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Elena P. Stanoevska and Besiana Dauti

International Balkan University, Skopje, Republic of North Macedonia, https://orcid.org/0000-0001-9618-3179

International Balkan University, Skopje, Republic of North Macedonia, https://orcid.org/0009-0001-3697-1189

Correspondence concerning this article should be addressed to Elena P. Stanoevska, Email: elena.parnardzieva@ibu.edu.mk

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Elena P. Stanoevska and Besiana Dauti

Abstract

Within the bricks and mortar economy, organizations focused more on profitability and require managers who can design and implement strategies over time. Nowadays, within the digital economy, e-business-oriented organizations focus on competitiveness and customer satisfaction, requiring astute leaders. Leaders who rely on intellectual or knowledge resources to initiate and implement a new set of company aims based on e-business initiatives. Leaders who can develop organizational cultures, ethics, and teams that can realize the potential of cutting-edge technology (the Internet of Things, Artificial Intelligence) for their business.

Investing in technology is important, but the critical success factor is getting people to use it effectively. Not every manager is a leader. Managers, as good leaders, should link competencies and resources within the organization to create and sustain a competitive advantage. Incumbent managers as leaders must maximize the e-space available within the organization by developing strategies for shaping culture and ethics that can operate effectively in the new environment. In this direction, the main goal of the paper is through surveying, descriptive analyses and by using practical case studies, to demonstrate leaders' role in cultivating culture and ethics within the organization. Moreover, the paper elaborates how, thanks to skillful leaders, famous and successful organizations try to create organizational culture and ethics that are aligned with their goals for success.

Key words: leaders, organizational culture, organizational ethics

Introduction

When asking what a leader is, most scholars would try to explain something along the lines of "someone who influences others," or they might use another word like one who "guides," "inspires," or "motivates" others. According to Maxwell (2022), leaders should possess several essential characteristics. They should serve as models for others and work to strengthen their own personal values. Effective leaders inspire a common vision by envisioning the future and conveying that vision with enthusiasm, which influences others. They should also encourage others to take action and be willing to accept challenges. Furthermore, leaders seek out and take advantage of opportunities, experiment with new approaches, and are willing to take risks. Promote cooperation, empower those around them, and recognize and reward the contributions of others. Finally, astute leaders celebrate shared values and victories. (Maxwell, 2022)

True leaders should not create separation among people. Instead, they should bring employees in the organization together. They should have vision, function with giving hope and support, and build integrity and collaboration within the organization. Indeed, those are important aspects of being a leader, so it is no surprise that two important things that a leader can influence, among many others, are the organizational culture and ethics.

When trying to understand culture and ethics within an organization, one could think of people's personal culture and ethics. Just like individuals who have their own culture with specific values, beliefs, and traditions, so do organizations, and just like individuals who follow their own ethical rules and principles, so do organizations.

This research paper examines in more detail the role that leaders play in shaping organizational culture and ethics. Through practical case studies, the main goal of the paper is to explore and answer the following research questions: Why are leaders important for the organization? How do leaders shape organizational culture? How do leaders shape ethics within the organization?

Research Methodology

The primary goal of the paper is to demonstrate the importance of leaders in today's world in shaping organizational culture and ethics as a prerequisite for organizational success. The methodology applied in this paper is descriptive. During

the research surveying, inductive and deductive methods, as well as analysis and synthesis methods, were applied. For the preparation of this paper, case studies and secondary sources (research papers, reports, journals, expert opinions, blogs, and websites) for analytic and field research were consulted. The Internet was used as a major tool to approach data and literature. Figures have also been employed for visual presentations during the research.

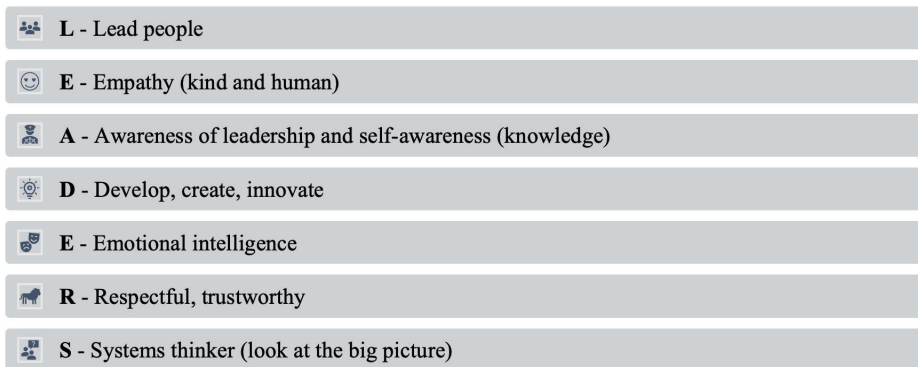
The Importance of the Leader for the Organization

According to Daft (2017), a leader is someone who influences their followers to achieve their shared goals and purposes. Someone who provides direction in the form of a vision, taking into account the challenges and opportunities that can arise and the strategies that will be needed to achieve that vision. A leader is a person who inspires and motivates others to achieve organizational goals. A leader is someone who creates change within an organization and promotes innovation rather than maintaining things as they are (Daft, 2017).

When one tries to define the term leader, the question arises: What kind of traits do leaders typically have? This is a topic that has been studied a lot. Generally, there are five common traits that effective leaders tend to have: optimism, self-confidence, honesty and integrity, and drive. Optimism means that leaders tend to look for the positive in situations, even when others might see a challenge, leaders see the opportunity. Self-confidence means that leaders believe in their own skills, ideas, and ability to make decisions and judgments. Honesty and integrity mean that leaders should be ethical – they should be truthful and non-deceptive, and act according to ethical principles. Drive means that leaders are motivated to put in a lot of effort, they are ambitious, and are concerned with achieving what they want (Daft, 2017). Moreover, anyone who possesses traits listed in Figure 1 below can be regarded as a true leader.

Figure 1:

Characteristics of true leaders



A leader can influence many things in an organization: the objectives of the organization and the strategies to achieve them, how the employee of the organization will be motivated to achieve those objectives, the collaboration among employee, the organization and coordination of the activities, the training and development of the employees, how resources are allocated, the shared beliefs and values of the organization (the organizational culture), the formal structure and systems, and many more (Yukl, 2012).

Leaders are extremely important for an organization for many reasons.

Firstly, leaders not only have a vision for the organization, but they also successfully communicate that to the members of the organization and guide them into achieving it and make sure that everyone is putting their efforts toward the same purpose (Goodbread, 2023).

Secondly, effective leaders create value for the organization by directing all members of the organization to work towards the same objective, ensuring that everyone is productive and efficient (Goodbread, 2023).

Thirdly, leaders introduce change and explain to their followers why change needs to happen and how it can happen (Baker, 2023).

Fourthly, they create a positive working environment in which they encourage their employees and allow them to contribute (Baker, 2023).

Fifthly, leaders should care about their employees, listening to their needs, showing appreciation and acknowledgment of their efforts to them, and providing guidance whenever necessary (Baker, 2023).

All of this can have an impact on the organization's performance – by providing clear direction of what employees should be doing, it is easier to track and monitor their performance and progress (Goodbread, 2023) and thus identify areas for improvement. Also, by creating a positive working environment, employees will be more satisfied and productive.

On the other side, as Maxwell (2022) has emphasized, there are ten main errors in leadership: 1. Failure to provide feedback; 2. Not having time for the team; 3. Too much "hands off"; 4. Too much kindness; 5. Not defining goals; 6. Misunderstanding motivation; 7. Haste with recruitment; 8. Straying from the "True Path"; 9. Non-delegation; 10. Misunderstanding the role.

Organizational Culture

One way to understand organizational culture is that it refers to how things are done in the organization (Mullins, 2016). More broadly, organizational culture is defined as the shared values, norms, beliefs, and understandings among the members of an organization that are taught to new members as the proper way to think, feel, and behave (Daft, 2020).

According to Schein (2010), there are three levels to organizational culture:

1. Artifacts – refer to the visible aspects of an organization such as the physical environment, technology and product, language, and the way employees dress, communicate, and behave. It also includes myths and stories about the organization, the publicly stated values, and the rites and ceremonies.
2. Espoused beliefs and values – refer to the beliefs and values that are learned when someone (leader or founder) proposes a course of action based on what he or she believes to be correct (e.g., a solution to a problem being faced) and convinces the others to behave according to that. If the members of the organization act based on the leader's suggestion and they like the outcome, then this results in the creation of a shared value and belief.
3. Basic underlying assumptions – once a solution works repeatedly, it is taken for granted. The learned beliefs and values become basic underlying assumptions, which determine the way the members of an organization behave, as well as how they perceive, think and feel about the matters.

An organization's culture can be analyzed from two aspects: the degree to which the competitive environment requires flexibility or stability, and the degree to which the strategic focus and strengths of the organization are internal or external. According to this, there are four types of organizational culture (Daft, 2020):

1. Adaptability culture - The adaptability culture is associated with a strategic focus on the external environment, and an emphasis on flexibility and meeting customer needs through change. This culture encourages not only responding quickly to changes in the environment but creating change as well. Innovation, creativity and taking risks are considered very important.
2. Achievement culture - The achievement culture is associated with meeting the needs of customers, but without the need for rapid change. The organization has a clear vision about what it wants to achieve, and the goals needed to achieve it, such as sales growth, profitability, or market share. The members of the organization might have a certain level of performance that they are required to achieve, and they are rewarded for it. In some cases, achievement culture is associated with a high level of competitiveness and a focus on profit.
3. Clan culture - The clan culture is associated with a high involvement and participation of the organizational members in a rapidly changing environment. The idea behind empowering employees in this way is that it gives them a greater sense of responsibility and ownership, thus their commitment to the organization is increased. The organization is concerned with meeting the needs of the employees to make sure that they are satisfied and, as a result, they perform at high levels.
4. Bureaucratic culture - The bureaucratic culture is associated with an internal focus and a stable environment. Organizations with this culture have procedures and practices to accomplish their goals. Involvement of the members of the organization is low, while the level of consistency, conformity, and collaboration among members is high.

An organization's culture is important for several reasons. First, it shows employees how things are done in the organization, i.e., its current methods of operations and what is acceptable and unacceptable behavior (Hellriegel & Slocum, 2010). Second, employees use the shared values and norms when making decisions and when reacting to new and uncertain situations (Jones, 2012). Third, it attracts employees who either share the same values of the organization, or who at least have no problem with those values and accept them (Hitt et al., 2010). These aspects,

on the other hand, have an impact on the organizational performance - employees will perform better, and there will be achievement of the organizational goals when they accept the values of the organization and know exactly what is expected of them.

The Role of Leaders in Shaping Organizational Culture

Organizational culture is created in three ways: from the values and beliefs of the founder (the first leader), the learning experiences of the members, and the values and beliefs of the new leaders. Founders play the most important part because they have the idea about the new organization and most likely the way to achieve it, and they influence their views on their employees, which form the behavior that the new organization will exhibit as it is trying to survive (Schein, 2010). The founder expresses his ideas and values in the form of a vision, strategy, or philosophy. When the organization becomes successful, the organizational culture that is formed reflects the vision and strategy of the founder (Daft, 2020).

Leaders shape organizational culture in different ways: through rites and ceremonies, stories, symbols, and specialized language, by carefully selecting and socializing the new members of the organization, and through their day-to-day activities (Daft, 2017).

Rites and ceremonies: Organizational rites and ceremonies refer to the planned activities that are meaningful for the members of an organization (Hellriegel & Slocum, 2010) and are done for the benefit of an audience (Daft, 2017). Ceremonies are important because leaders use them to showcase the organization's values, employees can grow closer to each other by sharing stories, and employees' achievements are celebrated and rewarded (Daft, 2017).

For example, The Ritz - Carlton is a hotel brand with the motto "We are ladies and gentlemen serving ladies and gentlemen," showing the importance given to both employees and customers. Bill Marriott, Chairman of Marriott Hotels (in 1998, Marriott acquired almost whole ownership of the Ritz-Carlton), who always cares for people, has quoted: "If you take care of your employees, they in turn will take care of the customers and the company will take care of itself ". Thus, by embracing trust, honesty, respect, integrity, and commitment, The Ritz-Carlton cultivates a diverse and supportive work environment that enhances quality of life, fulfills individual aspirations, and strengthens its uniqueness for the benefit of both employees and the company. An important part of its culture is also the "Employee

Promise" and "The Promise to the Employee" to remind employees that without them, they would not have been able to establish a culture of offering outstanding services. Many rites and ceremonies are held in this organization, such as:

- Leaders Meeting where exceptional employees are recognized for their achievements and receive a "First Class" card, which provides them with a free dinner or an award. "Five Star" awards are given quarterly, through which employees receive monetary rewards.
- Annual Gala, which takes place on Halloween, and all employees and their partners are invited. Entertainment is provided and gifts are given, and more importantly, the "Employees of the Year" reward is given.
- Employees' Appreciation Week, where they can participate in various "team building activities" such as volleyball games, having meals at restaurants, barbecue in the countryside etc. (Protopapadakis & Klapanaris, 2021).

Stories: Stories, which can either be true or fake, are retold and shared among the employees of an organization. They are used by leaders to emphasize the organization's principal values (Daft, 2017). These stories can be about the founders of the organization, inspirational stories about growing up poor and becoming rich, firing and relocation of employees, dealing with past mistakes, etc. (Robbins & Judge, 2023).

For example, stories are often retold at Apple. Joel Podolny, founder of Apple University, in an interview with Delaney (2024), recalled how often people would tell him stories that they heard were told by Steve Jobs or Tim Cook (Delaney, 2024). Indeed, Steve Jobs was a great storyteller, and he used stories to inspire his employees. He often told the story of how Apple started in a garage where he and co-founder Steve Wozniak built their first computer. He also talked about Apple's near failure as a lesson to never give up and show determination (Tennant, 2025).

Joel Podolny, in the interview with Kevin J. Delainey, also mentioned that a story that he himself liked to retell was one of when Steve Jobs was leading the Macintosh team. He was preoccupied with how long it took the computer to start, so he wanted his team to reduce that time by 20 seconds. When he was told that that there are certain things that a computer needs to do when starting up and it would not be possible to reduce it, he somehow made a calculation that led him to the conclusion that reducing the time by 20 seconds would save two human lives per day (Delainey, 2024).

Symbols: Symbols refer to the physical setting of an organization and the objects within that setting, as well as people's interpretations of and experiences with the symbols (Rafaeli & Worline, 2000). An organization's symbols can be its headquarters layout, office size, the furniture, perks, dress code, etc. (Robbins & Judge, 2023).

For example, in the Google offices, employees do not work in cubicles but in open spaces, and many perks and in-house services are offered to them such as: getting a haircut, massages, swimming pools, gyms, areas to play different kinds of sport, dry cleaning, meals and snacks, etc. depending on the country where the office is located (Marcene, 2023). This goes back to the founders of Google, Larry Page and Sergey Brin, who believed that it was worth spending money on benefits provided to employees since it saves their time and makes them healthier and more productive (Alphabet Investor Relations, 2025).

However, deeper thinking goes into the office, other than just the perks. Joshua Bridie, Google's director of global interior design, and Michelle Kaufmann, Google's director of research and development for the built environment, talked to Architectural Digest and gave more insight into how Google offices are designed. Kaufmann explains how they want to create offices that are functional and vibrant for years to come, and research done on other buildings led them to the conclusion that they typically have the following attributes: high ceilings, double-height space, access to natural light, space between columns, and exposed structure. Google designers strive to create spaces for concentration, collaboration and meetings, and innovation. Bridie mentions that Google offices around the world are similar, but they are still unique in their own way, and very often the company collaborates with local design firms (McLaughlin, 2022).

Specialized language: Specialized language refers to the slogans and sayings that are used by the leaders, which can then be repeated by the employees. It also includes mission statements and other formal statements that emphasize the organization's values (Daft, 2017).

For example, "If you have a body, you are an athlete" is a saying by Nike co-founder Bill Bowerman that has shaped the organizational culture of Nike. The mission of Nike is "to bring inspiration and innovation to every athlete* in the world," and that asterisk is there because it is always followed by "*if you have a body, you are an athlete", showing how important this quote is in the company. This mission statement shows the commitment to serving athletes through innovation (Nike, 2025).

Selection and socialization: Selection refers to how the new members of an organization are hired, while socialization means how they are taught the organizational culture. Leaders act as role models to the new members and might use training programs or even rituals as tools for socialization (Daft, 2017).

