the total GDP, but they showed positive effect on the stock market capitalization. Additionally, bidirectional causality with positive effect was determined between the GDP and Stock Market Capitalization.

Keywords: insurance companies, capital markets, economic growth

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Introduction

The finance-growth nexus has been deeply analyzed in many papers (Demetriades and Rewilak, 2020; Jayaratne and Strahan, 1996; Bello et al., 2022). Notwithstanding, capital markets and economic growth are interrelated with an impact running from both directions, depending on the country. The main difference between the countries is that some of them are market based and the others are bank-based. Levine (1997) claims that financial development contributes to economic growth through different channels, such as the productivity of capital, technological innovation, saving rate and channeling saving to investment. When it comes to the developing countries in Europe, the banking sector has been considered the main driver for economic growth. Nevertheless, the determinants of economic growth are constantly evolving and changing and the need for new and deep analysis is always occurring. Nowadays, the non-bank financial institutions are expanding with a rapid speed and are starting to become very attractive for the population because of the various kinds of instruments that they offer. Existing literature shows that the development of the non-financial sector can have great impact on the financial development. Prochniak and Wasik (2017) claim that some factors such as the regulations, the institutional environment of the country and the political stability can have an impact on the development of the financial sector. Additionally, Yadirichukwu and Chigbu (2014) determined that the capital markets have an impact on the economic growth of the country. Therefore, when analyzing the institutions that have an impact on both capital markets and economic growth, institutional investors have very important role. Thus, for increasing the competition in the financial markets, for encouraging financial innovation and for stimulating the market integration, insurance companies are of great importance (Balaban, 2012). In this context, it is worth mentioning that insurance sector has been growing rapidly in the past several years. On one hand, the main role of the insurance companies is to reduce the financial uncertainties of the people and the companies, and to compensate the losses. On the other hand, they are large investors that usually implement long-term investment strategies that are beneficial for the capital markets and the financial development in general. In addition, the interest in this paper is to analyze the impact of the insurance companies on capital market and economic growth in N. Macedonia. One reason for this research is the limited amount of papers analyzing the effect of the insurance sector in N. Macedonia. According

to the Insurance Supervision Agency in N. Macedonia, despite the various macroeconomic obstacles that occurred during 2022, the insurance sector achieved satisfactory financial results and was able to absorb all of the shocks that occurred (such as inflation and slow economic growth). In N. Macedonia in 2022 actively worked sixteem insurance companies, from which eleven are non-life insurance companies and five are life-insurance companies. The statistical data showed that the assets of the insurance companies are constantly increasing (ASO, 2022). Thus, considering the existing literature in this field for other European countries, this study will further expand the literature for the N. Macedonian insurance sector and its impact on the N. Macedonian economic growth and capital market.

1. REVIEW OF THE LITERATURE FOR THE RELATIONSHIP BETWEEN INSURANCE COMPANIES, ECONOMIC GROWTH, AND CAPITAL MARKETS

Well-functioning capital markets encourage new investments, create opportunities for individual investors, for companies and for institutional investors. The interest for analyzing the impact of institutional investors on stock market development occurred in the early 90s of the previous century. As it was mentioned in the paper of Bayar, et al. (2022), institutional investors improve the performance of the financial markets because they increase the market efficiency, stimulate the competition, especially in the banking sector and are considered long-term capital source. However, the literature that analyzes the relationship between the insurance companies and the capital markets is limited. Only few paper focus on this topic. For instance, Pradhan, et al. (2020) examined the causal relationship among the banking competition, stock and insurance market development and economic growth in Europe for the period 1996-2016. Through utilization of multivariate framework, they have concluded that the variables in their analysis are co-integrated, with short-run bidirectional causality between stock market and insurance sector. Cheng and Hou (2022) through panel data analysis for 17 European countries for the period 1980-2015 found that life insurance development assists in moderating

long-term real growth volatility and take up the side effect of private credit on the economic growth. Sawadogo and Guérineau (2015) analyzed the relationship between insurance penetration and the stocks traded total value, from which they determined that the more the stocks transactions increase, the more the insurance penetration rises.

Moreover, when comparing the insurance companies with the banking sector, many differences can be distinguished. Insurance companies do not serve as a channel for the monetary policy, neither are vulnerable to customer runs. Another difference is the composition of the balance sheet, mainly in the maturity of their liabilities and the structure of their assets (Trichet, 2005). However, both of the institutions are very important for the long-term economic growth. The linkage between the insurance sector and economic growth has been more deeply analyzed than the linkage between insurance sector and capital markets. Rudra, et al. (2015) through VAR analysis examined the impact of the insurance sector development on economic growth in G-20 countries for the period 1980-2011. The results showed that bidirectional causality exists among the insurance sector development and the economic growth. Positive relationship between the insurance sector and economic growth was also determined in the paper of Ege and Sarac (2011). Ojo (2012) analyzed the relationship between the insurance sector and the economic growth in Nigeria for the period 1985-2009, where they found positive results. Hais and Sümegi (2008) are other authors that analyzed the relationship between insurance and economic growth in Europe. Through cross-country panel data analysis for 29 European countries for the period 1992-2005, they found that insurance sector has positive effect on GDP growth. Despite the importance of having economic growth and understanding all of the factors that can positively affect the growth, financial stability is also of great importance. Nowadays, in order to have financial stability, proper functioning of the financial systems is needed. However, financial systems are becoming very complex and the banks that used to serve as the stability pillar in the financial systems are starting to be substituted by non-bank institutions. In this context, following the paper of Trichet (2005) it can be mentioned that the insurance sector is relevant and vital for the overall stability of the financial system.

1.1 Insurance sector in North Macedonia

The insurance sector in N. Macedonia is continuously developing throughout the years and the interest in different types of insurance is also growing. All of the insurance companies are predominantly owned by foreign legal entities (73.53%) or 14 out of 16 insurance companies. The insurance sector in 2022 participated with 1.54% in the GDP, which is much less compared to the developed European countries. In the structure of gross paid damages, the largest share is the damages based on auto liability insurance with 43.2%, followed by property insurance claims with share of 15%, life insurance claims paid with 13%, motor vehicle insurance- 10.7% and voluntary health insurance with 8.3% of the total damages paid. It is also worth mentioning that the structure of the assets of the life and non-life insurance companies in N. Macedonia is slightly different. However, the non-life insurance companies mostly invest in state securities (around 28% of their total assets), while at least they invest in corporate bonds (around 0.06% of their total assets). The rest of their assets are invested in different categories, such as deposits in banks, real estate, shares in open investment funds, shares in National Bureau of insurance etc. Similarly, life insurance companies mostly invest in state securities (around 67% of their total assets), while the rest of their assets are invested in various different categories. Additionally, life insurance companies invest more in stocks compared to non-life insurance companies (around 0.35% of their assets). Moreover, the largest share, or 60.81% of the total sources of funds of the insurance companies are the gross technical reserves. In 2022, the aggregated profit after taxation at the insurance sector level was around 25% higher compared to 2021 (ASO, 2022).

Moreover, literature that focuses on the insurance sector and its importance and impact in North Macedonia is very scarce. Dervishi (2020) in his paper analyzed the investments and portfolio structure of the insurance companies in N. Macedonia. Following his paper, it can be stated that the insurance sector in N. Macedonia is far from the insurance development level of the developed countries. One of the reasons may be the financial illiteracy and the limited analysis and research in this field. Hence, from the analysis in the paper of Dervishi (2020) and the official data available for the insurance sector in N. Macedonia, it cannot be expected that this sector has positive effect on the economic growth. Nevertheless, from the data available on the site of Insurance Supervision Agency in N. Macedonia and from the asset structure of the insurance companies, it can be expected that the insurance sector has an

impact on the N. Macedonian capital market. Therefore, the aim of this paper is to analyze the effect that the N. Macedonian insurance sector has on the domestic capital market and economic growth.

2. EMPIRICAL ANALYSIS

The first step when doing empirical analysis is to choose the right model and the right variables in order to obtain reliable results. Following the paper of Onuoha, et al. (2021), as one of the main proxies for the capital market performance is the market capitalization, which shows the total value of all stocks listed on the exchange. Hence, the stock market capitalization and the bond market capitalization are used as variables in this paper. Following the paper of Bello, et al. (2022), GDP represents the size of the economy of one country. Thus, this variable will also be used in the analysis. Nevertheless, the aim of this paper is to show the impact of the insurance companies on the capital market and economic growth in North Macedonia for the period 2014-2022.

Additionally, annual data has been used for the analysis. More specifically, the data for the stock market capitalization and the bond market capitalization was obtained from the official site of the N. Macedonian stock platform. The data for the assets of the insurance companies was obtained from the site of the Insurance Supervision Agency in N. Macedonia, while the data for the Gross Domestic Product was obtained from the World Bank database. It is worth mentioning that the analysis was conducted in E-Views platform. Additionally, three models have been used in the analysis. In the first model, the dependent variable is GDP. Therefore, through the first model the aim is to test the effect of the stock market capitalization, the bond market capitalization and the assets of the insurance companies on the economic growth in N. Macedonia. In the second model, the dependent variable is the stock market capitalization and the aim is to test the effect of the GDP and the assets of the insurance companies on the stock market capitalization. Lastly, in the third model the dependent variable is the bond market capitalization, through which the goal is to test the impact that GDP and the assets of the insurance companies have on the bond market capitalization.

Moreover, the first model used for the analysis is presented below, where GDP stands for Gross Domestic Product, MCS stands for market capitalization of stocks, MCB stands for market capitalization of bonds and AIC stands for assets of insurance companies:

$$\text{Model}_1: \text{GDP}_{it}=\text{constant}+\text{MCS}_{it}+\text{MCB}_{it}+\text{AIC}_{it}$$

For obtaining the results, the empirical analysis includes several steps. The first steps is the Unit root test through which the stationarity of the data was tested. The null hypothesis for the unit root test is that the time series has a unit root, which indicates non-stationarity. The alternative hypothesis is that the time series is stationary, which means it does not have unit root. Hence, considering that the obtained results showed that the *p*-value for all variables is more than the level of significance (1%, 5% and 10%) they were integrated in second difference. This step was necessary in order to remove the unit root and make the data stationary. Through this step, the stochastic trend which was present in the original data is eliminated, which means that the results will be unbiased and more reliable.

The second step in the analysis included regression analysis. The R^2 is 97%, which means that 97% of the dependent variable (GDP) is explained by the explanatory variables (MCS, MCB, AIC), while the other 3% are explained by other factors. In addition, in the table presented below are presented the results from the regression analysis:

Table 1: Regression analysis for Model 1

Variable	Coefficient	Probability
MCS	0.0773	0.0022
MCB	0.0279	0.4260
AIC	-1.9045	0.0096

Souce: Author's calculations

From the results presented above it can be detected that the significant variables are MCS and AIC. The probability of MCS is 0.0022 and of AIC is 0.0096, which is less than the level of significance (1%, 5%, 10%). MCS has positive effect on the GDP (the coefficient has positive sign: 0.0773), where the AIC has negative effect on GDP (the coefficient has negative sign: -1.9045).

From these results, it can be concluded that the stock market capitalization has positive effect on the GDP in N. Macedonia, while the bond market capitalization did not show any significant results. Additionally, the insurance sector (presented by the assets of the insurance companies) is significant in the regression analysis, but the impact on the economic growth is negative. As main limitation in this analysis may be the fact that the value of the assets of the insurance companies is much smaller compared to the other variables used. However, the aim of the paper is also to test the effect that the insurance sector has on the capital market in N. Macedonia, which in this paper is presented by the stock and bond market capitalization. Therefore, in the Model 2 below, as dependent variable is used the MCS, while the independent variables are AIC and GDP.

$$Model_2: MCS_{it} = constant + AIC_{it} + GDP_{it}$$

Table 2: Regression analysis for Model 2

Variable	Coefficient	Probability
AIC	25.60801	0.0004
GDP	12.48694	0.0005

Souce: Author's calculations

The results presented in Table 2 show that both AIC and GDP are significant variables, since the probability is less than the level of significance. Considering that the coefficient sign for both of the variables is positive, it can be concluded that the insurance sector and the GDP have positive effect on the stock market capitalization in N. Macedonia.

Additional analysis was conducted, where the dependent variable is MCB and the independent are AIC and GDP (Model 3). The results presented in Table 3 show that neither AIC, neither GDP are significant variables, which means they do not have an effect on the bond market capitalization in North Macedonia.

$$Model_3: MCB_{it} = constant + AIC_{it} + GDP_{it}$$

Table 3: Regression analysis for Model 3

Variable	Coefficient	Probability
AIC	-2.0449	0.5509
GDP	0.1764	0.9189

Souce: Author's calculations

From the results of the regression analysis for the three models it can be concluded that the insurance sector has negative effect on the economic growth in North Macedonia and positive effect on the stock market capitalization. The insurance sector does not have effect on the bond market capitalization in N. Macedonia. The finding in this paper can be related to the finding in the paper of Arena (2008), in which was determined that life insurance affects economic growth only in developed countries and not in the developing. However, in this paper it was estimated that the insurance sector generally negatively affects the economic growth.

It should be mentioned that N. Macedonia is a developing country. As it was stated in the paper of Lee (2018), the effect of the insurance sector on economic growth mostly depends on the performance of the investment of insures. Considering that the insurance companies in N. Macedonia mostly invest in stocks and bonds, and having in mind that the N.Macedonian capital market is small, it not a surprise that the results showed negative impact on the economic growth.

Additionally, the results in this research are similar to the results that were obtained in the paper of Phutkaradze (2014). In his paper, he used panel dataset analysis for 10 post-transition countries for the period 2000-2012. The results showed negative and statistically non-significant correlation between insurance and GDP growth, which indicates that the insurance sector does not contribute to economic growth in these countries. Therefore, N. Macedonia is also a country that went during that transition period; hence, same conclusion can be drawn. Following the paper of Phutkaradze (2014), as a suggestion for further analysis can be to analyze separately and for larger time span the impact of each insurance branch on the economic growth.

For further analysis, in the graphs below are presented the Stock market capitalization and Bond market capitalization in N. Macedonia for the period 2014-2022. It can be seen that the values of the stock market capitalization (MCB) are drastically bigger compared to the values of the Bond market capitalization (MCB). This suggests that in N. Macedonia, investors prefer stocks than bonds. One of the reason for that is the fact that stocks offer equity participation and are usually associated with higher returns. Another reason for the higher stock market capitalization is the much higher liquidity of the stocks compared to the bonds. Stocks are also associated with broader ownership, which is not the case for the bonds.

Graph 1: Stock market capitalization and Bond market capitalization in
N. Macedonia for the period 2014-2022

Souce: Author's calculations

In the Graph 2 below are presented the values of the assets of the insurance companies in N. Macedonia for the period 2014-2022. It can be noticed that there is an upward trend throughout the years. According to the Insurance Supervision Agency, the insurance companies mostly invest in government debt securities and bank deposits, while investing in stocks is much less. Although their investment strategies are more towards the bond market, the results from the empirical analysis showed that the insurance sector positively affects the stock market capitalization, while the impact on the bond market capitalization is not detectable.

Graph 2: Assets of insurance companies in North Macedonia
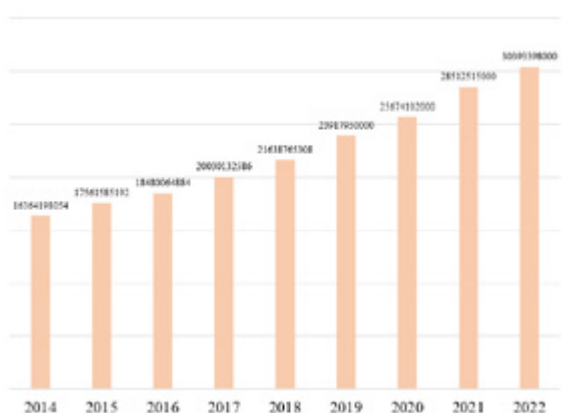
Souce: Author's calculations

Conclusion

Finance-growth nexus is evolving throughout the years, due to the fast changing economic environment in every country. The factors affecting the economic growth or the development of the capital markets may vary across the countries. For filling the financing gap that banking sector can no longer cover, institutional investors started to play very important role. More specifically, insurance companies are one of the biggest institutional investors that implement long-term investment strategies, which consequently positively affect the financial sector. However, when it comes to analyzing the relationship between insurance sector and economic growth and insurance sector and capital markets, most of the papers (mentioned above) focus on the more developed countries and the older EU Member states. However, less attention is paid on the Balkan countries and on the developing countries in general. One reason for the limited research may be availability of the data, and the possibility of obtaining results that do not confirm with the results from the existing literature. Hence, the aim of this paper is to add more to the literature that focuses on the insurance sector and its relationship between the economic growth and the capital markets, with main focus on N. Macedonia. In this context, N. Macedonia is a developing small country that went through the transition process. Due to the turbulences that have occurred throughout the years, the country experienced slower economic growth and slower capital market development, compared to the other European countries. However, insurance sector as the third largest sector in the N. Macedonian financial system has not been profoundly analyzed in empirical papers. That limitation in the literature was one of the reason for creating this paper and investigating how the insurance sector affects the N. Macedonian economic growth and capital market. The results are consistent with the expectations. Considering that the insurance sector participated with only 1.54% in the GDP of the country, it can support the finding in this paper that the insurance sector negatively affects the economic growth. This may be due to the very low participation in the GDP. However, as it was stated that the insurance companies mostly invest in various financial instruments offered on the financial market, it supports the finding in this paper that they positively affect the stock market development of the country (but not the bond market capitalization). Therefore, the capital market in N. Macedonia is relatively small and its further development can increase the effect that the insurance companies have on the capital market, and potentially later on the economic growth. Having in mind the finance-growth nexus, that more developed capital markets lead to higher economic growth, it can be expected that if better policies and regulatory frameworks are created, the insurance sector will potentially have a positive effect on the economic growth in the future.

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334.72.012.63/.64:502.131.1]:303.725.3(497.7)

(Original scientific paper)

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IMPLEMENTATION OF GREEN ECONOMY CONCEPT IN SMES: EMPIRICAL RESEARCH IN THE REPUBLIC OF NORTH MACEDONIA

Abstract

Although the pandemic further complicates the situation in the Macedonian economy, it gives an advantage for development of the green economy concept that is, by efficient use of resources and to find new technological and innovative solutions that will contribute in generating income, creating new jobs and different model of consumption than the previous one. Given this, the main purpose of the paper is to analyze and identify the opportunities faced by SMEs in terms of adopting green policies in its operations. The analysis showed that SMEs have an obvious lack of information on how SMEs can apply the concept of green economy in their operations and are facing with complex administrative procedure in implementing environmental practices. This can be explained by the fact that many small and medium-sized enterprises are subject to the same environmental regulatory regime as large enterprises. Despite the modest external support, most of the surveyed companies take measures for more efficient use of resources in order to save and reduce costs. Therefore, it is necessary to create a regulatory framework for green economy in North Macedonia by bringing clear and appropriate documents with specific activities and measures, harmonized with EU standards.

Keywords: green economy, SMEs, Republic of North Macedonia

JEL Classification: Q50, Q56, Q57

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INTRODUCTION

SMEs play a significant role in the national economy in the Republic of North Macedonia and their development is one of the key factors for achieving accelerated economic growth, increasing employment and growth in production. Recent decades, there is a new approach in the functioning of SMEs that stimulate economic growth and development, while ensuring that nature continues to provide resources and services in the environment on which the well-being of national economies depends. The concept of green economy offers a new approach to work dedicated to the principles of environmental sustainability, especially minimizing the negative impact on the environment and the use of renewable energy sources.

Green economy in SMEs in Republic of North Macedonia is a new concept in the modern society and aims SMEs in its basic policy to recognize the impact of the business activity on the environment. The main goal of the green economy is to find ways and methods that will ensure the most efficient use of resources to meet human needs and thereby preserve the environment unchanged. Responsibility for the environment and green work means sustainability to be incorporated in the work in all activities of the company. Business that provide green economy in their work or green businesses can be defined as a business that uses renewable energy sources (environmentally sustainable), takes into account the impact of its activities on society (socially responsible) while covering its costs or creating a profit (economically sustainable).

For a business to be called environmentally responsible or "green", it is necessary to meet the following criteria: (Cooney S., 2009,p.5)

➢ Principles of sustainability to be incorporated in every business decision;
➢ The business to provide environmentally friendly products and services;
➢ The business to build competitive relations that are "green" in relation to the traditional ones;
➢ There is a permanent commitment to environmental principles inside, within the business activities in the company

Responsibility for the environment and green business includes environmentally focused or "green activities" that ensure that all processes and products of the company are in line with current environmental issues while respecting their profitable motive. This implies such a choice of product design that will best take advantage of the current environmental situation, while recognizing the degree of success of the enterprise in the use of renewable resources. The company becomes "green" by adding value by technological redesign, modifying existing or introducing new technologies with less negative impact on the environment, by adapting the management system of environmental requirements to modern operations and by achieving environmental performance of its products and services.

Although the pandemic further complicates the situation in the Macedonian economy, it gives an advantage for development of the concept of green economy that is, by efficient use of resources and respect for the principles of natural laws to find new technological and innovative solutions that will contribute in generating income, creating new jobs and different model of consumption than the previous one. Namely, these are businesses dedicated to the principles of environmental sustainability, they try to minimize the negative impact on the environment with their activities and use renewable energy sources. In this sense, they stimulate economic growth and development, while ensuring that nature continues to provide resources and services in the environment on which the well-being of national economies depends.

Given this, the main purpose of the paper is to analyze the Macedonian SMEs in terms of the ability to apply and develop the concept of green economy, i.e. identify the opportunities and challenges faced by SMEs in terms of adopting green policies in its operations. For that purpose, it was conducted a research among SMEs in Republic of North Macedonia to see the situation of SMEs in terms of the possibility of application and development of the concept of green economy, i.e. identifies the opportunities and challenges faced by SMEs in terms of adopting environmental policies in their work or application of green economy principles.

METHODOLOGY

The methodology of research is based on primary data obtained from previously prepared, structured questionnaire, submitted to small and medium enterprises in the Republic of North Macedonia. In order to perceive the current situation, questions were referred to awearness and knowledge of SMEs on environmental regulation and application of environmental practices and principles of green economy in their operations. The analysis of the results is systematized in three areas:
- The application of environmental regulation and SME services,
- The current implementation of green practices by SMEs and
- The existing support for green practices in SMEs
The questionnaire was distributed to more than 60 small and medium enterprises in the Republic of Northern Macedonia in the period November - December, 2020. The questionnaire covers 21 questions related to the possibilities of SMEs to apply the concept of green economy in their work.
The questionnaire was answered by a total of 54 micro, small and medium enterprises, of which 59% are micro enterprises, i.e. enterprises with up to ten (10) employees), 28% are small, i.e. enterprises with eleven (11) to fifty (50) employees and 13% are medium enterprises where the number of employees is from fifty one (51) to two hundred and fifty (250). Most of them are from the sector of agriculture - seventeen (17) and retail - thirteen (13), followed by processing industry - eight (8), hotels and restaurants - seven (7), real estate - four (4), construction - three (3) and other service activities - two (2).

RESULTS AND DISCUSSION

The survey showed that SMEs have an obvious lack of information on how SMEs can apply the concept of green economy in their operations. Asked how your company meets the requirements for environmental protection, the highest percentage answered that it is the workshops and seminars organized by the business community (41%), and less that 39% said they introduced the Internet. also there are no concrete actions and measures to harmonize measures for growth and development of SMEs with environmental policies (Graph 1).
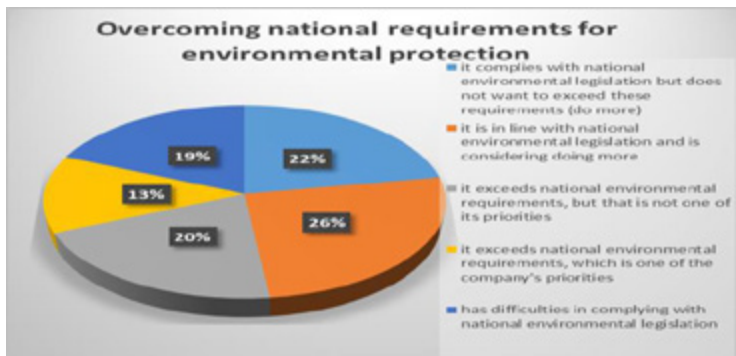
Graph 1
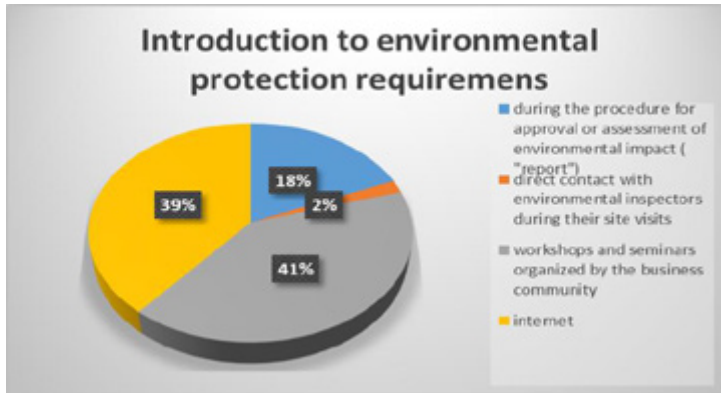
Own research

Graph 2 shows that there are divided mentions about oovercoming national requirements for environmental protection. So as we can see on the Graph 3, the companies that answered that they would not want to bypass national requirements, why they do not want to do so. Half of the surveyed companies answered that the legal requirements are too strict, one third that the costs exceed the revenues, and the rest that it is not a priority in the operation of the company. They face a complex administrative procedure in enforcing environmental practices and strict rules if they want to do more (better) than legally prescribed requirements. This can be explained by the fact that many small and medium-sized enterprises are subject to the same environmental regulatory regime as large enterprises. Also, the largest percentage of respondents said that their company is familiar with the requirements for environmental protection online, through workshops and seminars organized by the business community or during the environmental impact assessment by the expertise.
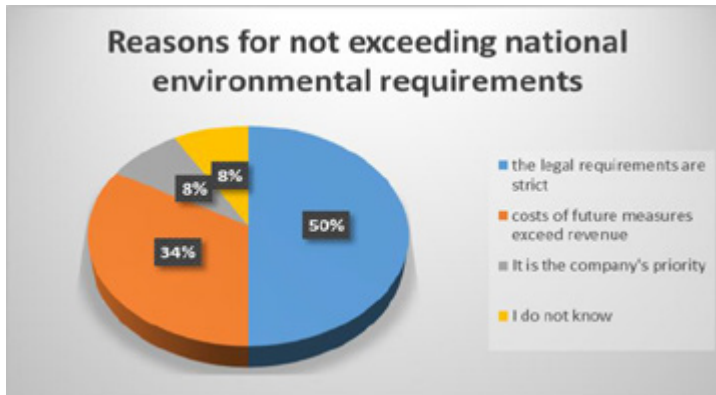
Graph 2

Own research

Graph 3

Own research

The largest percentage of companies surveyed that offer green products or services are companies in the agricultural or food processing sector, but there is also a significant percentage of companies in other industries that offer renewable energy products and pollution reduction technology. (Graph 4) Most companies enter this market because they want to protect and preserve the environment, partly because of improving their market reputation, but there are certain percentages who believe that offering green products or services will give them a competitive advantage. The largest percentage of companies cited waste minimization as an activity for more efficient use of resources, including recycling, approximately the same percentage saving of raw materials, energy and water, and less the use of renewable energy.
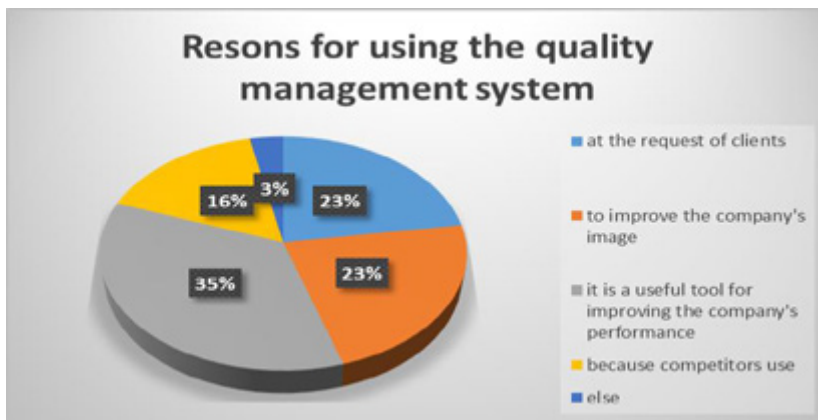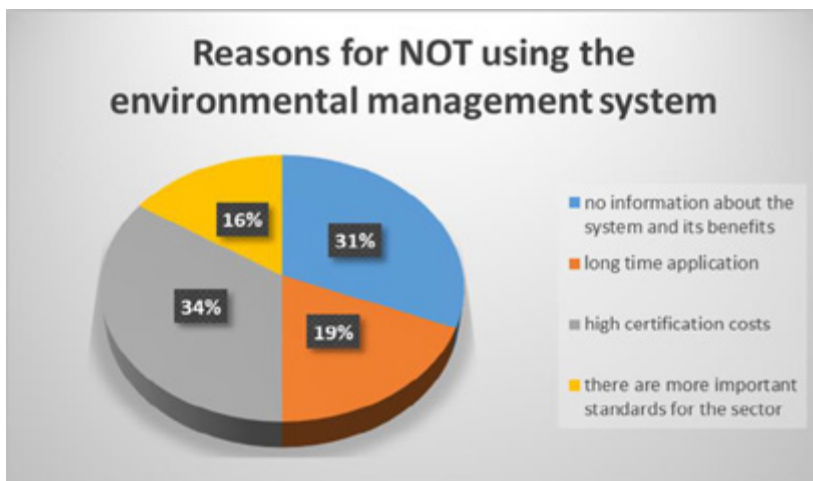
Graph 4

Own research

In order to find out whether the companies in the Republic of North Macedonia apply environmental practices and / or the principles of green economy in their operations, questions were asked about whether they use the ISO 14001 environmental management system or some other system that applies of environmental protection and the reasons why they use it or not. (Graph 5 and 6) The main reason for not using any system 34% of the surveyed companies answered that they are unfamiliar with the system, and 31% its benefits and costs for certification. Also, 19% of the surveyed companies answered that it is a long time to apply, but also that there are more important standards for the sector. Of the surveyed companies that answered that they use an environmental management system, 35% singled out the improvement of the company's performance as the main reason, the improvement of the image - 23% and at the request of the clients - 23%. This indicates lack of information, capacity or overload of time and costs for its implementation. First of all, there is very little market demand from business clients for the adoption of the system (such demand comes only from foreign companies), which means that the market benefits of investing in such a system are uncertain.

Graph 5

Own research

Graph 6

Reasons for NOT using the environmental management system

- no information about the system and its benefits
- long time application
- high certification costs
- there are more important standards for the sector

16% 31% 19% 34%

Own research

Despite the lack of external support, the largest percentage of companies are taking measures to use resources more efficiently, most often saving energy and raw materials, or plan to do so in the future. The main reason for such activities is purely economic, i.e. companies are already experiencing and expecting further increases in the prices of these resources, and it is known that the smaller the business, the more the impact of changes in resource prices is felt. It is also worth noting that, of the surveyed enterprises, the percentage share of SMEs planning to implement additional resource efficiency measures and those already implementing them are relatively the same. This indicates the need for companies to be convinced of the economic benefits of more efficient use of resources. The graph 7 shows that 75% of companies that take resource efficiency measures do not receive technical or financial support. Public financing, i.e. subsidies from the state are present only in the companies from the agricultural and processing sector in the part of food processing.

Graph 7
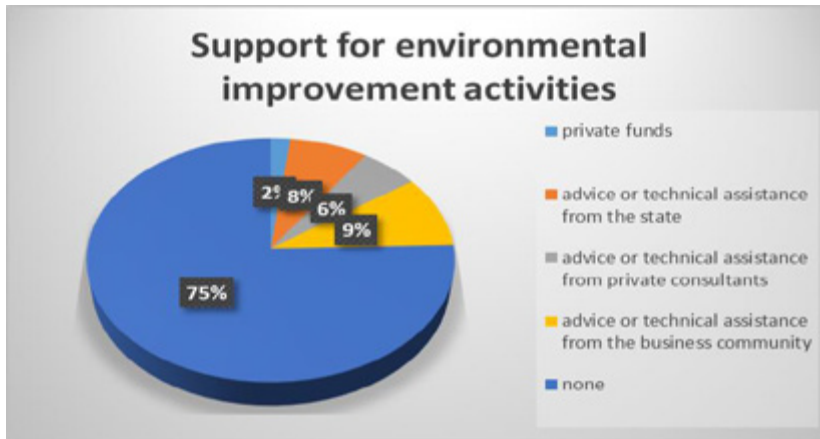
Own research

As part of the SME survey, companies were also asked about the type of state support that would most help them in introducing green products or services. Financial incentives were mentioned by more than half of the respondents, while better access to finance and technical advice were named by about a third of the businesses surveyed (Graph 8). The need for better access to finance was particularly pronounced among companies in the food production sector and micro-businesses. Most small businesses require clear and consistent information that aligns SME growth and development measures with environmental policies.

Graph 8
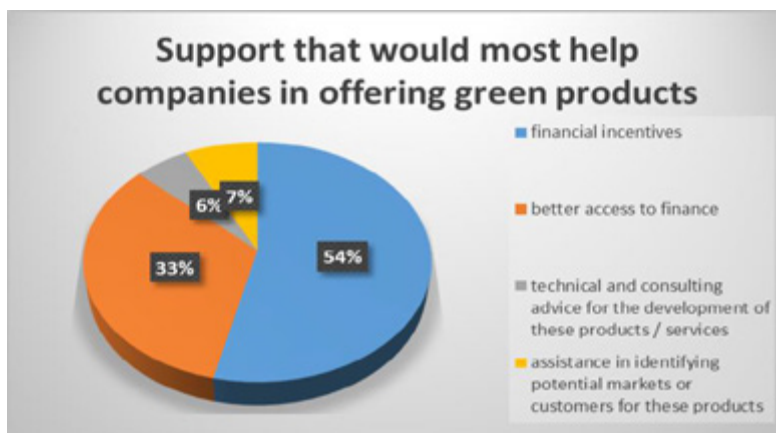
Own research

CONCLUSION

The results of the survey highlighted several critical points i.e. that clear and consistent information is needed on the minimum requirements for compliance with environmental protection policies and on the other hand, the application of the concept in the green economy is largely voluntary action, dependent on the persuasion of the owner or several employees: they see it as an opportunity to save, reduce costs and increase efficiency. They are aware of the potential of the green economy in order to improve the environmental performance of the company, but are prevented from lacking appropriate skills and expertise. Hence, concise and accessible publications are needed to comply with environmental or green practices, and thus to comply with the Law on Environment. Research has also shown that they often face barriers to accessing finance, as banks are reluctant to finance such investments and do not have the specialized staff needed to evaluate projects that have a green component. There are several financial mechanisms available to SMEs willing to go beyond compliance and invest in green technologies, such as the Fund for Innovation and Technological Development, the GEF Small Grants Programme and the Green Climate Fund. However, there is a need to expand state financial support for green businesses in several sectors and strengthen market incentives to improve the application of the concept of green economy, both directly (such as: green public procurement) and indirectly (green certificates and eco-labels) in order to increase the demand for improved environmental performance and green products and services.

