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Editorial Foreword

Prof. Dr. Sani Demiri

Editor in Chief

Dear Readers, Authors and Collaborators,

Mother Teresa University in Skopje is pleased to present **Volume 1 (2026)** of the *Journal of Economy (JE)*. This edition builds on the momentum generated by the **TSD 2025** conference and features a selection of rigorously peer-reviewed papers addressing key sustainable development challenges in the Western Balkans and beyond.

The volume showcases advances in social sciences from multidisciplinary perspective aiming to bring novelties **in times of globalization and AI-driven solutions, and in search of sustainability**. Its scope spans research on the study of circular economy, green economy, wellbeing and strategies for economic sustainability. Under the leadership of **Editor-in-Chief Sani Demiri, PhD**, the contributions in this issue are closely aligned with the **United Nations Sustainable Development Goals (SDGs)** and propose practical, evidence-based pathways for regional development and long-term resilience.

We extend our sincere appreciation to the authors, reviewers, and institutional partners whose commitment and expertise made this volume possible. We invite the academic and professional community to engage with these works, contribute new research, and collaborate with us in future editions to further amplify their impact.

Sincerely,
Prof. Dr. Sani Demiri, PhD
Editor in Chief

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GREEN PRACTICES IN NORTH MACEDONIAN FIRMS. EVIDENCE FROM THE WORLD BANK ENTERPRISE SURVEY

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ABSTRACT

North Macedonia is witnessing a growing shift towards green entrepreneurship with businesses increasingly integrating sustainable practices into their business models, often referred to as the "green transition". Although not a member of the European Union, the private sector in the country is seeking ways to implement environmental, social and governance principles amid growing pressure from their European trading partners. North Macedonia as a signatory of the Green Agenda Declaration, which is aligned with the European Green Deal, is working to implement measures that support the environmental and economic transformation, while focusing on climate change, sustainable energy and the circular economy. In this paper we ask which firms are more likely to implement green practices and which ones are less likely to do so? To answer this question, we use a nationally representative firm-level survey – World Bank Enterprise Survey, implemented in North Macedonia in 2023 by the World Bank Group. We consider factors such as firm age, legal status, ownership structure, management experience, exporting status, informal competition, access to finance, innovation, labor force, etc. while modeling the adoption of green practices by firms. Using descriptive statistics and a logistic regression analysis we identify and discuss the main factors that lead to the adoption of environmental-friendly practices. The findings of this paper offer new perspectives for firms, regulatory bodies and other interested parties that are keen on navigating the landscape of the green transition in North Macedonia.

KEYWORDS: green transition, firm-level survey data, European Green Deal, sustainable practices, North Macedonia

1 Introduction

The depletion of natural resources as a byproduct of global economic growth has urged the private sector around the world to consider the environment when starting or conducting business. Growing pressure from governments and other stakeholders to reduce the firms' carbon footprint and mitigate climate change has been an important external factor driving the implementation of sustainable business models. In addition, internal factors such as improved reputation, employee retention and satisfaction, innovation, cost reductions and improved efficiency, all lead to implementing more sustainable business practices (Donor Committee for Enterprise Development, 2022)

North Macedonia, like many other countries around the world, is taking steps to achieving the United Nations Sustainable Development Goals (SDG), a set of 17 goals designed to address global challenges such as climate change, environmental degradation, poverty, inequality, quality education, peace, justice and strong institutions by 2030. The government integrates these goals into national policies and collaborates with national and international institutions to mobilize resources and support SDG implementation.

The European Grean Deal and North Macedonia's path towards membership in the European Union provide a strategic framework in aligning its sustainable development goals with EU environmental regulations. However, despite positive trends, the country's growth remains highly carbon intensive. The domestic energy sector is three times more carbon-intensive than the EU average (World Bank Group, 2023). Electricity generation is highly dependent on coal which has major public health and economic consequences. In addition, the country has high energy import dependency and has high energy intensity (the amount of energy used to produce a unit of output). As a result, the country is facing a number of environmental issues such as air pollution, deforestation and inefficient waste management. Several studies (American Chamber of Commerce North Macedonia, 2025; American Chamber of Commerce North Macedonia; Kearney, 2022) have pointed to challenges in aligning North Macedonia's environmental policies with EU climate and energy policies. These include reducing the country's greenhouse gas emissions by enhancing energy efficiency and accelerating the adoption of renewable energy (most notably solar and wind energy), inadequate waste management, water quality management, lack of effective environmental regulation and policies as well as providing incentives for businesses to hire and train young workers, increasing access to finance for green projects and reducing bureaucratic hurdles for financial support programs.