For example, Zappos is a company that sells shoes, clothes, accessories, bags, etc., and has a culture based on 10 values, which, according to the company, will never change even as the company grows and its strategies change (Zappos, 2025). The importance of the culture can be seen from its interesting hiring process, which is not only about technical fit, but cultural fit as well. As part of the hiring process, the candidates have to go through two phone interviews, one about the technical aspects of the job and the other about the cultural fit, and once they pass them, they participate in a "Cultural Assessment" day. They get to see what the culture is during the tour given to them, shadowing, lunch, happy hour, and they also have a one-hour interview to make sure that the candidate possesses the core values (Trimarco, 2021).

However, it does not stop with just the hiring. In his book Delivering Happiness, founder and former CEO, Tony Hsieh, explained how every new employee, no matter their position, has to go through the same four-week training program that their call center reps do, and in two of those weeks, they have to take calls from customers. At the end of the first week, they offer the employees a payment for the training spent plus a bonus of $2,000, so they leave the company immediately. This is done in order to make the employees who only care about their paycheck leave (Rosenbaum, 2010).

Daily actions: Leaders can also shape organizational culture through their daily actions. Employees can learn by analyzing their leaders and what is important to them, what they pay or not pay attention to, what kind of behavior they praise or criticize, what they reward how they respond to and deal with organizational crises and most importantly, employees can examine whether the leaders actually possess the values that they want the employees to have (Daft, 2017; Yukl, 2012).

For example, Hastings & Meyer (2020), founder, former CEO, and now executive chairman of Netflix, strived to create a culture of flexibility, employee freedom, and innovation. He believes that in most organizations, employees, even if they are talented, cannot be given the freedom to make decisions because they do not know the company secrets, but once you create a culture filled with responsible, self-motivated, self-aware, and self-disciplined people, confidential information can be

shared with them. To inspire transparency, he tries to lead by example. This is why he does not have his own office or a cubicle with drawers that close. Throughout the day, he might use a conference room if needed; his meetings are booked at other people's workspaces, and he also likes doing "walking meetings" where he often encounters employees also conducting meetings out in the open. He also believes that leaders should be sharing everything with their employees, and they try to do this at Netflix in a process they call "sunshining" (Hastings & Meyer, 2020).

Leaders can also influence employees based on the organizational culture the organization has. In an adaptability culture, leaders allow employees to make decisions in order to meet the rapidly changing needs of the customers, and they reward innovation, creativity, and risk-taking. In an achievement culture, leaders develop specific targets that need to be achieved and reward those who achieve them (leaders value hard work and personal initiative). In a clan culture, leaders strive to create a friendly place to work, where members feel close to each other, almost like a family. They emphasize cooperation, meeting the needs of both employees and customers, and making sure that there are no status differences. In a bureaucratic culture, leaders emphasize order and following rules (Daft, 2017).

Organizational Ethics

Organizational ethics refers to the moral principles and beliefs that guide the behavior of the members of an organization when dealing with each other and with the stakeholders of the organization. These principles and beliefs show what is right and appropriate behavior, and wrong and inappropriate behavior, as well as provide guidelines as to how to act when faced with an ethical dilemma or ethical issue (Jones, 2012).

According to Jones (2012), three sources of ethical values influence organizational ethics:

1. Societal ethics, which can be part of a society's legal system, as well as reflected in a society's customs and practices, and the unwritten norms and values that people use to interact with each other. Many ethical norms and values become part of a person's own norms and values, and are instinctively followed by them, which in turn strengthens what is considered custom and practice in society when interacting with each other.
2. Professional ethics, which refer to the moral rules and principles that people follow when they perform their job or use resources. In an organization, some

employees who are expected to follow professional ethics include lawyers, accountants, and researchers.

3. Individual ethics, which are people's own personal standards on the way they interact with others. These ethics impact the actions and decisions that a person makes or does not make. People differ on what they consider ethical behavior, so these can influence how a person acts in an organization.

An ethical issue refers to when there are multiple actions that individuals, groups, or organizations have to choose between, and which must be assessed as right or wrong, ethical or unethical. An ethical dilemma refers to a situation in which there are only wrong or unethical actions that individuals, groups, or organizations can choose between (Ferrell et al., 2010). Some of the many ethical issues and dilemmas that can occur in an organization include:

1. Abusive or intimidating behavior is an ethical problem for employees, which includes many things like: physical threats, false accusations, annoying someone, swearing, yelling, insulting someone, being harsh, being unreasonable, bullying, etc. (Ferrell et al., 2010).
2. Lying, in which there are three types: joking without malice, commission lying, and omission lying. Joking without malice refers to when someone makes a joke that is not meant to be hurtful, but entertaining. Commission lying means to purposefully and knowingly lie to someone in order to deceive them and it can be in the form of lying about being at work, performing a job task, purposefully creating "noise" that will confuse the person who receives the message, complex procedures and contracts, puffery in advertising, etc. Omission lying means purposefully omitting negative information about a product, service or company, such as safety warnings, issues, etc. (Ferrell et al., 2010).
3. Conflicts of interest occur when individuals have to choose between improving their own interests, those of the organization, or those of some other group (Ferrell et al., 2010). Typically, an individual's judgment is clouded because there are financial gains or other gains for the individual making a decision or for someone close to them, such as a family member or friend (Treviño & Nelson, 2017).
4. Bribery which is the process of offering something to someone to obtain some kind of advantage (Ferrell et al., 2010). Bribes can be in the form of overt bribes, which include money or something else of value, or they can be in the form of subtle bribes, which include gifts or entertainment (Treviño & Nelson, 2017).

5. People issues, which refer to issues that happen when people work together, and can be in the form of discrimination, sexual (or other) harassment, and the way people interact with each other (Treviño & Nelson, 2017).
6. Fraud, which means intentionally misleading or hiding facts to create a misconception. It can be in the form of stealing office supplies, lying about working extra hours, stealing money, stealing the products of the company, accounting fraud (incorrect information in an organization's financial reports), market fraud (false information regarding how an organization's products are produced, distributed, promoted and priced), etc. (Ferrell et al., 2010).
7. Use of resources, which means employees should use company resources in a responsible manner (Treviño & Nelson, 2017).
8. Customer confidence issues which are related to confidentiality, truth in advertising, product safety and effectiveness, and special fiduciary responsibilities (Treviño & Nelson, 2017).

Ethics is very important for an organization because it provides many benefits such as: employee commitment, investor trust, customer trust and satisfaction, and better financial performance (Ferrell et al., 2010).

The Role of Leaders in Shaping Organizational Ethics

Leaders play a crucial role in shaping ethics as well. They act as role models to their followers and lead by example. Ethical leaders are not too preoccupied with their own desires and interests; rather, they care about the well-being of their employees, customers, and society as a whole. They are honest with their employees, partners, customers, and shareholders and strive to fulfill the agreements and commitments that they have made. They share success with their followers but also take the blame for failures. They help their followers achieve their full potential and allow them to participate in the decision-making process. They speak out against any behavior that they consider wrong (Daft, 2017). A great leader should create more leaders (Taxila Business School, 2025). As Sinek (2009) has stated, when someone tells people what to do, he or she creates workers, but when someone trusts the people to do their job, they create leaders.

Leaders can also ensure ethical behavior through the organizational system and policies, such as implementing open-door policies that encourage employees to speak their minds and give opinions without any fear, creating a code of ethics, re-

warding ethical conduct, and punishing violations of ethics. Most companies have a code of ethics or a list of ethical values to ensure ethical behavior, and some might hire a chief compliance officer (Daft, 2017).

A code of ethics is part of an organization's code of conduct, which shows how the organization expects its employees to behave. A code of ethics defines the structure for due process and how violations should be reported and punished (Ferrell et al., 2010).

For example, under the leadership of CEO Shantanu Narayen, Adobe has been recognized as an inclusive, innovative, and great place to work at (Gomes, 2024). Adobe is committed to being ethical by following six core principles: integrity, respect, honesty, quality, responsibility, and fairness (Adobe, 2025). Adobe's Code of Business Conduct provides principles about how everyone at Adobe, including the Board of Directors, regular employees, temporary employees, contingent workers, and interns, is expected to behave. Compliance with this conduct is expected every time they are conducting work for Adobe, representing the company, or when participating in company-sponsored events. There are many things discussed in this document, including creating a safe, creative, and productive work environment as well as:

- Adobe doesn't tolerate discrimination and harassment based on people's characteristics like: race, ethnicity, color, gender, gender identity or expression, age, disability, marital status, sexual orientation, etc.
- Adobe prohibits the use of illegal drugs, the inappropriate use of lawful medication and recreational drugs, the use of tobacco, and the possession of dangerous weapons.
- Adobe expects its personnel to use company assets only for legitimate business functions and for personal purposes allowed by Adobe policies.
- Confidential information should be protected, and this includes both information about Adobe and information provided to Adobe by third parties. Information should only be provided if the personnel are authorized by Adobe or when talking to government authorities in accordance with the law.

Additionally, other things discussed in the Code of Business Conduct include: acting according to the company values, how to report violations of this code, individual conduct, business relationships, compliance with the law, violations, waivers, responsibility, and related documents (Adobe Code of Business Conduct, 2024).

Conclusion

Leaders should strive to create a climate where employees love to work and are treated fairly. Employees are the organization's most important and invaluable assets, so they need to enjoy a working environment where they can thrive and be the most productive. As many studies have confirmed, along with capital and technology, employees are the third most important pillar within every organization.

The iceberg of ignorance (executives and team managers barely see around ten percent of the organization's problems) reveals that while the company leaders are hardly aware of any of the organization's real problems, employees (staff) detect and become aware of almost all real problems the organization faces. Building organizational culture and creating a functional work ethic can be useful and powerful tools to overcome the dismal state of the modern workplace and to melt the iceberg of ignorance.

The presented practical examples demonstrate how famous and successful organizations try to create organizational culture and ethics that align with their goals for success. Leaders possess a crucial role in those efforts.

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Era Memeti, Selbije Memeti Karemani, Blerta Abazi Chaushi

South East European University, North Macedonia

University of Tetova, North Macedonia

South East European University, North Macedonia

Correspondence concerning this article should be addressed Era Memeti. Email: eramemetiii5@gmail.com

BALKAN JOURNALS

Era Memeti, Selbije Memeti Karemani, Blerta Abazi Chaushi

Abstract

This paper investigates the macroeconomic drivers of economic stability in North Macedonia by applying a time series econometric framework based on Vector Autoregression (VAR) and Granger causality analysis, covering the period from 2000 to 2023. Key variables include GDP growth, inflation, money supply (M1), interest rate, unemployment, government budget balance, and current account balance. After testing for stationarity using the Augmented Dickey-Fuller (ADF) test, a VAR model with two lags was estimated, followed by Granger causality tests to identify predictive linkages.

The results reveal dynamic interdependencies, showing that monetary aggregates (M1) and fiscal balances significantly influence both GDP and inflation, underscoring the critical role of policy levers. Moreover, labor market conditions and external balances contribute to short-run macroeconomic outcomes. Granger causality tests highlight money supply as a leading indicator, while interest rates show responsiveness to inflation and unemployment, consistent with the Taylor Rule. These findings offer valuable insights into the policy transmission mechanism and provide a basis for improved economic forecasting and macroeconomic management in small open economies.

Keywords: Economic stability, monetary policy, inflation, VAR model, Granger causality, North Macedonia

Introduction

A country's economic stability depends on how well the economy can handle changes, recover from shocks, and create the conditions for steady growth. For North Macedonia, as a small and open economy with strong ties to European markets, this issue is especially important. The country has gone through significant transitions, political, structural, and economic, and today faces both opportunities and challenges as it works toward EU integration. Therefore, this paper focuses on some of the most important pieces of the economic puzzle, such as GDP growth, inflation, unemployment, the government budget, money supply, current account balance, and interest rates.

The selected macroeconomic indicators portray important economic developments of the country. Unemployment data and trends provide a picture of how well the labor market is working, whether people can find jobs, and whether those jobs are stable and productive. Inflation shows whether prices are rising too fast, which affects everyone's cost of living and the value of money. The government's budget balance describes how responsibly public money is being managed, while the money supply indicates the level of liquidity in the economy, how easy it is to borrow, invest, or spend. The current account balance reflects how much the country earns from the rest of the world compared to how much it spends abroad. And interest rates, set by the central bank, are a key tool for influencing economic activity, investment, and inflation. Moreover, these specific indicators have been selected for analysis due to their strong interconnections. A change in one can trigger changes in the others. For example, higher inflation can lead to higher interest rates, which can slow down borrowing and investment, affecting employment and economic growth. By studying these links over time using the official data, this paper tries to uncover what drives economic stability in North Macedonia through an econometric analysis applying the VAR model and the Granger causality test.

Employment is a central pillar of macroeconomic stability, reflecting the capacity of an economy to utilize its labor force productively and inclusively (IMF, 2025). In the context of North Macedonia, employment trends offer crucial insights into the country's structural and cyclical dynamics. Following independence and the transition from a centrally planned to a market-oriented economy, North Macedonia faced severe employment challenges, including deindustrialization, labor market mismatches, and limited private sector dynamism (Mojsoska-Blazevski, 2012). Despite moderate GDP growth in the 2000s and increasing integration with European markets, employment growth remained sluggish for many years, exposing the

weakness of job creation mechanisms and the gap between economic performance and labor absorption.

North Macedonia has experienced a diverse set of macroeconomic challenges over the past three decades, including, fiscal consolidation, inflationary pressures, post-conflict recovery and efforts toward European integration. Thus, understanding the underlying drivers of economic performance and stability and inter dependences among the core macroeconomic indicators is vital for designing effective policy responses.

Literature Review

Over the past years, scholars have devoted considerable attention to understanding the key drivers of economic stability and growth in North Macedonia, often highlighting persistent structural vulnerabilities. For instance, Lazarov and Simeonovski (2023) conclude that output volatility has a significant negative effect on GDP growth, particularly in the short term, underscoring the importance of fostering consistent and sustainable growth over time. However, they find no statistically significant impact of price or fiscal volatility on economic growth, which suggests that inflation fluctuations and fiscal balance instability do not directly hinder growth in the Macedonian context. Interestingly, financial stability, particularly proxied by the capital adequacy ratio, also appears to constrain growth, indicating that overly cautious banking practices may suppress credit activity and thus economic expansion.

The paper by Ameti and Idrizi (2024) investigates the influence of inflation and economic growth on unemployment in the Republic of North Macedonia between 2017 and 2022. The authors find a negative relationship between inflation and unemployment, and similarly, a negative relationship between economic growth and unemployment. These findings are interpreted through the lenses of the Phillips Curve and Okun's Law, suggesting that increases in inflation or GDP growth contribute to reducing unemployment levels. However, the decline in unemployment is also partially attributed to high levels of emigration, especially to Western Europe, which reduces the domestic labor force. The study highlights that while certain macroeconomic policies, such as self-employment support and employment subsidies, have shown some effectiveness, the overall economic structure remains fragile. Limited foreign investment, a large informal economy, and persistent policy inefficiencies continue to hinder stability. The authors emphasize that achiev-

ing sustainable development requires a combination of inflation control, economic growth stimulation, and more effective labor market interventions.

Dauti (2024) investigates the impact of fiscal policy on economic growth in North Macedonia, focusing on the effects of government expenditure and taxation. Using annual data from 2000 to 2021 and applying an autoregressive distributed lag (ARDL) model, the study finds that government spending has a positive and statistically significant effect on long-term economic growth. Conversely, taxation is associated with a negative long-run impact, implying that high tax burdens may suppress private sector activity. In the short term, the influence of both variables appears weaker and less consistent, suggesting that fiscal interventions take time to produce tangible economic effects. The study emphasizes the importance of guiding fiscal policy through principles of efficiency, transparency, and strategic public investment, particularly in sectors that enhance productivity and employment. These findings support the case for a balanced fiscal approach that avoids excessive deficits while ensuring sufficient support for development priorities. The paper by Mojsovska (2022) provides an in-depth analysis of the key macroeconomic trends and challenges facing North Macedonia between 2016 and 2022. The author highlights that the country has maintained relative macroeconomic stability over the years, despite external shocks such as the COVID-19 pandemic and the energy crisis following the Russian invasion of Ukraine. However, the study identifies critical vulnerabilities, namely rising inflation, increased public debt, and widening fiscal deficits, as threats to future stability. Mojsovska emphasizes the importance of maintaining monetary and fiscal discipline while managing these risks, especially in times of global uncertainty.