As proposed recommendations arising from the analysis of the research results, the following could be stated:

- ➢ There is a need to improve access to information, public participation and consultation in the decision-making process relevant to the environment and climate;
- ➢ Simplification of administrative procedures in the implementation of environmental practices in SMEs and strengthening the relationship between government institutions, ministries responsible for this issue, with the business community in order to directly introduce the need to meet certain standards for environmental protection in the operation of enterprises;

- ➢ The introduction of the green economy indicates that the main goal of achieving sustainable development in the Republic of North Macedonia is geared towards the integration of tourism, forestry, agriculture and industrial sectors with sustained support from the energy sector, infrastructure and transport sector;
- ➢ Raising the level of awareness on the availability of funds and loans from banks for SMEs orienting towards the green concept in the operation;
- ➢ Expanding the financial support from the state for green businesses in several sectors by opening a Green Fund for this purpose, i.e. project support of SMEs oriented towards a green economy with different goals, such as: reuse, repair, renewal (recover) and recycling.

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THE PECULIARITIES IN MICROFINANCE TRENDS: ANALYZING DIFFERENT GEOGRAPHICAL REGIONS IN THE PERIOD 2014-2021

ABSTRACT

The paper investigates the ongoing trends in microfinance, particularly the trend peculiarities per regions. The data encompassed three periods including years 2014, 2017 and 2021. By utilizing the empirical data, the paper offers a comprehensive overview and analysis of the different microfinance aspects and their trends and transformation during the specified period.

The results and conclusions from the analysis demonstrate the strong trend in increased values for three aspects in the analysed regions. Indicators representing global values show evidence of strong trend of increased impact of social, commercial, and digital aspects.

Findings not only underscores the microfinances significance in promoting financial inclusion, but also highlights the adaptability and acceptance of the microfinance institutions in addressing the evolving needs of low-income populations across the global regions. Determination of these trends is crucial for all stakeholders in the financials systems to exploit the high potential of microfinance as a significant support for economic and social well-being.

Keywords: Microfinance, social aspects, commercial aspects, digital aspects

JEL Classification: G, G00, G21

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Introduction

Microfinance is a widely used term in present days as an income generation tool for poorer population and effectively running approach of funding in many third-world countries. This tool has great significance in alleviating poverty and vulnerability of the poorer groups through shattering the disastrous cycle of poverty (Chowdhury, 2009). Microfinance is a financial service provided to unemployed or poor people or groups who would otherwise have no other way of benefits by any other financial services. It is a variety of services for low-income individuals, mostly women and young clients. The goal of microfinance is to aid poor people by giving them an opportunity to be self-sufficient and economically empowered through diverse ways (Islam, K.A. 2016).

Microfinance is constantly evolving in the track of developing contemporary products and services aimed to improve the living standard of the poor. The modern aspects of microfinance, driven by dynamic changes in the economy, accompanied by the digitalization are drastically changing the role of microfinance.

Recent years the microfinance sector has undergone a profound transformation based on technology shifts. Thus, microfinance is emerging as a valuable tool for poverty easing, financial inclusion, and economic development across various dimensions and regions. In the three observed periods 2014, 2017 and 2021, this sector experienced dynamic shifts and remarkable trends that reshaped its landscape and impact. This period promoted continued growth of microfinance in all regions, but also introduced significant increase in social, commercial and digital dimensions of microfinance (Chen et al., 2017).

Main research hypothesis is testing whether the microfinance dimensions observed via three aspects are increasing linearly in all regions and observed periods. The main idea is to analyse if one dimension is substituting the other or if all are increasing towards higher impact rate of usage by the population (Banerjee et al., 2010).

For this purpose, the paper is based on the World bank's global Findex database and their massive survey for usage of formal and informal financial services in all countries around the world. We use comparative analysis and graphical representation of trends to determine trend and status per indicator representing the social, commercial, and digital aspect of microfinance.

1. DATA AND METHODOLOGY

The source of data for this research is the database of Global Findex - World bank for years 2014, 2017 and 2021. This database contains the answers of 123.000 participants from 123 countries around the world. For analysing the microfinance trends between several aspects in this case we use data from different global regions and global data for the selected indicators.

In this research we use several indicators indicating the social, commercial, and digital aspects of microfinance. The main criteria for indicator selection were that the selected indicator has at least 60% available data from the countries, regions, and years. Other criteria which influenced the selection of data were the importance of the selected period and its impact to the lowest income group.

Ensuing the selected criteria in this paper we use the following indicators for analysing trend between different dimensions:

- Borrowed from a formal financial institution, income, poorest 40% (% ages 15+) representing social aspects.
- Owns a credit card, income, poorest 40% (% ages 15+) representing social aspects.
- Made a digital payment income, poorest 40% (% ages 15+) representing digital aspects.
- Yearly average for account income, poorest 40% (% ages 15+)- representing participation of the poorest income group in the financial system.

Furthermore, in the analysis we use the following global regions indicators available in the Global Findex database:
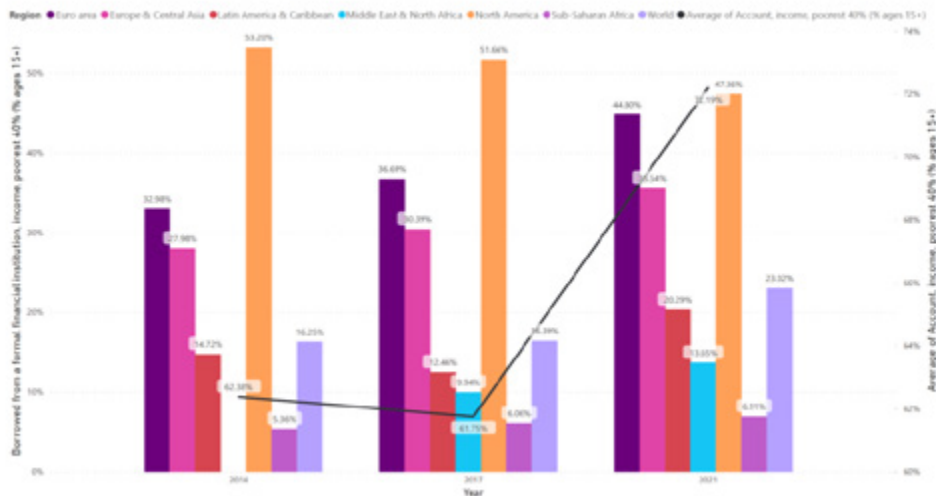
- Euro area;
- Euro and Central Asia;
- Latin America and Caribbean;
- Middle East and North Africa;
- North America;
- Sub Saharan Africa;
- World.

2. SOCIAL ASPECTS OF MICROFINANCE IN DIFFERENT GEOGRAPHICAL REGIONS

The social aspect of microfinance encompasses its ability to empower marginalized individuals and communities by providing them with access to financial services. It fosters financial inclusion, reduces poverty, and promotes economic self-sufficiency (Ahlin et al., 2010). Microfinance institutions often prioritize lending to women, fostering gender equality, and enabling them to start and expand small businesses (Beisland et al., 2021). Moreover, microfinance encourages savings habits and financial literacy, enhancing the overall well-being and resilience of vulnerable populations. The social impact of microfinance extends beyond financial transactions, contributing to social development, improved livelihoods, and reduced inequality within societies (Banerjee et al., 2013).

For the representation of the social dimension of microfinance we use the values of the indicator of "Borrowed from a formal financial institution, income, poorest 40% (% ages 15+)" which means that values consider percent of poorest population which borrowed money from the formal financial institution. This indicator is used under the assumption that the concept of microfinance considers the access to finance to low-income groups and that this indicator is closely related to access of low-income groups to finance. We also use the indicator of percent of average accounts per year of the poorest 40% of the population as the indicator of involvement of this population in the finance system. Another assumption we use is that by using these two indicators per different periods in this case 2014, 2017 and 2017 and with different global regions should provide insight of microfinance trends of the social aspects.

Graph 1 Borrowed from a formal financial institution, income, poorest 40% (% ages 15+) and percent of average accounts per year of the poorest 40% of the population

Source: Global Findex Database of World Bank.
https://www.worldbank.org/en/publication/globalfindex. Accesses 15.08.2023.

Graph 1 demonstrate that we have the strongest upper trend of borrowing money in the **Euro area and Europe and Central Asia** area and **Middle East and North Africa** (not considering the lack of data for 2014 for Middle East and North Africa), and a slow upper trend in the **Sub-Saharan** area **globally** world wise. A downward trend is registered in **North America** while in the case of **Latin America and Caribbean** values decreased in 2017 from 2014 and significantly increased in 2021. Analysing the values, the average accounts of the poorest population and comparing with and the money borrowed from the low-income population, we can conclude that the poorest population have higher percent of borrowing money, than the average percent of account of the low-income population. Such finding leads to general conclusion that in years 2014 and 2017 the population is borrowing money with higher rates than the accounts used by population. For the year 2021 we can perceive the trend of using accounts on average higher than the borrowing values in all regions.

The general conclusion is that the borrowing trend is closing in the year 2021 in highest registered values, except in the case of North America. Having in mind that the borrowing rate in North America is 47% which is significantly high compared to other region and it is just 10% lower than the highest registered rate of 53%, we can conclude that the hypothesis of the high impact of social aspect of microfinance is high and with an upper trend.

3. COMMERCIAL ASPECTS OF MICROFINANCE IN DIFFERENT GEOGRAPHICAL REGIONS

The commercial aspect of microfinance emphasizes its sustainability and profitability as a financial industry. Microfinance institutions operate as businesses, seeking to generate revenue while serving low-income clients (Hermes et al., 2011). They charge interest rates and fees on loans to cover operational costs and ensure financial viability. Commercial microfinance models aim to attract investments and achieve financial self-sufficiency, which enables them to expand their outreach and offer a wider range of financial products (Khavul, 2010). This aspect recognizes the importance of balancing social impact with financial sustainability, ensuring that microfinance can continue to reach, and benefit underserved populations over the long term (Abrar et al., n.d., 2023).

For the representation of the commercial aspects of microfinance we use the values of the indicator of "Owns a credit card (% age 15+) income, poorest 40% (% ages 15+)" which means that values consider percent of the poorest population which owned a credit card. This indicator is used under the assumption that owning a credit card by people of the poorest income group commercial would provide income to the financial institution issuing credit card. Also, we also use the indicator of percent of average accounts per year of the poorest 40% of the population as the indicator of involvement of this population in the finance system. Another assumption is that by using these two indicators per different periods in this case 2014, 2017 and 2017 and with

different global regions, should provide insight of microfinance trends of the commercial aspects.

Graph 2 Owns a credit card, income, poorest 40% (% ages 15+) and percent of average accounts per year of the poorest 40% of the population.
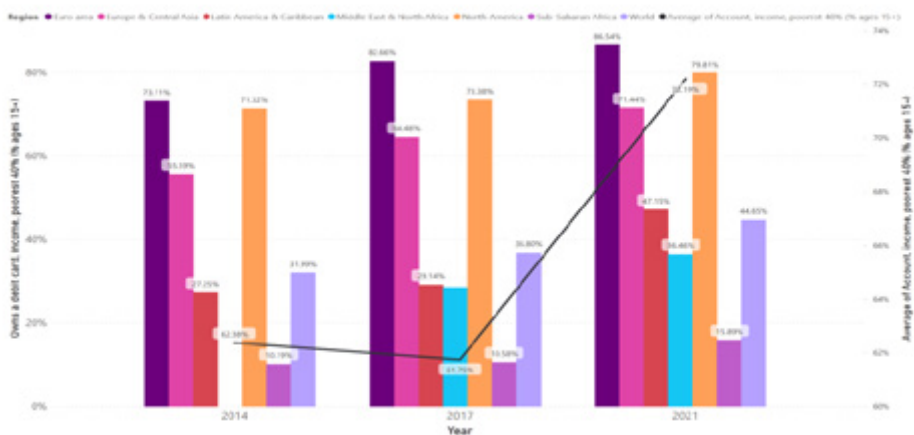
Source: Global Findex Database of World Bank.
https://www.worldbank.org/en/publication/globalfindex. Accesses 15.08.2023.

Graph 2 shows that we have the strongest upper trend of owning a credit card by the poorest population in all regions except for Latin America and Caribbean. Looking into the values of the average accounts of the poorest population and comparing with and the money borrowed from the low-income population, we can conclude that the trend of increased use of credit cards is higher than the trend of opening an account. This indicates that the commercial dimension of microfinance, represented by the owning a credit card by the poorest income group has an increased impact in almost all regions.

4. DIGITAL TRANSFORMATION AND MICROFINANCE IN DIFFERENT GEOGRAPHICAL REGIONS

Traditional financial services and channels have evolved from brick and mortar into the digital world. The expansion of digital financial services (DFS) meant more financial assets and easier access to financial inclusion for everyone. According to the data from Global Findex Database of World Bank in the year 2017 3,8 billion people (69 percentage of the adult population) possess a financial account (bank and mobile money), which is an increase of 1,2 billion people regarding 2011. In Sub-Saharan Africa, one in five adults now has a mobile money account, more than double as in 2014.

The digital aspect of microfinance refers to the integration of technology and digital tools into microfinance services (Siwale et al., 2021). It leverages mobile banking, online platforms, and digital payment systems to improve accessibility and efficiency. This allows clients, especially those in remote or underserved areas, to access financial services, make transactions, and receive loans or savings digitally (Benami et al., 2021).

The digital dimension also enables data analytics and risk assessment, enhancing the speed and accuracy of loan approvals. It can lower operational costs, reduce paperwork, and promote financial inclusion by extending services to individuals who were previously excluded from the formal financial sector, ultimately democratizing access to finance (Kandie et al., 2021).

For the representation of the digital aspect of microfinance we use the values of the indicator of "Made a digital payment, income, poorest 40% (% ages 15+) which means that we are using the percent of people from the lowest income group. Here we also use the indicator of percent of average accounts per year of the poorest 40% of the population as the indicator of involvement of this population in the finance system. Also, another assumption is that by using these two indicators per different periods in this case 2014, 2017 and 2017 and with different global regions should provide insight of microfinance trends of the digital dimension.

Graph 3 Digital payment, income, poorest 40% (% ages 15+) and percent of average accounts per year of the poorest 40% of the population
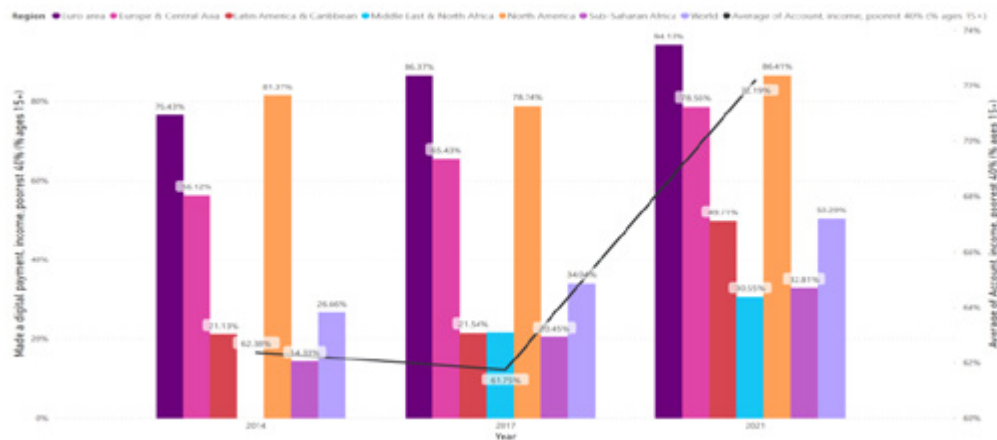
Source: Global Findex Database of World Bank.
https://www.worldbank.org/en/publication/globalfindex. Accesses 15.08.2023.

Graph 3 demonstrates that we have a strong upper trend in all regions apart from the region of North America in 2017, where the values are registered lower than the previous period of 2014. Highest registered values of digitalization through this parameter are registered in Europe area in 2021. The lowest rate of digitalization is showed in Sub- Saharan Africa with 32.81% in 2021, while globally we have significant increase up to 50,29% on global level seen though world values. Compared to the average account for a low-income population per country, we derived to the findings that the values of a digital payment indicator are increasing at a much higher rate than increasing the accounts. Such findings lead to the conclusion that digital dimension through the observed period has increased impact in the low-income population group.

Conclusion

Social, commercial, and digital aspects of the microfinance sector have demonstrated high adaptability and resilience during the years from 2014 to 2021. It has evolved from a simple model of small loans into a multifaceted industry that leverages technology, embraces sustainability, and navigates complex regulatory landscapes. While challenges persist, the impact of microfinance on improving financial inclusion and empowering individuals and businesses in underserved regions cannot be denied.

The ongoing COVID-19 crisis has also reinforced the need for increased digital financial inclusion. Digital financial inclusion involves the deployment of the cost-saving digital means to reach currently financially excluded and underserved populations with a range of formal financial services suited to their needs that are responsibly delivered at a cost affordable to customers and sustainable for providers.

The finding of this paper provided evidence that all three aspects of microfinance increased its influence on low-income populations. In all regions and in three observed periods, in the case of observed indicators we have robust evidence of a high trend of acceptance of indicators symbolizing social, commercial, and digital aspects of microfinance.

General recommendation drawn from the finding is that economic policy makers should use these peculiarities in the microfinance trend to produce higher rates of economic development, and stronger economic support for low-income groups through the concept of microfinance.

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INFLUENCE OF CLIMATE CHANGES ON INDUSTRY AND POPULATION IN THE OHRID-PRESPA REGION

Abstract

This research paper is based on the study for the Ohid-Presa region which aims to determine the socio-economic situation of the region given in consideration the climate change specifications. For the purpose of this paper, the emphasis of the research is given on the impact of climate change on the population and industry in the Ohrid-Prepa region. The analysis shows the probable forecast on the industry capacity for the region and GDP growth rate according to two different climate scenarios the RCP2.6 and RCP8.6 for future greenhouse gas concentrations for the period until 2100, as well as the dynamic of the total population in the region for the same period.

Key words: Socio-economic conditions, Industry, Climate change, population, Ohrid-Prespa region

JEL classification: Q50, Q510

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Introduction

This research paper as mentioned in the abstract is a derivative of a larger case study, a large scope of data of many international organization, as UN agency (The Intergovernmental Panel on Climate Change /IPCC , UNESKO, others), NASA, World Bank, WTO, OECD Key EU laws and policies, as domestic and many others institution was consulted. Furthermore the importance of climate change and its effects on socio-economic wellbeing of the population are highlighted by Abdallah, S. and Stoll, L. (2012); Adam Szirmai (2015); Jonathan Haughtonand and Shahidur R. Khandker (2009); Roy, J.; Tschakert, P.; Waisman, H.; Abdul Halim, S.; et al. (2018). They refer to the major changes that negatively affect the environment, such as air, water and land pollution, degradation of other ecosystems and consumption of large amounts of natural resources.

Recent information has shown a reduction in annual rainfall and increase in average temperatures. The analysis of the different climate change scenarios for the country shows that the average annual temperature will increase by 1.0 ° C by 2025 and 1.9 ° C by 2050, while the average rainfall is projected to decrease by 3% and 5%. In the same periods, which means a significant increase in dryness. This poses a significant risk for the country particularly in terms of agricultural productivity and as a threat to the two lakes in these municipalities that are of key environmental and socio-economic importance. All this forms an implied subject of this research paper, i.e. the impact of climate change on the industry and population in Ohrid Prespa region. The actuality of the subject is that much important, pparticularly because Ohrid and Lake Ohrid have been declared a protected region by UNESCO and the guidelines for the protection of the region must be implemented.

Furthermore, for the purpose of the analysis, it should be considered, that apart from the two lakes, this region is characterized with its relative mountainous specifics. Then, apart from the larger urban centres, the remaining area is agricultural, with scattered rural settlements, mountains and pastures. In terms of infrastructure, the most significant form of transport in North Macedonia is land/road transport. All the municipalities in the region accessible via public roads and there is no motorway/highway to any of the municipalities. One of

the other interesting aspects of transport is that Lake Ohrid has regulated water transport.

This research paper was conducted given in consideration two hypothesis. First one states that the climate change scenarios RCP 2.6 and RCP 8.6[1] have impact on the industry in the Ohrid Prespa region. The second hypothesis concerns the population of the region takin in consideration the same climate change scenarios.

The methodology is quantitative and it's based on the forecast model developed according to the historical data and according to these selected presumptions:

- GDP growth rate logarithmic trend line from the period 2010-2021
- Number of enterprises trend logarithmic line from the period 2010-2021
- Projections of number of population in the region according to the UN population data till 2100
- Changes in basic climate variables: daily temperature and daily precipitation according to the RCP2.6 and RCP8.6 scenarios for future greenhouse gas concentrations defined by the Fifth Intergovernmental Panel on Climate Change (IPCC) for the period until 2100.

This forecast does not take into consideration any other variables, and gives the presumption that no other factors will change in the given period, i.e. ceteris paribus. Also another forecast is made taking into consideration the SSP scenarios that respond to the RCP scenarios taken into consideration.

The forecast results show declining trends of the forecasted indicators. This can be expected because of several factors. The fall in population due to changes in the birth rate of the region, migrations, and climate change induced migrations also influence the fall of the two separate indicators. Fall in populations means fewer possible employees and therefore fewer enterprises in the years to come. This also influences the region's GDP growth rate, which

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[1] https://sedac.ciesin.columbia.edu/ddc/ar5_scenario_process/RCPs.html (Accessed on 9.10.2023)

will also fall due to the stated reasons. Third and the last reason for the decline of the indicators stated in this forecast is climate change.

1. INDUSTRIAL OVERVIEW OF THE REGION

The industry analysis of the Ohrid- Prespa industry region is firstly presented with the number of enterprises according to their size. As its show on the Figure below, it can easily be deducted that the majority of them are micro enterprises, which account for fewer than 10 employees. Expectedly so, next in number come small enterprises, followed by medium and large ones. In order to see more clearly the situation of the industry trend according to the size of the enterprises, the growth rates of the same are presented in the Figure 2.

Figure 1 Number of enterprises according to their size in Ohrid-Prespa region 2009-2021
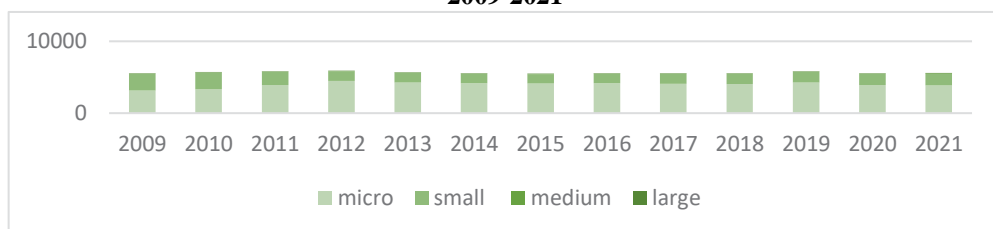
Source: State statistical Office of Republic of North Macedonia

Micro enterprises are the most common enterprise group in Ohrid-Prespa region, when size of the enterprises is taken into consideration. The analysis of the growth rate of the enterprises shows us that even though the average growth rate of micro enterprises is positive (1% g.r. over the observed period), their logarithmic trend is negative. This means that taken into consideration the changes of the number of micro enterprises through the years and the perceived climate change, the overall number of the same will start to decrease over the period. This concerns mostly business in the industries such as trade, agriculture, tourism, artisanship, crafts, etc. The largest rise in micro enterprises can be seen in 2011, and the largest fall is seen in 2020 due to the fact of the economic shocks caused by the pandemic. Small enterprises, which according to the statistics are the second largest amount of enterprises

according to size have different prospects. Even though their average growth rate is -4%, their overall logarithmic trend is positive. This means that their number is slowly but steadily, rising with the prospect of increasing their number in the future. The negative growth rate over the period derives from the immense fall in their number over the two-year period of 2011-2012, their fall can be explained through the ripple effects of the financial crisis of 2008 as well as economic policy of increased focus on attracting foreign investments. Small enterprises employee between 10 and 49 people.

Medium enterprises have the greatest average growth rate among all the different types of enterprises according to their size (4% average growth rate). They also have a positive logarithmic trend that inclines to growth in the years to come. Medium enterprises which employee from 50 to 249 people, witness the biggest decline in absolute numbers is recorded in 2011 due to mainly the same reasons as stated above. Their greatest rise is recorded in 2019 the year before pandemic.

The last category of types of enterprises according to size belongs to large enterprises that employee above 250 people. Their absolute number has risen in the observed period accounting for 17 large enterprises in the Ohrid-Prespa region, and an average growth rate of 11%. However, they have declining logarithmic trend due to limited sources of resource use, low sustainable development policies, climate change effects and last but not least infrastructure factors. Poor connection within the country, poorly developed road infrastructure and lack of working railroads make the growth of large enterprises even more questionable for the future, or until the socio-economic and business climate is more favorable. Also lack of qualified labor, now and even more in the future with the number of population declining will present as a serious problem in front of the large enterprises in the Ohid-Prespa region. They have seen the biggest rise in 2015 and the biggest fall was also recorded in 2011, supposedly according to the same reasons as other types of enterprises.

More in depth analysis of the industry or more so a general mapping analysis of the industry, has shown that different types of industries have different growth rate and are differently represented on the affects towards GDP of the Ohrid-Prespa region. Industry with the greatest number of enterprises in the period of 2010-2021 and as well as with the largest GDP contribution is wholesale and retail trade; repair of motor vehicles and

motorcycles. Second in the same parameters is tourism industry or in the official nomenclature of the industry stated as accommodation facilities and food service activities. Other industries witch are among the most important considering the number of enterprises and their contribution towards the GDP of the region are processing industry, construction, professional, scientific and technical activities, health and social care activities transport and logistic, agriculture. Different sets of industries have different growth rates that influence the growth of the GDP of the region itself. Higher industry growth is a necessary determinant for a higher GDP growth, and the highest industry growth is recorded in the Supply of electricity, gas, steam and air-conditioning. However, this is an industry, which has very small impact on the GDP, considering the overall GDP generated from the region. The second largest growth rate is recorded in the mining and quarrying industry that also does not have sufficient impact on the regional GDP. Other three industries witch combined have realized a significant growth are information and communication industry, professional scientific and technical activities and administrative services industry. These three industries can be called industries on the rise. Never the less their share in the GDP of the region is far less than the main industries referred above, and only one of them can be considered a reliable industry in the future of the region i.e. information and communication industry. Other two are relatively important but are considered satellite industries, i.e. industries that service other types of industries, and cannot exist by themselves. So further development of the information and communication industry in the region can bring additional sustainable development for the future, considering that the industries that were reliable in the past are slowly diminishing in the region.

Largest fall in the industry capacity for the observed period was noted in the largest industry in the region i.e. Wholesale and retail trade; repair of motor vehicles and motorcycles with an average annual fall of 2.41%. The second largest decline of the industry by type was registered in the agricultural industry with an annual average fall of 1.87%. Other important industries also realize negative growth rates in the observed period, such as: transport, logistics, and tourism industry. That is sufficient to create a total fall of the industry measured by number of enterprises and industry GDP related capacity of 0.22%.

Figure 2 Industry growth rate according to types of industries in Ohrid-Prespa region 2009-2021
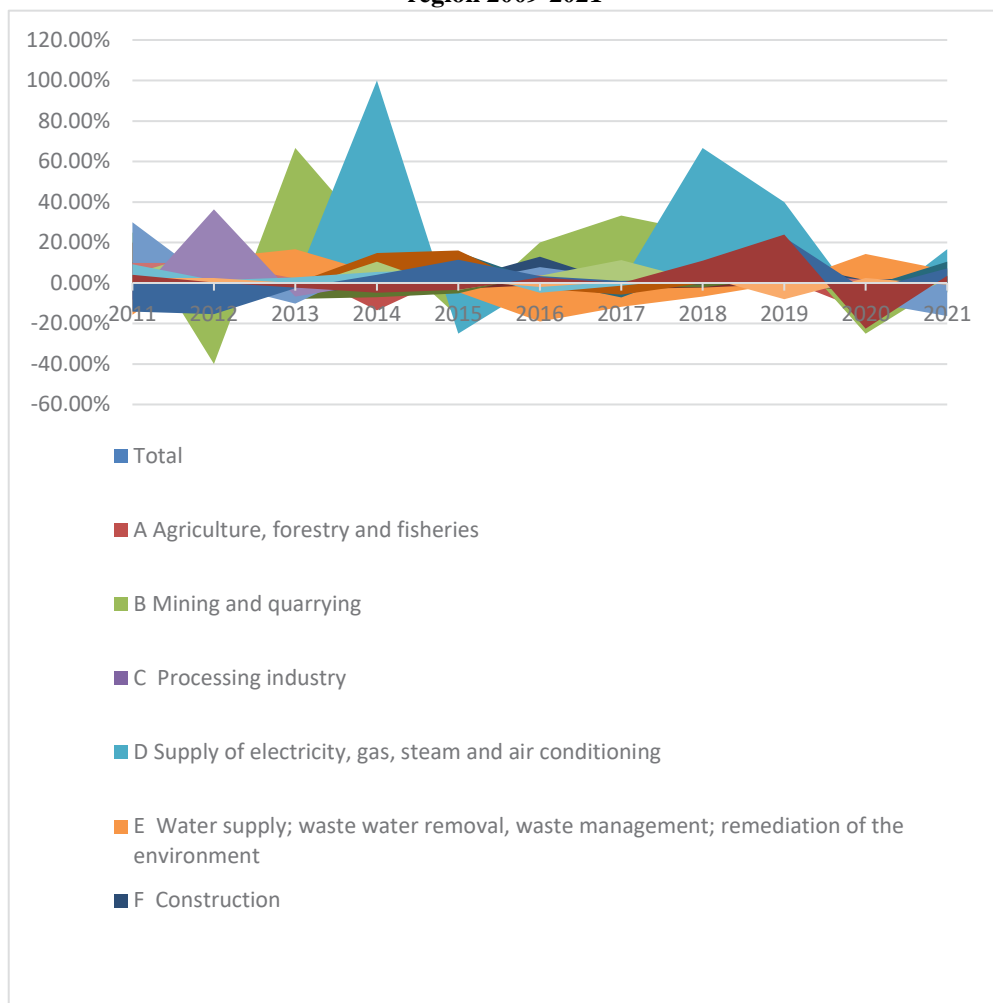
Source: State statistical Office of Republic of North Macedonia

The GDP growth rate of the region is positive with 3.2% on year to year basis. It is also similar to the GDP growth rate of the whole country. The biggest fall was realized in 2020 due to fall of the main industries to deliver the necessary output, related to start of the Covid-19 pandemic. Such sectors as wholesale, trade, agriculture and more so tourism were affected by the economic shock caused by the pandemic, therefore having impact on the fall of over GDP of the region. The greatest rise was recorded in 2018 with 7.65% rise of nominal overall GDP of the Ohrid-Prespa region.

**Figure 3 GDP growth rate of Ohrid-Prespa region 2009-2021**
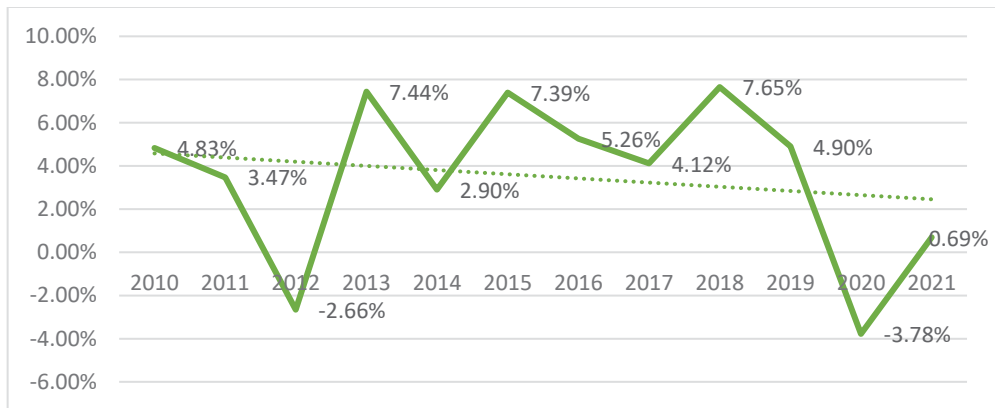
Source: State statistical Office of Republic of North Macedonia

Even though the average growth rate of the GDP of the region is positive, the logarithmic trend of the GDP is negative and shows downgrading tendencies. Although, as can be seen on the figure above the majority of years the industry of the region managed to create positive GDP growth, it still is not sufficient to generate positive trend for the future. This comes from the conclusion of the previous analysis i.e. the fall in output of the main industries in the region, trade, tourism, transport, and processing and agriculture industry. On the other, hand the rise of other industries such as IT industry is still not enough to create growth for the GDP of the region in the near future. The scope of each industrial sector in total industry of the region is presented in the figure below. As stated before the largest sectors belong to wholesale and retail trade, tourism, professional and technical activities, other activities and agriculture.

Total number of enterprises in the region is also in decline, this can be seen from the analysis presented in figure 4. The highest point of number of enterprises was realized in 2012 with the absolute number reaching 5803 entities. The lowest point was realized in 2015; however, the lowest growth or the biggest fall was realized in 2019 because of the pandemic and further uncertainties towards the future. The trend is incline with the industry trend, i.e. it has a downgrade perspective for the future. This only confirms the previously presented information from the industry analysis. Creating a more favourable business environment and further increasing the investment in infrastructure and sustainable energy resources could propel the industrial growth of the region.