Small and medium sized enterprises (SMEs) represent the backbone of the national economy, which are the main drivers of employment, investments and innovations. They are increasingly recognizing the adoption of green practices as an opportunity rather than an impediment to their growth and profitability. A number of studies (Abid & Marchesani, 2025;

Asif, Dhamija, Khan, Johri, & Wasiq, 2025; Li, Ye, Dai, Zhao, & Sheu, 2019; Purwandani & Michaud, 2021) have shown that SMEs which adopt sustainable solutions and green practices have a better reputation, improved customer relations and employee retention. In the long term these firms reduce costs and enhance their financial performance contributing to more sustainable economic growth at the macro level. Despite the benefits, implementing green practices has proved challenging for SMEs for several reasons: lack of knowledge and human resources in implementing such practices, lack of financial resources, limited organizational and technological capacities as well as orientation towards short-term goals.

Against this background, in this paper we address the extent to which green practices are adopted in the private sector in North Macedonia, as well as factors that increase the likelihood of such adoption. The findings of this paper offer valuable new information for the government, international institutions and other interested parties whose goals is to ensure economic growth and prosperity without compromising the environment and the path towards achieving global sustainable goals.

2 Data and methodology

2.1 Data

We use the latest round of the World Bank Enterprise Survey (WBES) for North Macedonia carried out in 2023 by the World Bank Group. WBES is a firm-level survey which collects both objective data (based on financial statement reports) as well as perceptions of firms regarding the business environment in which they operate. The aim of the survey is, through the information and opinions gathered, to help develop new policies and programs that enhance employment and economic growth. The survey has different modules, starting from general information such as firm legal status, ownership structure, year of establishment, information about the top manager, quality certifications, etc. Other modules include infrastructure and services, sales and supplies, commercial disputes, management practices, degree of competition, innovation, capacity utilization, land and permits, green economy, finance, business-government relations, labor force, as well as obstacles faced by the firms in the business environment they operate such as corruption, courts, crime, regulations, inadequately educated workforce, practices of competitors in the informal sector, access to finance, political instability, etc.

The universe of inference (population) are all fully or partially privately owned formal (registered) businesses with five or more employees across various sectors including manufacturing and services. One hundred percent government-owned firms and firms with less than five employees are excluded. For North Macedonia the universe of inference was obtained from the Central Registry and amounted to 8,075 firms.

To ensure representativeness of the sample a stratified random sampling approach is used,

where the population of establishments is first separated into strata (non-overlapping groups) and then respondents are randomly selected from each stratum. The stratification is done by sector of activity, firm size and geographical location. The stratification categories used in North Macedonia are industry – manufacturing, retail and other services; firm size – small (5-19 employees), medium (20-99 employees) and large (100 or more employees); region – Skopje, Western Macedonia (Polog, Southwestern, Pelagonija), Eastern Macedonia (Vardar, Northeastern, Eastern, Southwestern). The sample size is determined by the degree of stratification where for each degree of stratification an acceptable level of precision was achieved (usually 7.5%) as well as by the size of the population. The total sample achieved in North Macedonia was 354 firms across all three stratification levels described above (World Bank Group , 2023).

2.2 Variables and summary statistics

In this section we define the variables used in the analyses and provide some descriptive statistics, to give an overview of some of the main characteristics of the private sector in North Macedonia. Figure 1 presents some of these characteristics, whereas Table 1 and Table 2 show summary statistics and pairwise correlation coefficients, respectively, for all the variables used in the analysis. The definition of all the variables is summarized in the Appendix. The pairwise correlation matrix shows that there are no perfect correlations among the variables, therefore multicollinearity is not likely to be a problem in our analyses. As our aim is to model the adoption of green practices by firms in North Macedonia, we start by defining the variable Green as a binary variable which equals one if "Over the last three years, the establishment has monitored its CO2 emissions or adopted any energy management measures to reduce emissions, waste or pollution.", and zero otherwise. Out of 354 surveyed firms, 57% responded affirmatively to the above statement.