The IMF (2025) report titled "Republic of North Macedonia: Selected Issues" addresses key macroeconomic challenges and structural vulnerabilities affecting the country's economic stability. One of the core findings is that North Macedonia's medium-term growth potential is constrained by low productivity growth, limited private investment, and labor market inefficiencies. The report stresses the importance of improving the business environment, strengthening institutions, and boosting public investment efficiency, especially in infrastructure and human capital. Additionally, the IMF underscores the growing risk posed by rising public debt and fiscal pressures. While fiscal policy has played a crucial role in mitigating recent shocks, such as the pandemic and energy crisis, the report recommends a gradual return to fiscal consolidation to preserve long-term debt sustainability. Inflation,

although moderating, remains a concern due to its impact on real incomes and inequality.

The report also highlights the need for structural reforms to enhance competitiveness, including digitalization, improved governance, and education system reform to address skills mismatches. Overall, the IMF advocates for a balanced policy mix: prudent macroeconomic management combined with targeted structural reforms to achieve sustainable economic stability and inclusive growth in North Macedonia (IMF, 2025).

Kovachevska Stefanova et al. (2025) examine how external shocks—such as the COVID-19 pandemic, the war in Ukraine, and global financial tightening—have affected the macroeconomic environment in North Macedonia. The authors find that the country's high trade openness and reliance on energy imports make it particularly vulnerable to global disruptions. External shocks have intensified inflationary pressures, widened fiscal deficits, and slowed GDP growth, revealing structural weaknesses in the economy. The study highlights that while fiscal and monetary responses helped cushion the initial impact of these shocks, the effectiveness of these policies is limited by institutional constraints and fiscal space. Moreover, spillovers from the euro area and global commodity markets have strong and persistent effects on domestic inflation and economic activity. The authors recommend enhancing macroeconomic buffers, diversifying energy sources, and improving regional cooperation to strengthen resilience against future shocks. Their findings emphasize that in a small open economy like North Macedonia, macroeconomic stability is highly sensitive to international developments, and long-term stability requires not only domestic policy reforms but also stronger integration into global value chains and improved crisis response mechanisms.

Petreski et al. (2024) provide evidence that tax revenue shocks exert a contractionary effect on output, underscoring the restrictive nature of taxation within the economy of North Macedonia. Their findings emphasize the critical need to differentiate between fiscal instruments and the timing of their implementation. The authors advocate for a reorientation of public expenditure toward capital investments, which are shown to be more conducive to long-term economic growth than current spending. Furthermore, they stress the importance of enhancing fiscal transparency and adopting robust medium-term budgetary frameworks to improve policy credibility and overall fiscal efficiency.

Research Methodology

This study aims to identify and analyze the macroeconomic drivers of economic stability in North Macedonia by using a robust time series econometric approach. To accomplish this, the research employs the Vector Autoregression (VAR) methodology, complemented by unit root testing through the Augmented Dickey-Fuller (ADF) test and Granger causality testing. The methodology is structured to uncover both short-term dynamics and long-term interdependencies among key macroeconomic indicators, including GDP growth, inflation, money supply, interest rates, fiscal balance, unemployment, and the current account balance. These variables collectively shape the country's economic stability and reflect the multifaceted interaction of domestic and external forces in a small, open economy.

The empirical analysis is conducted using annual data spanning from 2000 to 2023. This period was selected based on both data availability and economic significance. All macroeconomic data used in the analysis were sourced from the Basic Economic database of the National Bank of the Republic of North Macedonia. It encompasses major structural changes in North Macedonia's economy, including periods of post-conflict stabilization, financial and sovereign debt crises in Europe, and the more recent economic pressures related to global supply disruptions and inflation shocks. The choice of this time frame allows the study to assess the resilience of North Macedonia's macroeconomic framework over more than two decades of domestic and global volatility.

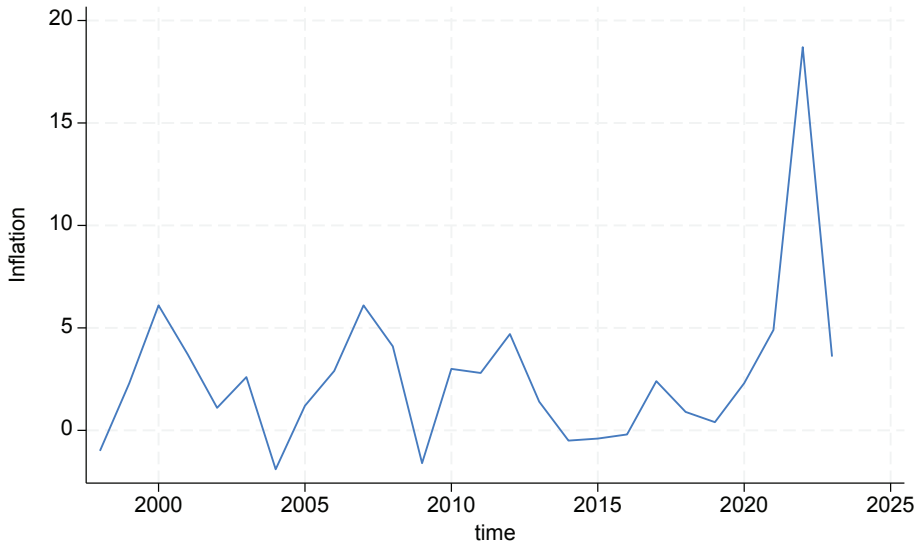
Variables and Descriptive Analysis

The variables used in the study include key macroeconomic indicators such as GDP Growth, Inflation, Unemployment, Government Budget, Money Supply (m1), Current Account Balance, and Interest Rate.

Inflation, measured as the annual change in consumer prices, is a crucial macroeconomic indicator reflecting the stability of a country's price level over time. In the post-2000 period, the country maintained relatively low and stable inflation, largely due to a credible monetary policy anchored in an exchange rate peg to the euro. However, recent global disruptions, such as the COVID-19 pandemic, energy price volatility, and the spillovers from geopolitical tensions, including the war in Ukraine, have contributed to a surge in consumer prices. In 2022, inflation reached double digits, driven primarily by food and energy prices, posing challenges for real incomes, consumption, and monetary stability (Graph 1).

Graph 1

Inflation Rate in North Macedonia

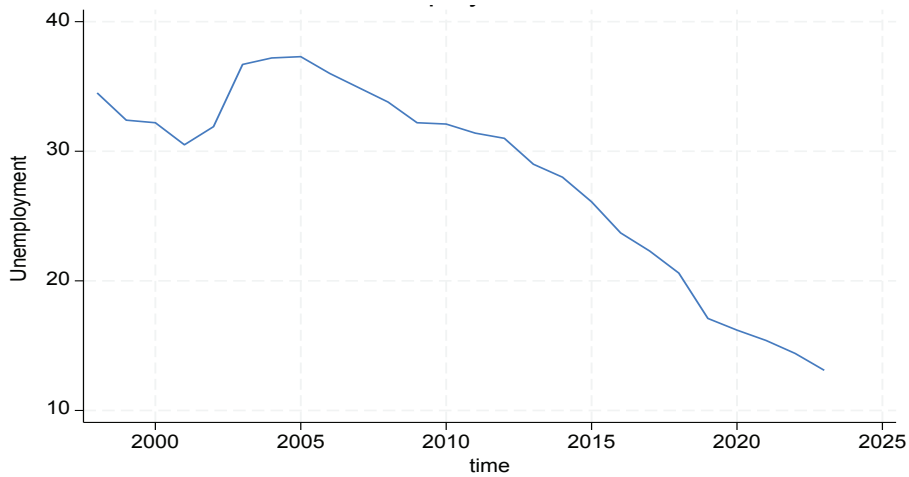


Note: Basic Economic Indicators, National Bank of the Republic of North Macedonia

The unemployment rate in North Macedonia represents a persistent structural challenge and is a key indicator of labor market health. The analysis of the first difference in unemployment is particularly useful in this study to capture cyclical fluctuations and the responsiveness of the labor market to macroeconomic shocks (Graph 2). For example, during the global financial crisis and the pandemic-induced downturn, the labor market in North Macedonia experienced significant strain, while recovery periods saw slow job creation, indicating rigidities. Moreover, labor market outcomes are tightly linked to the effectiveness of government policy, education system alignment with labor demand, and emigration trends.

Graph 2

Unemplyment Rate in North Macedonia

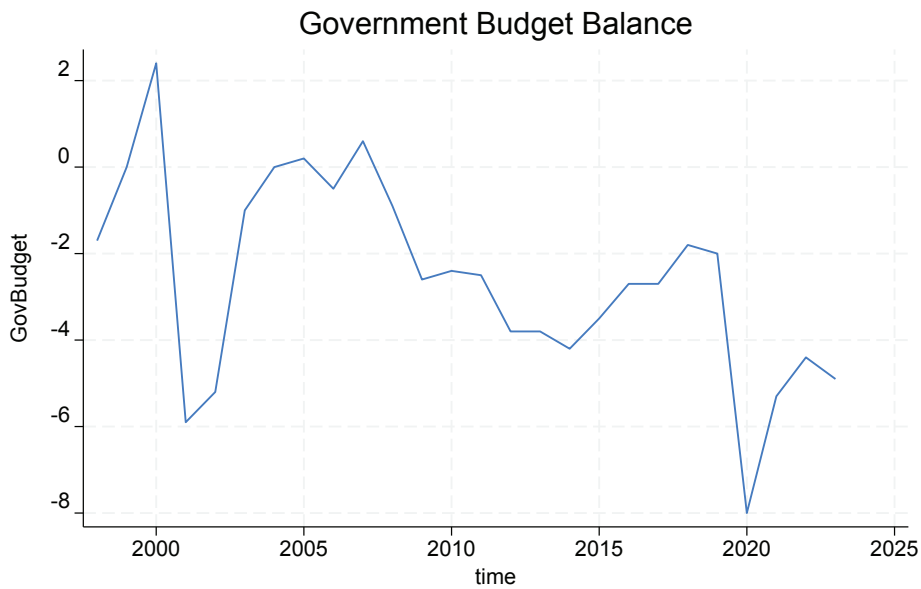


Note: Basic Economic Indicators, National Bank of the Republic of North Macedonia

The government budget balance, measured as a percentage of GDP, is a direct reflection of fiscal policy orientation, whether expansionary or contractionary, and a key determinant of economic stability. In North Macedonia, fiscal policy has historically oscillated between consolidation efforts and counter-cyclical spending, depending on external conditions and political priorities. The country has made efforts to maintain fiscal discipline, but structural deficits persist due to rigid public spending, low tax compliance, and underperforming state-owned enterprises. In this study, the fiscal balance is investigated not only as a standalone indicator but also in conjunction with other macroeconomic variables to evaluate how fiscal policy affects inflation, growth, and external balances (Graph 3).

Graph 3

Government Budget Balance

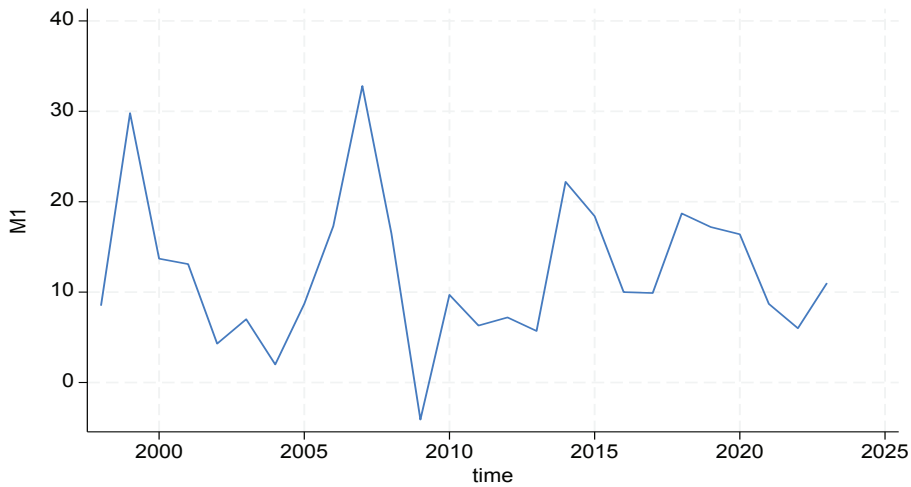


Note: Basic Economic Indicators, National Bank of the Republic of North Macedonia

Money supply, particularly measured through the broad money aggregate M1, plays a central role in determining liquidity conditions and the effectiveness of monetary policy transmission. In North Macedonia, the National Bank (NBRNM) has maintained a relatively stable monetary environment through a de facto exchange rate peg to the euro, which constrains the use of independent interest rate tools and places greater emphasis on money supply management. The analysis of money supply in this research aims to capture how monetary conditions influence macroeconomic stability and whether the growth of money is aligned with real sector developments (Graph 4). Furthermore, by observing the responsiveness of inflation and GDP growth to money supply shocks, the study evaluates the relevance of monetary targeting under a constrained exchange rate regime.

Graph 4

Money Supply in North Macedonia

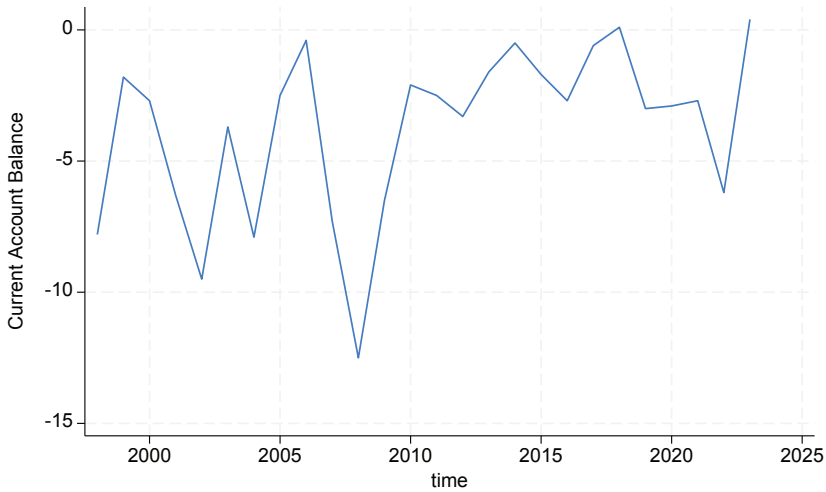


Note: Basic Economic Indicators, National Bank of the Republic of North Macedonia

The current account balance as a percentage of GDP serves as a critical indicator of a country's external position, reflecting the net outcome of trade in goods and services, primary income, and current transfers. For North Macedonia, a small and open economy, the current account balance is particularly significant due to its high dependence on foreign trade and capital inflows. In this research, the current account balance is analyzed as both a cause and consequence of broader macroeconomic dynamics, particularly how it interacts with fiscal balance, exchange rate policy, and inflation, providing insights into the resilience of North Macedonia's economy to external shocks (Graph 5).

Graph 5

Current Account Balance in North Macedonia

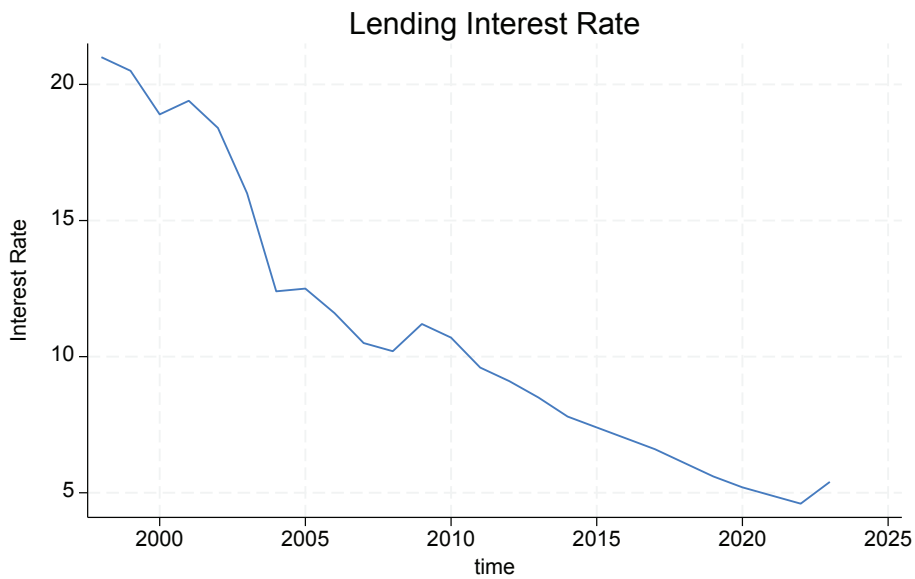


Note: Basic Economic Indicators, National Bank of the Republic of North Macedonia

The short-term interest rate, as determined by the central bank, is a primary tool of monetary policy used to influence borrowing costs, aggregate demand, and inflation expectations. In the case of North Macedonia, the central bank operates under a de facto exchange rate peg to the euro, which limits the scope for independent interest rate policy (Graph 6). In this paper, both the level of interest rates and their first differences are used to examine how monetary policy shifts impact the broader economy. Specifically, the analysis investigates whether interest rate changes Granger-cause variations in inflation and GDP, shedding light on the transmission mechanism of policy decisions. Moreover, interest rates are indirectly influenced by external factors such as ECB policy, capital market conditions, and risk perceptions of international investors. Therefore, understanding the role of interest rates in North Macedonia provides valuable insights into the trade-offs faced by policymakers in maintaining monetary stability, controlling inflation, and supporting economic growth under a constrained policy framework.