Figure 4 Number enterprises in Ohrid-Prespa region 2009-2021
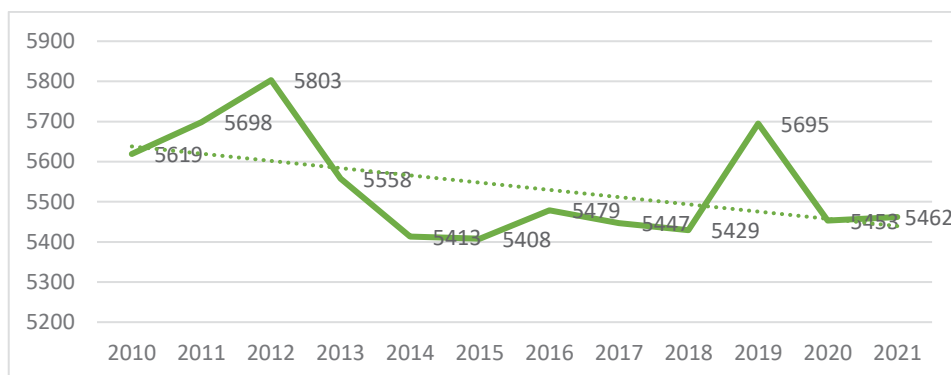
Source: State statistical Office of Republic of North Macedonia

2. FORECASTS

This part of the paper shows the probable forecast on the number of enterprises (as an indicator for industry capacity for the region) and GDP growth rate (as an indicator for the industrial output of the region). The forecast is made according to these selected presumptions:

GDP growth rate logarithmic trend line from the period 2010-2021

Number of enterprises trend logarithmic line from the period 2010-2021

Projections of number of population in the region according to the UN population data till 2100

Changes in basic climate variables: daily temperature and daily precipitation according to the RCP2.6 and RCP8.6 scenarios for future greenhouse gas concentrations defined by the Fifth Intergovernmental Panel on Climate Change (IPCC) for the period until 2100.

This forecast does not take into consideration any other variables, and gives the presumption that no other factors will change in the given period, i.e. ceteris paribus. The two forecasts are shown in the figures below. The first depicts the probable trend of the number of enterprises in the region given the consideration the previously described presumptions until the year 2070. The

second shows the forecast of the GDP growth rate in the same period given in consideration the same assumptions. Both of the figures show declining trends of the forecasted indicators. This can be expected because of several factors. Firstly, the declining trends of both indicators. The indicators shown previously in the industry analysis had both shown declining trends; due to lack of development of certain aspects that the industry needs in order to develop further more. Secondly, the decline of the population in the region as well as in the country, shown previously in the demographic analysis.

The fall in population due to changes in the birth rate of the region, migrations, and climate change induced migrations also influence the fall of the two separate indicators. Fall in populations means fewer possible employees and therefore fewer enterprises in the years to come. This also influences the region's GDP growth rate, which will also fall due to the stated reasons. Third and the last reason for the decline of the indicators stated in this forecast is climate change. Two different scenarios which were proposed and which show different temperature rises and two different precipitation forecasts, all generally incline towards the downgrade effect on both of the indicators. Rise in temperature and change in climate can really affect the region given that the biggest industry sectors are sensitive to climate changes.

Figure 5 Forecast of the number of enterprises in Ohrid-Prespa region 2009-2100
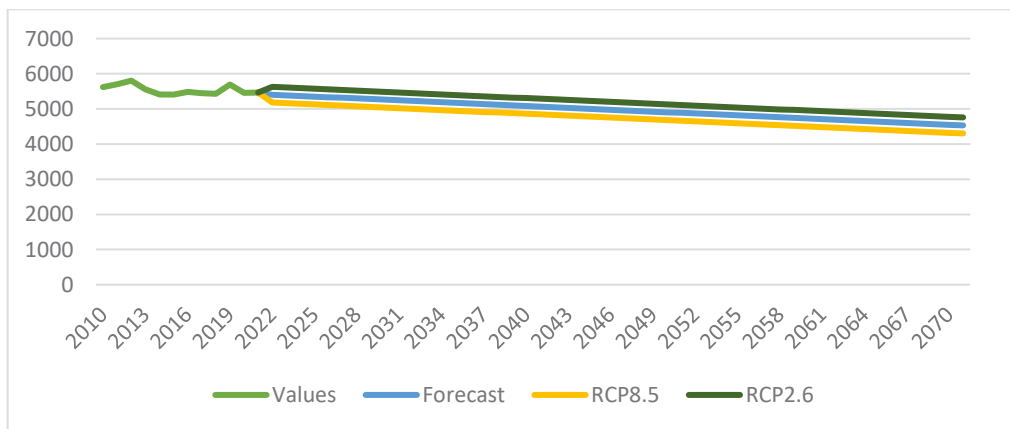
Source: Own calculations

Figure 6 Forecast of the GDP growth rate in Ohrid-Prespa region 2009-2100
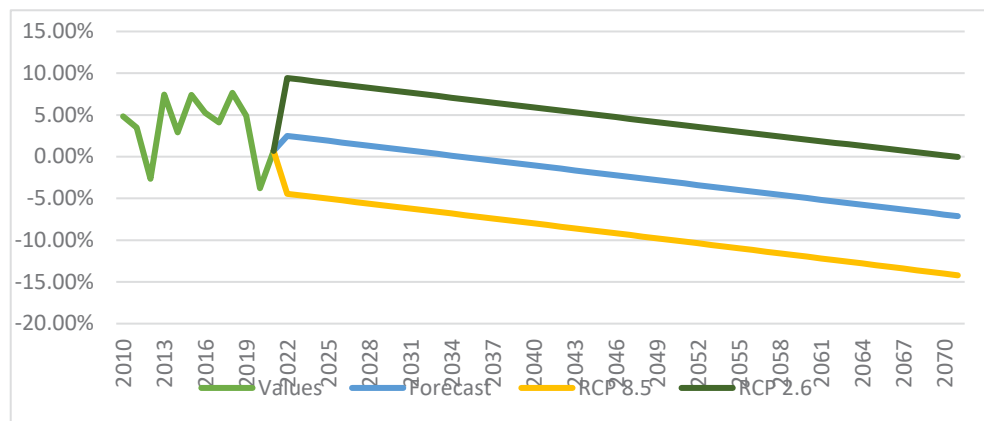
Source: Own calculations

Furthermore, the region lacks basic infrastructure to support the existing industries, yet alone support new ones, or build resilience towards climate change perspectives. Lack of sufficient road infrastructure, lack of sustainable energy and touristic capacities are all reasons, which could see the slow but immanent downfall of the region. This will further add pressure to the socio-economic conditions that the resident population is facing currently, leading to more migration and more stagnation for the region in the future.

Another forecast of the population and economic activity of the Ohid-Prespa region is also presented in this research paper. The second forecast is based on the data from Shared Socioeconomic Pathways (SSPs)[2]. Shared Socioeconomic Pathways (SSPs) were developed over the last years as a joint community effort (by an international team of climate scientists, economists and energy systems modelers) to provide a toolkit for the climate change research community to carry out integrated, multi-disciplinary analysis. They describe plausible major global developments that together would lead in the future to different challenges for mitigation and adaptation to climate change. The SSPs are based on five narratives describing alternative socio-economic developments, including sustainable development, regional rivalry, inequality,

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[2] https://iiasa.ac.at/models-tools-data/ssp (Accessed on 9.10.2023)

fossil-fuelled development, and middle-of-the-road development. In the context of the Pathways, the data from them was downsized in order to fit the purpose of the research and present the data for Ohid-Prespa region.

The forecast for the population according to the downsized data for SSP1 and SSP5 is presented in the figure below.

Figure 7 Forecast of the population of the Ohid-Prespa region according to the SSP1 and SSP5 scenarios

Source: © SSP Public Database (Version 2.0) https://tntcat.iiasa.ac.at/SspDb
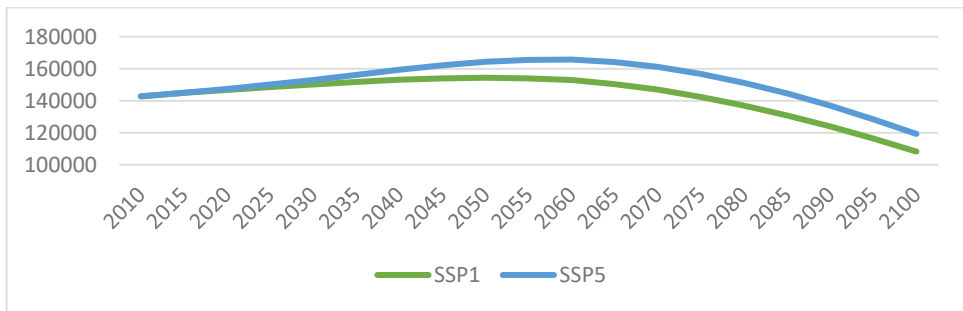
Sustainability (Taking the Green Road) or SSP1 stands for the paradigm that the world shifts gradually, but pervasively, toward a more sustainable path, emphasizing more inclusive development that respects perceived environmental boundaries. Management of the global commons slowly improves, educational and health investments accelerate the demographic transition, and the emphasis on economic growth shifts toward a broader emphasis on human well-being. Driven by an increasing commitment to achieving development goals, inequality is reduced both across and within countries. Consumption is oriented toward low material growth and lower resource and energy intensity. As we can see from the figure the number of population in the Ohrid-Prespa region will reduce reaching almost 100.000 people in the region by the year 2100. That also happens in the SSP5 scenario, or Fossil-Fueled Development Scenario. This scenario concerns with the thesis that the world places increasing faith in competitive markets, innovation and participatory societies to produce rapid technological progress and

development of human capital as the path to sustainable development. Global markets are increasingly integrated. There are also strong investments in health, education, and institutions to enhance human and social capital. At the same time, the push for economic and social development is coupled with the exploitation of abundant fossil fuel resources and the adoption of resource and energy intensive lifestyles around the world. All these factors lead to rapid growth of the global economy, while global population peaks and declines in the 21st century. Local environmental problems like air pollution are successfully managed.

There is faith in the ability to effectively manage social and ecological systems, including by geo-engineering if necessary. The next figure shows the GDP of the region in billion US dollars for the same period for both scenarios SSP1 and SSP5.

Figure 8 Forecast of the GDP of the Ohrid-Prespa region according to SSP1 and SSP5 scenarios

Source: © SSP Public Database (Version 2.0) https://tntcat.iiasa.ac.at/SspDb
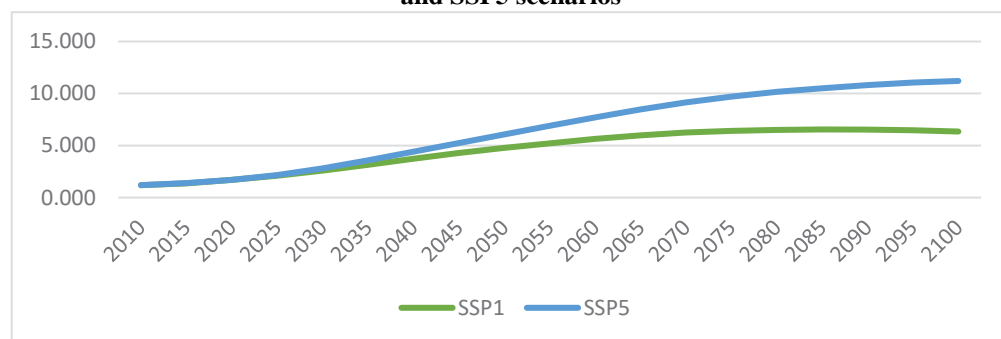
According to figure 8 there is expectations for the PPP growth in the region which will be more recognizable in the SSP5 scenario. In SSP1 the growth of GDP in the region will be less extensive and will spiral downwards in the end of the projecting period.

Conclusion

Industry, agriculture and tourism are the most important for the economy in the region. Micro and small enterprises are the core of the region. The analysis of the growth rate of the enterprises shows us that even though the average growth rate of micro enterprises is positive (1% g.r. over the observed period), their logarithmic trend is negative. This means that taken into consideration the changes of the number of micro enterprises through the years and the perceived climate change, the overall number of the same will start to decrease over the period. This concerns mostly business in the industries such as trade, agriculture, tourism, artisanship, crafts, etc. Small enterprises, which according to the statistics are the second largest amount of enterprises according to size have different prospects. Even though their average growth rate is -4%, their overall logarithmic trend is positive. Medium enterprises have the greatest average growth rate among all the different types of enterprises according to their size (4% average growth rate). They also have a positive logarithmic trend that inclines to growth in the years to come. The absolute number of large enterprises has risen in the observed period accounting for 17 large enterprises in the Ohrid-Prespa region, and an average growth rate of 11%. However, they have declining logarithmic trend due to limited sources of resource use, low sustainable development policies, climate change effects and last but not least infrastructure factors.

A general mapping analysis of the industry, has shown that different types of industries have different growth rate and are differently represented on the affects towards GDP of the Ohrid-Prespa region. Industry with the greatest number of enterprises in the period of 2010-2021 and as well as with the largest GDP contribution is wholesale and retail trade; repair of motor vehicles and motorcycles. Second in the same parameters is tourism industry or in the official nomenclature of the industry stated as accommodation facilities and food service activities. Other industries witch are among the most important considering the number of enterprises and their contribution towards the GDP of the region are processing industry, construction, professional, scientific and technical activities, health and social care activities transport and logistic, agriculture.

Largest fall in the industry capacity for the observed period was noted in the largest industry in the region i.e. Wholesale and retail trade; repair of motor vehicles and motorcycles with an average annual fall of 2.41%. The second largest decline of the industry by type was registered in the agricultural industry with an annual average fall of 1.87%. Other important industries also realize negative growth rates in the observed period, such as: transport, logistics, and tourism industry. That is sufficient to create a total fall of the industry measured by number of enterprises and industry GDP related capacity of 0.22%.

The GDP growth rate of the region is positive with 3.2% on year to a year basis. It is also similar to the GDP growth rate of the whole country. The biggest fall was realized in 2020 due to fall of the main industries to deliver the necessary output, related to start of the Covid-19 pandemic. Even though the average growth rate of the GDP of the region is positive, the logarithmic trend of the GDP is negative and shows downgrading tendencies.

In the last part, based on the GDP growth trend, the growth of the number of enterprises, the predictions of the number of the population according to the UN for the year 2100 and the scaling of two SSP scenarios for the climate conditions until the year 2100, projections for the economic capacity of the region in 2100 were made. Both of the figures (the probable trend of the number of enterprises in the region until the year 2070 and the second, the forecast of the GDP growth rate in the same period) show declining trends of the forecasted indicators.

Two different scenarios which were proposed and which show different temperature rises and two different precipitation forecasts, all generally incline towards the downgrade effect on both of the indicators. Rise in temperature and change in climate can really affect the region given that the biggest industry sectors are sensitive to climate changes.

The second forecast is based on the data from Shared Socioeconomic Pathways (SSPs). Shared. The SSPs are based on five narratives describing alternative socio-economic developments, including sustainable development, regional rivalry, inequality, fossil-fuelled development, and middle-of-the-road development. In the context of the Pathways, the data from them was downsized in order to fit the purpose of the research and present the data for

Ohid-Prespa region. The forecast for the population according to the downsized data for SSP1 and SSP5 shows big a fall of population in the both scenarios. The number of population in the Ohrid-Prespa region will reduce reaching almost 100.000 people in the region by the year 2100.

Another indicator show that there is expectations for the GDP growth in the region which will be more recognizable in the SSP5 scenario. In SSP1 the growth of GDP in the region will be less extensive and will spiral downwards in the end of the projecting period.

According to the forecast analysis and the outputs of the research taken into consideration the two hypothesis presented in the paper are accepted. The forecast based on the RCP and SSP climate scenarios showed that in the future the effects of climate change in the Ohrid-Prespa region will have sufficient impact on the industry of the region as well as the number of population. In order to tackle this challenges a climate risk mitigation strategy for the region should be imposed, which will take into consideration the climate change of the region and the problems that may arise with the same. Preventing the inevitable will be possible only by abiding to sustainable development strategies in the region and focusing on the growth of industries that would be less affected by the changes in climate of the region that are anticipated.

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THE "GLASS CEILING" PHENOMENON AND WOMEN MANAGERS: REPUBLIC OF NORTH MACEDONIA AND OTHER REGIONS IN EUROPE

Abstract

A well-developed management structure is the backbone for the successful operation of any enterprise. The underrepresentation of women in managerial positions has been a persistent concern in the context of gender equality and economic development. This paper investigates the percentage participation of women managers in European countries and its potential connection to GDP per capita. Utilizing a comprehensive dataset comprising various European countries, we conduct a comparative analysis of the proportion of women in managerial roles across different economies with a special reference to North Macedonia. Additionally, GDP per capita data is incorporated to explore potential correlations between women's representation in management and economic prosperity. The analysis covers the following regions: Scandinavia, Nordic region, as well as Eastern, Western and Southern Europe. The analysis refers to two consecutive years, 2020 and 2021. The results indicate that the percentage participation of women managers and GDP per capita are inversely proportional in the Scandinavian region, the Nordic region, as well as Eastern and Western Europe, while the opposite conclusion applies to the countries of Southern Europe.

Keywords: management, women managers, European countries, GDP per capita

JEL Classifications: J16, J7, N14

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Introduction

In recent years, the topic of the position of women within the workforce, especially in the vertical classification of jobs, has become increasingly relevant. Hence, research related to women as a part of management and managerial positions receives more attention and significance in recent years as the number of women who manage to fight for higher working positions increases. However, despite this progress, they still face specific challenges and obstacles in achieving certain positions in organizations. Managerial positions at any level are mostly held by men, while women lag far behind in achieving at least approximate percentage representation of these job positions.

The purpose of the paper is an analysis of the percentage participation of women in managerial positions and its connection with the degree of development of the countries in the regions of Europe and Republic of North Macedonia. As an indicator of the level of development of the countries, the GDP per capita indicator is used. To achieve the research objective, the paper analyzes women managers and the term "glass ceiling" from a theoretical point of view. The second part is empirical analysis; first, analysis of the percentage representation of women managers and the development of the countries separately for each region in Europe and second a comparative analysis of the performance achieved by North Macedonia in relation to these regions to the same indicators.

1. LITERATURE REVIEW

In the last decade, the question of the position of women in organizations has become increasingly relevant as their share in the labor market increases. Namely, in 2021, women in employment in the European Union (EU) participated with 67.7%. Despite the fact that there is still a gap in employment between men and women, however, it has decreased in the last 10 years by a modest 1.9 percentage points (European Commission, 2022). One cannot ignore the fact that they still belong to a minority group, especially when it comes to decision-making positions. This phenomenon is known under the name "glass ceiling". The "glass ceiling" phenomenon refers to situations in which qualified individuals cannot advance in an organization due to discrimination. The most common reasons for discrimination are the gender or the race to which those individuals belong, so often when it comes to this phenomenon, it means discrimination against women within organizations. Also, "glass ceiling" indicates vertical discrimination within the organization.

There are several authors who have researched this topic, and each of them defines in a different way the criteria that indicate the existence of this phenomenon in a certain organization. Elacqua, Beehr, Hansen and Webster (2009) investigate this

phenomenon and define it as the inability of women in a certain organization to be placed in a top management position. Also, they include in their model two factors, namely, beliefs about interpersonal and beliefs about situational variables in the organization, which in turn, they connect with the perception that men and women are treated differently in general, which they ultimately connect and draw a conclusion about whether there is a "glass ceiling" in the organization. Other authors, on the other hand, expand this research and, in addition to these two factors, add the organizational culture in relation to gender, that is, whether the beliefs and stereotypes perceived by society affect the perception of women that they are treated differently, that is, that they are prevented from advancing (Babic and Hansez, 2021).

However, they generally define the "glass ceiling" phenomenon as discriminatory barriers that prevent women from advancing to more responsible and powerful positions in the organization, just because they are women (Li and Wang Leung, 2001). Based on previous research, it can be concluded that this phenomenon in terms of discrimination against women is especially present in managerial positions, in other words the percentage representation of women lags far behind men in these decision-making positions. This is exactly the main research question in the part of the empirical analysis in this paper.

2. EMPIRICAL ANALYSIS

2.1. Data and methodology

The development of one country can be measured through several indicators. According to IMF (International Monetary Fund), GDP per capita is considered as one of the basic indicators that show economic development, so for the purposes of this research, was taken as a measure of economic development. Also, for the research purpose, the gender equality index is included in the analysis and it is developed by the European Institute for Gender Equality, which measures this index every year for each EU country. The index is based on 6 domains that are included in the calculation, namely: work, money, knowledge, time, power and health, all of these are divided into subdomains and each one is calculated based on a group of indicators, so this index is calculated based on 26 variables.

Also, the index can take a value from 0 to 100, were 100 means that that country has achieved full equality between women and men. Regions that are included in the analysis are: Scandinavia, the Baltic countries, as well as the countries of Eastern, Western and Southern Europe. The analysis refers to two consecutive years, 2020 and 2021, because at the time when the data for the research was collected, the last available data on the percentage

participation of women managers was for 2021. Data regarding the GDP per capita indicator is obtained from the database of the European Commission (Eurostat), while the data on the percentage of women managers in the total number of managers were obtained from the ILO (International Labour Organization). The methodology employed in this paper involves a comparative analysis of graphs to investigate trends and patterns across different countries. Through a systematic approach, the data is organized, cleaned, and preprocessed to ensure consistency and comparability. Subsequently, a variety of graph types, such as line charts and bar graphs are utilized to visualize and compare the indicators across countries. The goal of this methodology is to provide a comprehensive and nuanced understanding of the similarities and differences between countries.

2.2. Scandinavian countries

The Scandinavian region, also known as the Nordic region, is made up of five countries, namely: Denmark, Finland, Iceland, Norway and Sweden. The Scandinavian region is known for being considered a world leader in successfully maintaining gender equality (Dahlerup, 2011), and this is the main reason why this region of Northern Europe is included as a separate region in the analysis. Countries from other regions are even trying to implement the same policies in order to achieve greater gender equality and social systems as in the Scandinavian countries.

Graph 1: Percentage share of women managers in the total number of managers in the Scandinavian countries for 2020 and 2021
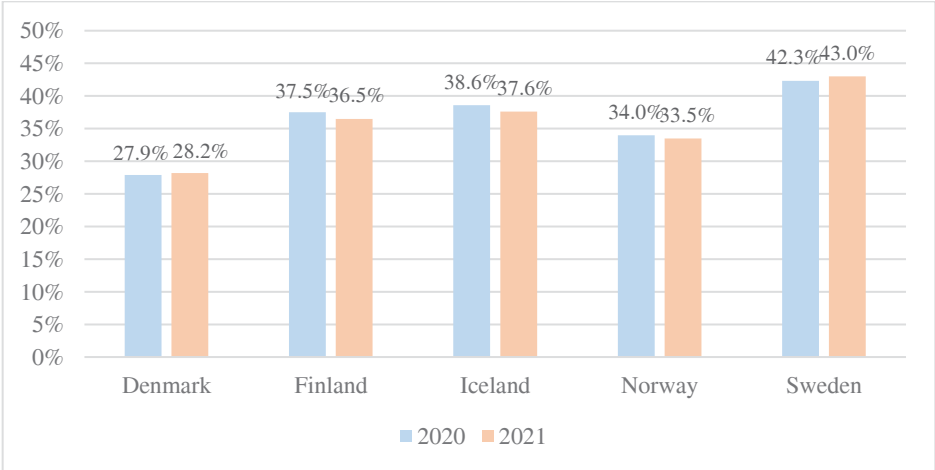
Source: ILO (International Labour Organization)

The data on graph 1 show the percentage share of women managers in the total number of managers for Denmark, Finland, Iceland, Norway and Sweden for two consecutive years, 2020 and 2021. As it can be seen from the graph, Sweden is the country that is on the first place in this region in terms of the participation of women managers with a percentage participation of 43% and 42.3% for 2021 and 2020, respectively. Meanwhile, Denmark is the country with the lowest percentage of female managers with 28.2% for 2020 and 27.9% for 2021. Although all these 5 countries are located in a region that is considered to have achieved a high level of gender equality between men and women, however, the figures from chart no. 1 indicate a slightly different results. First, the percentages in individual countries are far from the expected results, and there is also a wide spread in percentages between the best and worst performing country of 14.8 percentage points in the last analyzed year (2021). This poor statistic is mostly due to the fact that the Scandinavian countries have a large number of welfare-enhancing policies, generous benefit systems that reduce women's incentives for full-time work , paid (maternity) leave policies that encourage long breaks from work. All of these policies prevent women from reaching the top, thus creating a "glass ceiling" effect (Sanandaji, 2018). Graph 2 shows the level of development of the Scandinavian countries, i.e. GDP per capita in 2020 and 2021.

Graph 2: GDP per capita for Scandinavia, 2020 and 2021
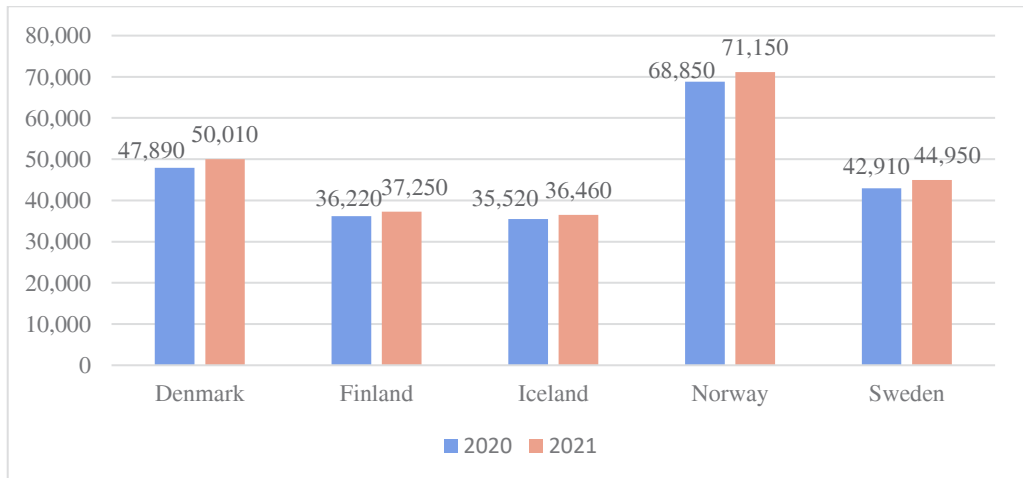

Source: Eurostat

It can be stated that although Denmark and Norway have the lowest percentage participation of women in management positions in 2020 and 2021, these two countries show the highest GDP per capita in these two years.

2.3. Baltic countries

Another region that is also known for high rates of gender equality is the Baltic States region. This region includes Estonia, Lithuania and Latvia. According to the gender equality index, the Baltic countries always are ranked high. According to this index for 2022 (calculations for 2022 are based mostly on data from 2020) Latvia had 61.4 index points, Estonia 61, and Lithuania 60.6 index points. They are arranged in this order in terms of the percentage participation of women in management positions as well (graph 3) for 2021, i.e. Latvia with 45.9%, Estonia with 41.2% and Lithuania with 37%.

Graph 3: Percentage share of women managers in the total number of managers in the Baltic countries for 2020 and 2021
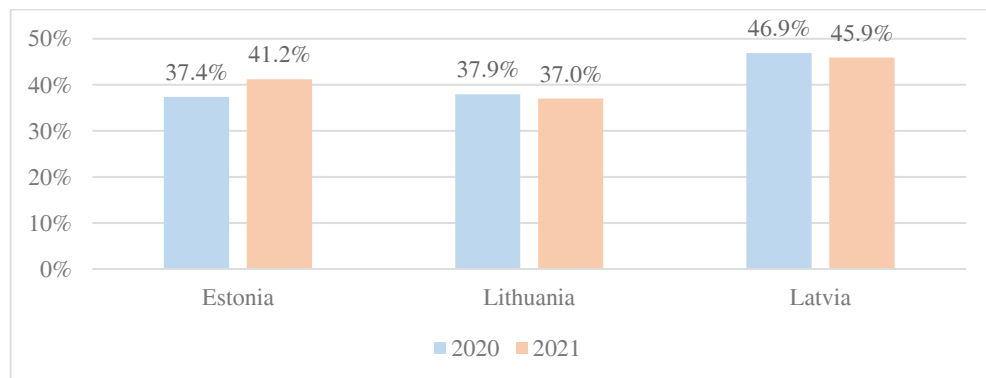
Source: ILO (International Labour Organization)

In terms of realized GDP per capita, Latvia, the country with the highest percentage of female managers, achieved the lowest GDP per capita, both in 2020 and 2021 (Graph 4).

Graph 4: GDP per capita in the Baltic countries for 2020 and 2021
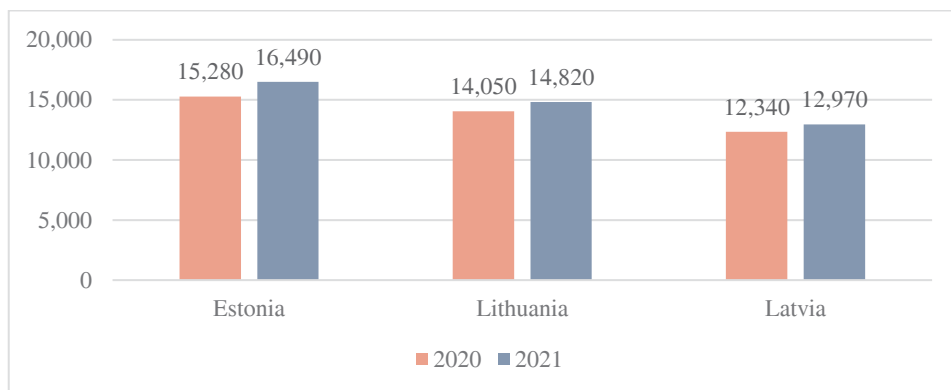
Source: Eurostat

2.4. Eastern and Western Europe

In Europe there is great diversity in terms of the development of individual countries. This means that the economic prosperity they offer varies from country to country. In general, the countries located in the eastern part of Europe are considered poorer and less developed countries compared to the western ones. This is the reason why these two regions are included as separate in the analysis. As countries from Eastern and Western Europe, the countries according to the division of the ILO will be included, that is: Bulgaria, Belarus, the Czech Republic, Hungary, Moldova, Poland, Romania, the Russian Federation, Slovakia and Ukraine from Eastern Europe, and from Western Europe the countries: Austria, Belgium, Switzerland, Germany, France, Luxembourg and the Netherlands. Otherwise, according to the Gender Equality Index, the eastern countries for which this index is calculated (EU member states) are below the average for the EU, which for 2022 (generally, calculated on the basis of data from 2020) is 68.6 index points, in more detail, Bulgaria 60.7, Poland 57.7, Czech Republic 57.2, Slovakia 56.0, Hungary 54.2, Romania 53.7. Meanwhile, the indices for the countries of Western Europe are above the average for the EU, namely: the Netherlands 77.3, France 75.1, Belgium 74.2, Austria 68.8 and Germany 68.7.

Interpreted according to these results, Western European countries have achieved greater equality between men and women compared to Eastern countries. However, according to the results of the percentage participation of women managers in the total number of managers (graph 5 and 6), Eastern countries have achieved a significantly higher representation of women in decision-making positions compared to western countries. In other words, the "glass ceiling" effect is more pronounced in Western countries than in Eastern countries, despite the fact that they are considered countries that have ensured greater gender equality following the index for gender equality.

Graph 5: Percentage participation of women managers in the total number of managers in the countries of Eastern Europe for 2020 and 2021
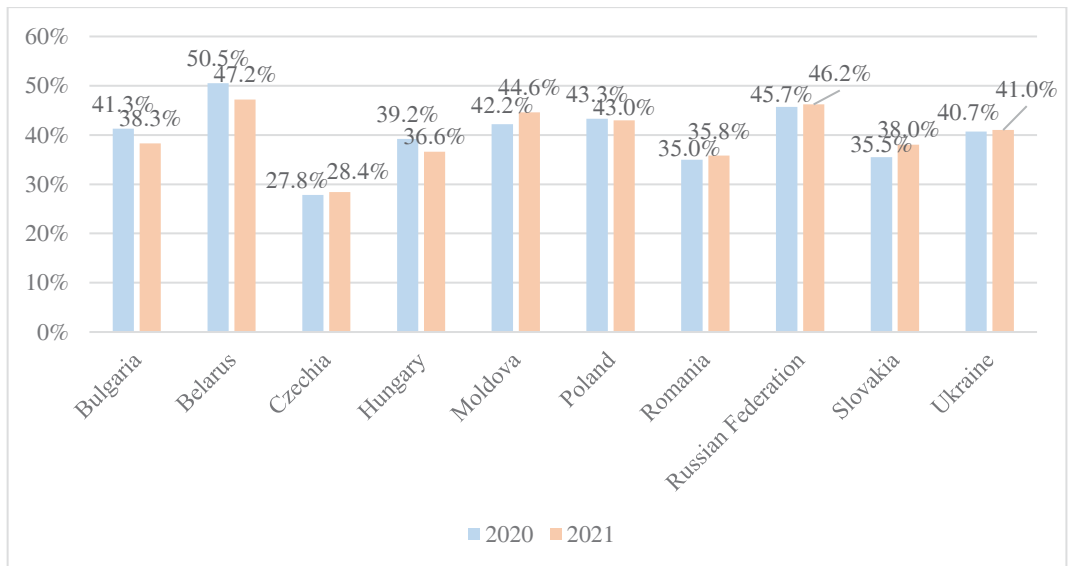
Source: ILO (International Labour Organization)

Graph 6: Percentage participation of women managers in the total number of managers in the countries of Western Europe for 2020 and 2021
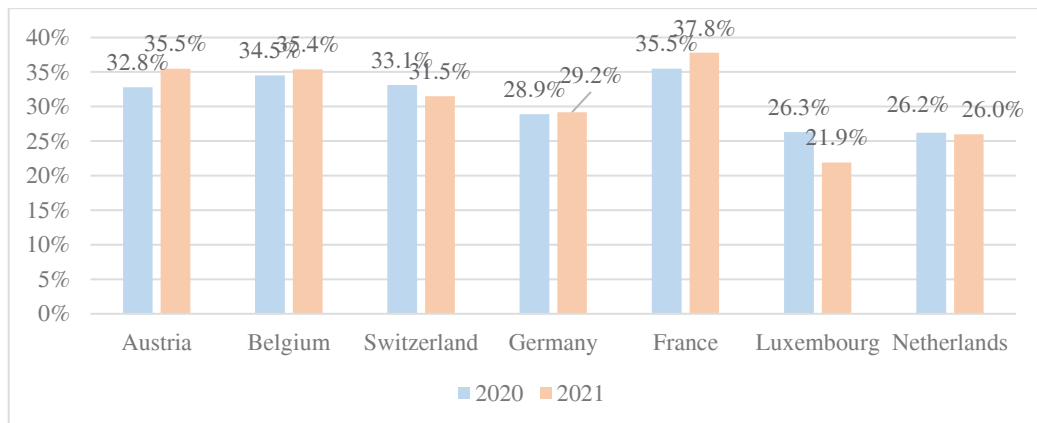
Source: ILO (International Labour Organization)

Regarding the macroeconomic indicator GDP per capita, in general, in Western Europe, countries that have shown a higher percentage of women in managerial positions have a lower level of GDP per capita. (Chart 7) For example, France, which in both analyzed years is the leader in terms of the percentage of female managers, is at the same time in the last place of this region following the indicator GDP per capita. In addition, Luxembourg, which ranks last in terms of female managers, showed an exceptionally high GDP per capita for both years. A similar conclusion applies to Austria and Belgium.

Of the Eastern countries, the Czech Republic has the highest GDP per capita, and in terms of the percentage of female managers, it is in last place in the region. Furthermore, Belarus, Ukraine and Moldova are at the top in terms of female managers, while in terms of GDP per capita they have achieved the lowest values in the region.