We consider several factors which the literature has shown to significantly impact the adoption of environmental-friendly policies. Starting from general information such as firm size, firm age, firm location (capital city vs. other cities), female owners, manager's experience in sector, international quality certification and audited. We define firm size using the standard definition in the literature – a firm is defined small if it employs up to twenty employees, medium if it employs between twenty and a hundred employees, and large more than a hundred employees. About 39% of our sample are small firms, 35% are medium firms and 26% are large firms. Firm age represents the number of years the firm has been operating in the market. A typical firm in our sample has been operating for 24 years (ranging from 1 to 101 years) with a standard deviation of 13.7 years. From figure 1 we can see the distribution of this variable, which has a skewness of 2.3 and a kurtosis of 12.1. The median value of age is 23 years (compared to the mean of 24 years) indicating that the distribution is skewed to the right. About 21% of firms are located in the capital city and about 26% of them have females among the owners of the firm. The average top

manager has 23 years of experience working in the sector (ranging from 1 to 49 years) with a standard deviation of 8.8 years. About 41% of firms have an internationally recognized quality certification (such as ISO, HACCP, NASSR, etc.). Finally, with regard to firms' transparency in reporting, we define the binary variable Audited which equals one if the firm has its annual financial statements checked and certified by an external auditor, and zero otherwise. About 57% of firms in our sample are externally audited.

To investigate the influence of disruptions in the business infrastructure of the firms we define the dummy variable Insufficient water which equals one if over the last fiscal year the establishment experienced insufficient water supply, and zero otherwise. About 4.2% of firms in our sample experienced such disruptions.

Next, we consider factors relating to the sales of the establishment. We define the binary variable Manufacturing which equals one if the establishment's main activity and product (that represented the largest proportion of annual sales) belongs to the manufacturing sector, and zero if it belongs to the service sector. About 34% of firms belong to the manufacturing sector. Sales are defined as establishment's total annual sales for all products and services in last complete fiscal year (in millions of local currency units). The average amount of sales for the firms in our sample is about 629 million denars (ranging from 44,000 den to 37 billion den) with a standard deviation of about 2.4 billion denars. Median sales are about 101 million den, which indicates that the distribution of the amount of sales is skewed to the right (with some extreme positive values). We account for the exporting status of the firm by defining the variable Exporter which equals one if more than 10% of establishment's sales were direct exports and indirect exports (sold domestically to third party that exports products), and zero otherwise. About 37% of firms, using this definition, are categorized as exporters.

We also consider factors relating to the competitive environment of the firm. To this end, we define the binary variable Competition which equals one if the answer to the question "Over the last year, has the level of competition in the market where this establishment sold its main product or offered its main service changed?" is Yes, there is more competition, otherwise zero (if the answer is Yes, there is less competition or No change). About 49% of firms consider that there is more competition in the market where this establishment operates. We also define the dummy variable Foreign technology which captures how upgraded the technology used by firms is. This variable equals one if the respondents answered affirmatively to the question Does this establishment presently use technology licensed from a foreign-owned company, excluding office software? and zero otherwise. About 25% of firms in our sample report using such technology.

To measure the business-government relations we define the dummy variable Government contract which equals one if over the last three years, the establishment has held a government contract, and zero otherwise. About 21% of the interviewed firms responded

affirmatively to the above stated question.

Finally, we consider factors relating to the workforce of the firm. We define the dummy variable Training which equals one if the establishment had formal training programs for its permanent, full-time employees, and zero otherwise. About 56% of firms in our sample offer formal training programs to its employees. We also define the dummy variable Uneducated workforce which equals one if inadequately educated workforce currently represents the biggest obstacle faced by the firm in the business environment it operates, and zero otherwise. About 22% of firms in our sample report inadequately educated workforce as being the biggest business environment obstacle they face. As shown in Figure 1 other obstacles reported by firms include political instability (with 17.2% of respondents reporting this as the biggest obstacle faced by them) followed by informal competition with around 14% of firms reporting it to be the biggest business environment obstacle. Other obstacles include corruption, access to finance, infrastructure, tax rates, etc.