Graph 6

Interest rate in North Macedonia



Note: Basic Economic Indicators, National Bank of the Republic of North Macedonia

Augmented Dickey-Fuller (ADF) Test

The ADF test is used to determine whether each time series variable is stationary (i.e., has a constant mean and variance over time). This is a critical step before using a Vector Autoregression (VAR) model because non-stationary variables can produce misleading (spurious) results. If a variable is not stationary at level, it must be differenced.

Table 1

ADF Test Results

Variable	Test Statistic	5% Critical Value	p-value	Stationary
gdpg	-4.880	-3.000	0.0000	Yes
inflation	-3.926	-3.000	0.0019	Yes
unemployment	1.233	-3.000	0.9962	No
dunemployment	-3.099	-3.000	0.0266	Yes (1st diff)
govbudget	-2.912	-3.000	0.0439	Borderline
dgovbudget	-5.723	-3.000	0.0000	Yes
m1	-3.887	-3.000	0.0021	Yes
currentaccountbalance	-3.555	-3.000	0.0067	Yes
interestrate	-2.254	-3.000	0.1872	No
dinterestrate	-3.703	-3.000	0.0041	Yes (1st diff)

The Dickey–Fuller test confirms that most variables are stationary at the level, such as GDP growth, inflation, M1, and current account balance. These can be directly included in the VAR at the levels. However, unemployment, government budget, and interest rate are non-stationary at the level, meaning they exhibit a unit root. For these variables, their first differences (e.g., dunemployment, dgovbudget, and dinterestrate) are stationary and hence appropriate for inclusion in the VAR model.

From an economic perspective, the presence of unit roots in unemployment and interest rate series is not surprising. These variables often adjust slowly to shocks due to structural labor market rigidities and monetary policy inertia. Differencing them allows us to model the short-term changes, which are more relevant for dynamic interaction analysis.

Including only stationary series ensures that our VAR model is correctly specified and avoids spurious relationships. The differenced series captures the true short-run dynamics, which is critical when the model is used for Granger causality testing, impulse response analysis, or forecasting.

Results of the Vector Autoregression (VAR) Model

A Vector Autoregression (VAR) model was implemented using seven key macroeconomic variables: GDP growth (gdpg), inflation, money supply (m1), current account balance, unemployment (dunemployment), government budget balance (dgovbudget), and interest rate (dinterestrate) over the period 2000–2023 with

two lags. The optimal number of lags was determined based on the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC).

Table 2

VAR Equation Summary

Equation	Parameters	RMSE	R-squared	Chi2	p-value
gdpg	15	2.49562	0.6801	48.89146	0
inflation	15	3.55155	0.7224	59.85495	0
m1	15	6.07962	0.7767	80.01725	0
currentaccountbalance	15	2.49247	0.7943	88.82371	0
dunemployment	15	1.25441	0.7721	77.90801	0
dgovbudget	15	2.55682	0.6286	38.92689	0.0004
dinterestrate	15	0.677829	0.8133	100.1847	0

All equations are highly statistically significant ($p < 0.001$), which confirms that the lags of the variables jointly explain a significant portion of the variation in each dependent variable. The R-squared values are all strong, ranging from 0.6286 (government budget) to 0.8133 (interest rate), indicating a good model fit.

Economically, the results reflect deep interactions between policy and performance indicators. GDP growth ($R^2 = 0.6801$) is well explained by inflation, monetary conditions, fiscal stance, and trade dynamics. Inflation ($R^2 = 0.7224$) is strongly explained by its past values and related variables, consistent with theories of inertia and expectations. The money supply (m1) equation ($R^2 = 0.7767$) suggests it is responsive to economic shocks and policy feedback.

The current account balance ($R^2 = 0.7943$) shows a very strong fit, reflecting the country's sensitivity to internal and external conditions. The unemployment equation ($R^2 = 0.7721$) further confirms that labor market fluctuations are shaped by macroeconomic policy and growth conditions. Although the government budget balance ($R^2 = 0.6286$) has the lowest fit, it is still significant, reflecting that fiscal outcomes are partially policy-driven and partially automatic. The interest rate ($R^2 = 0.8133$) has the best explanatory power, indicating that monetary policy reacts strongly to macro conditions, particularly inflation and output.

Overall, this VAR estimation demonstrates that North Macedonia's economy exhibits strong short-term linkages, with both fiscal and monetary policies having measurable and interconnected effects on key economic outcomes. The model is

statistically sound and economically meaningful, making it a solid foundation for further forecasting, simulation, and policy impact analysis.

Table 3

Estimated Coefficients from the Vector Autoregression (VAR) Model

Dependent Variable	Explanatory Variable	Lag	Coefficient	p-value	Granger-Causes?
gdpg	gdpg	L1	-0.9429	0.008	Yes
gdpg	gdpg	L2	0.4938	0.2743	No
gdpg	inflation	L1	0.3241	0.026	Yes
gdpg	inflation	L2	-0.0369	0.2334	No
gdpg	m1	L1	0.361	0	Yes
gdpg	m1	L2	-0.1235	0.05	Yes
gdpg	currentaccountbalance	L2	-0.8792	0.008	Yes
gdpg	dunemployment	L1	-1.6051	0.024	Yes
gdpg	dunemployment	L2	1.5045	0.006	Yes
gdpg	dgovbudget	L2	-1.1341	0.001	Yes
inflation	inflation	L1	1.0794	0	Yes
inflation	inflation	L2	-0.8346	0.012	Yes
inflation	m1	L2	0.3057	0.001	Yes
inflation	currentaccountbalance	L1	0.9436	0.002	Yes
inflation	currentaccountbalance	L2	-1.0261	0.031	Yes
inflation	dunemployment	L1	-2.5524	0.011	Yes
inflation	dunemployment	L2	2.0322	0.009	Yes
inflation	dgovbudget	L2	-1.8477	0	Yes
inflation	dinterestrate	L1	-3.2251	0.049	Yes
m1	gdpg	L2	2.2664	0.001	Yes
m1	inflation	L1	0.7122	0.044	Yes
m1	m1	L2	-0.3588	0.019	Yes
m1	currentaccountbalance	L1	2.5748	0	Yes
m1	currentaccountbalance	L2	-1.6185	0.046	Yes
m1	dunemployment	L1	-5.5327	0.001	Yes
m1	dgovbudget	L2	-3.2261	0	Yes
m1	dinterestrate	L1	-10.2874	0	Yes
currentaccountbalance	m1	L1	-0.4237	0	Yes

Dependent Variable	Explanatory Variable	Lag	Coefficient	p-value	Granger-Causes?
currentaccountbalance	m1	L2	-0.2222	0	Yes
currentaccountbalance	dunemployment	L2	-2.0441	0	Yes
currentaccountbalance	dinterestrate	L2	-1.2133	0.041	Yes
dunemployment	m1	L1	-0.1145	0.025	Yes
dunemployment	currentaccountbalance	L1	-0.2649	0.012	Yes
dunemployment	dgovbudget	L1	-0.3598	0.039	Yes
dgovbudget	dunemployment	L2	1.1336	0.042	Yes
dinterestrate	inflation	L1	0.1114	0.005	Yes
dinterestrate	dunemployment	L1	-0.6089	0.002	Yes
dinterestrate	dunemployment	L2	-0.2964	0.045	Yes
dinterestrate	dinterestrate	L1	-0.7572	0.016	Yes
dinterestrate	dinterestrate	L2	-0.3769	0.02	Yes

The summarized VAR estimation results in the table above reveal strong dynamic interdependencies among key macroeconomic variables in North Macedonia, both from an economic and econometric standpoint. The significance of lagged variables (with p-values < 0.05) across equations indicates the rejection of the null hypothesis in favor of Granger causality. For instance, GDP growth (GDPG) is significantly Granger-caused by its own past values (L1), inflation, money supply (M1), the current account balance, unemployment, and fiscal stance (dgovbudget), reflecting a rich autoregressive structure and policy-driven influences. The money supply, particularly, emerges as a core transmission mechanism, with M1 at lag 1 and 2 significantly affecting GDP, inflation, the current account, and even unemployment, demonstrating both demand-side effects and the consequences of liquidity on external balances. Inflation is highly inertial (inflation L1 and L2 are significant) and also influenced by monetary policy, labor market conditions, fiscal balance, and interest rates, reinforcing the complexity of price level dynamics. The labor market (unemployment) appears reactive to monetary and external changes, while fiscal policy (dgovbudget) is driven partially by unemployment shifts. The interest rate equation aligns with expectations from Taylor Rule dynamics, responding to inflation and unemployment with significant coefficients. From an economic perspective, these results suggest that both monetary and fiscal tools have measurable delayed impacts across key macroeconomic indicators, with feedback loops observ-

able especially in the relationships involving inflation, money, and interest rates. The findings confirm the importance of coordinated policy-making and validate the use of VAR models for forecasting and policy simulation in small open economies like North Macedonia.

Results of the Granger Causality Test

Granger causality tests help us understand whether one variable helps predict another. Although it does not imply true causation, it provides insights into predictive power and temporal ordering, useful for forecasting and policy guidance.

Table 4

Granger Causality Results

Dependent Variable	Excluded Variable	Chi2	p-value	Granger-causes?
gdpg	inflation	5.241	0.073	No
gdpg	m1	18.003	0	Yes
gdpg	currentaccountbalance	7.459	0.024	Yes
gdpg	dunemployment	10.981	0.004	Yes
gdpg	dgovbudget	13.127	0.001	Yes
gdpg	dinterestrate	3.308	0.191	No
inflation	gdpg	0.894	0.64	No
inflation	m1	11.96	0.003	Yes
inflation	currentaccountbalance	10.449	0.005	Yes
inflation	dunemployment	11.378	0.003	Yes
inflation	dgovbudget	16.776	0	Yes
inflation	dinterestrate	3.93	0.14	No
m1	gdpg	11.813	0.003	Yes
m1	inflation	10.369	0.006	Yes
m1	currentaccountbalance	25.449	0	Yes
m1	dunemployment	11.09	0.004	Yes
m1	dgovbudget	16.234	0	Yes
m1	dinterestrate	13.459	0.001	Yes
currentaccountbalance	gdpg	0.2	0.905	No
currentaccountbalance	inflation	2.093	0.351	No
currentaccountbalance	m1	27.311	0	Yes
currentaccountbalance	dunemployment	17.598	0	Yes

Dependent Variable	Excluded Variable	Chi2	p-value	Granger-causes?
currentaccountbalance	dgovbudget	2.007	0.367	No
currentaccountbalance	dinterestrate	4.578	0.101	No
dunemployment	gdpg	1.756	0.416	No
dunemployment	inflation	1.563	0.458	No
dunemployment	m1	5.529	0.063	No
dunemployment	currentaccountbalance	6.578	0.037	Yes
dunemployment	dgovbudget	7.929	0.019	Yes
dunemployment	dinterestrate	1.422	0.491	No
dgovbudget	gdpg	3.368	0.186	No
dgovbudget	inflation	1.379	0.502	No
dgovbudget	m1	3.545	0.17	No
dgovbudget	currentaccountbalance	1.089	0.58	No
dgovbudget	dunemployment	4.438	0.109	No
dgovbudget	dinterestrate	0.898	0.638	No
dinterestrate	gdpg	1.741	0.419	No
dinterestrate	inflation	9.059	0.011	Yes
dinterestrate	m1	2.7	0.259	No
dinterestrate	currentaccountbalance	1.897	0.387	No
dinterestrate	dunemployment	16.661	0	Yes
dinterestrate	dgovbudget	1.476	0.478	No

The full Granger causality analysis reveals a complex and insightful web of predictive relationships among North Macedonia's key macroeconomic indicators. Beginning with GDP growth as the dependent variable, the results indicate that it is significantly Granger-caused by money supply (M1), current account balance, unemployment, and government budget balance. These findings suggest that both monetary and fiscal policy tools, as well as external sector performance and labor market conditions, hold predictive power over economic growth. In contrast, inflation and interest rates do not statistically lead GDP growth, indicating that output changes are more closely tied to policy decisions and structural factors than to nominal fluctuations in this context.

Inflation, on the other hand, is Granger-caused by M1, unemployment, current account balance, and government budget, underscoring its multifaceted nature. It is influenced by demand-side factors such as the money supply and fiscal stance, cost-push pressures via unemployment, and external price movements. Interestingly, inflation

is not predicted by GDP or interest rates, suggesting that in this economy, price level dynamics are not directly driven by output or nominal interest rate shifts.

The money supply (M1) shows strong bidirectional causality with most variables, including GDP, inflation, current account, unemployment, government budget, and interest rates. This suggests that M1 is both a driver and a responder within the macroeconomic system, embodying the dual role of monetary aggregates as instruments of policy and outcomes of macroeconomic conditions. This dynamic interdependence reinforces the importance of monitoring money supply developments when forecasting or adjusting policy.

The current account balance is primarily Granger-caused by M1 and unemployment, suggesting it is influenced by domestic liquidity conditions and labor market strength. However, it does not respond significantly to GDP, inflation, fiscal balance, or interest rates, implying a degree of insulation or structural rigidity in its responsiveness to broader economic shifts.

Unemployment is significantly Granger-caused by the current account balance and government budget, indicating that trade performance and public sector fiscal decisions impact labor market conditions. Notably, unemployment is not statistically predicted by GDP, inflation, M1, or interest rates in the short term, which could point to structural challenges or delayed labor market responsiveness in North Macedonia.

The government budget balance does not appear to be Granger-caused by any of the variables, positioning it as an exogenous driver in this system. This likely reflects discretionary fiscal policy, where government spending and revenue decisions are not automatically adjusted in response to economic fluctuations.

Interest rates are significantly Granger-caused by inflation and unemployment. This aligns with the Taylor Rule framework, where central banks adjust interest rates in response to deviations in inflation and labor market performance. However, interest rates do not respond to GDP, M1, or fiscal and external variables in this model, reinforcing their role as a targeted policy tool rather than a broadly reactive variable.

Overall, these results offer a structured causal map of North Macedonia's macroeconomy. We achieved a deeper understanding of which variables serve as leading indicators and which respond to systemic changes. This knowledge is vital for policymakers, as it enables more proactive and informed decisions, particularly in the design of monetary and fiscal interventions.

Conclusions

This study investigated the macroeconomic drivers of economic stability in North Macedonia using a time series econometric approach based on a Vector Autoregression (VAR) model and Granger causality analysis. The findings reveal strong dynamic interdependencies among key macroeconomic indicators, with both fiscal and monetary factors playing a critical role in shaping short-term fluctuations and policy transmission.

The VAR estimation confirms that GDP growth is significantly influenced by past values of inflation, money supply (M1), the current account balance, unemployment, and fiscal stance. The Granger causality tests reinforce these findings, showing that monetary and fiscal indicators, particularly M1, unemployment, and budget balance, hold predictive power over output, while inflation and interest rates are not significant predictors of growth. Inflation is found to be highly inertial and strongly affected by monetary aggregates and labor market conditions. The money supply stands out as a core transmission channel, with bidirectional causality linking it to nearly all macro variables, emphasizing its dual role as both a policy tool and economic outcome.

The empirical results emphasize the importance of coordinated monetary and fiscal policies in sustaining economic stability. The strong predictive relationships and feedback loops identified in this study provide valuable insights for policymakers, suggesting that proactive management of monetary aggregates, fiscal discipline, and labor market interventions can contribute to a more resilient and balanced economic environment in North Macedonia.

Beyond the regression analysis, the broader macroeconomic context of North Macedonia reveals persistent challenges and structural interdependencies. While the country has achieved progress in employment, financial stability, and moderate growth, especially in the pre-COVID period, these gains remain vulnerable to external shocks and domestic constraints.