Graph 7: GDP per capita for Western European countries for 2020 and 2021
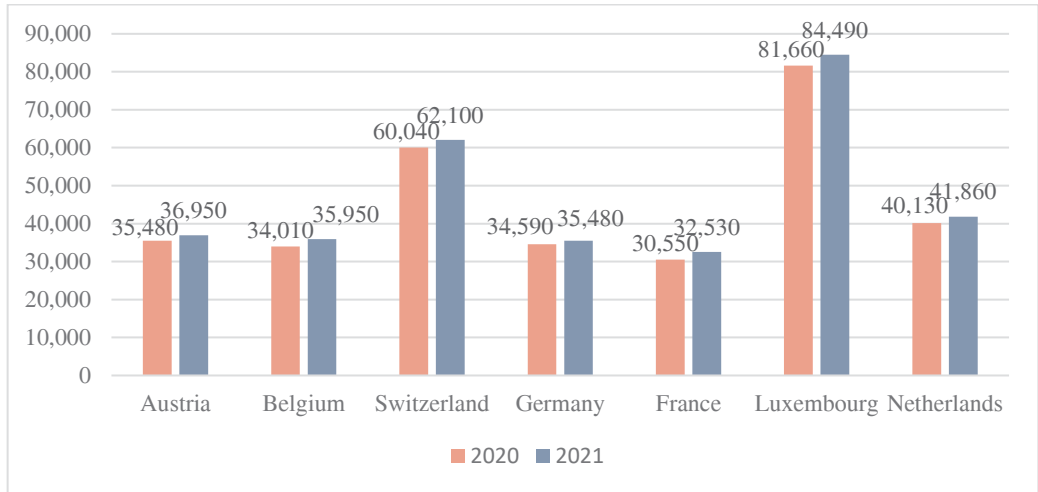
Source: Eurostat

Graph 8: GDP per capita for Eastern European countries for 2020 and 2021
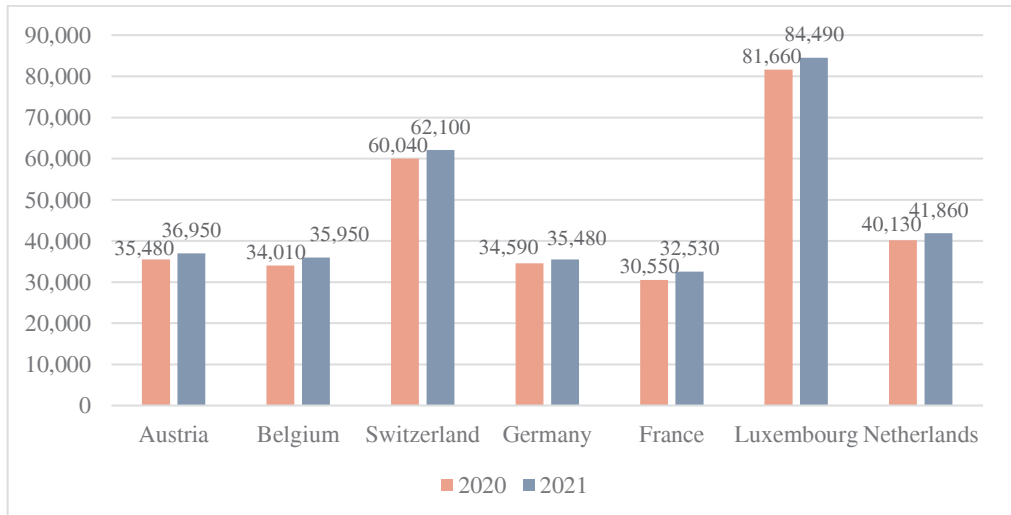
Source: Eurostat

2.5.Southern Europe

The last region covered in the research is Southern Europe. It includes the following countries: Bosnia and Herzegovina, Spain, Greece, Croatia, Italy, Kosovo, North Macedonia, Malta, Montenegro, Portugal, Serbia and Slovenia. Graph 9 also covers two years for each country, except for Montenegro, for which the last available data was 2020. Albania is completely left out of the graph because the last year for which data is available is 2019 and it is 34.1%, which leads to the conclusion that probably in 2020 and 2021 it is also in the same range as the rest of the Southern European countries. In general, Slovenia, Portugal, Spain, Serbia can be singled out as countries with more optimistic results for 2020 and 2021, while North Macedonia is at a much lower level compared to these countries, even in 2021 takes the last place following this indicator with 21.6% women managers.

Graph 9: Percentage participation of women managers in the total number of managers in Southern Europe for 2020 and 2021


Source: ILO (International Labour Organization)

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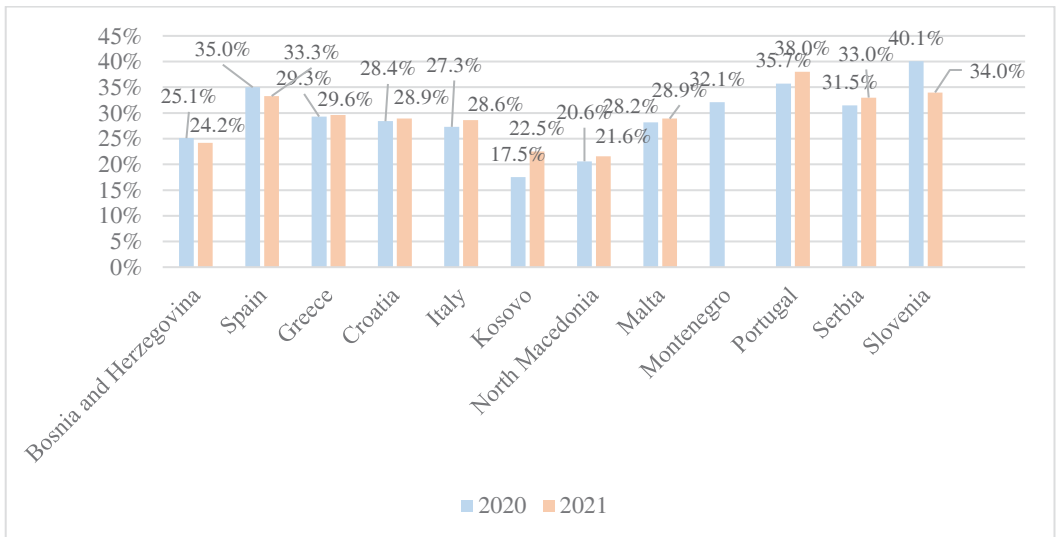
Graph 10: GDP per capita for Southern European countries for 2020 and 2021
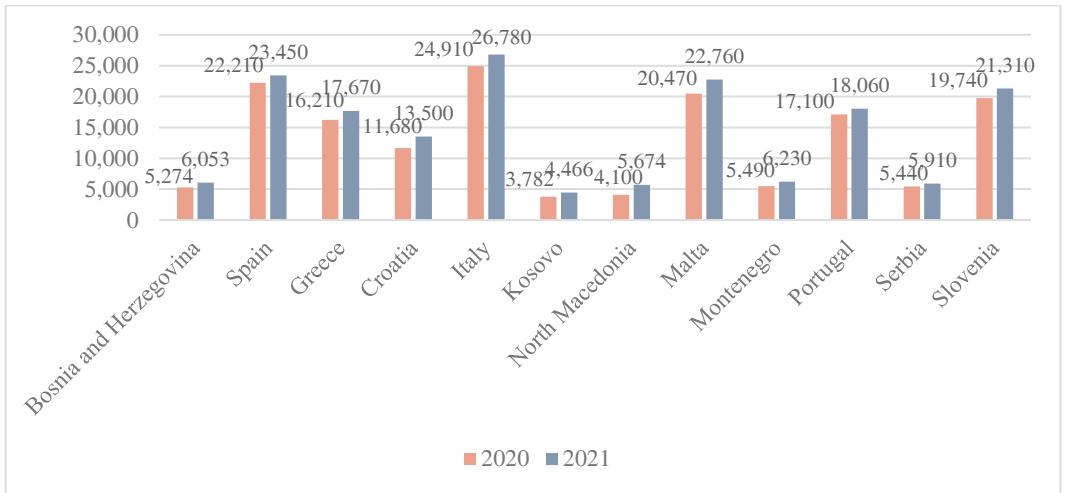
Source: Eurostat

The conclusions regarding GDP per capita in Southern Europe differ from other regions in Europe. As can be seen from chart 10, the countries that showed the least development measured by GDP per capita are at the same time the weakest in terms of the indicator of women in managerial positions. Such are: Kosovo, North Macedonia and Bosnia and Herzegovina. Contrary to them, Spain and Slovenia are countries that show good performance according to both indicators. From graph 10, it can be concluded that the Republic of North Macedonia is the weakest in the region in terms of percentage participation of women managers and at the same time it is among the weakest countries in terms of the GDP per capita indicator for the two analyzed years.

Unlike Southern Europe, in the rest of the regions we have a completely opposite conclusion, that is, the countries that showed the highest GDP per capita at the same time are also countries with the lowest percentage of female managers. Also, regarding the "glass ceiling" effect, a different conclusion is reached depending on whether it is based on the gender equality index or on the percentage participation of women managers. For example, the first place according to the gender equality index of the European Institute for Gender Equality belongs to Sweden with 83.9 index points, followed by Denmark with 77.8 index points. However, the percentage share of women managers in Sweden is lower than the share in Latvia, while in Denmark, the percentage share of women managers is only 28.2% (graph 1).

In other words, following the results of the percentage participation of women managers, the Scandinavian countries face a significantly more pronounced effect of the "glass ceiling" phenomenon than the Baltic countries, and this conclusion does not correspond if the "glass ceiling" phenomenon for these countries is analyzed only on the basis on the gender equality index. The same conclusion applies to the countries of Western and Eastern Europe, that is, following the index, the eastern countries have a more pronounced "glass ceiling" effect compared to the western ones, but if the percentage participation of women managers is analyzed, the conclusion is the opposite.

2.6. The "Glass ceiling" effect in Republic of North Macedonia in relation to other regions

This part of the research is dedicated to the Republic of North Macedonia in terms of women managers and the macroeconomic indicator GDP per capita compared to the performance of other regions. First of all, on chart 11 presents the entire available time series in relation to the percentage participation of women managers in the Republic of North Macedonia, in order to obtain a more comprehensive picture of the direction in which this indicator is moving. As can be seen from graph 11, in general the series has upward and downward movements during the entire analyzed period and no trend is observed in the analyzed period. In certain periods there are larger oscillations, and at the end of the series, what is devastating, although in 2021 there is a small increase compared to 2020, however, North Macedonia is almost at the same level as it was in 2002.

Graph 11: Percentage participation of women managers in the total number of managers in the Republic of North Macedonia (2002-2021)
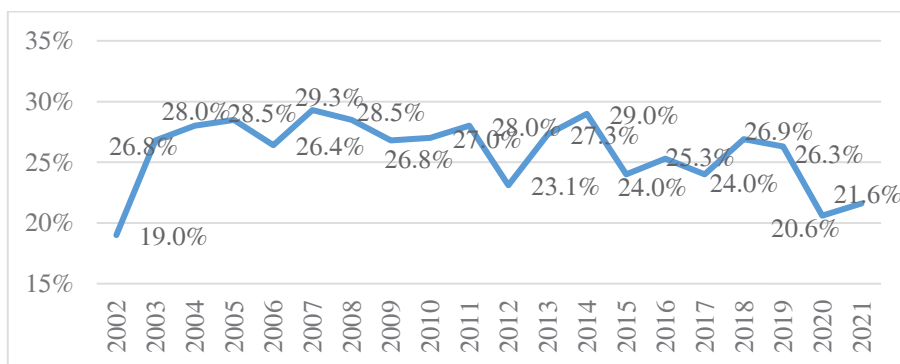
Source: ILO (International Labour Organization)

In relation to the first region analyzed in this paper (Scandinavia), North Macedonia lags behind in the percentage of female managers, being the closest to Denmark (Macedonia 21.6%, Denmark 28.2% for 2021), but according to the GDP per capita indicator North Macedonia is far behind. For 2021, RSM achieves 5,674 euros of GDP per capita, while for the Scandinavian region the country with the lowest GDP per capita for the same year is Iceland, with 36,460 euros. While the country that achieved the highest GDP per capita for the same year is Norway of 71,150 euros, and in the same year it had only 33.5% female managers in the total number of managers.

The second region included in the analysis is the Baltic region. Compared to this region, North Macedonia also lags behind in the percentage of female managers and in terms of development. The country with the lowest GDP per capita in this region is Latvia for both analyzed years, with 12,340 euros and 12,970, for 2020 and 2021 respectively, which means that North Macedonia and Latvia have the smallest gap in terms of the difference in GDP per capita. While in the percentage of female managers, the gap between North Macedonia and Latvia is the largest for this region and amounts to 24.3 percentage points.

Compared to the countries of Eastern Europe which are considered as less developed, North Macedonia, unlike the previous regions, is similar in terms of development to certain countries, namely: Bulgaria (6,950), Belarus (6,188), Moldova (4,433) and Ukraine (4,098). But unlike North Macedonia, these countries have high rates of female managers: Bulgaria 38.3%, Belarus 47.2%, Moldova 44.6% and Ukraine from 41%. According to the percentage of female managers, North Macedonia is closest to the Czech Republic, which has 28.4%, but this country has the highest GDP per capita of the Eastern countries in Europe, at 18,020 euros.

In relation to Western Europe, all countries are more developed than North Macedonia measured by the macroeconomic indicator GDP per capita, which is expected given the fact that it is a developed part of Europe, but in terms of women managers, North Macedonia do not lags behind on such a large scale. For example, Luxembourg is only 0.3 percentage points better for 2021, but in the same year Luxembourg reached 84,490 euros GDP per capita. Also, according to the percentage of women managers from this region, Macedonia is similar to the Netherlands (26%), Germany (29.2%).

Conclusion

A well-developed management structure is the backbone for the successful operation of any enterprise. Despite the fact that according to many researchers, and following the index of gender equality especially in the more developed countries of Europe, it was expected that the representation of women in these managerial positions is at a satisfactory level, however, this research gave the opposite conclusion. The Scandinavian countries are considered to be the leaders in Europe in terms of gender equality following the Gender Equality Index, however, apart from Sweden which may have a slightly better score, the rest of the countries have a very low percentage of female managers. In the same direction, Western European countries, which are far more developed than Eastern countries, generally have a lower level of female managers.

In terms of the degree of development of the countries, the countries that showed the highest GDP per capita in Scandinavia, the Baltic countries, Western and Eastern Europe are the countries that also have the lowest percentage of women in management positions. This leads to the conclusion that perhaps the number of women managers for the countries of these regions and their development are inversely proportional. Only for the countries of Southern Europe, the opposite conclusion was reached. There, the countries with the lowest percentages of female managers were also the least developed. Hence, conclusions cannot be generalized to all countries from these regions even they may differ not only between regions but also between individual countries within the same region.

Within the region where it is located, North Macedonia has the lowest percentage of women in managerial positions, and at the same time, in terms of development, it is only better than Kosovo. In relation to other regions, there are no countries that have achieved similar performances in terms of the number of women managers and at the same time similar development of the country. In other words, there are countries from other regions that are similar in terms of GDP per capita to North Macedonia, but have high percentages of female managers, or else have a similar representation of female managers, but are far more developed in terms of GDP per capita. This is probably also a result of different factors affecting GDP per capita in different regions and countries.

Based on this research, it can be concluded that despite the fact that certain countries are considered more developed and have achieved a higher level of gender equality, the "glass ceiling" effect is still present and at an unexpectedly high level.

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ANGELA ZAFIROVA[1]

KEY PRINCIPLES OF GOOD GOVERNANCE WITH PUBLIC FINANCES OF THE LOCAL GOVERNMENT IN THE REPUBLIC OF NORTH MACEDONIA

Abstract: Establishing a transparent, responsible, competing and service-oriented local self-government that is guided in its work according to the principles of good governance is a strategic priority for each country. Good governance is an appropriate, competent management of the municipality's resources, which should provide open access, accountability, transparency, an equal and responsive way of working to meet the needs of citizens. Hence, the main aim of this paper is to define the key principles of good governance of local self-government units in the Republic of North Macedonia, while serving as a basis for future detailed research on the issue. This paper insists to motivate the local self-government units to be more transparent, responsible, accountable and thus take a well-deserved place in the process of reforming local public policies. The legal framework establishes an obligation for local self-government units to apply the key principles of good governance: transparency, accountability, participation and direct communication with citizens. Although good governance as an ideal is very difficult to achieve, it is still necessary to take steps from the local government to bring our municipalities closer to this ideal.

Keywords: good governance, local self-government units, transparency, accountability, responsibility

JEL classification: H79

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Introduction

As in other countries in the world in our country as well, local self-government units have their own administrative tradition and culture that adapts to democratic changes in the society, guided by the principles of good governance. The employees in the public sector at the local level are part of the public administration in the country, which means that they should adhere to the general regulatory framework established in the state, and then apply the principles of accountability, transparency, equal treatment, efficiency, ethics and to act in the best interests of the citizens.

Establishing a transparent, responsible, competing and service-oriented local self-government that is guided in its work according to the principles of good governance is a strategic priority for each country. In general, the principles insist on the existence of municipalities that will help implement public policies at the local level and will have the capacity to meet the needs of citizens in a volume arising from the competences of the local self-government units, through transparent and accountable work, with the involvement of citizens.

Hence the main objective of this work is to define the key principles of good governance of local self-government units in the Republic of North Macedonia. The second goal of this work is to serve as a basis for future detailed research that will motivate local self-government units to be more transparent, responsible, accountable and thus take a well-deserved place in the process of reforming local public policies.

This paper is structured in several parts. The first part elaborates on the legal framework under which local self-government units operate and exercise their rights, responsibilities and obligations towards citizens. The second part defines the concept of good governance at the local level and sets out the key principles that this concept encompasses, while the third part elaborates the key four principles of good governance with public finances, which are: rule of law, transparency, accountability and participation. The latest part of this work gives conclusions regarding the concept of good governance of local self-government units in the Republic of North Macedonia.

1. **LEGAL FRAMEWORK FOR THE LOCAL SELF-GOVERNMENT UNITS IN THE REPUBLIC OF NORTH MACEDONIA**

This part of the work presents key legal acts that directly define the institutional framework under which the local self-government units operate in the Republic of North Macedonia and define their competences and obligations. Parts of this legal framework directly or indirectly relate to the grounds of good governance, taking into account the main principles of accountability, transparency and participation of citizens and the public in the budgeting processes and in the public financial management of the municipalities.

The Budget Law (Official Gazette of the Republic of North Macedonia No. 64/2005, 04/2008, 103/2008, 156/2009, 95/10, 180/11, 171/12, and 192/15) providing a detailed framework for the budgetary process, i.e. this law regulates the procedure for the preparation, adoption, management and implementation of the Budget of the Republic of North Macedonia as well as the budgets of local self-government units (municipalities) and the city of Skopje.

The Law on Local Self-Government ("Official newspaper of the Republic of North Macedonia" No. 5 of 29 January 2002) governing: the competences of the municipalities, the immediate participation of citizens in the decision-making process, organization and work of the municipal authorities, municipal administration, acts of authorities, property rights of the municipalities, supervision of the work of the municipal authorities, dissolution of the municipal council, mechanisms of co-operation between municipalities and the Government of the Republic of North Macedonia, local self-government units, protection of local self-government, establishment of official languages in municipalities and other issues of importance for the local self-government units in the Republic of North Macedonia.

Law on Financing of Local Self-Government Units (Official Gazette of the Republic of North Macedonia No. 61/2004, 96/2004, 67/2007, 156/2009 and 47/11, 192/15, 209/18, 244/19, 53/21, 77/21, 173/22) governing the financing of local self-government units, namely: determination and collection of municipalities' revenues, debt of municipalities, budget of municipalities, adoption, public management, reporting, accounting records, control and audit.

Law on Public Internal Financial Control ("Official newspaper of the Republic of North Macedonia" No. 90/09, 12/11, 188/13, 192/15) governing the system of public internal financial control in the Republic of North Macedonia, financial management and control, internal audit and harmonization.

Law on Accounting for Budgets and Budget Beneficiaries (Official Gazette of the Republic of North Macedonia No. 61/2002, 98/2002, 82/2005, 24/11 and 145/15) governing accounting, business books, accounting documents and data processing, recognition of revenues and expenditures , assessment of balance sheet positions, revaluation, financial reports, the submission of financial reports and other issues relating to the accounting of budgets of budget beneficiaries, including the budgets of local self-government units.

The Law on Free Access to Public Information ("Official Newspaper of the Republic of North Macedonia" No. 13/2006, 86/2008, 6/10, 42/14 and 148/15) provides a legal framework through which citizens' rights for free access to public information are regulated. This law regulates the conditions, the manner and the procedures for exercising the right of free access to public information at the disposal of state authorities and other institutions established by law, the authorities of municipalities, the city of Skopje and the municipalities in the city of Skopje, public institutions and services, public enterprises, legal entities exercising public power and activities of public interest.

This law ensures publicity and openness in the operations of the holders of public information and enables individuals and legal entities to exercise the right to free access to public information.

2. CONCEPT OF GOOD GOVERNANCE AT THE LOCAL LEVEL

Good governance is nothing but proper and competent management of the municipality's resources, which should provide open access, accountability, transparency, an equal and responsive way of working to meet the needs of the citizens. With this, public institutions (municipalities) carry out public affairs, manage public resources and ensure the exercise of human rights. Basically, as well as defining good governance, it must necessarily rely on several elements, transparency in decision-making, participation, accountability, rule of law and predictability.

Municipalities perform a series of public functions relating to the collection, allocation and spending of common financial resources, in order to achieve common economic goals and satisfy the social needs.

There are different aspects, different academic definitions of the principles of good governance, but there are certain key principles in good management with public finances that are most often promoted and implemented.

The following basic principles of good governance with public finances are elaborated by the academy, researchers and practitioners: stability and long-term sustainability of budgets, fiscal transparency, effective financial control, reporting and monitoring, effective and fair inter-budgetary relations, integrated budget and budgetary process, medium-term financial planning and results-oriented budgeting.

Given the knowledge of work, the needs of the austerity and the basic principles of good governance with public finances, the key four principles that are of particular importance to local self-government units are elaborated in the following parts of this paper.

3. KEY PRINCIPLES OF GOOD GOVERNANCE WITH PUBLIC FINANCES OF LOCAL SELF-GOVERNMENT UNITS

3.1 Rule of law as a basis for good governance with public finances

The rule of law is related to the legal framework under which the municipalities must operate. In the context of good governance, the rule of law includes clearly defined rights and obligations, mechanisms for their implementation, resolution of disputes by an independent judiciary and a legal framework for the protection of human rights.

The councillors are representatives of the local community, community leaders representing citizens in front of other local authorities. As council members, councillors also contribute to the local public policies, including the municipality's budget policies. In parallel, councillors also have the role of overseeing the work of other local government bodies in the process of implementing public policies and exercising the municipal budgets.

Councillors are a link between the community and the council. In this regard, it is of utmost importance for a councillor to take care of the problems

of the local community, inform the council about citizens' problems, have the capacity and skills to work with the local community, the business sector and the local communities and to defend the community's interests in front of the public.

The council is the legislature at the local level. Taking this into account, the councillor, through his engagement, influences the development of the community through the decisions related to the local planning and budgeting. In this regard, the active role of the councillor in the council is of particular importance.

In parallel with the two abovementioned functions, the councillor also has the role of policy supervision, service delivery and administration work. In other words, the councillor has the function of protecting one of the most important principles of good governance, the principle of rule of law.

Councillors are mediators between citizens and the municipality because:

- Present the proposals and the opinions of the citizens who are part of the municipality;
- Give initiatives for the adoption of regulations under the council's jurisdiction;
- Propose a search of issues relating to the Mayor's work;
- They have the right to ask the Mayor to inform the Council of his work;
- Propose a search of issues relating to the exercise of supervision of the performance of the work under the jurisdiction of the municipality;
- Propose a search of issues relating the activities for which the Municipality established public services, institutions and companies, as well as issues relating to the exercise of supervision of their work;

Implementation of the principles of good governance at the local level requires a councillor that has the capacity to perform the three functions: decision-making, representation and supervision of the work of the local self-government.

3.2 Fiscal transparency

Fiscal transparency is a key element for effective management with public finances, the determination of fiscal risks, rational financial decision-making, increasing accountability of policymakers and better fiscal policy-making. Fiscal transparency ensures that governments and municipal

authorities are open to the public about the structure and the functions of the state, fiscal positions, potential risks, benefits versus the costs of financial decisions and projections.

The reasons for the need of constant monitoring, and at the same time increasing fiscal transparency at the local level, can generally cease as follows:

- Monitors local government practices, which are particularly important for resource allocation and service provision.
- Reveals gaps in public financial management at the local level and has the potential to reduce corruption and governance errors.
- Monitors financial flows from source to place of use, answers ex-post questions about execution, implementation and procurement.
- Increases public accountability on issues of public interest (schools, infrastructure, etc.).
- Stimulates and increases civic activity and public debate.
- Provides monitoring and assistance in controlling local borrowing.
- Allows comparison at national level and encourages competition at interlocal level.

Respecting world, regional and domestic experiences, as well as good practices, we can say that the general domains in which it can be used in order to improve the level of transparency of local government are as follows:

- Providing fully transparent and comprehensive information to the public, in terms of budgeted and factual revenues and expenditures at all stages of the budgeting process.
- Local authorities should be controlled internally and externally and audit reports should be made available to the public.
- The possibility for the local council and citizens to give their input at several stages of the budget process.
- The budget adopted at central and local level should contain detailed information (quantitative and qualitative) on transfers from other levels of power.
- The budget should contain narrative and quantitative information on the need/demand for services in relation to how the funds are distributed.

- The budget proposal and other budgeting documents which are publicly available should contain narrative information about the responsibilities of each level of power in terms of providing decentralized services.

3.3 Accountability - financial control, reporting and monitoring at the local level

Accountability is one of the most important elements of good governance of local self-government units, given the basic function of local public financial management in an efficient and effective way to provide the necessary public services to the citizens of the municipality in a timely manner. Citizens provide public revenues (fill the municipality's budget) and hence the report to be given by the local government to citizens about the activities implemented and the public services provided is the basis of good governance. It is very important to note that reporting management is not possible without transparent presentation of the overall work of local self-government units.

The accountability of the local government should be considered from several general aspects:

- From the point view of established accountability mechanisms, including the preparation of key budget documents (municipal budget, annual report, final account, quarterly reports, monthly reports, etc.) that introduce citizens and the public to the work of the ELS.
- From the point view of the mechanisms that allow citizens to view the effects of certain municipal programs, projects, activities and plans on all parties concerned and analyzed from several aspects.
- From the point view of advanced potential mechanisms that can further strengthen accountability in the operation of the ELS in the future. This will increase all citizens' awareness of the importance of certain financial indicators and the way in which budgeting will clearly allow monitoring of the results and outlets of each municipality program.

3.4 Openness and inclusion of affected parties in public financial management

Communication with citizens and the media is the basis for transparency and accountability in the operation of local self-government units, so it is very important to have successful methods and tools to establish that communication, while being successful and mutual.

The types of instruments available to municipalities for better and more successful public relations are: annual reports, open sessions of the municipal council, open reception day, web – portal of the municipality, communication with the media, press conferences, radio and television broadcasts with open telephone lines, newsletters.

In the context of local self-government units, communication and building relations with citizens and parties concerned raises the level of transparency and at the same time improves the level of understanding of the needs of the community. Communication encourages a culture of community participation and improves the image of the Council in the community. Municipal councils have a legal and political obligation to communicate with the local community.

Conclusion

Not always the effective management of the local self-government units ensures that all citizens will receive equal and fair treatment or that the municipality's resources will be managed sustainably and allocated towards improving the quality of life of the citizens. Therefore, it is necessary to implement the principles of "good governance", which will ensure equal and transparent access. Good governance implies managing the municipality's economic and social resources in such a way as to take into account the needs and problems of various parties concerned.

The legal framework establishes an obligation for the local self-government units to apply the key principles of good governance: transparency, accountability, participation and direct communication with citizens. Although good governance as an ideal is very difficult to be achieved, it is still necessary to take steps from the local self-government to bring our municipalities closer to this ideal.

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THE IMPACT OF MONETARY POLICY ON THE OPERATION OF SMALL AND MEDIUM-SIZED ENTERPRISES - ASSESSMENT USING A REGRESSION MODEL

Abstract

How effective and efficient are the instruments of the monetary policy in stimulating the work of small and medium-sized enterprises? What are the studies that examine the impact of monetary policy on the survival of small and medium-sized enterprises? These questions initiate that the focus of this research is precisely determining the impact of monetary policy on the operation of small and medium-sized enterprises, which impact will be evaluated by applying the regression model. Despite the extensive literature available to us, there is still a lack of specific literature based on the relationship between monetary policy and the performance of small and medium-sized enterprises. For this purpose, this study tries to evaluate the impact that loans given by banks, the money supply in circulation M2 and the mandatory reserve have on the operation of wholesale and retail trade in the Republic of North Macedonia. It also investigates the effect that interest rates on treasury bills and interest rates on loans to small and medium enterprises have on the performance of small and medium enterprises. The rest of the work paper refers to the literature review, research methodology, presentation of results and concluding observations.

Keywords: monetary policy, SME, models

JEL Classification: E43, E51, E52

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Introduction

Small and medium enterprises undoubtedly represent a vital segment of the economic structure of any country. The enormous importance of small and medium-sized enterprises for every economy is also reflected through the prism of employment, innovation, entrepreneurial spirit, participation in the growth of the gross domestic product, and they themselves have the potential to develop, become more numerous and significant, and receive crucial importance in modern economic trends. The largest part or 90.47% [1]of the active entities belong to the category of micro, small and medium enterprises, which confirms the enormous importance of this sector for the economy in the Republic of North Macedonia.

Monetary policy is one of the techniques through which the activity of small and medium-sized enterprises is stimulated. The basic objectives of the monetary policy are to maintain a certain rate of economic growth, to maintain a certain level of production and employment, to determine the stability of the general level of prices, to maintain a balanced balance of payments and a stable exchange rate. Very little is known and the literature describing the impact of monetary policy on small and medium-sized enterprises is very modest.

1. LITERATURE REVIEW

1.1. Classical quantitative theory

Of greatest importance, with the greatest dose of support, the quantity theory is considered, which from its inception, through each development stage, undergoes a series of changes and additions, and therefore there are several segments of it. I. Fisher gave a transactional variant of the quantitative theory, and thus he is considered the creator of the mathematical variant of the quantitative theory of money, i.e. the amount of money and the speed of money circulation is directly proportional to the price index and aggregate income. [2]According to him, the size and quantity of produced and realized goods is defined by production conditions, natural conditions, technology, capital accumulation. The speed of circulation is determined by the institutional conditions such as: the system of payments, the degree of synchronization, which in the long term are slowly changing.

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[1] Average participation of MSMEs in the total number of project entities in the period from 2015-2021, State Statistics Office

[2] I.Fisher,*The Purchasing Power of Money, its Determination and Relation to Credit, Interest and Crises*,1991, p.31-35

1.2.Keynesian theory of the economic cycle

This theory is based on the teaching of John Meinart Keynes showing the measures of economic policy in order to eliminate or neutralize cyclical fluctuations in the economy. Monetary factors, i.e. money and credits, are a very important instrument with which monetary authorities influence overall macroeconomic trends. According to this theory, inflation is always and everywhere a monetary phenomenon. E. Prasetyo and N. Cahyani[3] in their research apply Keynesian theory in Indonesia, especially in solving the issue of unemployment and poverty through the problem of enormous government spending, economic growth and human resource capacity and they were facing an approved thesis.

1.3.Monetry theory of the economic cycle

Monetarism as a theory considers changes in the quantity of money as a powerful and dominant factor that explains changes in nominal income. The monetarist theory advocates freedom in the operation of the market, an increased share of the private sector in the performance of economic activity and limited intervention of the state in the economy. According to this theory, the entire economic cycle is conditioned by the action of monetary factors, that is, by the mass of money in circulation, which is the dominant factor in explaining changes in nominal income, as well as the central banking system. Accordingly, monetary authorities concentrate on maintaining price stability so that excessive expansion of the money supply resulting in price inflation does not occur. According to the monetary theory of the economic cycle, monetary aggregates are key instruments for achieving the goals of monetary policy, due to the strong correlation they have with nominal income and the strong influence and control by the Central Bank.

1.4.Empirical review

The fact is that there are big differences between SME and large enterprises, which difference is also reflected in the influence that monetary policy has on them. It is particularly significant to emphasize the fact that SMEs are much more dependent on bank financing, unlike large companies. Hence it follows that the situation in the banking sector, as the main creditor of SMEs, is closely correlated with their survival.

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[3] E. Prasetyo and N. Cahyani,2022: *Investigating Keynesian Theory in Reducing Unemployment to the case of Indonesia*

And for their part, banks face difficulties in assessing the creditworthiness of SMEs. [4] The theoretical and empirical literature shows that younger and smaller companies are more likely to be credit limited. Unconventional monetary policy measures for small and medium enterprises are vital given their banking dependence and importance reflected in economic activity. J. Michel, M. David, S. Andrew, D.Vavanos particularly point out that the active use of direct instruments such as the reserve requirement, the provision of credit facilities, as well as the purchase of government securities have a much greater impact on the performance of SMEs.[5] An essential need for the survival of businesses and for smooth business activity are exactly credits.

2.   OVERVIEW AND METHODOLOGY

Through the example of Michael Oluwasegun Ogundipe[6] who investigated the impact of monetary policy on small and medium enterprises in Nigeria, this research examines the effect of monetary policy on small and medium enterprises in the Republic of North Macedonia. The assumption is that the monetary policy in the country, expressed through the selected set of independent variables, is a significant determinant of trade, as a significant part of the overall Macedonian economy.

Several monetary variables have been taken as indicators of the monetary policy, namely: the **money supply M2** as a monetary aggregate and the placement of **loans from banks and savings banks** as a factor through which the Central Bank implements the monetary policy and influences the overall economic movements in the country. In accordance with the fact that auctions of treasury bills appear as a basic instrument of the monetary policy of the Republic of North Macedonia, the **interest rate of treasury bills** is a reference interest rate of the NBRM, i.e. it represents an indicator of the direction in monetary policy, as well as a basis for establishing the same are taken as an independent variable in the model.