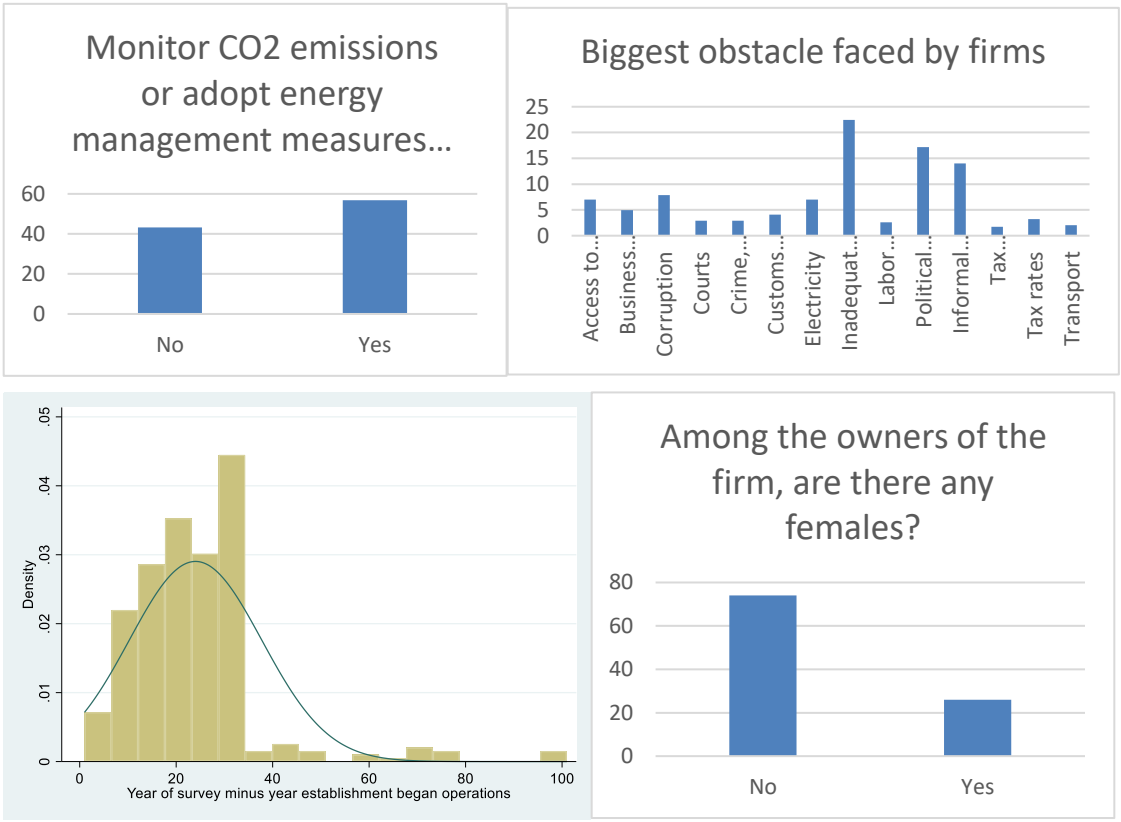

Figure 1: Characteristics of firms in the sample.

Table 1: Summary statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
Green	354	0.568	0.496	0	1
Small	352	0.392	0.489	0	1
Firm age (years)	352	24.014	13.742	1	101
Capital city	354	0.206	0.405	0	1
Female owner	352	0.261	0.440	0	1
Manager experience	350	23.283	8.875	1	49
Certified	347	0.415	0.493	0	1
Audited	351	0.573	0.495	0	1
Insufficient water	353	0.042	0.202	0	1
Manufacturing	354	0.339	0.474	0	1
Sales (mil den)	352	629.312	2408.781	0.044	37149.8
Exporter	353	0.371	0.484	0	1
Competition	344	0.488	0.501	0	1
Foreign technology	350	0.246	0.431	0	1
Government contract	352	0.207	0.406	0	1
Training	350	0.557	0.497	0	1
Uneducated workforce	343	0.224	0.418	0	1

This table shows summary statistics of the variables used in the analyses: number of observations (Obs), Mean value, Standard deviation (Std.dev.), minimum and maximum values. The definition of all variables is given in the Appendix.

Table 2: Correlation matrix.

	Green	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 Small	-0.3103*	1														
3 Firm age (years)	0.1642*	-0.2328*	1													
4 Capital city	-0.0204	-0.1524*	0.0932	1												
5 Female owner	0.1661*	-0.1464*	0.1963*	0.0716	1											
6 Manager experience	-0.1291*	-0.0405	0.2936*	0.1219*	0.0166	1										
7 Certified	0.3428*	-0.3386*	0.097	0.0078	0.1482*	-0.0046	1									
8 Audited	0.3027*	-0.4319*	0.1180*	0.2156*	0.041	0.0202	0.2396*	1								
9 Insufficient water	0.1265*	-0.0547	0.0146	-0.0369	0.1	0.044	0.0506	-0.0175	1							
10 Manufacturing	0.2032*	-0.2215*	0.041	-0.07	0.0259	0.0288	0.3206*	0.0763	0.0874	1						
11 Sales (mil den)	0.3467*	-0.6830*	0.2581*	0.2036*	0.0215	0.0173	0.3830*	0.4665*	0.0819	0.1258*	1					
12 Exporter	0.2459*	-0.1990*	0.0202	-0.0592	0.0578	0.0387	0.2565*	0.0872	0.1008	0.5629*	0.1662*	1				
13 Competition	0.0977	0.0249	0.0704	-0.0247	0.0138	-0.0009	0.0698	-0.0582	0.0192	-0.0825	-0.026	-0.0391	1			
14 Foreign technology	0.2622*	-0.1104*	-0.0123	-0.0239	0.0461	-0.0178	0.2753*	0.1557*	0.0443	0.2809*	0.2393*	0.2784*	-0.0155	1		
15 Government contract	0.2082*	-0.1250*	0.1432*	-0.0024	0.1088*	-0.0765	0.1760*	0.0422	-0.0042	-0.0989	0.1643*	-0.1120*	0.0121	0.1554*	1	
16 Training	0.2463*	-0.3081*	0.0562	0.0779	0.0638	0.0421	0.2515*	0.3501*	-0.0665	0.064	0.3453*	0.1400*	-0.0572	0.2588*	0.0852	1
17 Uneducated workforce	-0.0533	-0.1172*	-0.0777	0.0263	0.023	-0.0129	0.0141	-0.0023	0.0229	0.1803*	0.0322	0.1423*	-0.0953	-0.0009	-0.0343	0.1222*