The National Bank of the Republic of North Macedonia plays a central role in sustaining price stability and guiding expectations. However, as this and other empirical studies suggest, the effectiveness of monetary transmission is not uniform across all economic variables, and post-crisis dynamics have weakened its pass-through. These findings call for a recalibration of stabilization strategies that reconcile internal goals, like employment and growth, with external pressures from global markets and the limitations of a fixed exchange rate system.

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Gjorgji Ristov

Shanghai University of Finance and Economics, Shanghai, China

Correspondence concerning this article should be addressed to Gjorgji Ristov

Email: 2024732502@stu.sufe.edu.cn

BALKAN JOURNALS

Balancing Innovation and Regulation: Comparative Approaches to AI-Driven Labour Market Planning in North Macedonia and China

Gjorgji Ristov

Abstract

The aim of this paper is to understand the differing approaches to planned labor between North Macedonia and China, with a focus on the role of artificial intelligence (AI) in their labor markets. As AI advanced, so did the concern about job displacement, particularly in those sectors in which automation and machine learning could possibly replace human workers. This study aims to analyze these risks that concern AI-driven job loss and the implications that could arise for the national economies. The central question that we are addressing is whether countries like North Macedonia and China should or could adopt better and stricter governmental policies on education and labor force planning to lower these risks, or whether a more liberal one, allowing flexible labor market dynamics, would be more beneficial in the long term.

On one hand, China has a structured approach to labor and education-strict quotas, state-directed economic plans, and a big focus on preparing the workforce and society for emerging technological fields like AI. On the other hand, North Macedonia still struggles to create quotas and regulatory frameworks to address these challenges, which leaves the labor market more flexible but also potentially vulnerable to disruptive technological changes.

With the analysis of the both countries' policies, this paper examines how North Macedonia and similar countries can learn from China's model, and create a balanced approach for labor market planning that has account for AI's impact. We also explore the role of education in preparing future generations for the future demands of an AI-driven economy and propose recommendations for policy reforms.

Keywords: Artificial Intelligence, Labor policies, economic planning

Introduction

The development of AI is and will transform the whole world economy; it is providing a higher scale of productivity and innovation, while at the same time raising concerns about possible job displacements. Automation and AI are reshaping the whole industry, creating both opportunities and challenges for the governments, the business sector, and the workers. As the level of AI usage continues to rise, the need for labor market strategies becomes urgent.

The aim of this paper is to analyze both approaches of two nations such as North Macedonia and China toward managing and planning the AI's influence on their markets and workforce planning. North Macedonia, as a flexible and decentralized labor market, still hasn't established a national policy that focuses on these challenges. Meanwhile, China has already created a state-driven approach, including strict quotas, state-directed economic plans, and development, while at the same time focusing on providing its workforce with skills suitable to the new emerging technological fields.

The main focus in this paper will be whether countries like North Macedonia should have elements of China's model, including stricter regulations, educational reforms, including automation, and new workforce initiatives, or have a more liberal, market-driven approach that could possibly better serve their long-term plans. This analysis delves into the potential risks and rewards of these different strategies; it offers actionable insights for policymakers. While analyzing the level of innovation, workforce readiness, and economic stability, the paper focuses on creating a plan and suggestions for the nations to thrive in a new, increasingly AI-driven global economy.

Methodology

The research draws on a comprehensive collection of primary and secondary data sources relevant to AI integration and labor market planning in China and North Macedonia. Primary sources include official government policy documents such as China's *Made in China 2025*, *Internet Plus*, and *New Generation Artificial Intelligence Development Plan* (2015–2017), as well as North Macedonia's *National ICT Strategy 2023–2027* and publicly available information about its National AI Strategy (FITR, 2021). Secondary sources consist of academic publications, institutional reports from bodies like the World Economic Forum, ITU, World Bank, and the Institute for Security & Development Policy, and credible online databases providing up-to-date labor market and digital skills statistics.

Data selection was guided by the relevance of materials to the core themes of AI development, workforce education, labor market adaptation, and digital skills advancement within the time frame of 2015 to 2025. Efforts were made to include both qualitative policy texts and quantitative labor market data to provide a holistic understanding of the subject matter.

Analysis Criteria

The collected data was analyzed using specific criteria to ensure a structured and focused comparison:

1. **Policy Scope and Objectives:** The clarity, ambition, and comprehensiveness of national strategies regarding AI adoption and labor market transformation were examined to understand each country's long-term vision.
2. **Implementation Mechanisms:** Attention was given to the concrete tools and measures governments use to enact these policies, including legal regulations, education system reforms (particularly in STEM and AI-related fields), workforce quotas, and real-time labor market monitoring systems.
3. **Governance and Adaptability:** The study compared China's centralized, state-driven approach with North Macedonia's more flexible but less coordinated labor market planning, evaluating how governance models influence AI integration and workforce readiness.

Literature review

Political and Institutional Influence on Labor Market Planning in China

China's way of developing the labor market is deeply connected to its political and economic system, which focuses on state-led development, directed by the Chinese Communist Party (CCP). Unlike market-driven economies, where the labor market and its trends largely follow business demands, China's governance enables planned control over workforce development, ensuring that national priorities and plans shape employment policies.

National priorities have huge importance in shaping the employment policies within China's labor market. The biggest characteristic of this system is the mixture of state capitalism with extensive regulatory control. Most important to this frame-

work is the Ministry of Human Resources and Social Security (MOHRSS), which is an administrative body led by the State Council. This institution is formulating and enforcing labor policies, at the same time, is overseeing the employment regulations, and is managing the country's social security system. Also, it has a big role in labor force administration, creating employer-employee relations, and building legal frameworks that lead the workforce operations. With these mechanisms, China keeps and maintains a structured and policy-driven approach to its labor market management (Ministry of Human Resources and Social Security, 2025). They create quotas and education policies to align with the long-term economic goals. The country's Five-Year Plans serve as the biggest roadmaps, highlighting our employment priorities that influence vocational training, labor mobility, and job creation.

The World Economic Forum's annual meeting (www.weforum.org), regarding Transforming Industries with AI and Lessons from China's Journey, says that over the last decade, China has hugely expanded its focus on artificial intelligence and IT industries. Currently, the AI industry is valued at more than $70 billion and has a balanced ecosystem of more than 4,300 companies, and China sets insights into how nations can connect strategy, innovation, and ecosystem development to boost the AI's transformative potential.

There are several big initiatives that reflect this shift, starting from *Made in China 2025* (2015), which was focused on reducing reliance on foreign technology, and this policy prioritizes advanced manufacturing, robotics, and AI. In 2015, Prime Minister Li Keqiang launched "Made in China" (MIC 2025), an initiative that aims to modernize China's industrial capability. This 10-year, comprehensive strategy focuses heavily on intelligent manufacturing in 10 strategic sectors (see Figure 1) and has the aim of securing China's position as a global powerhouse in high-tech industries such as robotics, aviation, and new energy vehicles such as electric and bio-gas(Institute for Security & Development Policy, ISDP, 2025).

As Wang Zhu et al. (2016) report, *Internet Plus* (2015) is designed to integrate AI and big data into conventional industries, increasing demand for STEM (science, technology, engineering, and mathematics) expertise. The plan aims to integrate mobile Internet, cloud computing, big data, and the Internet of Things (IoT) with traditional industries to promote economic restructuring, improve people's livelihoods, and even transform government functions.

The seminal document entitled "The New Generation Artificial Intelligence Development Plan", released by China's State Council, (2017), reports about the *New*

Generation Artificial Intelligence Development Plan, which outlined strategies to establish China as a global leader in AI by 2030, including measures to reshape education and workforce development, also to seize the major strategic opportunity for the development of AI, to build China's first-mover advantage in the development of AI, to accelerate the construction of an innovative nation and global power in science and technology, by the requirements of the CCP Central Committee and the State Council, this plan has been formulated.

As reported by China Law Translate by the State Council (2023), some initiatives, such as the Interim Measures for the Management of Generative AI Services (2023) and the AI Safety Governance Framework, address emerging risks while fostering technological advancement. To support these policies, the government enforces a series of legal and structural interventions like Education Policies which makes universities required to expand STEM programs, with particular emphasis on AI-related disciplines, beside that also the Labor Quotas with which the state ensures a continuous supply of skilled workers by regulating employment targets in key sectors, also the Employment Monitoring with which AI-driven systems track labor trends in real-time, allowing authorities to adjust workforce policies as needed.

These strategies highlight how China's political and legal institutions actively shape labor markets, favoring economic control and long-term planning over the flexibility seen in free-market economies.

The Economic and Policy Implications of AI-Driven Labor Market Planning

China's big investments and focus on artificial intelligence, IT and high-tech industries has had a huge impact on its economic development, it demonstrated the state's capacity to shape labor markets and economic policy with centralized governance. The shift from a manufacturing-based economy to a technology-driven model is not just an economic evolution but a reflection of China's strategic planning, in which labor policies and AI development are tightly interwoven with political and institutional priorities.

State-Directed AI Integration and Economic Growth

In the early 2000s, China's economic boom was predominantly fueled by labor-intensive manufacturing and export-oriented growth. However, under directives such as *Made in China 2025* and the *New Generation Artificial Intelligence Development Plan*, the government has aggressively transitioned toward AI and automa-

tion, aligning workforce development with national economic priorities. This shift has been reinforced by labor market policies that emphasize STEM education, government-mandated employment targets, and AI-driven workforce monitoring.

As a result, the Artificial Intelligence (AI) software market size will be valued at US$98 billion in 2024. Growing at a Compound Annual Growth Rate (CAGR) of 30%, the AI software market size will reach US$391.43 billion in 2030. Generative AI will be the fastest-growing AI framework with a 49.7% CAGR over the market forecast period, with foundation models, optimization software, and model deployment tools offering the largest opportunities. www.abiresearch.com

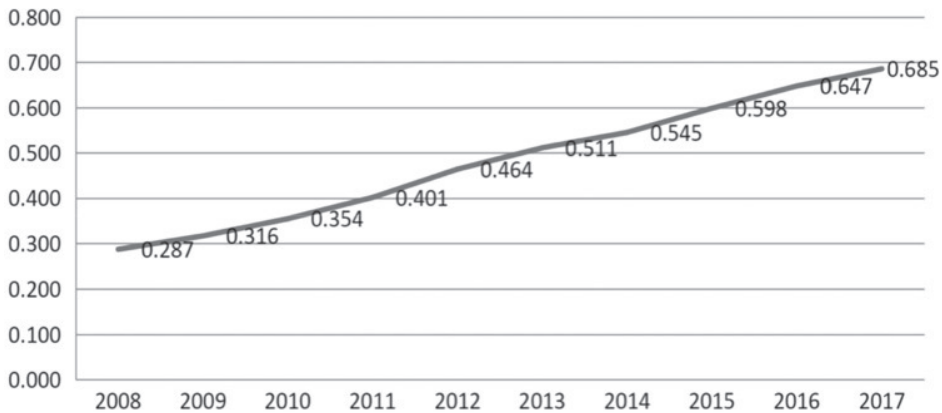
Traditional AI (AI sensing, predictive AI, Natural Language Processing (NLP)) will continue to lead total revenue in the AI software market. This significant growth will be driven by maturing enterprise AI strategies that will make these frameworks more accessible.

Regional Disparities and Policy Challenges

According to Lin et al. (2024), despite national-level economic gains, China's AI-driven growth has been uneven across regions. The artificial intelligence industry development index—a measure of AI sector maturity—reveals stark regional disparities. Beijing (1.033), Shanghai (0.946), Jiangsu (0.876), Guangdong (0.867), and Zhejiang (0.830) lead the country, benefiting from concentrated government investment, research institutions, and advanced infrastructure. In contrast, provinces such as Shanxi (0.189), Gansu (0.160), Xinjiang (0.159), Hainan (0.061), and Qinghai (0.052) lag significantly behind, reflecting broader economic inequalities and limited access to AI-driven opportunities, as shown in the following figure (Fig. 1).

Fig. 1.

National average artificial intelligence industry development level from 2008 to 2017



Source: Lin et al. (2024). *The influence of artificial intelligence on the economic growth of different regions in China*. Scientific Reports, 14, Article number: 9169.

These disparities present critical policy and legal considerations. The Chinese government faces a complex challenge on how to balance national AI dominance with equitable labor market development. To address this, policies may need to focus on redistributive mechanisms, such as regional investment incentives, targeted education reforms, and AI-assisted workforce planning that extends beyond major urban centers.

Labor Market Planning in North Macedonia: The Current State of the Macedonian Labor Market

Unlike China, Macedonia has not implemented a coordinated strategy for workforce development in the face of AI. The Macedonian market is characterized by a greater degree of flexibility, with fewer regulatory controls or quotas dictating the education and employment sectors. As Radonjanin et al. (2024) state, this flexible approach has some advantages, including adaptability to market changes, but it also presents challenges, especially in the context of AI disruption. The World Economic Forum's Future of Jobs Report 2023, released, assesses the impact of macro trends, as well as technological change, on jobs and skills over the next five years. Their report finds that nearly a quarter of all jobs (23%) globally will change in the next five years. Across 45 economies, covering 673 million workers, 69 million new jobs are expected to be created and 83 million to be eliminated, a net decrease of 14

million jobs, or 2% of current employment (https://www.weforum.org/), this is a reason, signal that alarms the countries to take action regarding the matter. North Macedonia hasn't yet developed and created a national strategy to guide workforce development in the new emerging sectors such as AI, robotics, and automation. This lack of planning and not taking any action may leave the country vulnerable, especially the sectors that are getting heavily impacted by AI.

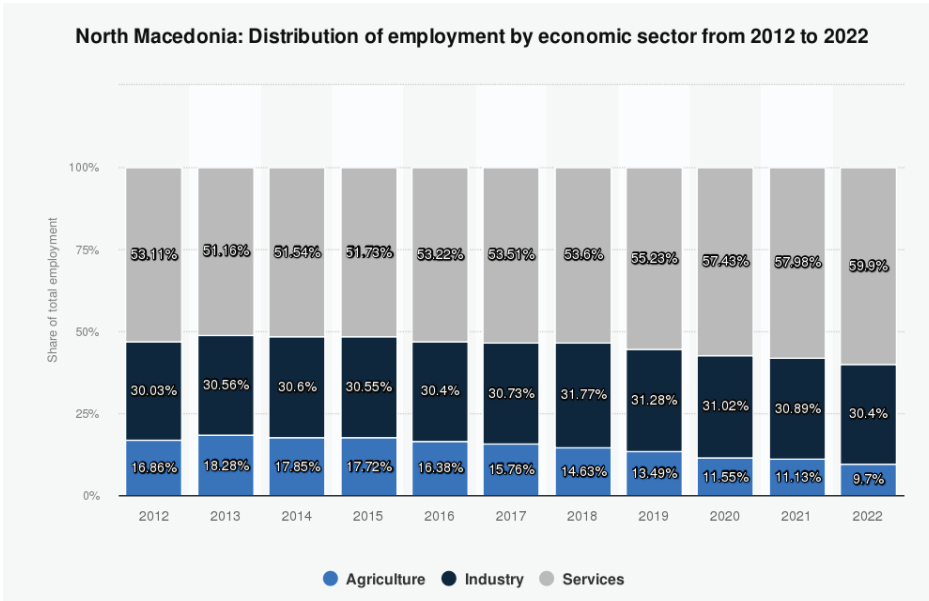
Many of the Macedonian workforce is employed in industries that are highly susceptible to automation, such as manufacturing and agriculture. While the country still focuses on and is making efforts to attract foreign investment and develop the service sector, there is a significant skills gap in emerging technologies. While there are efforts to reform education, the Macedonian system has struggled to keep pace with the demands of a modern, technology-driven economy. The lack of STEM education and training in AI and other emerging fields means that many graduates are not adequately prepared for the types of jobs that will be in demand in the future (www.schoenherr.eu).

The report by the World Bank Group states that North Macedonia's labor market has historically struggled with poor labor planning (www.worldbank.org), particularly when it comes to adapting to global technological changes such as AI. Unlike China, which has actively pursued centralized, long-term strategies for AI integration, North Macedonia has been reactive rather than proactive in shaping its workforce to meet future demands. The skills required for emerging industries like AI, robotics, and data science are not being sufficiently incorporated into the education system. As a result, many Macedonian graduates find themselves underprepared for the rapidly changing labor market. For example, despite the growing demand for tech professionals, STEM education in North Macedonia remains underfunded and insufficiently developed to meet the needs of the digital economy. often, there is analogue automation and an extremely low level of use of artificial intelligence (Bisev et al. 2020).