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[4] Smaghi B. Pesa L. - *Monetary policy, credit flows and small and medium-sized enterprises*, Member of the Executive Board of the ECB San Casciano Val di, 2009,pp. 12-16

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Table 1: Presentation of variables taken into the model

Variable	Description	Unit	Source
Trade	Wholesale and retail trade in motor vehicles and motorcycles, parts and accessories and their maintenance and repair	million denars	State Statistical Office
m2	Total money supply - cash in circulation, deposits with depository institutions, in denars, in foreign currency, in denars with a currency clause	million denars	NBRM
Reserve	Mandatory reserve of banks and savings banks	million denars	NBRM
IR-Treasury Bills	Monthly weighted interest rate on treasury bills	%	NBRM
IR-Loans	Interest rate on loans (denar without currency clause) to the corporate sector (non-financial institutions, public and others)	%	NBRM
Loans	Loans (in denars) given by other deposit institutions (banks and savings banks) to non-financial institutions (public and others), to households and other residents	million denars	NBRM

Source: Developed by the authors

The research refers to the Republic of North Macedonia, for the period from 2011 to 2022 and the data is on a quarterly basis (48 observations in total). The source of the data is the database of the National Bank of MK, as well as the database of the State Statistics Office. From data on the money supply in circulation M2 that are available on a monthly basis, in order to harmonize the frequencies, they are averaged to obtain them on a quarterly basis. The model was estimated using the ordinary least squares method, a commonly used technique in regression analysis in practice. The analysis basically consists of estimating a multiple linear regression model, and testing hypotheses related to the significance of its parameters.

In relation to the functional form of the model, the variables whose original values are expressed in absolute amounts (trade, credits, money supply and mandatory reserve), during the evaluation of the model, are taken in logarithmic form, while those that are expressed in percentages are taken in their original values (without logarithms).

A check was made regarding the stationarity of the time series, in order to determine whether they have a single root, that is, to determine the order of their integration. It was determined that all variables are non-stationary, that is, they are integrated from the first order, while in the model they are transformed using the first difference method, in order to avoid the problem of possible false regression. Through Augmentet Dickey Fuller's test to determine whether a single root is present in the sample of the time series, it is differentiated and with such a transformation the meaning of the variables also changes, i.e. they are no longer states, but an increment that in turn affects the interpretation of the results, that is, the coefficients.

2.1. Research Hypotheses

H01: The growth of small and medium enterprises in the Republic of North Macedonia is influenced by the money supply M2

H02: The mandatory reserve of banks and savings banks has an impact on the growth of small and medium enterprises

H03: The interest rate of bank loans significantly affects the growth of small and medium enterprises

H04: The interest rate on treasury bills significantly affects the growth of small and medium enterprises

H05: Loans from banks significantly affect the growth of small and medium enterprises

3. RESULTS

Before evaluating the initial model, the descriptive statistics (Table 2) and an overview of the correlation between the variables (Table 3) and a tabular display of stationarity of series, determined through Augmentet Dickey Fuller's test of stationarity, are attached. Based on the available set of data, it can be stated that in the period from the first quarter in 2011 until the last quarter in 2022, that is, with 48 observations, wholesale and retail trade in the Republic of North Macedonia

ranged between 4,607 million denars and 13,541 million denars, i.e. 7,199 million denars on average per quarter.

Table 2: Descriptive statistics of variables in initial model

Descriptive statistics of variables in the model						
	TRADE	M2	RESERVE	LOANS	IR_Loans	IR-Treasury Bills
Mean	7,438.08	285,881.80	21,826.61	428,224.10	5.93	2.94
Median	7,199.50	261,831.80	18,957.67	412,177.80	6.02	3.25
Maximum	13,541.00	438,398.40	32,606.67	636,363.30	8.72	4.75
Minimum	4,607.00	204,155.90	15,914.90	272,326.70	3.27	1.25
Std. Dev.	1,873.64	72,393.47	5,365.29	105,243.00	1.85	0.92
Skewness	1.29	0.73	0.69	0.30	-0.01	-0.53
Kurtosis	4.85	2.16	1.91	1.97	1.59	2.34
Jarque-Bera	20.14	5.68	6.15	2.81	4.00	3.10
Observations	48.00	48.00	48.00	48.00	48.00	48.00

Source: Developed by the authors

Graph 1: Graphic representation of wholesale and retail trade -
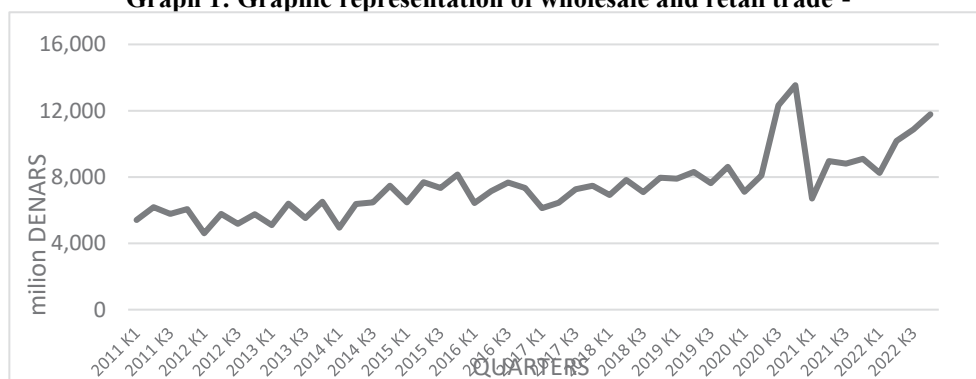
Source: Developed by the authors

From the attached graphic display of wholesale and retail trade, it can be seen that trade has a moderate increase in the analyzed period and a drastic increase in Quarter 3 and Quarter 4 of 2020 and Quarter 1 of 2021, which increase is primarily due to the low comparison basis which is the result of the strict measures taken to prevent the spread of Covid-19.

Apart from the comparative basis, the reason for the drastic growth of trade is considered to be favorable movements in the economy, which in turn are related to the stabilization of the epidemiological situation and the initiation of the immunization process in the country. In addition, a high degree of linear association between the independent variables can be observed from the displayed coefficients,

which can potentially be reflected as multicollinearity later when evaluating the models. Based on the calculated correlation coefficients, it can be seen that trade has a moderate and positive linear relationship with the reserve requirement, a pronounced positive linear relationship with the money supply M2 and credits, and a pronounced linear negative relationship with credit interest rates. Regarding the correlation of wholesale and retail trade with interest rates on treasury bills, there is a moderate negative relationship. For that reason, it is the differentiation of the series that represents one way to remove that possible multicollinearity from the model.

Table 3: Tabular overview of correlation of variables

Correlation of variables						
	TRADE	M2	RESERVE	LOANS	IR_Loans	IR- Treasury Bills
TRADE	1.00	0.78	0.65	0.80	-0.76	-0.49
M2	0.78	1.00	0.91	0.98	-0.94	-0.72
RESERVE	0.65	0.91	1.00	0.89	-0.92	-0.90
LOANS	0.80	0.98	0.89	1.00	-0.98	-0.70
IR_Loans	-0.76	-0.94	-0.92	-0.98	1.00	0.78
IR_Treasury Bills	-0.49	-0.72	-0.90	-0.70	0.78	1.00

Source: Developed by the authors

Regarding multicollinearity, although there is a certain correlation between the independent variables in the original form, which is shown in table 3, which could potentially be a source of multicollinearity in the model, it has been removed by differentiating the variables. Namely, all variance inflation factors in the model are below the limit value of 5.

The starting model (Final-0) was evaluated, which in mathematical form can be expressed as:

$$\Delta \log(\textbf{\textit{Trade}}) = \boldsymbol{\beta_0} + \boldsymbol{\beta_1} \Delta \log(\textbf{\textit{Loans}}) + \boldsymbol{\beta_2} \Delta \log(\textbf{\textit{M2}}) + \boldsymbol{\beta_3} \Delta \log(\textbf{\textit{Reserve}}) \qquad \textit{Equation}$$
$$+ \boldsymbol{\beta_4} \Delta KS_{loans} + \boldsymbol{\beta_5} \Delta KS_{\text{Treasury Bills}} \qquad \qquad \textit{(1)}$$

During the evaluation of this model, it was determined that the interest rates on treasury bills are statistically insignificant, while the rest of the independent variables are statistically significant at the significance level of 0.1 and 0.05. In addition, it was determined that the model has a low adaptability (adjusted coefficient of determination equal to 0.33), that is, only about 33% of the variations in the dependent variable are explained with the help of the given independent variables.

Also, most of the assumptions of the classical linear regression model are violated, such as the assumption of correct functional form of the model (Reset test), the assumption of heteroskedasticity (White test), and the assumption of normal distribution of residuals (Jarque-Bera test)). On the other hand, it is necessary to take into account that differentiating the series causes another potential problem, which is autocorrelation of the first order. Namely, by differentiating the variables in the model, the random error becomes a first-order autoregressive process.[7]

Although it is not significantly expressed in the model, it can be seen through the Durbin-Watson statistic, which generally falls in the indecision zone, that is, it cannot be confidently claimed that in the model has no first-order autocorrelation. In order to overcome this problem, a correction was made to the standard errors of the grades in the model (robust standard errors), using the HAC (Newy-West) method. [8]At first, this correction of standard errors led to an improvement in the statistical significance of total loans and money supply.

In addition, if we look at the movement of the residuals from the model, we can see some structural disruption in the corona period, where we have an increase in trade during that period (unusually high growth rates), as well as in the first quarter of 2021, when observed a significant sharp decline.

Picture 1: Graphical representation of model residual
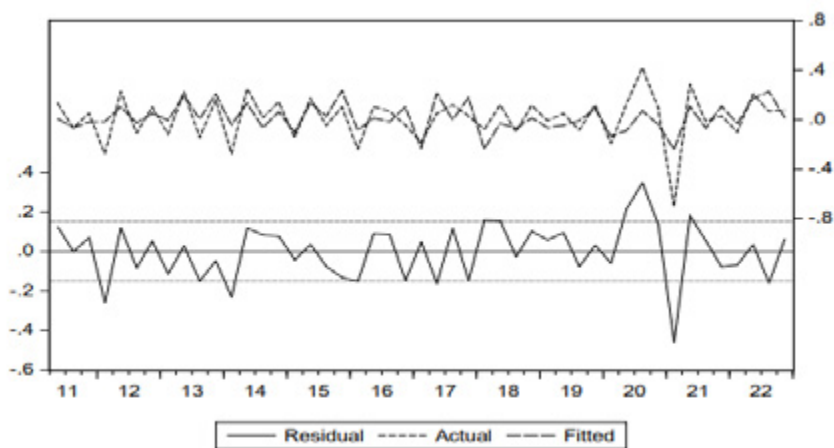
Source: Developed by the authors

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[7] Bucevska V.- *Econometrics and application of Eviews*, Skopje,2006,pp. 321-350
[8] Newey, Whitney K., and Kenneth D. West."*A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix*." Econometrica, 1987, pp:703–708

Taking into account all the above, in the starting model (equation 1), in addition to the correction of standard errors, two artificial variables were added, one covering the entire period of the corona crisis (from the second quarter of 2020 to the first quarter of 2021), as and an additional dummy variable for the first quarter of 2021 only, in order to isolate that structural decline in the trade growth rate. Mathematically, this model could be written as follows:

$$\Delta \log(Trade) = \beta_0 + \beta_1 \Delta \log(Loans) + \beta_2 \Delta \log(M2)$$
$$+ \beta_3 \Delta \log(Reserva) + \beta_4 \Delta KS_{loans}$$
$$+ \beta_5 \Delta KS_{Treasury\ Bills} + \beta_6 DUM_{Covid} + \beta_7 DUM_{2021Q1}$$

Equation (2)

In this way, the overall significance and adaptability of the model is significantly improved (the adaptability is over 60%), while it fully satisfies all the assumptions.

The results of the evaluated models are shown in Table 4.

Table 4: Evaluation of the regression model

Dependent Variable: DLOG(TRADE)				
Independent variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	-0.0628	-0.0440	-0.0477	-0.0253
DLOG(LOANS)	4.2214 *	4.2619 **	5.1493 ***	5.5825 ***
DLOG(M2)	-2.7371 *	-2.0552	-3.2150 ***	-3.4081 ***
DLOG(RESERVE)	-1.1453 **	-0.8966 *	-0.8639 **	-1.0361 **
D(IR_LOANS)	-0.5258 **	-0.3302 *	-0.2260	
D(IR_TREASURY)	0.1237	0.0825	0.0878	
DUM_COVID		-0.5412 ***	0.2610 ***	0.2670 ***
DUM_2021Q1			-0.7783 ***	-0.8232 ***
R-squared	0.40	0.56	0.67	0.65
Adjusted R-squared	0.33	0.49	0.61	0.61
F-statistic	5.49 ***	8.48 ***	11.25 ***	15.22 ***
Durbin-Watson stat	2.33	2.22	2.54	2.55
Ramsey RESET test (1 fitted term)	4.84 **	0.38	0.66	1.18
Jarque-Bera	4.93 *	0.36	1.13	0.74
White test (cross terms)	31.06 *	23.18	16.73	11.24
*Note: *, **, and *** mean statistically significant coefficient on 0.1, 0.05, and 0.01 significance level respectively.*				

Source: Developed by the authors

As can be seen from what is shown, interest rates on loans and treasury bills are statistically insignificant determinants of trade in the Republic of Macedonia, even at a significance level of 0.1, compared to reserve requirements, money supply and total loans. Therefore, these two variables are excluded from the evaluation of the final model. In the final model, but also in the previous estimates, total credits have a positive impact on trade, while the mandatory reserve and the money supply have a negative impact. According to the results of the final model, an increase in total credit growth by 1% would cause an average increase in trade growth by about 5.85%, in case that everything else remains unchanged. Specifically, the 95% confidence interval for this parameter indicates that the increase in trade growth would range between 2.01-9.15%. Contrary to this, an increase in the growth of the money supply in circulation, i.e. the mandatory reserve by 1%, everything else unchanged, would lead to an average decrease in the growth of trade of 3.4%, i.e. 1.04% respectively. Similarly as before, the 95% interval for the money supply is from -5.75% to -1.07%, while for the reserve requirement it is from -1.81 to -0.26.

In the period of the corona crisis, the model shows 26.7% higher trade growth rates on average, compared to the period of economic stability, while in the first quarter of 2021, we have an average drop in the trade growth rate by 82, 3%. From the point of view of the statistical significance of the model, the conducted diagnostic tests show that it fully meets the assumptions of the classic linear regression model. Namely, with the adjustments made to the starting model, the problems with the functional form of the model, heteroskedasticity and the normal distribution of the residuals were solved. The final evaluated model has a high statistical significance (F-statistic = 15.22) and a adaptability of over 60%. However, as certain limitations could be highlighted using exclusively monetary independent variables in the model, as well as the presence of certain structural disturbances as a consequence of the corona crisis and other global flows towards the end of the period, which require appropriate quantification with the help of artificial variables.

Conclusion

According to the obtained results, it can be concluded that the decamonetary policy has an impact on trade, primarily expressed through crediting, the mandatory reserve and the money supply. In order to maintain a satisfactory level of wholesale and retail trade, the interaction of monetary factors is necessary. According to the constructed plausible model 4, the interest rate of bank loans and the interest rate of treasury bills are statistically insignificant variables for the growth of small and medium enterprises, thus hypothesis 3 and hypothesis 4 are rejected. On the other hand, hypothesis 1, hypothesis 2 and hypothesis 5 are accepted and supported, i.e. the growth of small and medium-sized enterprises in the Republic of North Macedonia is influenced by the money supply M2, the mandatory reserve of banks and savings banks that has an impact on the growth of small and medium-sized enterprises and loans from banks significantly affect the growth of small and medium-sized enterprises.

Considering the importance of SMEs as drivers of inclusive economic growth in the Republic of North Macedonia, it is necessary to provide a favorable business environment that will stimulate their operations, entrepreneurship and investments. Compared to other European countries, the financing of SMEs by borrowing from a bank is at a relatively low level, due to collateral requirements, high interest rates, complicated application procedures, etc. According to the fact that the Central Bank is responsible for the implementation of the monetary policy, all with the aim of stabilizing the economy, through the instruments of the monetary policy, the Central Bank increased the supply of money in the analyzed period, which increased the credit potential of the commercial banks, and according they become more accessible to small and medium-sized enterprises, which for their part always have the necessity of providing finance for their operations. The increase in the mandatory reserve ratio by the Central Bank reduces the credit potential of commercial banks and thereby reduces the money supply in circulation, thus negatively affecting the operations of small and medium-sized enterprises.

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MILICA MILOSHESKA GAVROVSKA[1]

MONETARY POLICY TIGHTENING IN THE REPUBLIC OF NORTH MACEDONIA SEEN THROUGH THE FINANCING OF HOUSEHOLDS AND NON-FINANCIAL COMPANIES AND BANK PROFITABILITY

Abstract: These are difficult times for central bankers. The surge of global inflation in 2021 has caught many central banks by surprise.

This paper analyzes the implications of the effects of the conduct of monetary policy in the RN Macedonia on the financing conditions faced by households and non-financial companies compared to the profitability of other financial institutions.

The findings of the research show a stagnation in the borrowing of households and non-financial companies, as well as an increase in savings primarily as a result of caution. Furthermore, the research reveals that the rest of the financial institutions, despite such a situation and negative volume effect, record an increase in profitability. This is mainly due to the structure of the Macedonian banking system, where placements in treasury bills and deposits in NBRNM dominate, and the realized interest income from non-resident financial companies, where placements in foreign banks dominate, also has an impact.

The inflation is decreasing, but it is still at a high level and far from the target inflation, and the uncertainty from the external environment still exists. High inflation makes things worse for everyone, so it is necessary to assess the risks of it becoming embedded.

Keywords: Inflation; Interest Rates; Banks; Household; Firms

JEL Classification: E31; E43; G21; H31; H32

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Introduction

Decades of moderate price increases have suddenly come to an end through a unique combination of crises: the global pandemic, the energy crisis and the Russian invasion of Ukraine. The pandemic has driven higher prices for energy, metals and other globally traded commodities. The sharp increase in wholesale energy and commodity prices has increased not only energy and food inflation, but also – indirectly – core inflation of goods and services. The price increase was reinforced by the Russian invasion of Ukraine. The growth of these prices is an important source of the high level of consumer price inflation. High energy prices and other input costs created higher costs for businesses, which in turn increased selling prices.

High inflation adversely affects firms and households in a variety of ways, including by eroding real incomes and widening inequality.

In such challenging times, central banks have taken a series of measures, no matter how difficult they were, in order to ensure a reduction in inflation, that is, price stability, because the consequences if too high inflation took root would be much worse for everyone. They responded by significantly tightening their stance on monetary policy, which partly affects the real economy through its effects on financial institutions. This naturally constrained demand through increased borrowing costs and lower credit flows to the real economy. The negative impact on economic activity and growth is a standard feature of a tightening, but it still deserves close monitoring.

Some crisis effects – high inflation, disruptions in supply chains, higher trade barriers – can last much longer or intensify. That could cause macroeconomic instability around the world, especially in emerging markets.

The monetary policy tightening is conditioned by the need for further stabilization of inflation and inflation expectations on a more permanent basis. While financial conditions have already tightened significantly, the magnitude and timing of the impact on the real economy is more difficult to assess. Distributional effects can be expected to be modest.

In the following, we will consider how the measures of the National Bank of the Republic of North Macedonia affected households, non-financial companies and other financial institutions in the Republic of North Macedonia. The paper is structured as follows: in the first part, previous discussions on the topic are reviewed, in the second part, the measures of the NBRNM are analyzed, in the third part, the effects of the tight monetary policy on non-financial institutions and households are observed, in the fourth part, the impact of the decisions is analyzed of NBRSM on the profitability of banks, and finally, follow concluding observations.

1. Literature review

After a long period of low interest rates and low inflation, the global economy is entering a phase characterized by high inflation and high levels of public and private debt.

Monetary policy is a responsibility of the central bank. The primary responsibility of monetary policy is to contribute to nominal stability. Nominal stability is important for developments in the real economy and is the most valuable contribution that monetary policy can make to economic growth[2]. Both fiscal and monetary policy have played a role when an economic shock occurs. Recent research has shown that the stance of monetary policy can affect financial stability. The policy rate of the central bank has a direct impact on the credits supply by affecting the costs of bank refinancing[3]. The pandemic and war have brought new challenges to global central banks in the coming years[4].

High inflation caused an immediate reaction by central banks through an increase in interest rates. According to Fabio Panetta, we need to adapt our policies to the overlapping effects of shocks, to geopolitical developments, to the risk of financial amplification and to spillovers from other jurisdictions[5]. The remarkable recovery in demand and the changed dynamics of the commodity and labor markets contributed to the wrong estimates[6]. The tightening of monetary policy has materialized in financial terms, but its quantitative impact on the real economy is uncertain[7].

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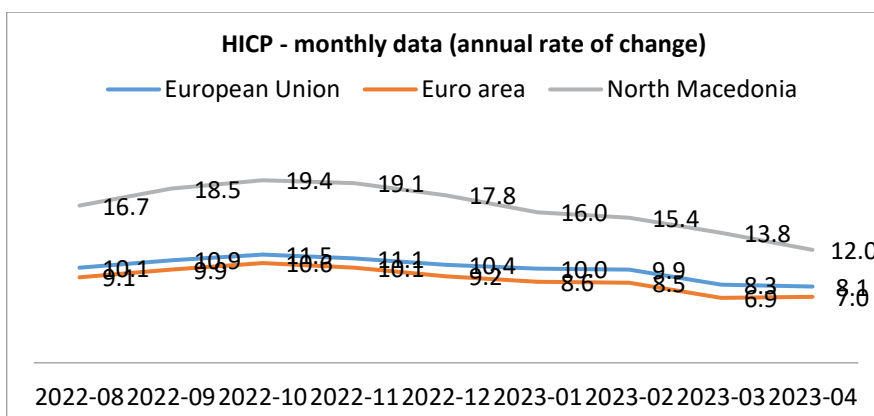
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2. Monetary policy tightening, NBRNM measures

In 2022, inflation reached historically high levels in almost all economies, and especially in less developed economies. World inflation accelerated to nearly 9%, which is more than double the average of the previous two decades (3.9%). In the region of Central and Southeastern Europe, the average inflation reached 13.3%, and in our country it reached 14.2%, against 9% in the European Union[8].

Figure 1. Inflation rate movements in RN Macedonia, Eurozone and EU in 2022

HICP - monthly data (annual rate of change)
— European Union — Euro area — North Macedonia

| 2022-08 | 2022-09 | 2022-10 | 2022-11 | 2022-12 | 2023-01 | 2023-02 | 2023-03 | 2023-04 |

North Macedonia: 16.7, 18.5, 19.4, 19.1, 17.8, 16.0, 15.4, 13.8, 12.0
European Union: 10.1, 10.9, 11.5, 11.1, 10.4, 10.0, 9.9, 8.3, 8.1
Euro area: 9.1, 9.9, 10.6, 10.1, 9.2, 8.6, 8.5, 6.9, 7.0

Source: Eurostat, HICP - monthly data (annual rate of change)

In response to the large increase in inflation, central banks have taken various measures to reduce it. The results of the measures taken for different economies had different effects.

After more than a decade of extremely favorable monetary policy to deal with the "low prices" conundrum, suddenly the NBRNM changed gears in order to deal with multi-decade high inflation. In response to the large increase in inflation from 2021, the NBRNM from the end of 2021 began active liquidity management through interventions in the foreign exchange market, and from April 2022 through an increase in interest rates. Namely, during this period, the basic interest rate was increased several times, up to the level of 6%.

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[8] NBRNM Annual Report for 2022, Retrieved July 10, 2023. https://www.nbrm.mk

At the same time, interest rates on overnight and seven-day deposits increased, up to the level of 3.40% and 3.45%, respectively. The monetary policy was also strengthened by the several previously made changes to the Bank's reserve requirement ratio instrument, through which the denarization process (growth of savings in denars) and green financing is encouraged, all for the purpose of supporting stability in the economy. Monetary measures were also strengthened by additional systemic measures, i.e. the introduction of a countercyclical protective layer of capital, as well as macroprudential measures related to the quality of credit demand, in order to strengthen the resilience of the banking system (NBRNM Annual Report for 2022).

Figure 2. Interest rate on Central Bank bills
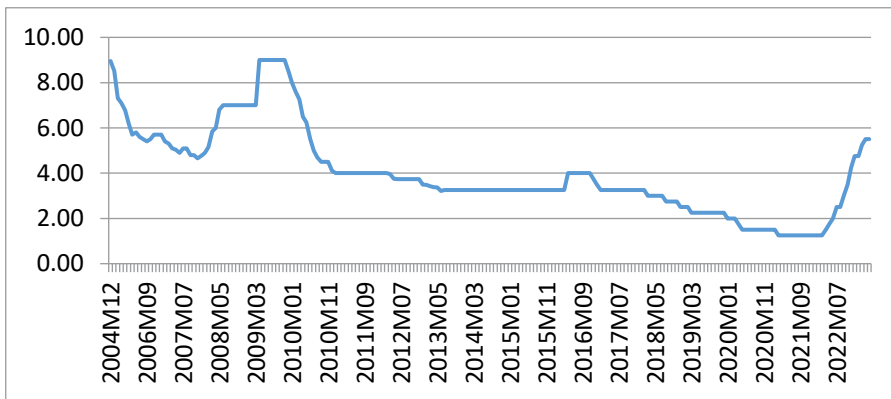
Source: NBRNM, Deposits and Lending Interest Rates of the NBRNM

The monetary policy tightening is conditioned by the need for further stabilization of inflation and inflation expectations on a more permanent basis, as well as the intention to return inflation to the medium-term target of 2 percent. As a result of the measures taken, the monetary policy, together with the measures of other policy makers, as well as the stabilization of the prices of primary products, a gradual slowdown of the total inflation has already been observed since November 2022, and the base inflation has been on a downward path since February.

According to the latest data taken from trading economics[9], the inflation rate in Macedonia in June 2023 is 9.30 (May 11.30), and the base inflation is 9.30 (May 11.22); the inflation rate in the European Union in June 2023 is 7.10 (May 8.10), and the base inflation is 6.13 (May 6.45); the inflation rate in the Eurozone in June 2023 is 5.50 (May 6.10), and the base inflation is 5.40 (May 5.30).

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[9] Trading economics indicators, Retrieved July 09, 2023. https://tradingeconomics.com/

Inflation is decreasing, but it is still at a high level and far from the target inflation, and the uncertainty from the external environment still exists. The economy's supply capacity is set to recover from pandemic-related damage and a war-enhanced energy shock, with monetary policy tightening ensuring demand is better matched to supply.

3. Monetary policy tightening and the financing of households and non-financial companies

It is strongly in the interests of the enterprise sector and households that inflation is low and stable over the medium term, since high and volatile inflation disrupts business operations by making it more difficult to execute basic tasks, including the setting of prices, the management of costs and the development of medium-term financial and operational plans[10].

During this tightening cycle, households and businesses not only have to contend with an inflationary shock, but also with the impact of an upward shift in interest rates by banks.

Higher interest rates affect households and businesses through multiple channels. At the macroeconomic level, tight monetary policy reduces consumption and investment, reducing demand for consumer and business products. All else being equal, it also causes the currency to appreciate, which is exporters challenge.

There are basically three ways of financing non-financial companies, through: undistributed (accumulated) profits, lending (debt capital) or equity capital. Unlike non-financial companies, household financing is through: wages and other sources, savings or credit. Households can allocate their assets - income generated from wages and other sources - to financial assets such as bank deposits, stocks and other securities, or to non-financial assets such as houses, land and other fixed assets.

It is clear that stricter financing conditions will have a greater impact on firms that have a high dependence on external sources of financing, as well as on households that are inclined to credit.
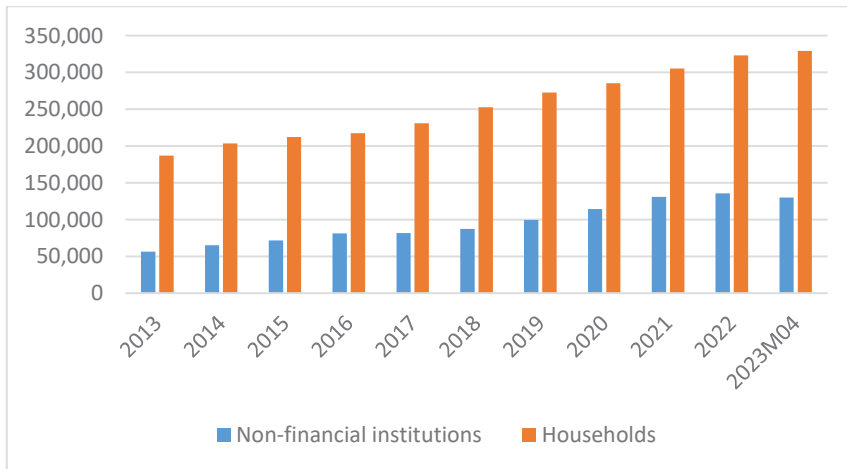
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[10] Lane, P.R (2023, April). Monetary policy tightening and the financing of firms. SPEECH at the Enterprise Ireland Summit 2023, Dublin, Retrieved June 10, 2023. https://www.ecb.europa.eu/press/key/date/2023/html/ecb.sp230419

In terms of internal financing, higher interest rates make it more attractive for firms to place retained earnings in deposits or interest-bearing financial instruments, rather than using accumulated funds to finance investments and working capital.

Higher interest rates make it more attractive for households to save for investment purposes, or for households with higher incomes, who have a relatively low propensity to consume. In addition, the uncertain environment influences households to save out of caution. This was the case during the recent crises: the Covid-19 pandemic, the energy crisis and the Russian invasion of Ukraine,when the substantial stock of excess savings was created (Fig.3.1).

Figure 3. Non-financial institutions (corporate sector) and households (individuals and self-employed persons) deposits, in millions of denars

The banks balance sheets showed an increase in deposits. The level of savings has increased significantly in the country. Households are a surplus item for the banking sector, as the level of savings significantly exceeds loans. Changes in the rate of growth of deposits in the "household" segment are influenced by several factors, such as: inflationary pressures, uncertainty, inflows based on private transfers, the trend of financial markets (i.e. stock exchanges); which directly affect the disposable income of households, and thus increase or decrease the propensity to save.

From a macro-economic viewpoint, households are typically net lenders, i.e. they have a positive net lending/net borrowing, and thus add each year to their net financial wealth[11].

Figure 4. Total loans approved to non-financial institutions and the household sector, and their share in total loans approved by deposit institutions (banks and savings banks)
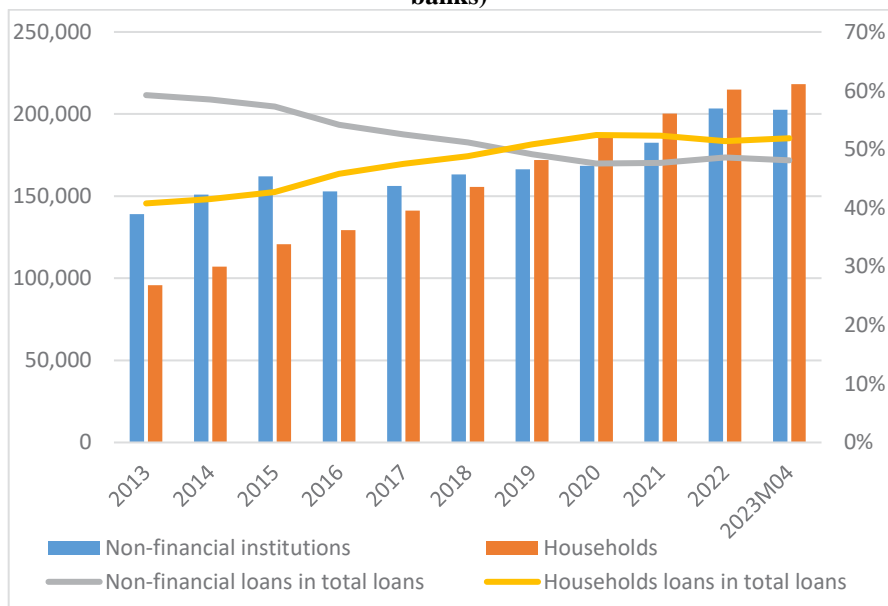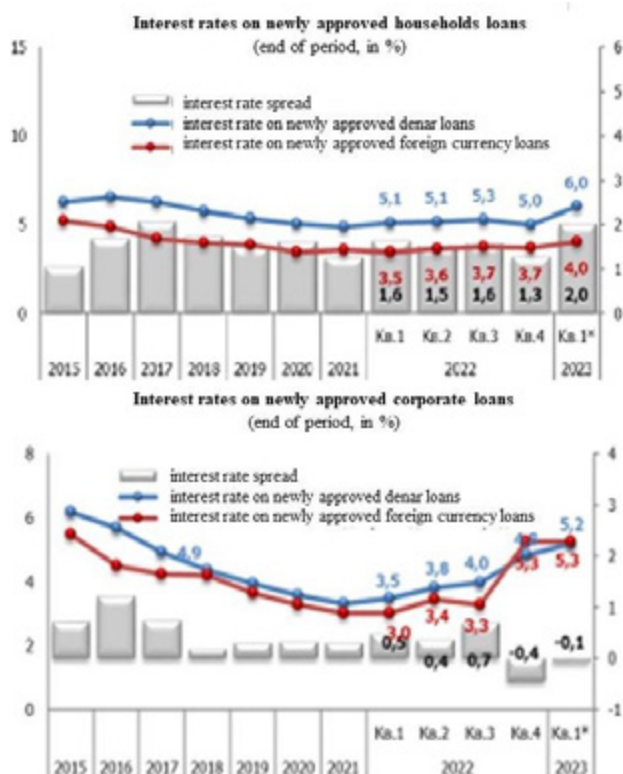

Source: NBRNM, Statistics, Monetary and Interest Rate Statistics, Balance Sheets and Reviews of Depository Institutions

The costs of firms and households financing from banks have started to rise up in the second half of 2022, although the NBRNM started monetary policy tightening at the end of 2021. The strongest and fastest pace is reached at the beginning of 2023:

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[11] Van de Ven, P. & Fano, D (2017). *Understanding Financial Accounts*. OECD

Figure 5. Interest rates on newly approved loans (denar and foreign currency) to households and firms, in % per year

Source: NBRNM, Statistics, Monetary and interest rate statistics, Interest rate statistics

Increased bank funding costs have been significantly passed on to lending rates applied to new loans. This reflects the fact that banks price new loans based on their own funding costs plus a margin, depending on, among other factors, the borrower's risk characteristics. In addition, higher interest rates are usually associated with falling asset prices. This reduces the value of the collateral, leading to a further increase in interest rates upwards, over and above those associated with higher bank funding costs. In addition, banks pass on higher funding costs to outstanding debt when variable rate debt is rerated.

Banks can also limit the loans supply by applying stricter credit approval criteria.

This is the sharpest tightening of credit standards since the crisis of 2009. Among the key factors driving this tightening were the increases in risks associated with the reduction of the economic outlook during 2022 and the deterioration of the creditworthiness of borrowers, as well as the lower risk tolerance by the banks.

As tighter monetary policy increases banks' funding costs and negatively affects their balance sheets, it also reduces their willingness to lend.

Historically, such a tightening of credit standards is usually followed by a reduction in lending a few quarters later. And indeed, in the case of the RNM banking network, bank loans to firms are slowing down from the third quarter of 2022 (Tab. 3.1 and Tab. 3.2). **The first quarter of 2023 the total flow of bank loans for companies in RN Macedonia is negative, which shows that more loans are due or returned than are approved.**

Table 1. Loans to households

	2021				2022				2023
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
quarterly changes, во %									
Total loans to households	1,6	2,8	1,7	1,6	1,6	2,6	1,5	1,4	1,2
contribution to the quarterly change in total loans in p.p.									
Denar loans	1,0	1,3	1,0	0,9	1,0	1,0	0,5	0,1	0,3
Foreign currency loans	0,5	1,4	0,6	0,6	0,6	1,3	1,0	1,3	0,8
Short-term loans	0,2	0,1	0,0	0,2	0,2	0,1	0,0	-0,2	0,2
Long-term loans	1,1	2,7	1,6	2,0	1,3	2,4	1,5	1,9	1,0

Source: NBRNM

Table 2. Loans to firms

|	2021				2022				2023
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
quarterly changes, во %									
Total loans to firms	0,8	2,3	0,6	4,9	3,7	2,8	0,9	3,9	-1,3
contribution to the quarterly change in total loans in p.p.									
Denar loans	0,2	2,3	0,3	4,1	1,7	0,9	-1,0	2,4	-1,1
Foreign currency loans	0,6	0,1	0,2	0,8	2,0	1,8	1,8	1,5	-0,2
Short-term loans	0,9	1,1	-0,7	1,9	2,7	0,9	-0,3	1,3	-1,4
Long-term loans	-0,1	1,1	1,5	3,3	1,3	1,5	1,0	3,1	0,2

Source: NBRNM

The monetary policy tightening had a direct impact on the level of lending to the sectors. Quarterly changes in lending indicate reduced growth rates of newly approved loans, and even negative rates in the corporate sector (Tab. 3.1 and Tab. 3.2).

As lending costs rose and banks tightened approval requirements, bank lending slowed. Bank loans as a share of GDP are declining (2021: 54%; 2022: 53%; 2023M04: 47%), and market expectations are for further declines this year. There are several factors that drive this. First, the current tightening occurred in response to negative aggregate supply shocks. Second, the current contraction in credit supply is stronger than usual, mainly reflecting increased risk perceptions on the banking side. Third, the pace and size of the current rate hikes are remarkable. This could mean greater sensitivity of borrowing to rising rates at the current moment.

At the beginning of 2023, banks' interest rates increased further, reflecting the increase in the reference interest rate of the NBRNM. Bank loans to firms and households also eased further amid higher interest rates, weaker demand and tighter credit standards.

Figure 6. Interest rates on newly received deposits (denar and foreign currency) of households and firms, in % per year
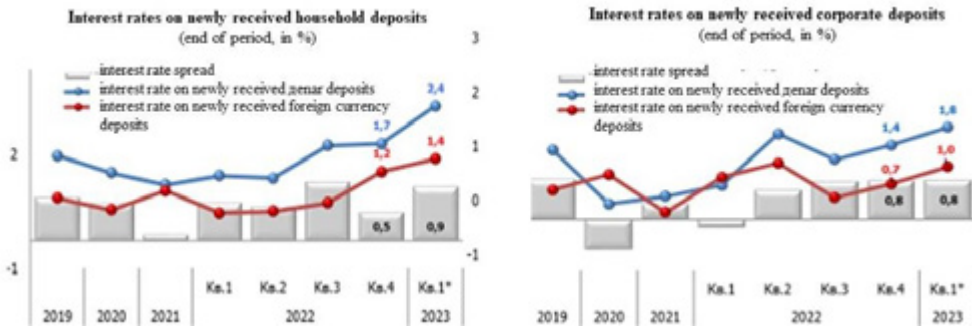

Source: NBRNM, Statistics, Monetary and interest rate statistics, Interest rate statistics

Rates on newly received deposits rose from 1.34% in December 2022 to 2.04% in March 2023.

4. The impact of the key interest rates decisions of NBRNM on banks profitability

The positive impact of bank interest margins has been transferred to a high share of banks in the Republic of North Macedonia that report the positive impact of the increase in NBRNM rates on their net interest income in the past period.

Figure 7. Data and indicators for the banking system of the RN Macedonia
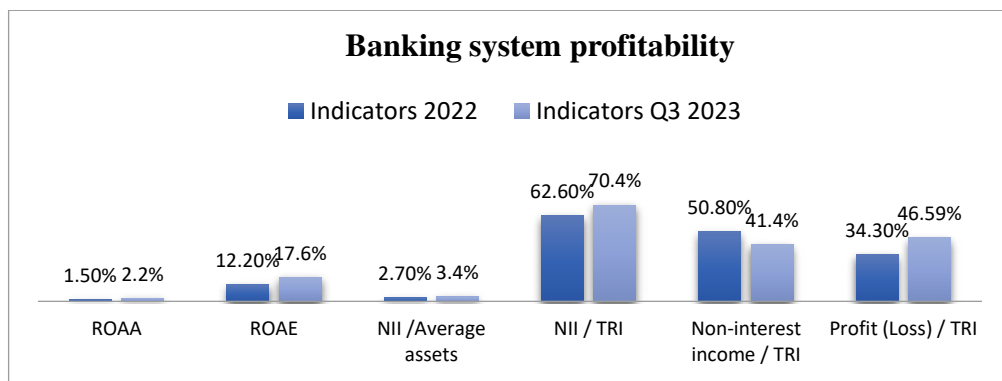
Source: NBRNM, Supervision, Data and indicators for the banking system of the Republic of North Macedonia

Legend of abbreviations:
ROAA - Return on average assets
ROAE - Return on Average Equity
NII - Net interest income
TRI - Total regular income

Net interest income, which represents a basic component in the formation of total operating income, recorded an increase in the first quarter of 2023 of 42.90% compared to the same period last year, which is due to the continuous increase in the basic interest rate of the National bank and on the interest rates of the foreign financial markets, combined with the structure of the banks' assets.

Table 3. Indicators of the profitability of the banking sector

Indicators	Banking sector					
	2018	2019	2020	2021	2022	Q3 2023
Return on average assets (ROAA)	1,73%	1,27%	1,30%	1,50%	1,50%	2,2%
Return on Average Equity (ROAE)	16,00%	11,66%	11,30%	12,90%	12,20%	17,6%
Operating expenses / Total regular income (Cost-to-income)	46,27%	50,09%	48,20%	47,40%	47,80%	43,2%
Employee expenses / Total regular income	20,52%	22,33%	21,40%	20,50%	20,40%	18,0%
Employee expenses / Operating expenses	44,35%	44,58%	44,50%	43,20%	42,60%	41,6%
Value adjustment for financial and non-financial assets / Net interest income	24,72%	27,19%	30,10%	24,60%	23,90%	14,1%
Net Interest Income /Average Assets	3,19%	2,85%	2,70%	2,60%	2,70%	3,4%
Net interest income /Total regular income	62,88%	64,62%	62,60%	59,40%	62,60%	70,4%
Net Interest Income / Operating Expenses	136,2%	129,1%	129,8%	125,3%	131,0%	162,9%
Non-interest income/Total regular income	45,82%	46,25%	47,60%	52,90%	50,80%	41,4%
Profit (loss) from operations / Total regular income	34,15%	28,77%	30,10%	34,70%	34,30%	46.59%

Source: NBRNM

The increase in banks' net interest income (net percentage of 3.4% in the first quarter of 2023 compared to 2.7% in 2022), mainly led to a positive effect on their overall profitability (net percentage of 46.59% in first quarter of 2023 compared to 34.30% in 2022).

The structure of the RNM banking system is dominated by placements in treasury bills and deposits in the NBRNM, while increases in the interest rates of the NBRNM have a positive and significant impact on the increase in interest income earned by financial companies. In addition, interest income from non-resident financial companies is also increasing, where placements in foreign banks dominate.

This is because in the first quarter of last year the Euribor interest rate was around 0% or negative, and this year it reached around 3.5% to 4%.

On treasury bills, interest rates rose from 1.25% to the latest 5.75%, and on treasury bills from 0.40% to 3.70%, or 5.25% on two-year government bonds, up to 7.14 % at the last Eurobond.

At the same time, the impact of NBRNM interest rate decisions on volume was negative, consistent with a slowdown in credit growth as noted elsewhere in the survey.

As a result of such movements, the realized profit of the banking system in the first quarter of 2023 reached 3.8 billion denars, which represents an increase of 44.29% compared to the same period in 2022 (2.6 billion denars).

This direct evidence from banks on the impact of NBRNM rate increases on their financial condition is consistent with changes in the components of bank profitability through the fourth quarter of 2022. Indicators up to the first quarter of 2023 suggest a continuation of these developments, i.e. a similar positive impact of NBRNM interest rate decisions on their net interest margins, which will support their net interest income and overall profitability despite the negative volume effect.

Conclusion

We are still going through a series of global shocks that are disrupting economies around the world. In just three years we have seen a pandemic, severe supply chain disruptions, war, an energy crisis and most recently tensions in the banking markets. The rising prices were a surprise from the perspective of pre-crisis policies, especially for advanced economies. Most economists missed the rise in inflation

There are no simple solutions to these complex problems, so central banks have taken a series of measures. The response of the Central Bank of RN Macedonia in efforts to reduce inflation was the same as central banks around the world, tightening monetary policies through the increase of interest rates, hence an indirect impact on the real economy. Tight monetary policy reduced consumption and investment, reducing demand for consumer and business products. Higher interest rates were a necessary step in transferring financing conditions to firms and households.

In such conditions, banks enjoy increased income due to increased interest rates and cheap deposits. The first quarter of 2023 was an exceptional quarter for the banking sector, with record revenue growth.

It is important to note that with the tightening of the monetary policy, inflation is decreasing, but it is still at a high level and far from the target inflation, and the uncertainty from the external environment still exists. The economy's supply-side capacity is set to recover from pandemic-related damage and a war-enhanced energy shock, with monetary policy tightening ensuring demand is better matched to supply.

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PRICE STABILITY TARGET OF THE CENTRAL BANK AND ITS INTEREST POLICY
CASE STUDY OF NORTH MACEDONIA

Abstract

Continuous increase in the general level of prices or excessive volatility are among the most important problems of the economy. If the price stability is considered as the main objective in monetary policy, first of all, the factors causing instability in the general level of prices should be identified and then appropriate monetary policy tools should be used.

The main objective of the Central Bank of North Macedonia, set by law, is to ensure the price stability. To achieve the final target, the Central Bank sets the intermediate target of monetary policy. The Central Bank since January 2002 has been implementing a fixed exchange rate strategy against the Euro. Therefore, ensuring the stability of the exchange rate is one of the intermediate objectives of monetary policy. While the effects of the COVID 19 pandemic were overcome in 2021, the global food crisis that broke out in 2022 affected the whole world, while the North Macedonian Economy experienced high price increases that have not been seen for many years. As a matter of fact, the country reached double-digit inflation in 2022. Inflationary pressures in the economy are mainly caused by the prices of products in which food and energy have a high share in the consumption basket. Due to the increase in prices, the Central Bank of North Macedonia has gradually narrowed its monetary policy since 2022. As a contractionary monetary policy instrument, additional measures were taken in compulsory reserves, particularly in interest rates. In order to ensure the price stability, the monetary policies implemented should be supported by fiscal policies. The government's taking parallel steps with the central bank in this regard will reduce the pressure on prices.

Keywords: Price stability, inflation, monetary policy, central bank

Jel Clasification: E31, E40, E50
Introduction

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Nowadays, Governments and Central Banks determine price stability as the main target of their Economic Policies. The countries that implement price stability aim at changes that will not be affected by minor price movements and that this can be sustained.

The main objective of the Central Bank of North Macedonia, set by law, is to ensure price stability. To achieve the final target, the Central Bank sets the intermediate target of Monetary Policy. Thus, from April 1992 to September 1995, the Central ank implemented the strategy of targeting the M1 money supply as an "Intermediate Target" of Monetary Policy. Since October 1995, the central bank has been implementing a fixed exchange rate strategy of the Macedonian denar against the German mark, and from January 2002 against the Euro. Therefore, ensuring the stability of the exchange rate is one of the intermediate objectives of Monetary Policy[1].

The beginning of the Russia-Ukraine war in February 2022 directly affected many countries, especially the European continent. As a result of the embargo and the closure of the grain corridor, the global food crisis has affected the whole world, while high price increases have been experienced in the economy of North Macedonia for many years. As a matter of fact, the country reached double-digit inflation in 2022.

Interest rates in the country, which have been on a downward trend in recent years, have recently been fixed at 1.25%. As a result of the increase in prices and high inflationary expectations, the central bank increased interest rates after 6 years in April 2022. The interest rate hike has been accepted as an indication that the central bank has adopted a contractionary Monetary Policy to suppress inflation and that interest rates will increase gradually. As a matter of fact, when we came to June 2023, the interest rate in the country has increased from 1.25% to 6 percent.

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[1] Dervis, B. (2021) *Ekonominin Temelleri.* Gostivar, North Macedonia. p. 252

1. LITERATURE REVIEW AND THE THEORETICAL FRAMEWORK

The classical Economics Approach attributes the main reason for price increases to increases in the money supply. Irving Fisher, one of the leading economists of the classical approach, put forward the quantity theory of money and expressed the one-to-one relationship between inflation and money supply. According to Fisher equation, a 1% increase in the inflation rate leads to a 1% increase in the nominal interest rate. This one-to-one relationship between the inflation rate and the nominal interest rate is called The Fisher effect (Mankiw, 2007, p.101)[2].

According to Friedman (1968), the demand for money is a stable quantity. Frideman revealed the importance of the growth rate of the money supply in the relationship between interest rates and prices. In this context, the positive effects of interest rate hikes on prices vary depending on the direction of monetary growth. Accordingly, the positive effects of interest rate hikes on prices, which are caused by other effects (wealth, expected inflation, price effect…) that suppress the liquidity effect in periods of monetary expansion, are more evident than interest increases in the period when there is no monetary expansion.

Another similar explanation for the existence of a positive relationship between interest rates and the general level of prices was made by Hannsgen (2004).

Accordingly, the fact that interest rates are a fundamental variable affecting production costs reveals the existence of a "cost-push" channel in the transmission of monetary policies[3].

Central Banks try to control the aggregate demand and therefore the price level with money supply management. Thus, in the monetary targeting strategy, is assumed that there is a strong relationship between the money supply and the general level of prices over aggregate demand (Akbakay, 2016: 78)[4].

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[2] Kolcu, F. (2023). Türkiye'de enflasyonun belirleyicileri. *Hitit Sosyal Bilimler Dergisi, 16(1)*, 31-56. doi: 10.17218/hititsbd.1207652

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According to the research conducted by Hannsgen (2004), the fact that interest rates are a fundamental variable affecting production costs reveals the existence of a "cost-push" channel in the transmission of Monetary Policies[5].

Aklan, N.A., Akay, H.K. and Çınar, M (2014), there is a positive and statistically significant relationship between the nominal interest rate and the general price level in the long run.

In the study of Uğur, B. & Atılgan, D. (2021), the effect of money supply on inflation in terms of 5 selected emerging economies between the period 1995-2017 was examined by panel data analysis with the addition of the real income (Gross domestic product) control variable. Findings indicate that a 1% increase in money supply growth rate (M2) for selected 5 emerging economies increases inflation by 0.70%.

In the study of Kılavuz, E. & Altınöz, B. (2020) , the relationship between inflation and three different measures of money supply in Turkey was analyzed using quarterly data 2006:Q4-2018:Q4 and a boundary test approach. In the results of the analysis for M2, a positive and statistically significant relationship was found from money supply to inflation. This result partially confirms the idea of Monetarist theory that inflation is a monetary phenomenon. An increase in the money supply does not have a positive but very strong effect on inflation in the long run.

Let's consider the theoretical operation of the Contractionary Monetary Policy with alternative methods in order to maintain the central bank price stability, in other words, to reduce the inflationary pressure.

A. Goods and money market (IS-LM) method

The IS-LM method is used to analyze the situation between Monetary Policy and the goods market (demand). With this method, the impact of monetary policy changes on macroeconomic activities is measured.

In part A of Figure 1, the Central Bank will reduce the money supply in the market to curb price increases, which will shift the LM0 curve to the left to LM1. The new equilibrium will be achieved at point B where IS=LM1 intersects. At the new equilibrium level, while the interest rates will rise to I1, the liquidity in the economy will decrease.

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[5] Hannsgen G (2004), Gibson's Paradox, Monetary Policy and the Emergence of Cycles

With this method, the Central Bank aims to keep the public holding less money by raising interest rates and, accordingly, to control price increases by reducing total demand.

As a result of the Contractionary Monetary Policy implemented in part B of Figure 1, there is a change in the goods market (demand) depending on the increasing interest rates.

Since the increase in interest rates decrease the total expenditures, the IS curve shift to the left and return to IS1 position, and the new equilibrium will shift from B to C. An important issue to be considered here is the change between the rate of increase in interest and the rate of decrease in interest. This change is due to the shift in the LM and IS curves. As in the B part of the figure, the shift in LM is greater than IS, which raises the interest rates to I2 relative to the starting point I0. Since the decrease in total expenditure (demand) caused by the decreasing money supply due to the shift in LM is smaller than the decrease in the money supply, the interest rate rises compared to the beginning.
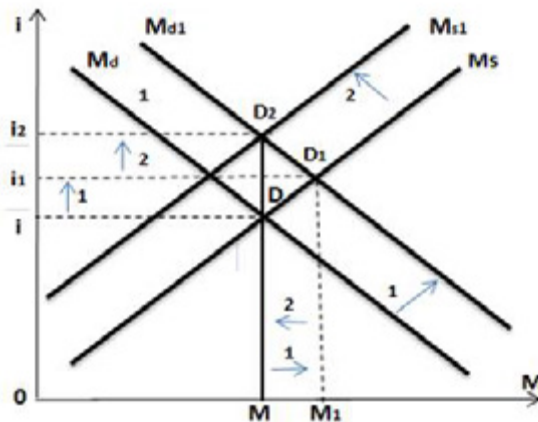
Figure 1. The effect of shifting IS-LM curves on the interest rate
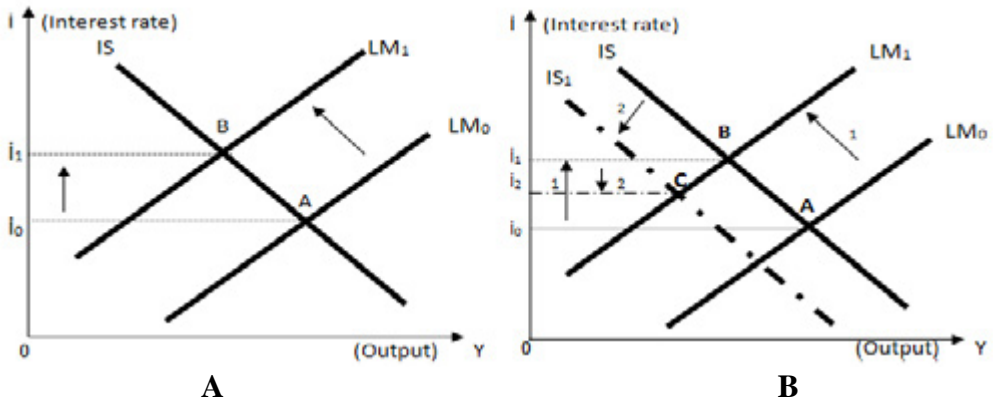
B. Money supply and demand (Money market) model

If the Central Bank wants to suppress inflation, in other words, to ensure price stability, then it will implement a contractionary monetary policy despite the increasing money demand.

Figure 2. Contractionary Monetary Policy

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The increase in money demand caused the balance to be formed at a higher interest rate. At equilibrium level D1', the new money demand curve is equalized with the money supply. D1= Ms = Md1. In creasingdemand for money will increase total expenditures and will also push prices up. The Central Bank will reduce the money supply with the help of monetary policy tools in order not to deviate from its main target. In this case, the money supply curve will shift to Ms1 and the new equilibrium in the economy will be achieved at point D2. At this point, the amount of money in the market decreased and returned to its previous level. However , the increase in money demand increased the interest rate and as a result of the contraction of the money supply by the central bank, interest rates has risen again[6].

2. THE INTEREST POLICY OF THE CENTRAL BANK OF NORTH MACEDONIA DESPITE PRICE INCREASES

There are basically two sources of the increase in the general level of prices. The first is demand inflation, which occurs due to demand, and the other is cost inflation, which is caused by supply. The price increases in the country in recent years are due to the increase in costs. While increasing production

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[6] Dervis, B. (2021). Ekonominin Temelleri, p. 256

costs increase prices , they also reduce purchasing power[7]. The high price increases in consumer prices, especially in food and energy, caused the inflation in North Macedonia to reach 20 percent. This is the highest rate recorded in over 28 years. Before 2022, the average inflation rate in the country was below 3 percent.

Table 1. N. Macedonia Inflation Rates (2017 – 2023 Q2)

2017	2018	2019				2020				2021				2022				2023	
2017	2018	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
2.4	0.9	1.4	0.3	0.3	0.4	0.5	1.7	1.9	2.3	2.1	2.7	3.7	4.9	8.8	14.5	18.7	18.7	14.7	9.3

Source: Institute of Statistics of North Macedonia (https://www.stat.gov.mk/OblastOpsto.aspx?id=15)

The increase in prices as of the end of 2021 is due to the increase in demand after the end of the COVID 19 epidemic. At the beginning of 2022, the increase in costs as a result of the Russia-Ukraine war and rising energy prices pushed the economy into supply-side inflation.

Price increases affected not only North Macedonia, but the whole region, and even the whole of Europe. The European Central Bank increased interest rates by 0.5 percentage points in July 2022 for the first time in order to maintain price stability in the face of inflationary pressures. Interest rate hikes continued in later returnees. As of June 2023, interest rates in Europe have increased to 4 percent[8].

As of the end of 2021, the North Macedonian central bank switched to a contractionary monetary policy by intervening in the foreign exchange market in order to maintain the stability of the denar rate[9]. As of April 2022, it has been announced that there will be a change in required reserve ratios and most importantly interest rates will increase gradually but continuously in order to increase domestic savings. The following table shows the interest rates on treasury bills between January 2022 and June 2023.

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[7] Dervishi, B. (2023). The effect of minimum wage increases on inflation. *International Journal of Research in Business and Social Science (2147-4478)*, *12*(3), 258-262.

[8] From March 2016 to June 2022, interest rates in Europe were set at 0 (zero)percent.

[9] Since October 1995, the Central Bank has been applying the fixed (nominal) exchange rate strategy of the Macedonian denar to the German mark and from January 2002 to the Euro. Therefore, ensuring the stability of the exchange rate is one of the intermediate objectives of the monetary policy..

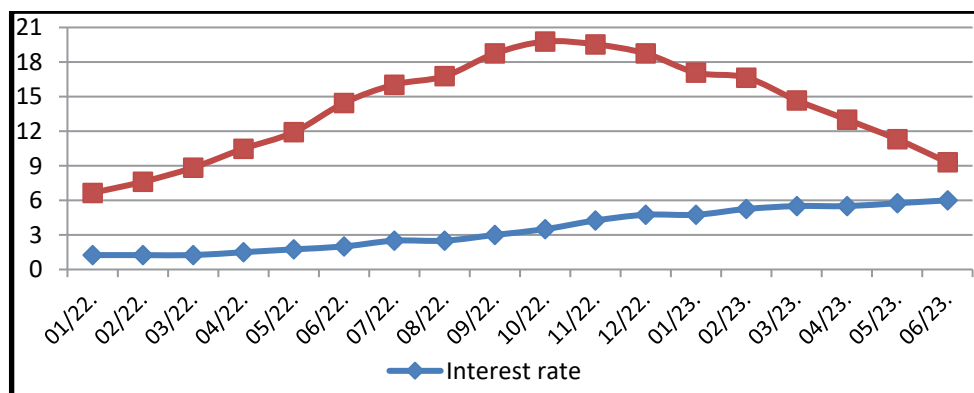**Table 2. Interest Rates in North Macedonia (January 2022 – June 2023)**

2022												2023					
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
1.25	1.25	1.25	1.5	1.75	2.0	2.5	2.5	3.0	3.5	4.25	4.75	4.75	5.25	5.5	5.5	5.75	6.0

Source: Central Bank of North Macedonia (https://www.nbrm.mk/statistika_na_kamatni_stapki.nspx)

The double-digit inflation rate (10.5%) in April 2022 carried the contractionary monetary policy implemented by the central bank one step further by increasing the interest rates by 0.25 points. The central bank has inititated to gradually increase the interest rates over the last 15 months and has increased the treasury bill interest rate, which was 1.25% in the beginning (March 2022), to 6 percent in June 2023.

The following figure shows the course of the interest rate depending on the inflation rate. While the increase in the general level of prices at the end of 2021 and the beginning of 2022 was attributed to the changes in the total demand in the economy, the country's economy faced supply-side inflation as a result of the increase in energy and food prices as of the first quarter of 2022. The Central Bank of North Macedonia took an important step in the fight against inflation by increasing the treasury bill interest rate from 1.25% by 0.25 points. In the following periods, interest rates were increased many times.

Figure 3. Interest rate rise and inflation

Source: Central Bank of North Macedonia (https://www.nbrm.mk/statistika_na_kamatni_stapki.nspx)
Institute of Statistics of North Macedonia (https://www.stat.gov.mk/OblastOpsto.aspx?id=15)

When we examine the data on inflation and interest rates for the January 2022 – June 2023 period, we can see that increasing interest rates suppressed price increases. However, it should be noted that the inflation rate is still not at the desired level. It would be incomplete and wrong to say that only an increase in the interest rate reduces inflation. While the Central Banks are implementing their monetary policy, it is very important that they are supported by the Government with correct and determined Fiscal Policies. Otherwise, while the Central bank implements a Contractionary Monetary Policy in order to ensure price stability, the Government's expansionary fiscal policy will render the Monetary Policy ineffective.

When we look at North Macedonia, with the contractionary Monetary Policy implemented by the Central Bank, the Ministry of Finance has opened the Fiscal Consolidation Plan. The government aimed to control the aggregate demand in the economy by reducing public expenditures with Fiscal Consolidation. In addition, the tax reform, which has been discussed for a long time, is expected to be brought to the agenda again and to be implemented after the necessary Legal Regulations.

3. INFLATION – INTEREST BIDIRECTIONAL RELATIONSHIP

In order to ensure price stability, the central bank intervenes in the market by applying contractionary or expansionary Monetary Policy by using Monetary Policy tools. However, it is necessary to analyze the factors that disrupt price stability (causing inflation). If inflation has arisen from the changes in the total demand in the economy, expenditures are reduced by directing the liquidity in the economy to savings with the method of increasing interest. If the source of inflation is due to costs (production factors and input costs), then increasing the interest rate will increase prices even more. Since interest is the cost of capital used (financing), increasing this cost will cause price increases and inflation.

When we look at the Economy of North Macedonia, the price increases at the beginning consisted of the increase in total demand, while the source of the inflation that emerged in the middle of 2022 was the increase in energy and food (cost) prices. Therefore, the country's economy was faced with cost inflation and then demand inflation. Although prices started to increase in the last quarter of 2021, the Central Bank did not change the interest rate until

April 2022. The Central Bank, which adopted a Contractionary Monetary Policy towards the end of 2021, initially changed the required reserve ratios.

The relationship between inflation and interest should basically be determined by looking at the source of inflation. In demand-side inflation, an increase in interest rates is considered a correct step in the fight against inflation as it will reduce total expenditures, while in cost-side inflation, an increase in interest rates will increase inflation rather than lower it, as it will increase input costs. If inflation is both demand-side and supply-side, as in the North Macedonian Economy, then it is necessary to analyze the effect of the source of inflation well. For example, if the effect of demand inflation is 70 percent and the effect of cost inflation is 30 percent, the costs will be reduced by lowering the interest rate, which means a decrease in prices. The increase in prices due to the demand that will arise as a result of the decrease in interest rates will be less than the price decreases that will occur as a result of the decrease in costs.

Conclusion

While trying to overcome the negative effects of the pandemic on the economy, the world economy came to the brink of crisis again with the Russia-Ukraine war at the beginning of 2022. After the pandemic, the economy started to revive, the total demand increased and the inflation rate accelerated upwards. However, the war between Russia and Ukraine led to an increase in the costs of energy and food mines, price increases were experienced in many countries, especially in European countries, and the inflation rate reached historical levels.

According to Literature Review, it is mentioned that there is a linear relationship between money supply and inflation and between interest rates and inflation. In addition, it is assumed that there is a strong relationship between the money supply and the general price level, based on aggregate demand.

In the theoretical part of the study, the theories put forward by the economic schools (classical, keynesian) of the interaction between price stability and interest rates are also discussed. According to Fisher equation, a 1% increase in the inflation rate leads to a 1% increase in the nominal interest rate. According to Keynes, inflation is affected by increased aggregate demand due to low interest rates. Frideman, on the other hand, explains the positive effects of interest rate hikes on prices by the existence of a positive and statistically significant relationship between the nominal interest rate and the general price level in the long run.

In the above study, the possible effects of the Contractionary Monetary Policy implemented by The Central Bank despite the recent high inflation in North Macedonia are discussed theoretically and the current situation is analyzed. Increasing demand for money will increase total expenditures and will also push prices up. The Central Bank will reduce the liquidity in the economy by reducing the money supply in the market in order not to deviate from its main target (price stability). With this method, The Central Bank aims to keep the public holding less money by raising interest rates and, accordingly, to control price increases by reducing total demand.

North Macedonia has faced double-digit inflation rate after a long period. In order to maintain price stability in the face of inflationary pressures, the European Central Bank increased interest rates by 0.5 percentage points in July 2022. Interest rate hikes continued in later returnees. As of June 2023, interest rates in Europe have increased from zero to 4 percent.

North Macedonia's Central Bank also switched to a Contractionary Monetary Policy by intervening in the Foreign Exchange Market in order to maintain the stability of the local currency (denar), despite the increasing inflation. The Central Bank then announced a change in reserve requirement ratios to increase domestic savings, and finally, it would gradually but continuously increase interest rates. As a matter of fact, in the period of April 2022 – June 2023, the central bank increased interest rates several times and increased interest rates from 1.25% to 6 percent. Naturally, it is desired to prevent rising prices by reducing total demand and total expenditures in the economy by increasing interest rates in order to ensure price stability and fight against inflation. An important issue that should not be forgotten here is that if inflation is not demand-side, it is supply (cost)-side. If inflation is caused only by increases in aggregate demand, price increases will be curbed by raising interest rates. However, if inflation is caused by increased production costs, prices will rise even more as interest rate hikes will increase financing costs. While the initial price increases in North Macedonia were due to aggregate demand, the increase in food and energy prices in particular increased the inflation rate in the country, as it increased the finances. Therefore, Policy Makers have to decide by determining the causes of inflation, by calculating how much the increasing interest rates will decrease the total demand and how much they will increase the financing costs.

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BRAND COMMUNICATION ON INSTAGRAM

Abstract

Businesses are slowly changing their communication strategies, especially smaller businesses with limited marketing budgets. Social media are emerging as an alternative channel for communication given that they enable targeted marketing campaigns at affordable prices.

Instagram is one of the most popular social media platforms among the younger generation. If the brands want to target millennials and build effective communication with them, they must discover and understand what the millennials preferences on this social media are.

The purpose of this research is focused on determining the type of visual brand communication that millennials prefer the most as well to discover the type of content that the millennials are most found of in order to increase the likelihood of their engagement with the brand.

Key words: Instagram, Brand communication, Customer engagement, Social media

JEL Classification: (M370, M310, M300)

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Introduction

Businesses, particularly smaller ones with limited marketing budgets, are shifting their communication strategies away from standard Above the Line (ATL) campaigns. Social media offers a cost-effective alternative, with profiles serving as ATL while ads become Below the Line (BTL), allowing precise targeting without significant costs. Such campaigns can reach a wide audience, tailored to specific demographics, for less than $100.

This research aims to gain insights into Generation Y's behavior on Instagram, valuable for brands seeking to boost customer engagement on social platforms, especially Instagram. Instagram, highly popular among Millennials (born between 1981 and 1996), holds substantial importance for brand communication due to this demographic's growing purchasing power.

Despite the significance, limited research exists on effective communication with Millennials on Instagram and the importance of social media advertising. While a previous study by Hellberg (2015) explored visual brand communication on Instagram in Finland among females aged 20 to 30, this research seeks to address gaps in academic literature by providing fresh insights into consumer engagement on Instagram. It is important to note that this research does not involve activities violating the platform's policies, such as buying likes, followers, or employing automated bots. The findings will be particularly beneficial for small and micro businesses.

1. LITERATURE REVIEW

1.1. Brand, awareness, and loyalty

The marketing practice of creating a name, symbol or design that identifies and differentiates a product from other products is called branding. An effective brand strategy allows the business to have an advantage in competitive markets. According to Davis & Baldwin (2005), brands help the consumer to "select one product over another in a complex world of increased choice". Brands help consumers to identify and choose products that they perceive as superior in comparison to the alternatives.

A brand is one of the most valuable assets a company can have. It is company identification. Brand loyalty is the center of all marketing activities. With increased market fragmentation and intensified market competition, traditional brands are forced to focus more on developing and maintaining long-term

relationships with their consumers and therefore seeking to adopt relationship marketing (Sheth and Parvatiyar, 1995; Rust et al., 2004). Brands have to think about their customer relationship in the long run, otherwise they will quickly lose ground to companies who are more focused on their consumers.

1.2. Social media and communication

In the past decade, advertising has evolved beyond traditional platforms to include online and social media ads. The saturation of these digital spaces poses challenges for brand recognition.

The rise of Web 2.0, especially through social networks (Chen et al., 2012), has reshaped media consumption (Mangold and Faulds, 2009). Consumers now prefer social media over traditional channels like TV, radio, and magazines for information (Mangold and Faulds, 2009). Millennials spend about 30% of their daily 18 hours of media consumption on user-generated content and social networking (Ipsos MediaCT, 2014), highlighting their visual sophistication (Bolton et al., 2013). Social media's societal impact now rivals traditional media, with a significant presence among those aged 15 to 64, particularly in developed countries (Jokien, 2016).

Social media offers cost-effective opportunities, especially for small businesses (Jokien, 2016). It excels in targeting specific demographic markets (Turban et al., 2008), making it an attractive advertising platform.

1.3. Instagram

Instagram is a social media network founded in 2010. Unlike other social networks such as Facebook that focuses on pictures and large texts and Twitter that is a text-based platform, Instagram focuses on visuals (images and videos). One image is worth a thousand words because looking at an image, usually takes less time than reading a whole paragraph of text.