Many graduates end up in low-skill or traditional industries that are vulnerable to automation. North Macedonia's economy has long been reliant on sectors like manufacturing, agriculture, and textiles, industries that are now increasingly being replaced by automation and AI-driven solutions. The slow shift toward high-tech industries has left the country vulnerable to job displacement without clear plans for retraining and reskilling workers (Gate, 2025)

Fig. 2.

Distribution of employment by economic sector from 2012 to 2022 in North Macedonia



Note: World Bank (North Macedonia data), via Statista 2024

Career Planning and Educational Quotas in North Macedonia

North Macedonia has struggled to develop comprehensive, strategic workforce policies that align with technological advancements, such as the rise of AI and automation. One of the most significant challenges North Macedonia faces in terms of labor planning is the lack of effective labor market forecasting. The country does not have a unified system to predict the future needs of various sectors and how they might evolve due to technological disruption. This lack of data and forward-looking strategies has led to significant mismatches between educational outputs and the real needs of the labor market.

The overall assessment across all areas of digital skills, according to the ITU report, shows that the majority of respondents possess a basic level of digital skills (55.4%), followed by 38.6% who demonstrate above-basic digital competencies. Only 6.0% of respondents exhibit a lower level of digital skills, specifically low (4.5%) or no digital skills at all (1.5%) in the digital domain (Nakjeva Ruzhin et al.,

2021). When this data is compared to the European standards outlined in The Path to the Digital Decade Policy Programme, which sets the target of at least 80% of adults having basic digital skills by 2030, it becomes evident that although many individuals are aware of and meet the basic standard, there is still progress to be made to fully align with EU benchmarks.

From the analysis by Statistics in North Macedonia (www.meta.mk), one of the most significant obstacles to effective labor market planning, besides the digital knowledge in North Macedonia, is its old administrative structure, which has struggled to keep pace with modern demands. The system remains fragmented, with poor coordination between educational institutions, government agencies, and the private sector. Government agencies responsible for education, labor, and employment are often disconnected, making it difficult to implement cohesive policies that align educational outputs with labor market needs. Unlike China, where the government can quickly implement large-scale reforms, North Macedonia's political and administrative system is slow to adapt, making it difficult to respond to the changing dynamics of the labor market.

National ICT Strategy of the Republic of North Macedonia

National ICT Strategy of the Republic of North Macedonia for 2023-2027 (www.ener.gov.mk), was created 2 years after the plan and the speech of the Director of FITR it outlined the country's vision for embracing new advanced technologies, including Artificial Intelligence (AI), Big Data, the Internet of Things (IoT), and Cloud services. These technologies are central to innovation in various sectors such as healthcare and agriculture, with a particular emphasis on AI, Big Data, Cloud computing, IoT, and 5G networks, all of which are expected to play a significant role by 2027.

The strategy highlights the potential for applying these technologies in North Macedonia, supported by a skilled workforce capable of serving highly digitalized industries. It stresses the importance of encouraging local organizations to explore and innovate with these technologies in collaboration with foreign companies, fostering joint digital solutions. To facilitate this, the creation of innovation hubs for advanced ICT technologies is recommended, promoting cooperation between domestic businesses, the academic community, and international companies. This is expected to attract foreign investment into the Macedonian digital ecosystem (www.ener.gov.mk).

As stated in the report, the government's focus on increasing and bettering the number of graduates with STEM (Science, Technology, Engineering, Mathematics) knowledge is seen as crucial to the country's digital growth (ICT, National Strategy, 2023-27).

This emphasis on developing digital skills is key for positioning North Macedonia as a competitive location for ICT companies looking to establish development centers.

Although there is no specific plan for immediate implementation, the strategy focuses on future actions, such as building trust in these technologies, promoting their use for social benefits, and addressing challenges related to data collection and management. It envisions a gradual process of integration, aiming for continuous commitment to these innovations in the coming years.

As a result of these trends in digitalization, and on the initiative of the Fund for Innovation and Technological Development, a working group was established in September 2021 with the aim of creating the country's first National Strategy for Artificial Intelligence. The group includes both local experts and successful Macedonian professionals who are globally recognized and work at prestigious international companies and universities. The National AI Strategy is expected to provide opportunities for many domestic, innovative startup companies to realize their ideas and projects, ensure appropriate education, and facilitate access to modern equipment. However, apart from this general information, no further details or publicly available documents regarding the strategy can be found online, making it difficult to assess its current status or implementation progress (https://fitr.mk/).

North Macedonia has certainly established strategic goals for integrating new technologies; the focus remains on preparing the infrastructure, education, and policy framework for the future adoption and widespread use of AI, Big Data, IoT, and related technologies.

AI's Role in North Macedonia's Labor Market

North Macedonia has a dual challenge in integrating Artificial Intelligence (AI) into its labor market, boosting AI's potential and its usage for creating better economic growth, while focusing on the risks of job displacement, particularly in industries that are more traditional. The impact of the AI on the Macedonian workforce is likely to be not even, having some sectors more susceptible to automation than others.

As example, similar to trends in countries like China, North Macedonia's manufacturing sector is at high risk of job losses because of automation and the adoption of AI technologies. As AI-driven systems take over the routine tasks, many manufacturing jobs may be displaced. Without strong government policies and labor market planning, workers in these sectors could be left without a clear path and vision for transitioning to emerging industries.

In this regard, Bisev et al. (2020) assume that, similarly, North Macedonia's service sector faces pressure from AI-driven automation. Industries such as call centers, retail, and administrative services are increasingly relying on AI-powered systems for customer support, inventory management, and data processing.

This shift could lead to significant job losses, particularly among lower-skilled workers. To mitigate the impact, proactive efforts are required to reskill and upskill the workforce, ensuring that workers are prepared for the new roles and opportunities that AI technology can create.

For North Macedonia to successfully navigate these challenges, it will be crucial to invest in retraining programs, vocational education, and policies that facilitate the transition to new, tech-driven industries. Without such initiatives, the country risks facing higher unemployment rates and widening inequality, especially for workers in industries most affected by automation.

Comparative Analysis on the Role of Government in Workforce Planning: Should North Macedonia Follow China's Example?

One key question that arises from this comparison is whether North Macedonia should adopt a more centralized, state-driven approach to labor market planning, similar to China's model. By setting quotas and directing educational resources toward high-demand fields like AI, the government can ensure that the workforce is prepared for future technological shifts, thereby minimizing economic disruption. Through structured training programs and targeted investments in technology sectors, North Macedonia could reduce the risks posed by AI-driven job loss. This proactive approach could also help boost the country's competitiveness in global markets.

On the other hand, some might argue that North Macedonia should maintain its current approach and allow the labor market to adjust more organically. A more liberal approach could encourage:

- Innovation and Entrepreneurship: A flexible labor market allows for greater entrepreneurial freedom and innovation. Startups and smaller companies may be better able to adapt to AI developments without being constrained by state-imposed quotas or regulations.
- Market-Driven Education: Without strict government control, educational institutions and private companies can be more agile in adapting to the fast-evolving job market, offering new courses and certifications in response to emerging demands in AI and technology fields.

Recommendations for North Macedonia

This paper suggests several recommendations for North Macedonia to address the challenges from AI and automation while fostering economic growth:

- North Macedonia should prioritize STEM education and provide targeted reskilling programs for workers in industries vulnerable to automation. The creation of public-private relations can bridge the gap between academia and industry, ensuring that the labor force is prepared for the future.
- North Macedonia could establish innovation hubs or tech parks, similar to China's model, where AI-driven businesses can thrive and workers can access specialized training in emerging technologies.
- Rather than adopting a strict quota system, North Macedonia could introduce gradual labor market regulations that incentivize companies to invest in AI and automation while also ensuring that workers are protected and retrained for new roles.

Conclusion

As AI is continuing to reshape the global economy, North Macedonia and China are two different examples of how nations can deal with the challenges and opportunities of automation. China's centralized, state-driven model shows the potential of the top-down strategies that are guiding the workforce transitions and are promoting new technological advancements. However, North Macedonia, with its unique and special socio-economic landscape, still has the opportunity to create a way that can mix and have both state support and market-driven flexibility.

This study reveals that China's centralized, strategic approach to AI and labor market planning enables effective workforce development and technological leadership, while North Macedonia's flexible but fragmented system struggles to keep pace with AI-driven change. To address these challenges, North Macedonia should prioritize enhancing STEM education, create stronger public-private partnerships, and implement coordinated labor market policies. Additionally, gradual regulatory frameworks supporting AI adoption, combined with worker reskilling programs, are essential to mitigate automation risks. By adopting these measures, North Macedonia can better prepare its workforce, stimulate innovation, and strengthen its economic resilience in the face of AI-driven transformation.

By focusing on STEM education, boosting public-private partnerships, and investing in innovation hubs, North Macedonia can start building long-term success. A gradual regulatory approach that promotes the business sector to adopt AI while protecting workers with reskilling programs can help the country avoid the negative outcomes of automation. Furthermore, promoting entrepreneurship and allowing educational institutions and universities to adapt organically to market trends and needs can guarantee that North Macedonia will remain competitive and innovative in the technological field.

North Macedonia has already made the beginners steps with its National ICT Strategy, it showed its commitment to adopt digital transformation. However, the strategy still requires bigger focus, need for collaboration between public and private sectors, and better implementation to keep with the evolution of AI and automation technologies.

Ultimately, North Macedonia does not need to fully imitate China's model but can take lessons from its successes. A hybrid strategy—combining proactive government involvement with the dynamism and involvement of a liberal market—offers the best path forward. By implementing balanced policies and boosting its digital initiatives, North Macedonia can turn the challenges of AI into opportunities for economic growth, workforce development, and global competitiveness.

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Blerta Kondri and Nimete Berisha

Mother Teresa University, Skopje, Republic of North Macedonia

University of Pristina, Republic of Kosovo

Correspondence concerning this article should be addressed to Nimete Berisha,

Email: nimete.berisha@uni-pr.edu

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Economic Volatility in North Macedonia: ARDL Modelling of the Effects on Economic Growth

Blerta Kondri and Nimete Berisha

Abstract

The purpose of this research is to investigate the economic volatility of North Macedonia over the period 1998-2023. The study employs an Autoregressive Distributed Lag (ARDL) model that intends to assess the dynamics of economic volatility over economic growth. Economic volatility is measured as the standard deviation of GDP growth over a rolling window. The empirical results reveal that government budget balance, private sector credit, current account balance, money supply, and economic volatility significantly influence GDP growth, though with varying lag structures and directions. Notably, economic volatility stands out as a critical variable, while it may temporarily correspond with higher growth, its lagged effects are profoundly negative, showing the destabilizing consequences of persistent fluctuations. To mitigate volatility, the government needs to promote sound institutional frameworks, counter-cyclical policies, and structural reforms that enhance resistance to shocks.

Keywords: Economic volatility, GDP growth, Shocks, ARDL

Introduction

North Macedonia has had a difficult pathway with numerous economic challenges characterized by transition, reforms, and resilience. As a newly sovereign state emerging from the breakup of Yugoslavia, the country faced significant political, institutional, and economic transformations. Over more than three decades, macroeconomic stability has been shaped by internal reform efforts and external shocks, while economic policies have played a crucial role in guiding the country through various periods of turbulence and recovery.

After the independence, North Macedonia faced a severe economic downturn. The transition from a centrally planned economy to a market-based system was marked by declining industrial output, hyperinflation, and rising unemployment. The Greek trade embargo (1994-1995) further complicated the economic environment. In response, the Government initiated market liberalization policies, launched privatization programs, and introduced a new currency, the denar, in 1992. With support from the International Monetary Fund and World Bank, early stabilization programs aimed to control inflation and restore fiscal order. By the late 1990s, inflation had begun to fall, and the foundations for a more stable macroeconomic environment were laid.

The early 2000s brought new challenges, the ethnic conflict that threatened both political and economic stability. However, the Ohrid Framework Agreement helped restore peace and peeved the way for renewed economic development. Supported by international donors, the government implemented reforms aimed at fiscal discipline, strengthening the financial sector, and improving governance.

The Central Bank maintained a fixed exchange rate regime, anchoring inflation expectations and building public confidence. During this period, North Macedonia recorded steady economic growth, declining inflation, and modest improvements in employment, though structural weaknesses persisted. However, this progress was disrupted by the global financial crisis (2008-2009) when the country faced reduced export demand, declining foreign direct investment, and slower growth. To mitigate the negative effects of this crisis, the government adopted counter-fiscal policies, increasing public investment and introducing tax incentives to stimulate the economy, which measures also contributed to rising public debt levels.

Between 2015 and 2017, the country experienced a period of political instability stemming from corruption scandals and governance concerns. During this period, macroeconomic indicators remained stable, with modest growth and low inflation. Reforms were influenced by the broader objective of European Union accession.

Institutions began aligning more closely with EU standards, and economic policy focused increasingly on transparency, the rule of law, and competitiveness.

As a result of COVID 19 Pandemic, North Macedonia witnessed another unprecedented economic shock. Lockdowns and disruptions in global supply chains led to a contraction in GDP in 2020. The government responded with emergency fiscal packages, including wage subsidies, liquidity support for businesses and increased health spending while the central bank maintained financial stability. Recovery began in 2021, aided by global reopening and ongoing fiscal support.

As of the 2023-2025 period, North Macedonia faced with the similar challenges as other regional and European countries. The country confronted inflation pressures in 2022 due to energy and food price shocks. Economic growth has resumed, although at a moderate pace. Policymakers were focused on consolidating public finances, advancing digital and green transitions and strengthening the resilience of the economy.

The period of more than three decades from 1991 to 2025 reveals that the macroeconomic stability of North Macedonia has evolved through phases of deep crisis, gradual reform, and cautious recovery. While external shocks and political instability have posed recurrent challenges, sound economic policies have played a central role in navigating these periods. Prudent fiscal and monetary policies were essential in maintaining economic stability and economic growth for the country. Considering these enlightenments, the purpose of this study is to empirically analyze macroeconomic volatility in North Macedonia by reflecting the most important macroeconomic indicators and analyzing the changes they have undergone over the years as a result of various fluctuations that the country has experienced since its independence until today.

Literature Review

Several scientific studies related to the impact of macroeconomic volatility on economic growth examine economic growth from the perspective of various influencing factors. Large number of scholars date back to the initial stages of economic and political transformation for Eastern European countries studied the causes of the initial recession, the advantages and drawbacks of gradual adjustment and the role played by the liberalization and democratization, providing useful insights about the economic condition in these countries (Campos & Coricelli, 2002; Popov, 2007; Lazarov & Simeonovski, 2023; Bilenko, 2024).

The problem of economic growth and macroeconomic stability is particularly important in moments of recession and economic downturn, as well as post-crisis periods, and there are many such situations that countries have gone through, including North Macedonia. Some authors attributed the initial recession to weakened consumer demand (Blanchard et al., 2010), although most researchers attribute the decline in production to supply-side factors. The collapse of the previous central planning system brought about a change in the reallocation of resources (Popov, 2007).

Regarding the connection between business cycles and economic growth, the study of Fatas (2002) reveals that characteristics of the business cycle are not independent of the growth process, and the volatility associated with the business cycle is negatively related to long-term growth rates. Based on a cross-country analysis of the relationship between macroeconomic volatility and long-run economic growth, Hnatkovska and Loayza (2005) have found that macroeconomic volatility and long-run economic growth are negatively related. The analysis is conducted for poor and institutionally underdeveloped countries, and this is due to recessions rather than normal cyclical fluctuations. However, according to Martinez and Sachez–Robles (2009), through panel data analysis for 13 countries, macroeconomic stability accompanied by low inflation rates and a low level of public deficit are positively related to economic growth. Furthermore, Imbs (2002) confirmed that growth and volatility are negatively related across countries. In fact, he argued that this relationship can be positive or negative depending on the mechanisms that transmit it. Also, Lazarov and Simeonovski (2023), using the ARDL model and quarterly data for the period 2007-2022, find that high GDP volatility has a negative impact on economic growth at the level, but positive in the time lag.