Visual communication is a subject of study by several sciences such as communication, psychology, art and more (Smith, et al., 2005). People can be affected by visual communication emotionally or logically, or both (Sojka and Giese, 2006). It seems that visual brand communication could be a very effective form of communication when it is done adequately. In accordance with Hellberg (2015) study, consumers prefer visual brand communication on Instagram since this kind of communication has much stronger emotional effect.

Instagram offers brands a more personal approach to communication. This type of approach is well accepted by users, regardless whether the brands are followed for practical reasons like receiving new information or simply for the aesthetic reasons. The aim of this paper is to provide valuable insights and guidelines how the bran/ds can effectively communicate their message to millennials.

1.4. Social media in Republic of North Macedonia

There are 1.2 million social media users in Republic of North Macedonia (Datareportal, 2023) and the younger generation widely use various social media. The first social network that gained mass popularity was Facebook in 2009. According to the latest research, Meta's Facebook had 914 thousand users in early 2023 (Statista, 2023) which yields a high penetration rate of almost 50% of the total population in early 2023.

In the last several years, Instagram has gained much more popularity among the younger generation compared with Facebook and other social media platforms. In accordance with the Meta's Advertising tools (DataReportal, 2023), Instagram in Macedonia had around 711 thousand (seven hundred and eleven thousand) users in early 2023, which is 39.1% of the local internet user base. According to the Datareportal on Instagram users, stats, data and trends (2023) Instagram users base is mainly younger population, as 69.7% are aged between 13 and 34, and 15% are aged over 45. Although, Instagram penetration rate in Macedonia is smaller than the one the Facebook is having, bearing in mind that only 30,000 (thirty thousand) out of 1.1 million Facebook users are aged between 13 to 18 according to Meta's advertising tools (DataReportal, 2023), which can lead us to a conclusion that the younger generations slowly are replacing Facebook with Instagram.

2. RESEARCH METHODOLOGY

Semi-structured in-depth interview was used as a method for providing findings about the research topic, because via discussion and open-ended questions the responders can more easily explain their behavior on Instagram and their views about brand engagement on this social media. Semi-structured interview was also chosen as a research method in order to determine and better understand the type of visual brand communication that millennial prefer on Instagram.

2.1.Sample

For the purpose of the study, urban male and female Instagram users, classified as millennials or generation Y were used as homogenous sample. The sample size for this study was 30 (thirty) responders aged between 22 (twenty-two) and 38 (thirty-eight). In order to have results that are more realistic, beside the age and Instagram account criteria, brand following was introduced as another additional criteria for selecting the responders. The type of the brand didn't matter, because the aim of the research was to investigate the general awareness about visual brand communication posts on Instagram.

2.2.Interview process and guide

The research methodology involved conducting interviews with respondents to collect data for answering research questions. A structured interview guide (Patton, 2002) was used to cover various topics. Some interviews followed the guide closely, while others were more discussion-oriented and varied in duration. The interviewer improved techniques over time, gaining deeper insights. All interview topics were covered, with probing used for detailed clarification (Patton, 2002). Respondents were encouraged to open Instagram during the discussion to provide specific examples, but not all chose to do so. The interviews began with descriptive questions to ease respondents into the topic, followed by general questions about their Instagram use, favorite content, followed brands, and preferred visual communication styles. The final set of questions focused on factors influencing consumer engagement with brand content on Instagram.

3. DISCUSSION OF RESULTS

Brand communication on Instagram is accepted and welcomed by all respondents. Many of the respondents perceived brand communication on Instagram as more personal in comparison with brand communication on other social media. The two main elements that come from this research as findings were related to Visual brand communication preferences and Engagement preferences. The visual brand communication part covers the image/video and content preferences. Liking, commenting, sharing, lurking, and following will be presented as part of the engagement preferences. As a key topic in this study, personal engagement will be discussed as well. The conclusion will provide summarized findings and will also provide further insight

3.1. Visual communication preferences

Instagram offers the brands a type of communication that practically did not non-exist before this social platform was invented. The study found that the Y generation prefer visual brand communication on Instagram, because this type of communication enables effective transfer of information through images and videos. The respondents followed the brands for different reasons: inspiration, information about promotions or just for the aesthetically pleasing content. The frequency of posting content and up to date information was found as one of the factors that affects respondents' perception about the brand. Posting frequently may be found displeasing by many users, but on other hand, posting rarely can make the brand irrelevant

Findings related to visual brand communication preferences on Instagram will be presented in the following section.

3.1.1. Images

One of the key aspects of this research was aimed at revealing the preferences of users when it comes to posting images. Images and interpretations are not equally favorable by everyone. However, in the study, some common preferences were found. The inspiration and the good feeling that the brand content provided (aesthetical experience) was the preferred feature. Colorful images and Framing were also commonly preferred.

3.1.1.1. Aesthetical experience

Image aesthetic is an extremely important preference in visual communication or as the famous quote states "A picture is worth a thousand words". The emotions that an aesthetical image stimulates are on subconscious level. Every viewer analyses the image in their own way comparing it with images, shapes and patterns from their previous life experiences. The study found that some of the things that users want to get from a brand image is inspiration and good feeling. Product focused images were not so successful and inspirational. It was also found out that the images do not only inspire people and create good feelings, but they also spark the imagination of the users. People like to dream about flying or being super strong, but also, they dream about expensive jewelry. The findings also support the argument that images help individuals in visualizing the ways a certain product can be used.

3.1.1.2.Colorful images

Colors and colorful images were also something to which most of the respondents reacted positively. Although the colorful images were found to be an attentions grabber, they were not a guarantee for a visual engagement. However, it can be argued that by initially attracting the user's attention, if other aspects of the image are of interest to the potential customer, the likelihood of visible engagement increases.

3.1.1.3.Composition or framing

The way a potential customer perceives certain brand visual communication is subjective and is based on experiences. Framing of the image was also found to be an important factor for customers. Robert et al. (1982) argues that framing the product into an image of how the product is used in practice will increase the value of the brand and the product because it plays with connotative responses in the user's mind. Each customer has a different opinion on what is a well-composed or well-framed picture. People with similar backgrounds and societal norms have similar opinions on the framing and composition of images, and within a certain group, the image will be interpreted very similarly or the same. However, our research shows that not all users prefer products framed in a situation of use, but some of the customers prefer to see only the product, without taking into account the aesthetics. Those customers are only interested in what the brand offers and what the product looks like. They are not interested in framing and colorful images; they are purely product focused when it comes to brands and their communication on Instagram.

3.1.2. Videos

There are divided opinions about the use of videos as a tool for visual communication of the brand. Walter & Gioglio (2014) argue that videos are important and useful in brand storytelling since they have extra components like sound and movement, something that images lack. Many responders believe that the videos are tools that provides good value, however there was a significant group of responders who thought that videos were a waste of time because they almost never watched a video on Instagram. It is worth noticing here, that one of the arguments of the opponents of the idea of using videos for visual communication on Instagram was the lack of creativity in videos made by the brands. The research showed that the respondents who believe that

videos are a good tool for visual communication mainly dealt with cycling, fitness, skiing, or other activities which is very difficult to explain or express using a static picture. These customers wanted to see and experience how someone else does such an activity in motion, for example cycling or a specific fitness exercise.

3.2 Engagement preferences

Customer's engagement with the brand content can be an indicator for success or failure of the brand communication efforts on Instagram. Content should always be created in a manner that will increase the possibility for customer engagement, which in the end will not only improve the brand communication endeavor but the brand itself. The study found that different responders preferred different types of engagement. Hellberg (2015) argues that in the earlier days of Instagram, lurking was mostly used by the respondents, but as Instagram cements its place in our daily life, people seem to favors other types of engagement as well. In this section, all concepts of engagement identified in the research will be presented.

3.2.1 Liking

Liking is the most common and freely used form of engagement. This might also be connected to the amount of effort that user needs to put into 'liking' a post. While most of the respondents valued their 'like' as a preferred method of engaging with a brand, some of the respondents, in an effort to preserve their privacy, were not supportive of this type of engagement.

3.2.2 Commenting and Sharing

Instagram does not allow simple sharing of the post in a feed without using third-party software. Easier forms of sharing are tagging in the comments section, direct message sharing and sharing on the user story. Given that one of the most used ways to share on Instagram is based on sharing through the commenting section, these two activities (commenting and sharing) will be considered in conjunction.

Commenting on brand posts was found to be quite uncommon. Some of the respondents only commented when a brand was having some sort of giveaway. Similarly, with 'liking', avoiding comments also came as a result of the need for preserving privacy and anonymity.

The most used feature that somehow combines sharing and commenting is tagging a friend in the comment section. Another alternative that might be even more common is direct message sharing. A later approach creates engagement that is not visible. The respondents stated that elected type of sharing depended mostly on how they felt at the moment and whether they wanted someone else to see the post that was intended for their friends. Another way to share posts is sharing the post on the user stories. This type of sharing was the least used way, and only a few of respondents used it.

3.2.3 Following

Following a brand was quite common for all the respondents. Followed brands varied from personal brands, celebrities, influencers up to traditional brands. Although this type of engagement was common, responders stated they had some criteria that needed to be met to follow a certain brand. Respondents discussed that post content is important, but also post frequency was a factor that had an impact on whether they would continue following the brand.

Some of the respondents followed brands even thru they had no intention to purchase from them. They follow the brand because of the well-made posts or for inspirational purposes. This further proves that aesthetics has a great role in attracting new followers and more followers always means better business.

3.2.4 Lurking

Lurking emerged as the predominant way users view Instagram posts, with a significant portion of respondents admitting to primarily lurking during their time on the platform. The study revealed that individual mood and availability play crucial roles in determining the level of engagement on Instagram. Busy schedules, fatigue, or time constraints often hinder users from transitioning beyond lurking to visible engagement. However, some respondents mentioned revisiting previously scrolled content in search of interesting posts, indicating a latent level of engagement even when not visibly interacting. This suggests that users pay attention to posts, even when not actively engaging with them.

Furthermore, all respondents reported changes in their Instagram behavior over time. Most now focus on posting their own content and engaging more visually with brand posts, aligning with Helberg's (2015) observation that users initially tend to lurk but gradually become more inclined to engage visibly as they familiarize themselves with the platform's visual style. Notably,

two outliers mentioned reduced Instagram usage over time, primarily due to time constraints.

In conclusion, lurking emerged as the favored form of user engagement on Instagram, with the level of visual engagement primarily influenced by factors such as timing, mood, and the user's familiarity with the platform.

3.2.5 Personal Engagement

As it was stated before, aesthetics in visual brand communication on Instagram is very important. But inspiring content might not always result in a visible engagement, although it was found that it still had effect on the users.

Users with lurking behavior, are more likely to change their behavior and start visible engagement with a brand if they feel that they have on some level a personal connection with the brand post. The study showed that the engagement that the user has with the content of the brand would be much stronger when the brand post contains a certain aspect that connects the user with his background or with his beliefs. If the content of the post is personally attractive to the user, then it creates a stronger emotional reaction. Emotional reaction means that the likelihood of visible engagement by the user is much higher.

Conclusion

In the last several years, Instagram has gained much more popularity among the younger generation compared with Facebook and other social media platforms. If the brands want to target millennials and build effective communication with them, they must discover and understand what the millennials preferences on this social media are. In accordance with this study, millennials or generation Y engage with visual brand content on Instagram mostly by liking the posts. Some of them share the content in a few different ways, like sharing it on their stories, by tagging their friends in the comment section and most notably by sending it to their friends via the direct message option. Sharing and commenting can sometimes overlap due to the Instagram tagging option. Millennials in Macedonia rarely comment on brand posts.

When it comes to their preferences for the type of visual content they would like to engage with, most of the respondents prefer images over videos. Millennials have divided opinions about the content of the image. While some of them enjoyed a more aesthetically pleasing image, others are more satisfied with a product-focused image. Regardless of the content of the image, the interviews have shown that users from generation Y are most likely to engage with an image that affects them emotionally. Some responders prefer videos over images due to their hobbies and work. For example, people who liked biking and sports mostly preferred videos because images could not illustrate what they were looking for.

There were still some respondents with predominantly lurking behavior. Although these respondents were not visibly engaging with the brand, the posts served them as springboard for future action.

Due to the narrow nature of the study, this research is limited to only millennials that are on Instagram and that live in the Republic of Macedonia. The current study of engagement with visual brand communication on Instagram, was conducted on a sample of both male and female respondents, who were in the millennial age group or gen Y in Macedonia, thus making wider generalization based on the findings is impossible. In the future, a study where the interviewed respondents are within a different age group could be something that yields interesting results.

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DIFFUSION MODELS OF OPTION PRICING: REVIEW OF SOME LOCAL VOLATILITY MODELS (LVM) AND STOCHASTIC VOLATILITY MODELS (SVM) WITH COMPUTATIONAL EXAMPLES

Abstract

This paper is about financial models based on diffusion. And such models are represented by the Stochastic differential equation (SDE) driven by a Brownian motion. In this paper we are considering local volatility models and stochastic volatility models. These models are solving the shortcomings of Black-Scholes model namely by assuming that the volatility of the underlying price is a stochastic process rather than a constant, it becomes possible to model derivatives more accurately. Models like Carr-Madan and Black-Scholes Fourier pricing were presented before the previous two classes of models. In the class of stochastic volatility models SABR STOCHASTIC α, β, ρ model along with Heston model and displaced diffusion DD models are their main representatives in this paper. When it comes to market and model comparison this paper concludes that SABR model, Displaced diffusion (DD) model and Heston model are very close to market results, when it comes to implied volatility and strike price (SABR, DD) and Heston model are better when compared implied volatility with moneyness (strike price /spot price).

Keywords: diffusion models, local volatility, stochastic volatility, SABR model, Heston model

JEL: G12, G13

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1. INTRODUCTION

This paper will deal with financial models that are based on diffusion processes. While the Black-Scholes(1973) model is the simplest formulation for derivative pricing and is still utilized, there is a flaw of that model when volatility surfaces, a situation which implies different underlying parameters for every quoted option, so in that situation Black-Scholes(1973)model is unable to correctly predict the evolution of prices of the underlying asset, see Hirsa (2012). But the first explicit general equilibrium solution to the option pricing problem for simple puts and call was presented in Black,Scholes(BS)(1973) and Merton (BSM) (1973) all this four paper by Merton 1973 a,Merton 1973 b, Merton1973 c ,Merton 1975 , provides, within the Capital Asset Pricing Model(CAPM) framework, an elegant answer to the problem of assigning price to every option by identifying a relation between the value of the stock and its option. Important information is modeled as a jump-process because it arrives at discrete times, Merton (1975). These models in order to be consistent with the Efficient market hypothesis (EMH) see Fama (1970) (i.e. that asset prices fully reflect the information), the unanticipated part of the stock price movements should be a martingale (conditional expectation of the next value of the sequence, given all prior information, is equal to the present value). The relationship between implied volatility and exercise price is not constant and may look like a smile, a skew, etc. (for simplicity are all called "smiles") see Orlando,G., Taglialatela(2017). Implied volatility is calculated by taking the observed option price in the market and a pricing formula such as the Black-Scholes formula that will be introduced below and backing out the volatility that is consistent with the option price given other input parameters such as the strike price of the option, for example ,see Kosowski,Neftci (2015). [1]

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[1] There is a distinction between implied volatility and actual volatility, later is realized volatility.

Local volatility models can be traced back to the work by Dupire, B. (1994) and Derman, E. ,Kani, I. (1994). The Black-Scholes theory relies on two assumptions: the values of contingent claims do not depend on investor preferences; therefore, the option can be valued as though the underlying stock's expected return is riskless. [2]Second assumption, is that stock prices evolve log-normally with constant local volatility σ_v. [3] But market option prices are not consistent with Black-Scholes formula. Some models and formulas that account better for volatility when stock price is close to strike price include: Brenner, Subrahmanyam (1998), Bharadia, Christofides and Salkin Formula (1995). For these previous two formulas the accuracy of the approximation worsens as soon as the option departs from the at-the-money position (ATM). Next, this paper will introduce a class (not all of them) of stochastic volatility models that are extending the classic Black-Scholes or local volatility framework. These models are modeling not just the skew but the smile also. Overall, the more out-of-the-money(OTM) (Spot- Strike < 0) a call (put) option is, the higher is the corresponding implied volatility. This well-established empirical fact is known as the volatility smile, or volatility skew, and has major implications for hedging, pricing, and marking-to-market of many important instruments. In statistics, stochastic volatility models are those in which the variance of a stochastic process is itself randomly distributed. Here we will review and set computational examples for: SABR model, Heston model, Displaced diffusion model and implied volatility by Newton-Rapshon method. But paper first starts with Black-Scholes Fourier pricing and Carr-Madan (1999) method as representatives of option pricing by transform techniques and direct integration.

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[2] The risk neutral valuation is allowed because the option can be hedged with stock to create instantaneously riskless portfolio.

[3] The stock evolution is described simple as: $\frac{dS}{S} = \mu dt + \sigma dW$, where μ is the expected return $\mu = r - q$,risk free rate minus dividend, S is the stock price, dW is a Wiener process $W \sim (0, dt)$

2. BLACK-SCHOLES FOURIER PRICING

2.1 Characteristic function, Levy process, Fourier transform

Characteristic function of payoff is available analytically for all levy processes.
[4] **Levy process**- L let be is an infinite divisible random variable $\forall t \in [0, \infty]$

   ✓ L can be written as the sum of a diffusion, a continuous Martingale, [5] and a pure jump process; i.e:

$$L_t = at + \sigma B_t + \int_{|x|<1} x d\tilde{N}_\tau + \int_{|x|\geq 1} x dN_\tau (\cdot, dx), \forall t \geq 0 \qquad (1)$$

In previous expression $\in \Re$, B_t is the standard Brownian motion, N is defined to be the Poisson random measure of the Lèvy process.

   ✓ Lèvy -Khintchine formula: from the previous property it can be shown that for $\forall \tau \geq 0$ one has that :

$$E\left|e^{inL_t}\right| = e^{\wedge}(-\tau\psi(u)$$

$$\psi(u) = -iau + \frac{\sigma^2}{2}u^2 + \int_{|x|\geq 1}(1 - e^{iux})dv(x) + \int_{|x|<1}(1 + e^{iux} + iux)dv(x)$$
(2)

$a \in \Re; \sigma \in [0, \infty); v > 0$ borel measure and σ is Lèvy measure. More so $v(\cdot) = E[N_1(\cdot, A)]$ See Applebaum (2004).Log normal process that we are considering here is:

$$\log \frac{S_{t+\Delta t}}{S_t} \sim \mathcal{N}\left(\left(r - q - \frac{1}{2}\sigma^2\right)\Delta t, \sigma^2 \Delta t\right)$$
(3)

Where S_t is stock price at time t and σ is stock price volatility,r is a risk-free interest rate and q is the dividend rate. Characteristic function is given as:

$$\psi(\xi) = \exp\left[i\xi\left(r - q - \frac{1}{2}\sigma^2\right)\Delta t - \frac{1}{2}\xi^2 \sigma^2 \Delta t\right] \qquad (4)$$

---

[4] Characteristics function of any real-valued random variable completely defines its probability distribution. Sometimes characteristic functions are denoted by using so called Iverson bracket see Iverson (1962) or as an indicator function $F_x(x) = E(\mathbf{1}_{\{X \leq x\}})$,see Abramowitz, M. ,Stegun (1972).

[5] A sequence of random numbers $X_0, X_1, ..$ with finite means and conditional expectation of $X_{n+1}|X_0, ..., X_n = X_n$ i.e., $\langle X_{n+1}|X_0, ..., X_n \rangle = X_n$

Or in general characteristic function for random variable X is given as:
$\varphi: \mathbb{R} \to \mathbb{C}$, and :

$$\varphi(u) \mapsto \mathbb{E}[\exp(iuX)] = \int_{-\infty}^{+\infty} \exp(iux)dF(x) \qquad (5)$$

The characteristic exponent is logarithm of the characteristic function,[6] or
$\psi = \log(\varphi(u))$,and the n-th moment of the random variable if $\exists \mathbb{E}[X^n]$ is :

$$\mathbb{E}[X^n] = i^{-n}\frac{d}{du^n}\varphi(u)|_{u=0}$$

$$(6)$$

See [Kienitz, Wetterau (2012)](#) on this part, here also cumulant function k,
moment generating function, θ, and cumulant characteristic function are
given as:

$$\begin{cases} k(u) = \log(\varphi(iu)) \\ \quad \theta(u) = \varphi(iu) \\ \quad \varphi(u) = \log\varphi(u) \end{cases} \qquad (7)$$

Where $i = \sqrt{-1}$ is an imaginary number, the payoff for European vanilla
option,g is given as:

$$g(S_T) = \max(\theta(S_T - K), 0) = \left(\theta(S_T - K)\right)^+ \qquad (8)$$

Where S_T is the stock price at maturity T, K is the strike price and $\theta = 1$ for
call and $\theta = -1$ for put. Payoff is equal to log of price: $x = \log\frac{S_T}{S_0}$; log strike
is:$k = \log\frac{K}{S_0}$,lower log-barrier is: $l = \log\frac{L}{S_0}$; upper log-barrier is : $u = \log\frac{U}{S_0}$.
So now the payoff function becomes:

$$g(x) = e^{ax}S_0\left(\theta(e^x - e^k)\right)^+ \mathbb{1}_{[lu]}(x) \qquad (9)$$

---

[6] CDF: $F(x) = \frac{1}{2} + \frac{1}{2\pi}\int_{-\infty}^{+\infty}\frac{e^{iux}\varphi(-u)-e^{-iux}\varphi(u)}{iu}du$; PDF:$f(x) = \frac{1}{2\pi}\int_{-\infty}^{+\infty}e^{-iux}\varphi(u)du = \frac{1}{\pi}\int_0^{\infty}e^{iux}\varphi(u)du$

The Fourier transform is given as:

$$\hat{g}(\xi) = \mathcal{F}_{x\to\xi}[g(x)] = \int_{\mathbb{R}} e^{i\xi x} e^{ax} S_0 \big(\theta(e^x - e^k)\big)^+ \mathbb{1}_{[lu]}(x)\, dx = S_0 \int_l^u e^{(i\xi+a)x}\big(\theta(e^x - e^k)\big)^{+dx} = S_0 \int_v^\eta e^{(1+i\xi+a)x} dx + S_0 \int_v^\eta e^{k+)i\xi+a)x} dx = S_0 \left(\frac{e^{(1+i\xi+a)\eta} - e^{(1+i\xi+a)v}}{1+i\xi+a} - \frac{e^{k+(i\xi+a)\eta} - e^{k+(i\xi+a)v}}{i\xi+a}\right) \qquad (10)$$

Where $\eta = \begin{cases} u\ for\ call \\ l\ for\ put \end{cases}$ and $v = \begin{cases} \max(k,l) for\ call \\ \min(k,u) for\ put. \end{cases}$ In order to find the option value V we need to discount the expected payoff :

$$V = e^{rT}\mathbb{E}\big[g(X_T)e_T^{-aX_T}|X_0 = 0\big] = e^{-rT}\int_{\mathbb{R}} g(X_T)e_T^{-aX_T} f_x(x,T)dx$$
$$(11)$$

Where $e_T^{-aX_T}$ I the undamping factor and f is the PDF of X_t .Now thanks to Parseval-Plancherel theorem integral can be computed in Fourier space:

$$V = \frac{e^{-rT}}{2\pi}\int_{\mathbb{R}}\hat{g}(\xi)\psi^*(\xi + ia,T)d\xi \qquad (12)$$

Where $\psi(\xi,t) = \hat{f}_x(x,t)$ is the characteristic function of X_t , and * denotes complex conjugate, we can include undamping $\psi^*(\xi + ia,T)$factor due to shift theorem

2.2 Parseval-Plancherel theorem

Plancherel theorem (sometimes called the Parseval–Plancherel identity) is a result due to Plancherel (1910).

Theorem 1 : Parseval–Plancherel theorem
$$\int_{\mathbb{R}} f(x)g^*(x)dx = \frac{1}{2\pi}\int_{\mathbb{R}}\hat{f}(\xi)\hat{g}^*(\xi)d\xi \qquad (13)$$
Proof: *in the LHS we have :*

$$f(x) = \mathcal{F}_{\xi \to x}^{-1}[\hat{f}(\xi)] = \frac{1}{2\pi} \int_{\mathbb{R}} e^{-ix\xi} \hat{g}^*(\xi) d\xi$$
$$g(x) = \mathcal{F}_{\xi \to x}^{-1}[\hat{g}(\xi)] = \frac{1}{2\pi} \int_{\mathbb{R}} e^{-ix\xi} \hat{g}(\xi) d\xi$$

(14)

Since $(ab)^* = a^* b^*, \left(e^{-ix\xi}\right)^* = e^{+ix\xi}$ and so we have: $g^*(x) = \frac{1}{2\pi} \int_{\mathbb{R}} e^{ix\xi} \hat{g}^*(\xi) d\xi$ and henceforth :

$$\int_{\mathbb{R}} f(x) g^*(x) dx = \frac{1}{(2\pi)^2} \int_{\mathbb{R}} \left(\int_{\mathbb{R}} e^{-ix\xi} \hat{f}(\xi) d\xi \right) \left(\int_{\mathbb{R}} e^{ix\xi'} \hat{g}^*(\xi') d\xi' \right) dx =$$
$$\frac{1}{2\pi} \int_{\mathbb{R}} \int_{\mathbb{R}} \hat{f}(\xi) \hat{g}^*(\xi') \frac{1}{2\pi} \int_{\mathbb{R}} e^{-i(\xi - \xi')x} dx d\xi' d\xi$$

(15)

Since $\frac{1}{2\pi} \int_{\mathbb{R}} e^{-i(\xi - \xi')x} dx = \delta(\xi - \xi')$, where δ is Dirac delta see <u>Dirac (1958).</u>[7]

$$\begin{cases} \int_{\mathbb{R}} f(x) g^*(x) dx = \frac{1}{2\pi} \int_{\mathbb{R}} \hat{f}(\xi) \int_{\mathbb{R}} \hat{g}^*(\xi') \delta(\xi - \xi') d\xi' d\xi \\ \int_{\mathbb{R}} \hat{g}^*(\xi') \delta(\xi - \xi') d\xi' = \hat{g}^*(\xi) \\ \int_{\mathbb{R}} f(x) g^*(x) dx = \frac{1}{2\pi} \int_{\mathbb{R}} \hat{f}(\xi) \hat{g}^*(\xi) d\xi \quad \blacksquare \end{cases}$$

(16)

2.3 Shift theorem

Theorem 2 : Shift theorem

$$\mathcal{F}_{x \to \xi}[f(x) e^{-ax}] = \hat{f}(\xi + ia)$$

(17)

Proof:
$$\mathcal{F}_{x \to \xi}[f(x) e^{-ax}] = \int_{\mathbb{R}} e^{ix\xi} e^{-ax} f(x) dx = \int_{\mathbb{R}} e^{i(\xi + ia)x} f(x) dx = \hat{f}(\xi + ia) \blacksquare$$

(18)

Where we were using the fact that $i^2 = -1$.

---

[7] The delta function is sometimes called Dirac's delta function or the "impulse symbol" ,<u>Bracewell (2000),</u>delta function can be viewed as derivative of Heaviside step function: $\frac{d}{dx}[H(x)] = \delta(x)$,and has a fundamental property $\int_{a-\epsilon}^{a+\epsilon} f(x) \delta(x - a) dx f(a), \forall \epsilon = 0$

Figure 1. Black -Scholes method Fourier pricing and Carr-Madan option pricing with one and more α dampening parameters
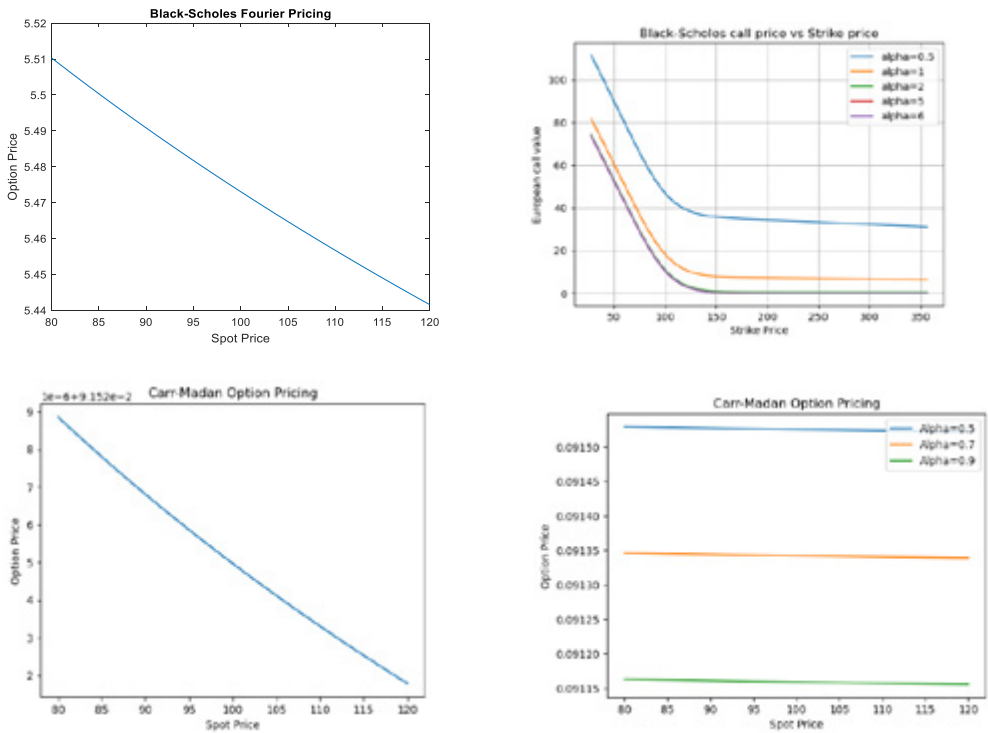
Source: Authors own calulation inPython and code available at:
https://github.com/MalutiKgarose/Option-prices-using-FFT/blob/master/FFTvsAnalytical%20Black-Scholes.ipynb

Carr-Madan (1999) model, call price is given as:$C(K,T) = \int_k^\infty e^{-rT}(e^y - e^k)f(y|x)dy$; $C(K,T) \to S(0)$; $K \to 0$; $\lor\ k \to \infty$ Parameter α is called dampening parameter.