Methodology and Data

The aim of this research article is to analyze the volatility and shocks to economic growth. For this purpose, first a multiple regression model is used, estimated by OLS, and second, an Autoregressive Distributed Lag (ARDL) model is applied. To estimate the response of economic growth to volatility and shocks related to three significant crises, the econometric model is specified as in the following form:

$$ECONG_t = \beta_0 + \beta_1 INFLATION + \beta_2 M2 + \beta_3 CREDITS + \beta_4 GOV + \beta_5 CAB + \beta_6 FDI + \beta_7 VOLATILITY + \delta_1(2001) + \delta_2(GFCRISIS) + \delta_3(COVID19) + \varepsilon_t$$

Where the dependent variable is economic growth or GDP growth and as independent variables are inflation rate, the growth of monetary aggregate M2, bank and savings houses credits to the private sector growth rate (CREDITS), government budget balance (GOV), current account balance (CAB), foreign direct investment (FDI) and volatility which refers to economic growth volatility. It was calculated from the standard deviation of the GDP growth rate over a moving time window. Also, three dummy variables are included in the model considering the 2001 armed conflict, the global financial crisis, and recently the COVID-19 crisis, respectively. This relationship is estimated through OLS, whereas the effect of volatility is estimated using Autoregressive Distributed Lag (ARDL) model which is an econometric approach used to analyze the dynamic relationship between a dependent variable and one or more independent variables in both the short run and long run, when the used variables are of mixed order of integration (i.e., I(0) or I(1), but not I(2)). It combines lags of the dependent variable (autoregressive terms) and current and lagged values of the independent variables (distributed lag terms) to capture temporal dynamics. The ARDL model is particularly useful in small samples and allows for estimating both short-term fluctuations and long-run equilibrium relationships through the bounds testing approach to cointegration developed by Pesaran et al. (2001). Once a long-run relationship is established, the model can be reformulated into an Error Correction Model (ECM) to examine how quickly deviations from long-run equilibrium are corrected. However, in this study, the standard ARDL model will be used, not yet reparametrized into its error correction form (ECM). Thus, the coefficients reflect short-run dynamic relationships rather than distinguishing explicitly between short-run and long-run effects. This type of model is adequate for this analysis since the sample size is small as well as the variables have mixed order of integration (Table 1). In the ARDL model, the dummy variables are excluded from the model due to collinearity problems.

The annual data are used and are provided from National Bank of Republic of North Macedonia and State Statistical Office for the time spin 1998-2023.

The table below displays the results of the stationarity test, where the null hypothesis (H_0) is that the variable has a unit root (i.e., non-stationary). The alternative hypothesis (H_1) is that the variable is stationary. If the test statistics are more negative than the critical value, we reject the null hypothesis (i.e., the series is stationary). The results clearly show that for GDP growth, inflation, current account balance, government budget balance, M2 and economic growth volatility, we reject the null hypothesis of non-stationarity, meaning that they are stationary at levels,

i.e. I(0) whereas for credits and FDI we fail to reject the null hypothesis at level, but it was rejected at the first difference, so the order of integration for these variables is I(1). This test justifies the application of the ARDL model for these variables and the number of measurements.

Table 1

Stationarity Test based on DF-GLS

Variables	**Optimal Lag**	**DF-GLS**	**5% Critical Value**	**Decision**	**Order of integration**
GDPG	2	-3.614	-2.927	Reject H_0 at 5%	I(0)
INFLATION	1	-3.743	-2.946	Reject H_0 at 5%	I(0)
M2	2	-5.041	-3.498	Reject H_0 at 1%	I(0)
CREDITS	2	-1.026	-2.946	Fail to reject H_0	I(1)
D_CREDITS	**2**	**-3.566**	**-3.033**	Reject H_0 at 5%	
GOV	1	-3.952	-3.452	Reject H_0 at 5%	I(0)
CAB	2	-4.395	-3.498	Reject H_0 at 1%	I(0)
FDI	4	-1.740	-3.014	Fail to reject H_0	I(1)
D_FDI	**2**	**-4.031**	**-2.950**	Reject H_0 at 1%	
VOLATILITY	1	-5.312	-3.505	Reject H_0 at 1%	I(0)

Empirical Estimation

The OLS regression results are displayed in Table 2, indicating that several macroeconomic and shock-related variables (dummy variables) have statistically significant impacts on GDP growth. Notably, M2 monetary aggregate growth, credits, and foreign direct investment (FDI) have positive and statistically significant coefficients, suggesting that increased money supply, higher lending activity, and FDI inflows are associated with stronger economic growth. The current account balance shows a negative effect on growth, significant at the 10% level, indicating that smaller deficits may correspond with lower growth, possibly reflecting weak domestic demand. The COVID-19 and 2001 conflict dummy variables have strong negative and significant impacts, pointing out the sharp contractions caused by these crises. However, variables like inflation, government budget balance, and volatility are statistically insignificant in this specification, suggesting limited explanatory power for GDP growth within the sample period.

Table 2

OLS regression results

Variable	Coefficient	Robust Std. Error	t-Statistic	P-Value	Significance
INFLATION	-0.1048	0.0798	-1.31	0.214	Not significant
GOV	0.2720	0.3646	0.75	0.470	Not significant
CAB	-0.2500	0.1208	-2.07	0.061	*
M2	0.0836	0.0305	2.74	0.018	**
D_CREDITS	0.8147	0.3189	2.55	0.025	**
D_FDI	0.3350	0.1371	2.44	0.031	**
VOLATILITY	0.5583	0.4584	1.22	0.247	Not significant
Conflict 2001 Dummy	-9.0674	1.9208	-4.72	0.000	***
Global Financial Crisis	-1.7117	1.1572	-1.48	0.165	Not significant
COVID-19 Dummy	-5.8052	2.0775	-2.79	0.016	**
Constant	2.9874	1.4191	1.11	0.177	-

Note: Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; Robust standard errors used to correct for heteroskedasticity.

Overall, the OLS model highlights the importance of monetary conditions, external investment, and crisis events in explaining growth fluctuations. The coefficient for economic volatility (measured as the standard deviation of GDP growth) is positive (0.558) but not statistically significant (p = 0.247), indicating that while there appears to be a positive association between volatility and economic growth, this relationship is not robust enough to be considered reliable in a statistical sense. This could suggest that in periods of higher growth fluctuations, GDP growth may sometimes increase, perhaps due to rapid recoveries following downturns, but this effect is not consistent across the sample.

The results of the standard dynamic ARDL model are presented in Table 3, considering a maximum of 2 lags, based on the optimal number of lags presented in Table 1, as well as bearing in mind the small number of observations. Basically, the ARDL

(2,1,1,2,2,2,1) model reveals a strong and statistically significant dynamic relationship between GDP growth and key macroeconomic variables, excluding FDI and dummy variables from the model due to collinearity.

Table 3

ARDL model results

Variable	Coefficient	t-Statistic	P-Value	Significance
GDP Growth (L1)	0.1067	1.34	0.250	Not significant
GDP Growth (L2)	0.1153	1.93	0.079	*
INFLATION (current)	–0.0407	–1.82	0.143	Not significant
INFLATION (L1)	0.0461	2.08	0.106	*
GOV (current)	1.1478	21.38	0.000	***
GOV (L1)	–0.7932	–8.00	0.001	***
CREDITS (current)	–0.0408	–1.77	0.151	Not significant
CREDITS (L1)	0.3327	10.13	0.001	***
CREDITS (L2)	0.1013	4.42	0.011	**
CAB (current)	0.0516	1.03	0.360	Not significant
CAB (L1)	0.2983	7.47	0.002	***
CAB (L2)	0.3449	6.20	0.003	***
M2 (current)	-0.1195	–4.17	0.014	**
M2 (L1)	–0.2116	–8.66	0.001	***
M2 (L2)	–0.1301	–5.34	0.006	***
VOLATILITY (current)	0.9167	5.02	0.007	***
VOLATILITY (L1)	–1.3928	–9.18	0.001	***
Constant	7.3566	11.65	0.000	***

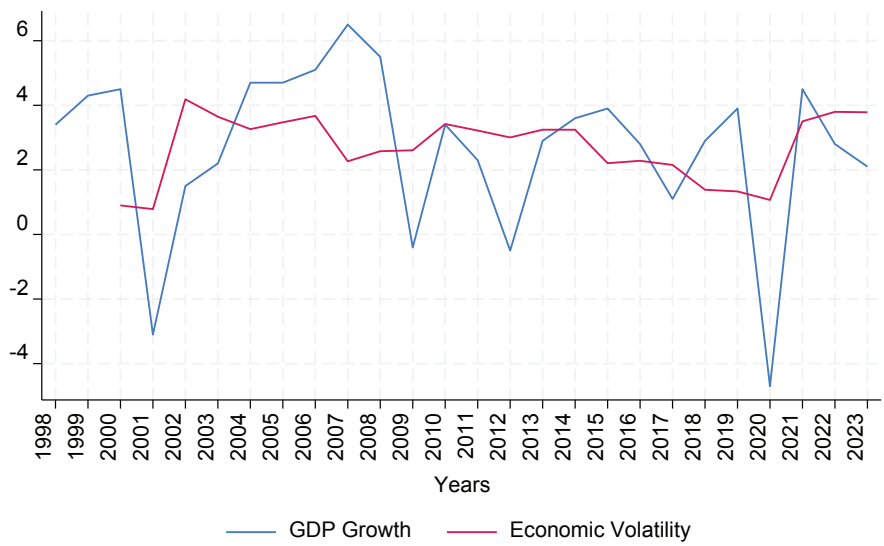
Note: Significance levels: ***p < 0.01, **p < 0.05, *p < 0.1

The results disclose that government budget balance (GOV) has a highly significant and positive immediate effect on growth, while its lagged value has a strong negative coefficient, suggesting short-run stimulus but possible long-term fiscal burden. Credit to the private sector significantly contributes to growth with lagged effects, emphasizing delayed but positive financial deepening. The current account balance positively affects GDP growth with significant lags, indicating that external balance improvements translate into growth over time. Unlike the OLS results, the coefficient of M2 growth in this model has consistently negative and significant coefficients, implying inefficient liquidity effects.

In the ARDL model, economic volatility emerges as a crucial determinant of economic performance, with both its current and lagged values being statistically significant. The positive and significant coefficient on current volatility (0.917, p = 0.007) suggests that in the short run, periods of heightened growth variability may coincide with or even stimulate higher growth, possibly due to post-shock recoveries or cyclical rebounds. However, the large negative coefficient on its lagged value (–1.393, p = 0.001) highlights the destabilizing effect of prolonged or persistent volatility on future growth. This asymmetric dynamic implies that while the economy may temporarily benefit from volatile periods, such fluctuations can weaken longer-term growth trajectories by increasing uncertainty, discouraging investment, and weakening macroeconomic planning. Additionally, Graph 1 illustrates the relationship between GDP growth and economic volatility from around 1998 to 2023. GDP growth exhibits significant fluctuations, with notable downturns in 2001, the 2008–2009 global financial crisis, and a sharp contraction in 2020 due to the COVID-19 pandemic, followed by a strong rebound in 2021. In contrast, economic volatility shows a smoother pattern, with increases during periods of uncertainty such as the early 2000s and the pandemic years. While volatility generally rises during economic downturns, it remains relatively stable in other periods, indicating that while growth is cyclical and shock-sensitive, volatility is more persistent and may reflect broader macroeconomic uncertainties.

Graph 1.

Relationship between GDP growth and Economic Volatility



These findings expose the importance of managing economic volatility not only as a symptom but as a key structural factor that can shape both the resilience and the sustainability of growth. Based on these results, the government should improve fiscal discipline, strengthen the institutions, and diversify the economy to reduce vulnerability to shocks. Overall, the graph highlights an inverse relationship between growth and volatility in times of crisis, with volatility serving as an indicator of underlying economic instability.

Conclusions

In this research paper, the effects of economic volatility on economic growth using OLS and ARDL estimation models were examined. The findings from both models are quite different; however, robust results are considered those obtained through the ARDL model, which reveal that government budget balance, private sector credit, current account balance, money supply (M2) growth, and economic volatility significantly influence GDP growth, though with varying lag structures and directions. Notably, economic volatility stands out as a critical variable, while it may temporarily correspond with higher growth, its lagged effects are profoundly negative, showing the destabilizing consequences of persistent fluctuations. Regarding the dummy variables included in the OLS model, one can conclude that the 2001 conflict and COVID-19 dummy variables have strong negative and significant impacts, pointing out the sharp contractions caused by these crises. The results from both models highlight the importance of macroeconomic stability, effective fiscal management, and financial development in supporting sustained economic performance. Furthermore, the evidence reinforces the need for policymakers to not only stimulate growth but also to mitigate volatility through sound institutional frameworks, counter-cyclical policies, and structural reforms that enhance resilience to shocks.

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Teuta Qerimi Sadiku, Albiona Demiri Bekteshi

Department of Finance and Accounting, Faculty of Economics- University of Tetovo, https://orcid.org/0000-0001-6436-0687

National Bank of the Republic of North Macedonia, https://orcid.org/0009-0007-6201-1900

Corresponding author e-mail: teuta.qerimi@unite.edu.mk

BALKAN JOURNALS

The Efficiency of the Banking System in the Republic of North Macedonia

Teuta Qerimi Sadiku, Albiona Demiri Bekteshi

Abstract

The purpose of this research is to analyse the efficiency and stability of the banking system in the Republic of North Macedonia over the period 2004-2024. Using annual data from the National Bank, we estimate a linear regression model in which return on average assets (ROAA) is explained by cost-to-income ratio, employee cost-to-total-income ratio, net interest margin, and non-interest margin. The results reveal that cost-to-income and net interest margin both exert a statistically significant negative effect on profitability, whereas higher investment in human capital improves efficiency. Descriptive indicators confirm a stable system, indicating that in 2024 the capital adequacy ratio stood at 18.9 %, well above the regulatory minimum, while ROAA and ROAE reached 2.2 % and 17.6 %, respectively. Five large banks hold 82 % of total assets, and foreign capital accounts for nearly 80 % of ownership, reflecting a highly concentrated yet well-capitalised sector. Policy implications underscore the importance of further reducing operating costs and diversifying income sources to sustain profitability. Overall, the North Macedonian banking sector remains resilient, liquid, and adequately capitalized, providing a sound basis for continued economic growth.

Keywords: Banking system, efficiency, capital adequacy, monetary policy

Introduction

Monetary policy is an integral part of economic policy and has a central role in stabilizing the economy through the control of price stability. The National Bank of the Republic of North Macedonia has a key role in implementing this policy through instruments such as open market operations, reserve requirements, and short-term loans. The banking system is part of the financial system in which banks participate with their operations.

The North Macedonian banking system consists of a network of financial organizations and legal structures that regulate banking activities in North Macedonia. As part of the wider financial system, it incorporates the National Bank of the Republic of North Macedonia, the Development Bank of North Macedonia, commercial banks, savings houses, and the Deposit Insurance Fund, as well as pertinent laws and regulations. One of the most important roles for the National Bank is the regulation of commercial banks and other financial institutions in an attempt to promote the overall industry effectiveness and profitability. By setting policy and utilizing regulatory indicators like capital adequacy tests, the National Bank gauges the performance of banks and oversees financial system stability. Thus, the aim of this research article is to analyze the efficiency and stability of the banking system in the Republic of North Macedonia using a descriptive and econometric analysis.

Monetary Policy and the Role of the National Bank

Monetary policy is one of the classic tools of economic policy with which governments seek to influence inflation and other macroeconomic variables. Monetary policy was until a certain time subordinated to fiscal policy and other policies used to manage the macroeconomics, but today it can be considered one of the most important policy tools used to achieve various general economic policy goals in a country. However, the main objective of monetary policy in North Macedonia is price stability which ensures long term sustainable economic growth (NBRNM, 2025)[1].

In a market economy, the instruments of monetary policy can influence the goals of economic policy only indirectly. The role of intermediaries, or transmission agents through which this influence is exerted, is played by the so-called inter-

1 See for more details: https://www.nbrm.mk/postavienost_na_monietarnata_politika-en.nspx

mediate targets of monetary policy. In other words, intermediate targets include those objectives that demonstrate a stable and causal relationship with the final goal, have a leading influence on it, and can be affected by the central bank through the so-called operational targets (Trpeski, 2018).

To achieve the primary goal of monetary policy, which is price stability, the National Bank uses various instruments, in which we will refer to those that are most frequently used, such as open market operations, reserve requirement, available deposits, overnight credit available and intraday credit.

Due to the complicated and indirect connection attended by a time lag between the instruments of monetary policy and its final objective, the National Bank monitors the movement of some economic variables, which are operational and intermediate targets. The operational targets are controllable but farther from the final objective, while the intermediate targets are less controllable but nearer to the final objective. By controlling interest rates and thereby the degree of liquidity in the banking system as an operating target, the National Bank attempts to affect the level of the exchange rate, an intermediate monetary policy target.