And the call price will be :$c(k,T) := e^{\alpha k}C(K,T)$. Fourier transform of call function is: [8]

$$\varphi_{call}(v) = \int_{-\infty}^{+\infty} e^{ivk}c(k,T)dk \qquad (19)$$

---

[8] Upper bound is: $\alpha^{VG}\_\sup = -\frac{\theta}{\sigma^2} + \sqrt{\frac{\theta^2}{\sigma^4} + \frac{2}{\sigma^2 v}} - 1$ where VG is variance gamma model,

and $\alpha_{sup}^{VGGOU} = -\frac{\theta}{\sigma^2} + \sqrt{\frac{\theta^2}{\sigma^4} + \frac{2}{\sigma^2 v}(1 - \exp\left(\frac{v\beta\lambda}{1-e^{-vt}}\right)} - 1$

In the case of European call option :

$$\varphi_{call}(v) = \int_{-\infty}^{+\infty} e^{ivk} \int_{k}^{+\infty} e^{-rT+\alpha k}(e^y - e^k)f(y|x)dydk$$
$$= \frac{e^{-rT}\varphi(v - (\alpha + 1)i)}{\alpha^2 + \alpha - v^2 + i(2\alpha + 1)v}$$

When $k = \log(K)$:

$$C(k,T) = \frac{e^{-\alpha k}}{\pi} \int_0^\infty e^{-ivk} \, \varphi_{call}(v)dv \qquad (20)$$

Black-Scholes analytical formulas will help us to plot put and call surfaces here. The value of call option at time t is equal to:

$$C(S,t) = S_t e^{-qt} N(d_1) - Ke^{rt}N(d_2) \qquad (21)$$

Where :

$$\begin{cases} d_1 = \frac{\log\frac{S_t}{K}+\left(r-q+\frac{1}{2}\sigma^2\right)\tau}{\sigma\sqrt{\tau}} \\ \quad d_2 = d_1 = -\sigma\sqrt{\tau} \end{cases} \qquad (22)$$

Where S_t is the stock price at time , T is the expiration rate, τ is time to maturity, i.e. $\tau = T - t$, K is the strike price,r is the risk free interest rate . q is the dividend rate, σ is the stock volatility $\mathcal{N}$ is the CDF of cumulative standard normal distribution function defined as:

$$\mathcal{N}(x) = \frac{1}{2\pi} \int_{-\infty}^{x} e^{-\frac{1}{2}\phi^2} d\phi \qquad (23)$$

The value of a put option is given as:

$$P(S_t,t) = Ke^{-rt}\mathcal{N}(-d_2) - S_t e^{-qt}\mathcal{N}(-d_1) \qquad (24)$$

Next we are plotting Call-Value and Put-value and (S,T,v)

Figure 2. Call value , Put value and S, t, v
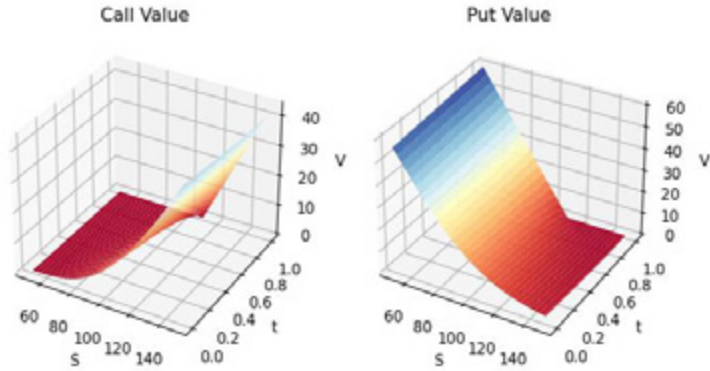
3. SABR MODEL (STOCHASTIC α, β, ρ MODEL) AND DISPLACED DIFFUSION (DD) MODELS

In this part we are taking into consideration SABR or stochastic volatility (stochastic α, β, ρ) model introduced in Hagan, P.S., Kumar, D., Lesniewski, A.S., Woodward, D.E. (2002). SDEs of the model are given as:

$$\begin{cases} dS_t = \sigma_t S_t^{\beta} dW_t \\ d\sigma_t = \sigma_t v dZ_t \\ S(0) = S_0 \\ \sigma(0) = \sigma_0 \\ \langle DW_t, dZ_t \rangle - \rho dt \end{cases} \tag{25}$$

Here S_0 is the spot asset price and σ_0 is the spot value of volatility. The other model parameters are the CEV parameter (constant elasticity of variance) β,[9] the volatility of volatility v and the correlation ρ between the Brownian motions W and Z driving the asset and the volatility dynamics. The original SABR pricing formulae is given as:

$$\sigma_{SABR}(K,T) \approx \frac{\sigma_0}{(SK)^{\frac{1-\beta}{2}}\left(1+\frac{(1-\beta)^2}{24}\log^2\left(\frac{S}{K}\right)+\frac{(1-\beta)^4}{1920}\log^4\left(\frac{F}{K}\right)+..\right)} \frac{z}{x(z)} \left(1 + \left(\frac{(1-\beta)^2\sigma_0^2}{24(SK)^{1-\beta}} + \frac{\rho\beta v\sigma_0}{4(SK)^{\frac{1-\beta}{2}}} + \right.\right.$$

$$\left.\left. v^2\frac{2-3\rho^2}{24}\right) T + \cdots\right) \quad (26)$$

Where $= \frac{\frac{v}{\alpha}(fK)^{\frac{1-\beta}{2}}\log f}{K}$; and $x(z) = \log\left\{\frac{\sqrt{1-2\rho z+z^2}+z-\rho}{1-\rho}\right\}$ for the special case of ATM (at the money) options :

$$\sigma_{ATM} = \sigma_B(f,f) = \frac{\alpha}{f^{(1-\beta)}}\left\{1 + \left[\frac{(1-\beta)^2}{24} + \frac{\alpha^2}{f^{2-2\beta}} + \frac{1}{4}\frac{\rho\beta\alpha v}{f^{(1-\beta)}} + \frac{2-3\sigma^2}{24}v^2\right]t_{ex} +.\right\}$$

$$(27)$$

See [Hagan, P.S., Kumar, D., Lesniewski, A.S., Woodward, D.E. (2002)](#) . Next we will graphically depict SABR model with implied volatility : $d S_t = r S_t dt + \boldsymbol{\sigma} S(t)dW(t)$, and
σ is implied volatility, and $\sigma \approx I^0(x)(1 + I^1(x)\tau) + O(\tau^2)$; where:

$$I^0(x) = \begin{cases} \alpha K\beta^{-1} \; ; x = 0 \\ \frac{xa(1-\beta)}{S^{1-\beta}-K^{1-\beta}} \\ vx\log\left(\frac{\sqrt{1-\rho z_1+z_1^2}+z_1-\rho}{1-\rho}\right); \beta = 1 \; ; \\ x\log\left(\frac{\sqrt{1-\rho z_1+z_1^2}+z-\rho}{1-\rho}\right); \beta < 1 \end{cases} \quad (28)$$

---

[9] Constant elasticity of variance (CEV)model is a stochastic volatility model that attempts to capture stochastic volatility and the leverage effect. The standard CEV model : $dS_t = \mu S_t dt + \sigma_{cev} S_t^\beta dW_t, S(0) = S_0$.This model is due: [Schroder, M. (1989)](#) and [Andersen, L. ,Andreasen, J.(2000)](#), see [Kienitz, Wetterau (2012)](#)

And $I^1(x) = \frac{(\beta-1)^2}{24}\frac{\alpha^2}{(SK)^{1-\beta}} + \frac{1}{4}\frac{\rho\beta\alpha v}{(SK)^{\frac{1-\beta}{2}}} + \frac{2-3\rho^2}{24}v^2$ and where $z_1 = \frac{vx}{\alpha}$; $z = \frac{v}{\alpha}\frac{S^{1-\beta}-K^{1-\beta}}{1-\beta}$

Figure 3. Call prices and implied volatility SABR and OTM, ATM,ITM
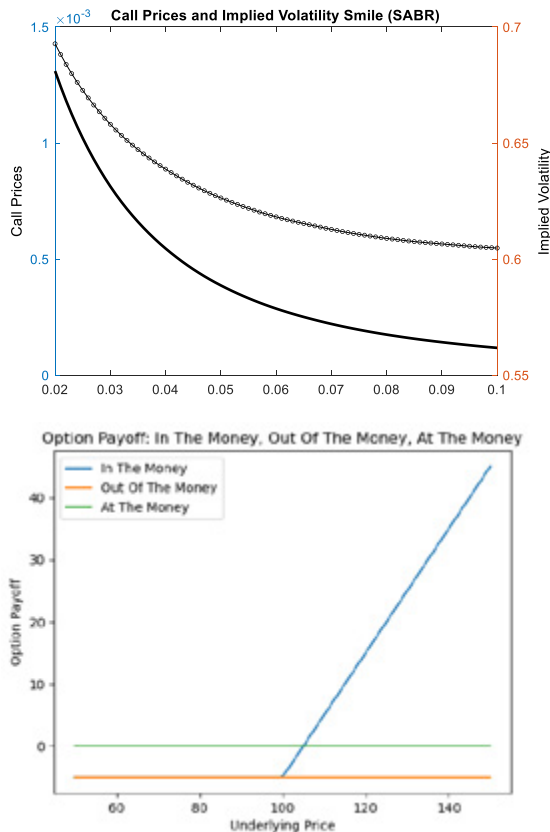
Source: Author's calculations and code provided by :
https://de.mathworks.com/matlabcentral/profile/authors/3467507
DD model had been presented by Rubisntein (1983).

DD model can be presented in following manner:

$$DS_t = \mu(S_t + a)dt + \sigma_{DD_t}(S_t + a)dW_t; S(0) = S_0 \qquad (29)$$

The only parameter different than the standard Black-Scholes(1973) model is $a > 0$. This is called displacement parameter hence the name of the pricer. Pricng formulae in DD model is given as see also Rebonato (2002):

$$C(K,T) = e^{-rT}\big((S(0) + a)\mathcal{N}(d_1) - K^*\mathcal{N}(d_2)\big)$$
$$P(K,T) = e^{-rT}\big(K^*\mathcal{N}(-d_2) - (S(0) + a)\mathcal{N}(-d_1)\big) \tag{30}$$

Where $K^* = K + a$ and where :

$$d_1 = \frac{\log\left(\frac{S(0)+a}{K^*}\right)+\frac{\sigma_{DD}^2}{2}T}{\sigma_{DD}\sqrt{T}}; d_2 = d_1 - \sigma_{DD}^2 T \tag{31}$$

For time dependent volatility we replace σ_{DD}^2 with $v_{DD}^2(t_0, t_1) :=$ $\int_{t_0}^{t_1} \sigma_{DD}^2 u(du)$,parity between Black-Scholes and DD model means : $C_{DD}(K,T) = C_{BS}(K,T)$. Rebonato (2004) shows that European call option ATM (at the money) prices can be recovered reasonably:

$$\sigma_{DD} \approx \frac{S_0}{S_0+a}\sigma_{BS}\frac{1-\frac{1}{24}\sigma_{BS}^2 T}{1-\frac{1}{24}\left(\frac{S_0}{S_0+a}\sigma_{BS}\right)^2 T} \tag{32}$$

Here as in Marris(1999) and Rubinstein (1983), Geske (1977), arbitrage pricing mechanism leads to European option call formula: $E[ae_t^W S_0 + bS_0 - K]^+$;[10] which resembles Cox, Ross (1976): $E[e^z S_0 - K]^+$ and now the analytical solution as an adjustment to Black-Scholes formula is:
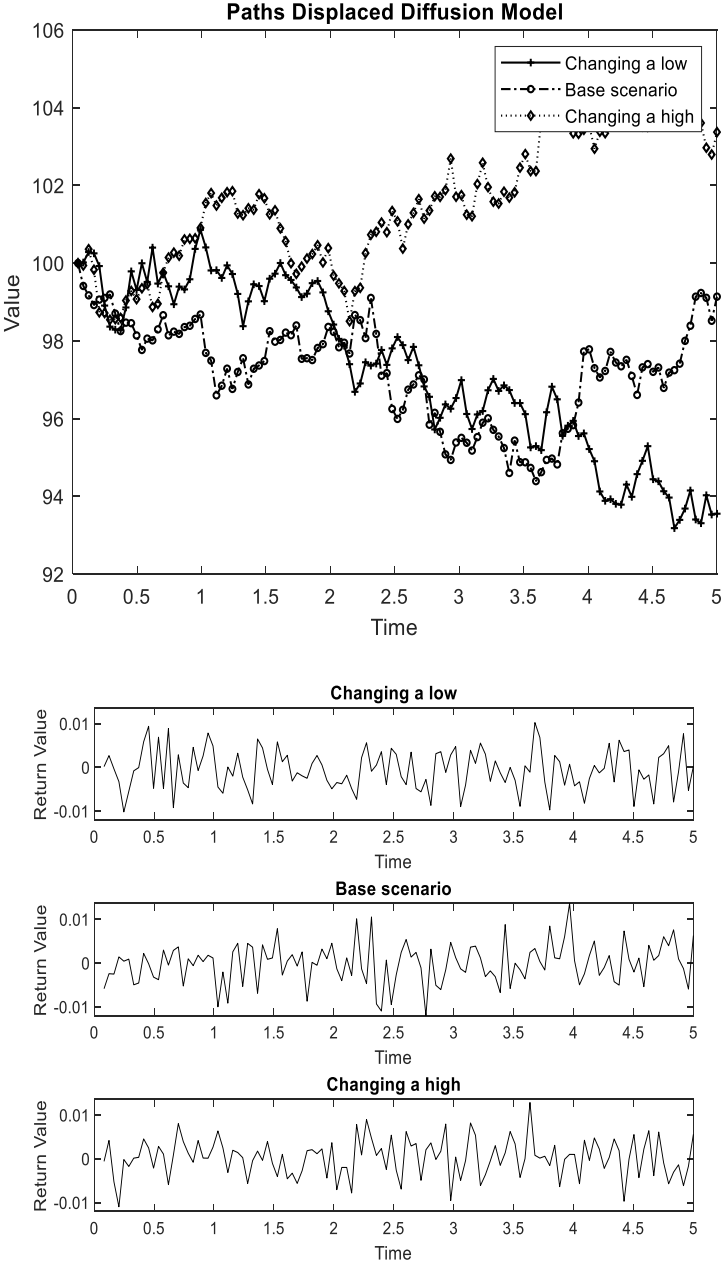
$$PV_{eurocall}(S_0, K, t, r, \sigma) \to PV_{eurocall}(aS_0, K - bS_0, t, r, \sigma_r) \tag{33}$$

Rubinstein (1983) requires debt to be riskless which means $\alpha < 1$,if so firms debt will not exceed firms riskless assets, which is opposite from $\alpha > 1$ where firm's debt exceed its riskless assets see Hull (1997). Next we are plotting DD model and DD SABR model.
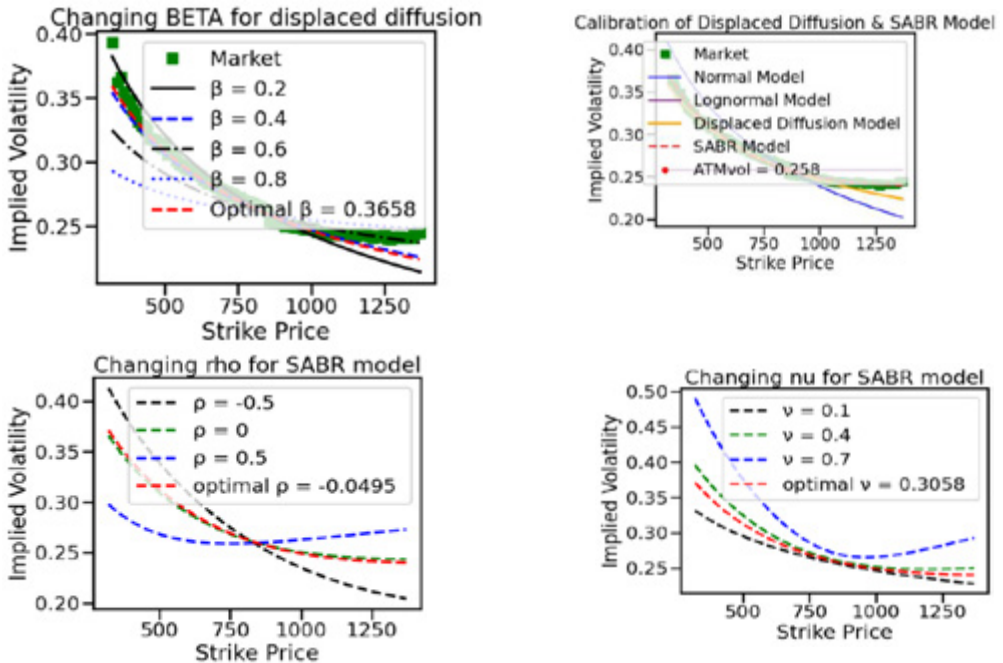
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[10] Here also: $a = \alpha(1 + \beta); b = (1 - \alpha - \alpha\beta)r$, where α are risky assets, $\beta = \frac{debt}{equity}$

Figure 4. DD model for different $\alpha \in (0.0, 50, 100)$

Figure 5. DD SABR model, with changing β; ρ; ν

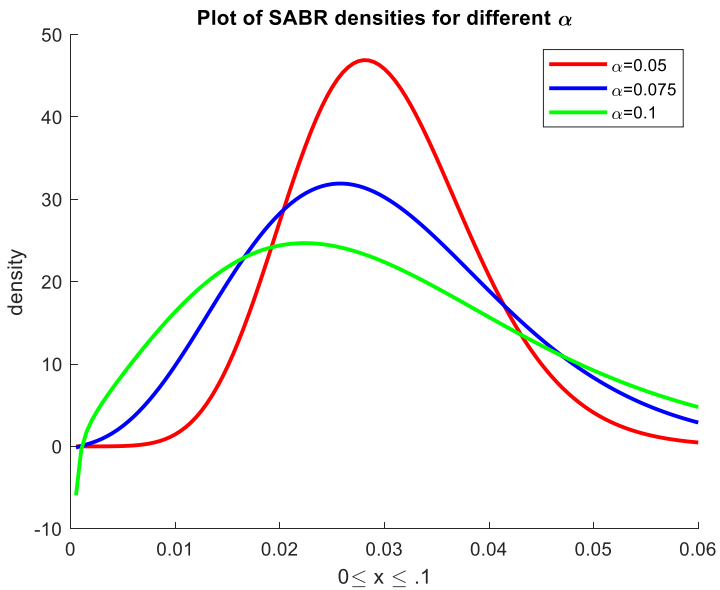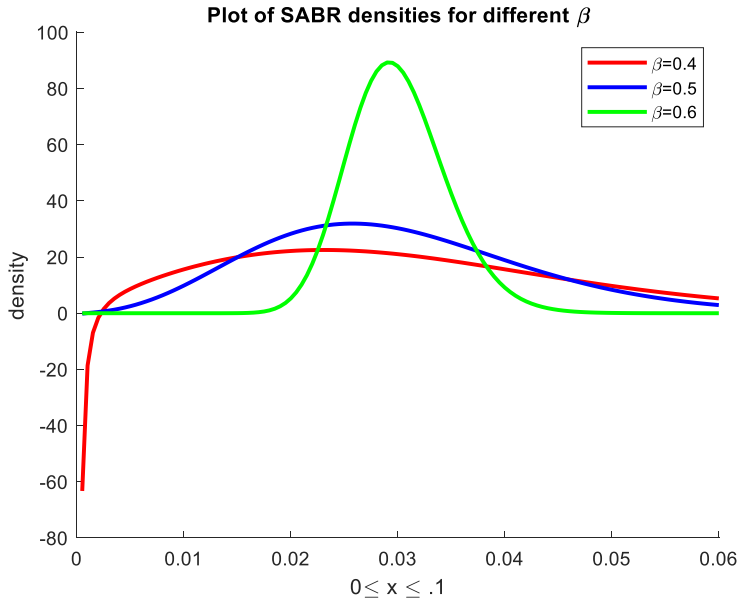https://github.com/Mordant-Black/options_SABR_model/blob/master/Volatility%20Smile.ipynb

Model Parameters

1) σ: 0.25827414878228955, β: 0.3657704004978997 2) α: 7.468394914810275 , ρ: -0.049519209180403284 , ν: 0.30576503781656666

If $\beta = 0$ model is stochastic normal, when $\beta = 1$ model is stochastic lognormal. Next we are plotting CDF's for SABR for different ρ, ν, β, α

Figure 6. CDF's SABR for different ρ, ν, β, α

Plot of SABR densities for different ρ

Plot of SABR densities for different ν

Source : Author's own calculation based on a code provided at:
https://de.mathworks.com/matlabcentral/profile/authors/3467507
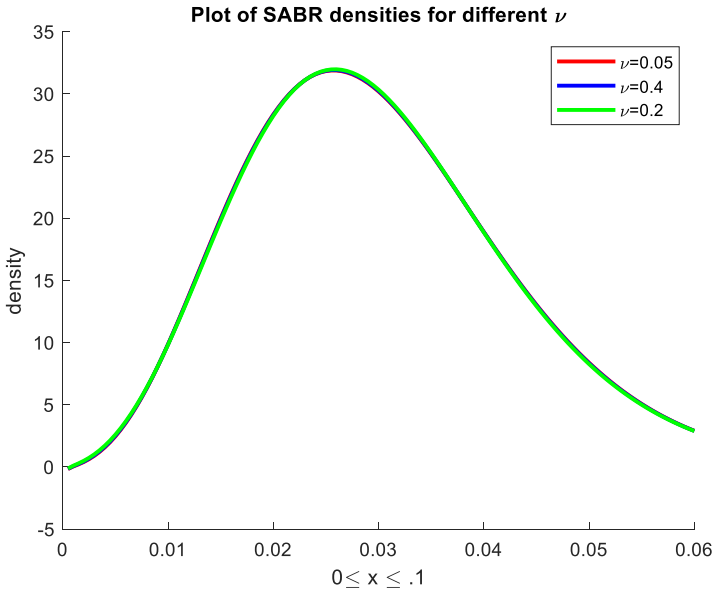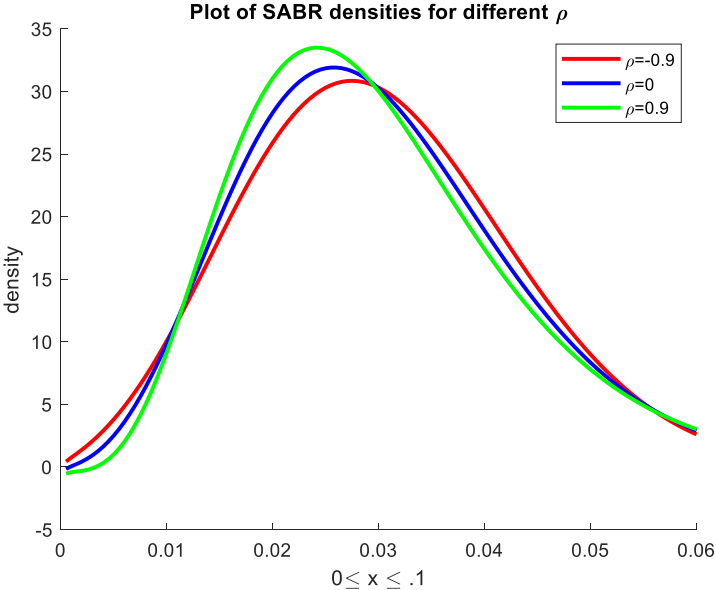
4. IMPLIED VOLATILITY: NEWTON-RAPHSON METHOD

In the Newton's method the algorithm can be applied iteratively to obtain: $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_{n-1})}$,if $\lim_{x_{n+1} \to x^*} \frac{f(x_n)}{f'(x_n)} = x_n$, and $x_n = x^* + \epsilon_n$,where $\epsilon_{n+1} = \frac{f''(x^*)}{2 \cdot f'(x^*)} \epsilon_n^2$ .Fixed point theorem states that if $\exists f(x) \in [a, b]$,then $\exists x \in [a, b]$, and $f(x) - x = 0 \Rightarrow f(x) = x$, see [Rosenlicht (1968)](#).In our case let V_m denotes the market price of an option,$V_{BS}(\sigma)$ is a price of an option obtained by Black-Scholes model we should have a goal to find volatility σ_I such that : $V_m = V_{BS}(\sigma_I)$ .Now we will use Newton-Raphson technique the initial guess of implied volatility is σ_I^0 afterwards with each step iteration we will improve the result: $\sigma_I^{n+1} = \sigma_I^n + \frac{V_m - V_b(\sigma_I^n)}{v(\sigma_I^n)}$ and:

$$v = \frac{\partial V_b}{\partial \sigma} = S_t \sqrt{T - t} e^{-q(T-t)} \frac{1}{\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{\log\frac{S_t}{K} + (r - q + \frac{\sigma^2}{2})(T-t)}{\sigma\sqrt{T-t}}\right)^2\right]$$

(34)

v is the vega of the option.S_t is the stock price at time t, K is the strike price r is the risk-free rate and q is the dividend rate. Or formally the procedure is defined as:

$$\sigma_{n+1} = \sigma_n - \frac{\mathcal{N}(d_1)S - \mathcal{N}(d_2)Ke^{-rT} - C^*(S,T)}{S\mathcal{N}'(d_1)\sqrt{T}} \ s.t.$$
$$d_1 = \frac{1}{\sigma\sqrt{T}}\left[\ln\left(\frac{S}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)T\right]; d_2 = d_1 - \sigma\sqrt{T}$$

(35)

Next we are plotting volatility smile (implied volatilities computed and given)

Figure 7. Volatility smile (implied volatilities computed and given)
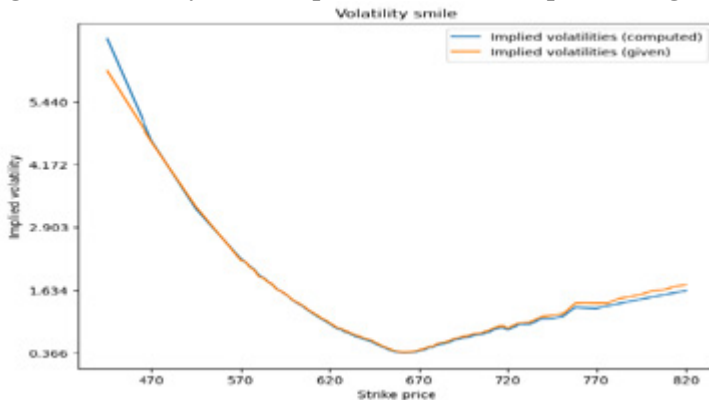
Source: Author's own calculation based on a code provided at:
https://github.com/woutervanheeswijk/Implied_volatility_calculator

5. HESTON MODEL

Heston model is due to [Heston (1993).](#)In this model spot asset at time t follows diffusion:

$$dS(t) = \mu s dt + \sqrt{v(t)} S dW_1(t)$$
$$dv(t) = k\big(\Theta - v(t)\big)dt + \sigma_v\sqrt{v(t)}dW(t)^2 \tag{36}$$

In previous $\mu = r - q$; W_1 is a Wiener process,the square of volatility follows a CIR process [Cox.Ingersoll.Ross model (1985).](#) [11] In previous following symbols have this meaning:

r is the continuous risk-free rate,q is the continuous dividend yield,$S(t)$ is the asset price at time t, vt is the asset price variance at time t , v_0 is the initial variance of the asset price at $t = 0$ for $(v_0 > 0)$,θ is the long-term variance level for $(\theta > 0)$. κ is the mean reversion speed for the variance for $(\kappa > 0)$,σ_v is the volatility of the variance for $(\sigma_v > 0)$,p is the correlation between the Weiner processes W_t and W_t^v for $(-1 \leq p \leq 1)$.

---

[11] CIR model follows process where the short-rate is assumed to satisfy the following differential equation:$dr(t) = k\big(\theta - r(t)\big)dt + \sigma\sqrt{rt}dw(t)$, where $k, \sigma, \theta > 0$ with $2k\theta > \sigma^2$ and w is an Brownian motion under risk-free measure. In the CIR model the price of a zero-coupon bond with maturity T at the time $t \in [0,T]$ is given as :$P(t,T) = A(t,T)e^{-r(t)B(t,T)}$,where $A(t,T) = \left(\dfrac{2he^{\frac{(h+k)(T-t)}{2}}}{2h+(h+k)(e^{h(T-t)}-1)}\right)^{\frac{2k\theta}{\sigma^2}}$; $B(t,T) = \dfrac{2(e^{h(T-t)}-1)}{2h+(h+k)(e^{h(T-t)}-1)}$; $h = \sqrt{k^2 + 2\sigma^2}$

Table 1 Characteristic function Heston model

Characteristic function Heston	$f_{Heston_j}(\phi) = \exp\big(C_j + D_j v_0\big) + i\phi \ln S(t)$
Elements of characteristic function (1)	$C_j = (r-q)i\phi\tau + \dfrac{k\theta}{\sigma_v^2}\bigg[(b_j - p\sigma_v i\phi + d_j)\tau$ $- 2\ln\left(\dfrac{1 - g_j e^{\wedge}(d_j\tau)}{1 - g_j}\right) n\bigg]$
Elements of characteristic function (2)	$D_j = \dfrac{b_j - p\sigma_v i\phi + d_j}{\sigma_v^2}\left(\dfrac{1 - e^{d_j\tau}}{1 - g_j e^{d_j\tau}}\right)$
Elements of characteristic function (3)	$g_j = \dfrac{b_j - p\sigma_v i\phi + d_j}{b_j - p\sigma_v i\phi - d_j}$
Elements of characteristic function (4)	$d_j = \sqrt{(b_j - p\sigma_v i\phi)^2 - \sigma_v^2(2u_j i\phi - \phi^2)}$
Inverted characteristic function CDF	$P_j(x, v, T; \ln K) = \dfrac{1}{2} + \dfrac{1}{\pi}\int_0^\infty Re\left[\dfrac{e^{-i\phi \ln K} f_j(x, v, T; \phi)}{i\phi}\right] d\phi$
Call(K)	$Call(K) = S(t)e^{-q\tau}P_1 - Ke^{-r\tau}P_2$
Put (P)	$Put(K) = S(t)e^{-q\tau}P_1 - Ke^{-r\tau}P_2 - Ke^{-r\tau} - S(t)e^{-q\tau}$

Source : see Heston (1993) , Kienitz, Wetterau (2012) and Albrecher et al .(2012)

Next on the following figure we present Heston model with implied volatility and moneyness.[12]
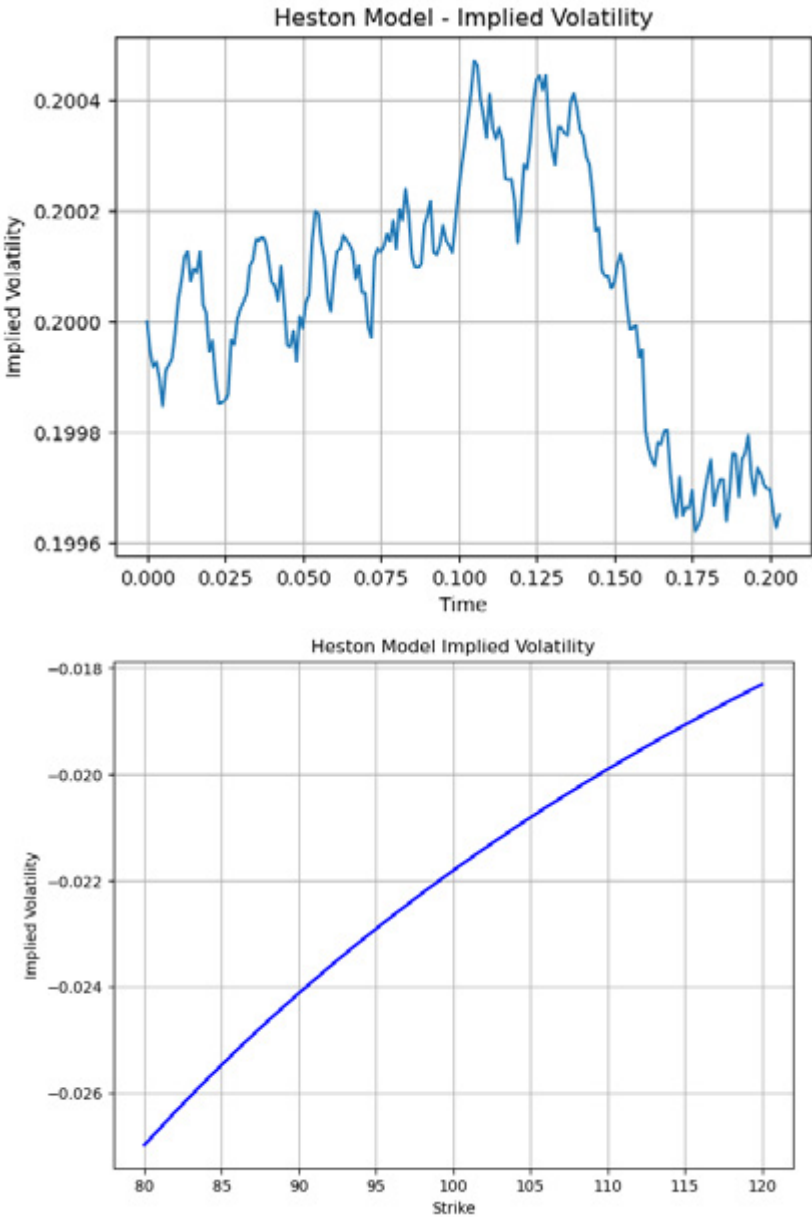
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[12] Moneyness is description of a derivative relating its strike price to the price of its underlying asset

Figure 8. Heston model with moneyness
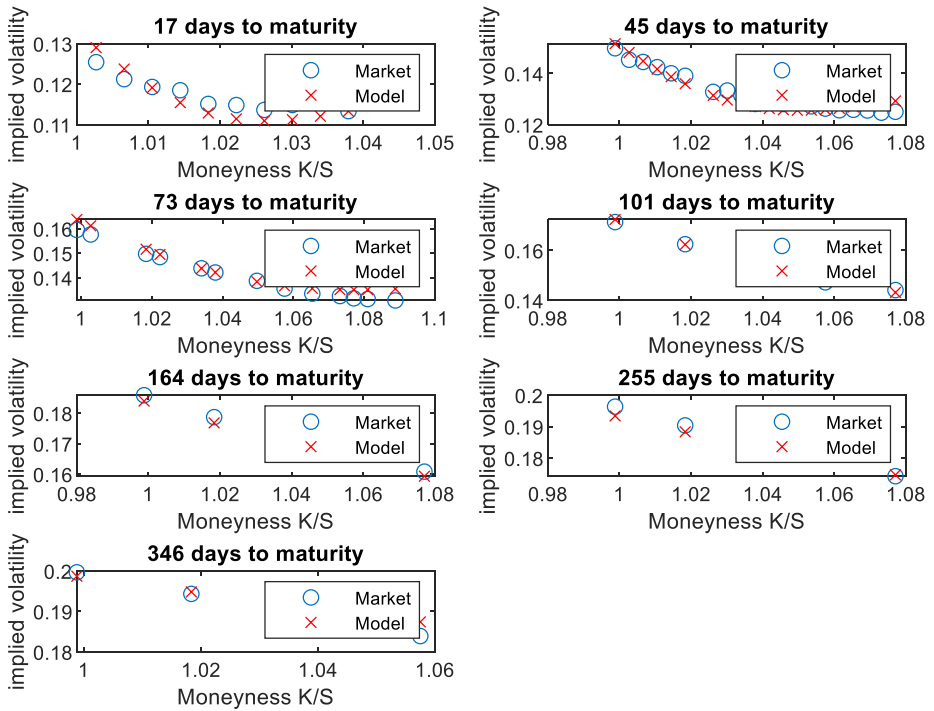
next we will graphically depict movement of Heston's model implied volatility and $dt = \frac{T}{N}$ time,
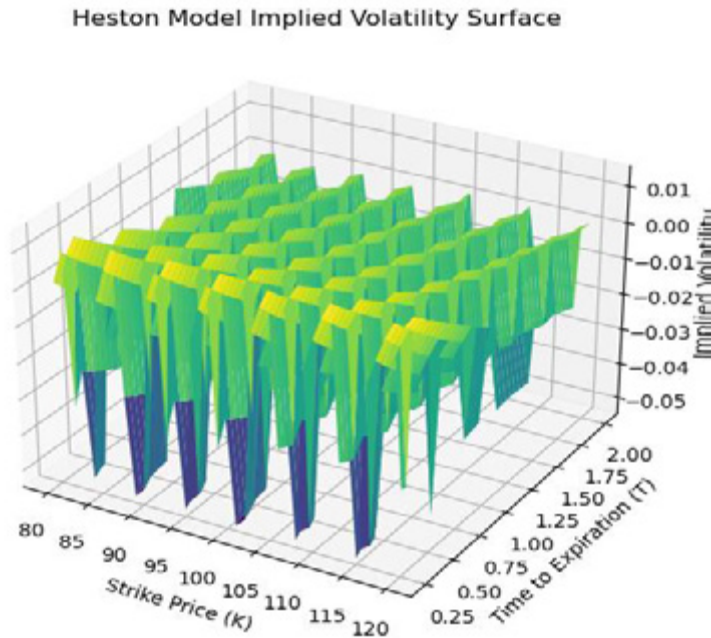
Figure 9. Heston model implied volatility and time and Heston model implied volatility and strike price

Source : Authors own calculation

Parameters on the Heston model implied volatility are: $r = 0.05$ risk free rate , $\kappa = 2.0$ mean reversion speed, long-term variance $\theta = 0.04$; volatility of volatility $\sigma = 0.3, \rho = -0.5$ correlation between asset price and volatility, $v_0 = 0.04$ initial volatility, $S(0) = 100$ initial asset price , $N = 1000$ number of time steps, M=1000, Montecarlo paths and parameters for the Heston implied volatility and Strike price are : $\kappa = 2.0; \theta = 0.04; \sigma = 0.3; \rho = -0.8; v_0 = 0.04, r = 0.05, S(0) = 100; K = 100, T = 1$. Previous two graphs can be plotted in one mesh graph

Figure 10. Heston model implied volatility (IV) surface

Source : Authors own calculation

$v_0 = 0.04, r = 0.05, S(0) = 100; K = 100, T = 1, \kappa = 2.0, \theta = 0.04, \sigma = 0.5, \rho = -0.5, S(0) = 100; K = 100, T = 1$

6. Conclusion

This paper confirmed that when it comes to market and model comparison this paper concludes that SABR model, Displaced diffusion (DD) model and Heston model are very close to market results. When it comes to implied volatility and strike price (SABR, DD) and Heston model are better when compared implied volatility with moneyness (strike price /spot price K/S).When β is optimal SABR implied volatility and strike price movements are almost identical to market. In the Heston model for all the levels of moneyness implied volatility is almost identical to actual market volatility or realized volatility. Black-Scholes Fourier pricing and Carr-Madan option pricing proved that there is an inverse relation between striker option prices and spot prices. In the Black-Scholes method the higher α i.e. the risky asset the lower is the value of European call option. A European option is a financial contract that gives the holder a right but not an obligation to buy and sell the underlying asset from the writer at the time of expiry for a pre-determined price. Displaced Diffusion (DD) models are capable of modelling skewed implied volatility structures. In the DD model for different $\alpha \in (0.0, 50, 100)$ paths generated by the model are continuous since the stochastic driver is a Brownian motion. This model showed that volatility is timely dependent.

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