Banking System in the Republic of North Macedonia

The financial system is a set of financial markets (money market, capital market, foreign exchange market), financial institutions such as deposit (commercial banks, savings banks, credit unions, etc.) and non-deposit (investment funds, insurance companies, pension funds, etc.), financial infrastructure (payment systems), as well as financial instruments (securities and their derivatives).

The banking system is a component of the financial system, within which banks operate through their activities. It represents an integral part of the overall financial framework in North Macedonia. The system is composed of the National Bank of the Republic of North Macedonia, commercial banks, savings institutions, and the Deposit Insurance Fund, alongside relevant banking laws and regulatory bylaws. Because banking plays such a major role in channeling funds to borrowers with productive investment opportunities, this financial activity is important in ensuring that the financial system and the economy run smoothly and efficiently (Mishkin & Eakins, 2006).

The act of monetary independence was accompanied by the establishment of the National Bank of the Republic of Macedonia as an independent issuing bank, re-

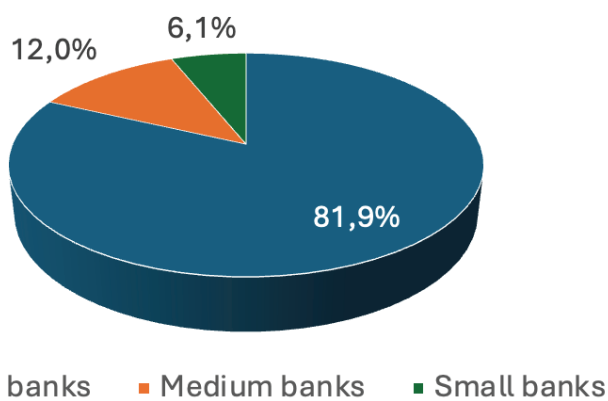
sponsible for the stability of the currency, monetary policy, and overall payment liquidity within the country and abroad (Trpeski, 2009)

In the Republic of North Macedonia, there are five banks. In order to increase competition between banks, a more liberal legal regulation for the establishment of banks was set, which reduced the barriers to entry into the banking sector. Such approaches have had a positive result in the economy and the banking system. By the end of 2024, there were thirteen banks and two savings banks in the banking structure.

In the Republic of North Macedonia, there are separate groups by number of banks, the so-called "large banks" which consist of five banks (Komercijalna Banka, Stopanska Banka, NLB Banka AD Skopje, Halk Banka AD Skopje, Ohridska Banka AD Skopje) which participate in the banking assets of the Republic of North Macedonia with 82%, i.e. a group of banks with assets greater than 55,55 billion denars, and a group of "medium-sized banks" consisting of three banks, i.e. they participate in the banking assets with 12%, respectively with assets between 13,8 and 55,55 billion denars until 31.12.2024, and a group of "small banks" are those banks that have less than 13,8 billion denars in the assets of the banking structure until 31.12.2024, i.e. with 6% in the banking assets (Chart 1)[2].

Chart 1.

Structural share of banks by size (2024)



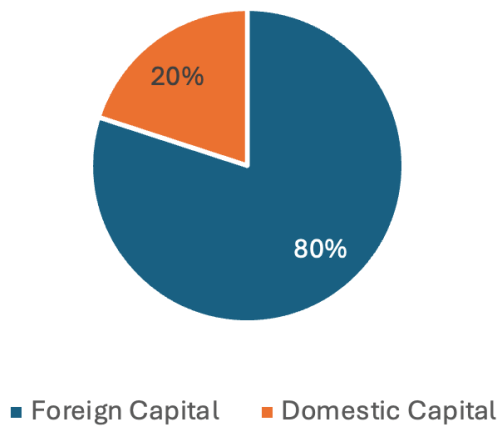
Note: Based on NBRNM data

2 The data in this and following charts are compiled from: https://www.nbrm.mk/podatotsi_i_pokazatieli_za_bankarskiot_sistiem_na_riepublika_makiedonija.nspx

In 2024, the five largest banks controlled 81.9% of total assets, while foreign capital accounted for 79.72% (Chart 2). Regional concentration is most pronounced in Skopje.

Chart 2

Structural share of banks by type of ownership in total assets (2024)



Note: Based on NBRNM data

Efficiency of the Banking System

The efficiency of the banking system in recent decades has been strongly influenced by the high degree of globalization and integration within the financial system (Naumovska & Cvetkoska, 2016; Bilalli, 2021). On the other hand, the stability of the financial system is mainly determined by the stability of the banking sector (Mitreva et al., 2024). Nowadays, the efficiency of bank operations is a critical factor for survival in the face of technological innovation, banking consolidation, and increased competition in the financial services sector.

The indicators that are most commonly used to measure the efficiency of banks are net interest margin (Net interest income/Average interest-earning assets) which measures how effectively a bank earns income from its interest-bearing assets (like loans and investments) relative to the cost of funding those assets (such as deposits). The other indicator is cost-to-income ratio (Operating Expenses / Total Operating Income) which reflects the cost efficiency of a bank and the lower the ratio, the more efficiently the bank is operating. The third indicator is the ratio that com-

pares a bank's net interest income to its non-interest expenses (such as administrative and personnel costs). It shows how well the core lending and deposit-taking functions cover the bank's operating costs that are not related to interest. A higher ratio indicates that the bank is better able to support its operations through its interest-related activities, implying higher efficiency. In order to obtain an appropriate interpretation of the value of these indicators, it is advisable to supplement this analysis with indicators of the profitability of the banking sector such as return on average assets (ROAA) and return on average capital and reserves (ROAE).

Table 1

Banking system indicators

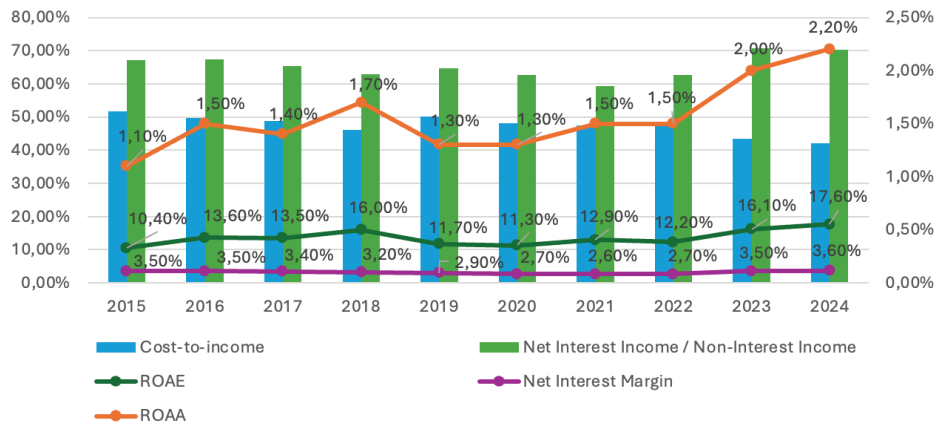
Indicator	**2023**	**2024**
ROA	2.00%	2.20%
ROE	16.13%	17.60%
Adequacy of capital	18.10%	18.90%

Note: Based on NBRNM data

Between 2023 and 2024, all three financial indicators show positive developments, reflecting improved performance and stability. Return on Assets (ROA) increased from 2.00% to 2.20%, indicating more efficient use of assets to generate profit. Return on Equity (ROE) rose from 16.13% to 17.60%, suggesting higher profitability for shareholders. Additionally, the Capital Adequacy Ratio grew from 18.10% to 18.90%, demonstrating a stronger capital position and greater ability to absorb financial shocks. Overall, these trends suggest enhanced financial health and resilience in 2024 (Table 1). Although the banking sector's profitability is stable, it is still exposed to various types of risks that are present in the operation of financial institutions, considering the global developments (Gogova-Samonikov & Josifova, 2021).

Chart 3.

The Efficiency of Banking system



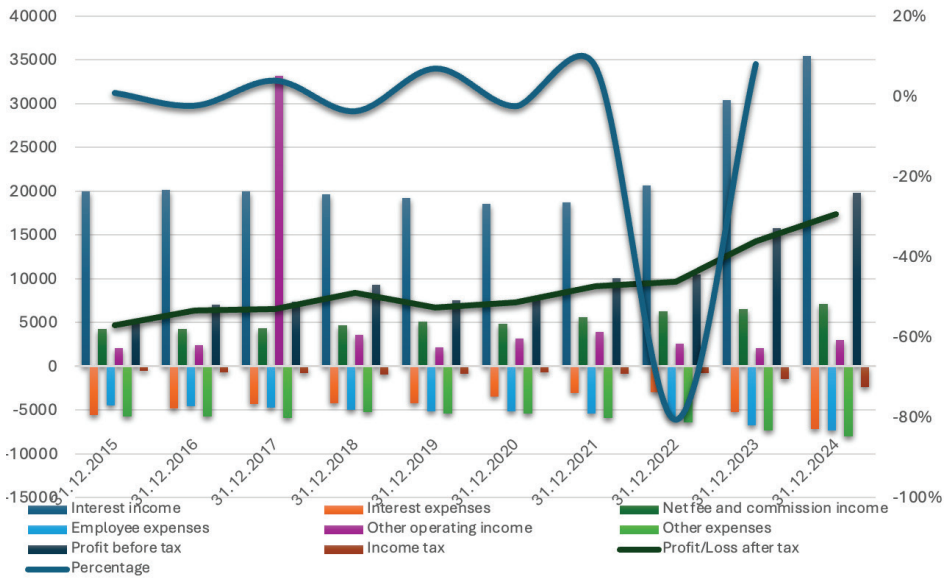
Note: Based on NBRNM data

Chart 3 shows a positive trend in the performance and efficiency of the banking sector from 2015 to 2024. Over this period, Return on Assets (ROAA) and Return on Equity (ROAE) both improved significantly, reaching 2.20% and 17.60% respectively in 2024, indicating stronger profitability. Net Interest Margin remained relatively stable around 3.5%, reflecting consistent income from core lending activities. Meanwhile, the Cost-to-Income ratio gradually declined, falling below 45% by 2024, suggesting improved operational efficiency. Additionally, the Net Interest Income to Non-Interest Income ratio remained high, reinforcing the banking sector's reliance on interest-based earnings. Overall, the chart reflects enhanced profitability, cost efficiency, and a solid income structure in the banking system over time.

Additionally, for a more detailed analysis on the efficiency of the banking sector, the trends and patterns of other remaining components that influence the net interest income are also considered and displayed in (Chart 4).

Chart 4.

Banking system efficiency according to other variables



Note: Based on NBRNM data

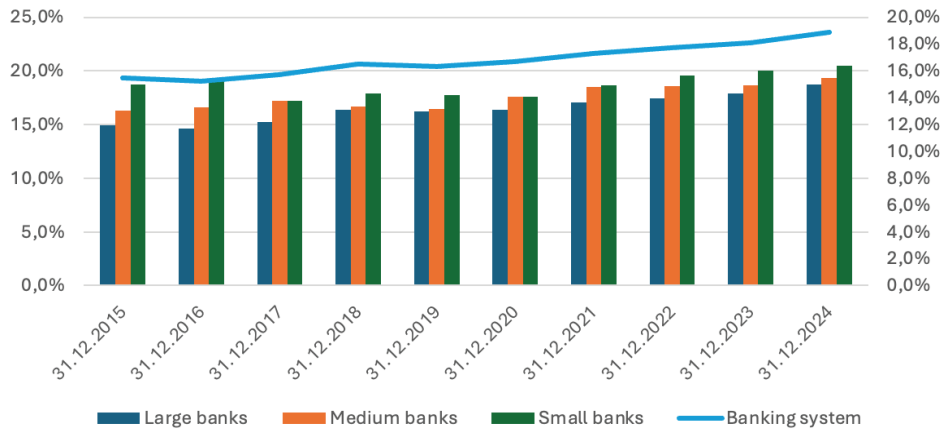
Regulation and Supervision

To maintain an efficient and stable banking system, the National Bank, in performing its supervisory function, applies a series of supervisory standards based on international standards and practices established by the Basel Committee on Banking Supervision. In its supervisory activities, the National Bank particularly controls the fulfillment of the obligations it prescribes in terms of solvency and capital adequacy. Capital adequacy, i.e., maintaining an adequate level of capital that will enable coverage of the risks to which banks are exposed in the course of their operations. The capital adequacy ratio, as the ratio between own funds and risk-weighted assets, cannot be lower than 8%. The capital adequacy ratio (CA) represents the ratio between the guaranteed capital (GC) and the bank's risk-weighted assets (RWA).

CA= (G.C)/RWA=8%

Chart 5.

Capital adequacy ratio of banks



Note: Based on NBRNM data

The banking system remained stable in 2024, maintaining high capitalization and a stable solvency position. However, the higher volume of activities in 2024, namely those for which a higher risk weight is applied in the calculation of capital adequacy, contributed to the moderate annual decrease in solvency indicators. As of 2024, the capital adequacy ratio was 18.9% for the banking system.

Econometric Analysis

A linear regression analysis is also employed to assess the impact of key financial indicators on return on assets (ROAA), including all banks in the Republic of North Macedonia for the period 2004-2024. The independent variables included are Cost to Income Ratio (CIR), Employee Cost to Total Regular Income (ECTI), Net Interest Margin (NIM), Non-Interest Margin (NNIM). The data were obtained from the National Bank of the Republic of North Macedonia and represent annual observations.

The following equation represents the econometric model:

$$ROAA = \beta_0 + \beta_1 CIR + \beta_2 ECTI + \beta_3 NIM + \beta_4 NNIM + \varepsilon_t$$

Where ε_t is the disturbance term, capturing other indicators that may affect ROAA but that are not considered in this model.

Results of the Regression Model

The following table presents the regression results from which a statistically significant model can be observed that explains a substantial portion of the variance in ROAA based on the F-statistic. Three out of the four independent variables were statistically significant at the 1% significance level, such as Cost to Income Ratio (CIR), Employee Cost to Total Regular Income (ECTI) and Net Interest Margin (NIM), whereas Non-Interest Margin (NNIM) is not statistically significant (Table 2).

Table 2.

Regression results

Variable	**Coefficient**	**Std. Error**	**t**	**Sig.**
Constant	6.852	2.524	2.715	0.022
CIR	-0.063	0.017	-3.712	0.004
ECTI	0.021	0.005	4.653	0.001
NIM	-0.021	0.004	-5.144	0.000
NNIM	-0.036	0.040	-0.890	0.394
Goodness of fit				
R-squared	0.858			
F	15.148 (0.000)			

Cost-to-Income Ratio has a negative and statistically significant impact on ROAA, = -0.063. This implies that higher cost-to-income ratios are associated with lower profitability, underlining the importance of operational efficiency.

Employee Cost to Total Regular Income ratio shows a positive and statistically significant impact on ROA = 0.021, suggesting that greater investment in human capital is positively related with improved bank efficiency and financial performance.

Net Interest Margin also exhibits a negative and significant relationship with ROA with a coefficient = -0.021. Although this is contrary to traditional expectations, it may be due to structural inefficiencies or regulatory pressures that limit the profitability associated with interest margins.

The coefficient for Non-Interest Margin was not statistically significant with p value > 0.05, indicating that non-interest income does not have a statistically significant impact on ROAA.

The coefficient of determination R-squared is 0.86, indicating that approximately 86% of the variations in ROAA can be explained by the variation of independent variables.

Conclusions

The aim of this study was to investigate the efficiency and stability of the banking sector in the Republic of North Macedonia over the period 2004–2024. Based on descriptive statistics, the banking system in the Republic of North Macedonia is stable and efficient, with high capital adequacy and positive trends in profitability. The National Bank successfully carries out its monetary and supervisory functions, ensuring financial stability and supporting economic development. Efficiency was assessed by net interest margin, cost-to-income, ROAA, and ROAE. In 2024, all indicators show stable efficiency and profitability, supported by capital adequacy exceeding 18%.

Also, using annual data from the National Bank, a linear regression model was estimated with return on average assets (ROAA) as the dependent variable, explained by key financial indicators such as the cost-to-income ratio, employee cost-to-total-income ratio, net interest margin, and non-interest margin. The findings indicate that higher cost-to-income ratios and net interest margins are associated with a statistically significant decline in profitability, suggesting inefficiencies in cost management and interest-based income generation. Conversely, greater investment in human capital, as reflected in the employee cost ratio, appears to enhance operational efficiency. The sector remains highly concentrated, with the five largest banks controlling 82% of total assets, and is predominantly foreign-owned, with international investors accounting for nearly 80% of total ownership.

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