This table shows pairwise correlation coefficients for all the variables used in the analysis. * denotes significance at 5% significance level.

2.3 Methodology

To assess the main factors driving the adoption of green practices by firms in North Macedonia we use a logistic regression, as our dependent variable is binary. With a logistic regression we model how the probability of success varies with the independent variables and determine whether or not these changes are statistically significant. In fact, we are modelling the logarithm of the odds. The logistic regression model takes the following form:

$$\log\big(odds(Green)\big) = logit(\pi) = \log\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 general_i + \beta_2 infrastructure_i + \beta_3 sales_i + \beta_4 competition_i + \beta_5 business\_government_i + \beta_6 labor_i + \varepsilon \quad (1)$$

where, $\pi(0 \leq \pi \leq 1)$ is the probability of an event happening (success), $\pi = P(success)$. Parameters β_i are estimated using the maximum likelihood method. A positive (negative) and significant coefficient indicates that the corresponding factor significantly increases (decreases) the log odds of the adoption of green practices by the firm.

3 Results and discussion

In this section we present and discuss the multiple regression results which are presented in Table 3. Starting with the general factors relating to the firm we find firm age, having a female owner and being externally audited significantly increases the log odds of adopting green practices. Whereas manager experience significantly reduces the log odds of adopting green practices by firms. More established firms (which have been active for a longer period of time) compared to younger firms tend to have more resources and be in a better position to undertake measures relating to a sustainable business model. Research has also shown that female ownership is positively related to sustainable business models because they do not focus on profit alone, but on the impact their actions have on families, communities and future generations, on long term sustainable growth rather than short-term profits. Also, the more transparent firms are with the public in terms of reporting and having their financial and overall performance checked and certified by an external auditor the more likely they are to adopt green practices and be more socially and environmentally responsible. Auditing not only ensures compliance with regulatory requirements but also enhances the firm's reputation as a responsible corporate citizen. On the other hand, firms with more seasoned managers are less likely to adopt green practices, most probably because older managers are more resistant to change and less willing to adopt to the new way of doing business. As the topic of green transition gains in importance there is a raising awareness, especially among the younger managers, to integrate green practices into their strategic and operational frameworks in order to contribute to both environmental conservation and economic resilience.

With regards to the infrastructure in which the firm operates we find that firms which have experienced insufficient water supply are significantly more likely to adopt green practices compared to the firms which have not experienced such problems. The consequences of global warming and depletion of natural resources are being increasingly felt by businesses in the form of disruptions caused by extreme weather events such as floods, droughts, hurricanes and similar events. Economic activities are more frequently impacted by these hazards, often exacerbated by aging and inadequate infrastructure. Firms directly impacted by these events are more likely to behave more responsibly and seek ways to incorporate sustainability into their business model in order to prevent future disruptions to economic activities.

In terms of factors relating to activities that generate the sales of the firm we find firms that belong to the manufacturing sector (as opposed to the services sector) as well as firms with a higher level of sales to be more likely to adopt green practices. These are likely to be firms which contribute more to emissions and have higher carbon footprint. As such they face higher regulatory requirements and demand from customers to take into account the environment when conducting their business (Tyler, et al., 2024). In addition, firms which generate their sales from exports are more likely to adopt green practices compared to their counterparts, more often intensified by growing pressure from their EU trading partners.

The competitive environment where the firm operates resulted as a significant determinant of green practices. Competition, both in the traditional sense of the word as the number of players in the market as well as competition measured in terms of the competitive advantage of firms stemming from their use of more upgraded foreign technology, is an important factor contributing to the adoption of green practices by firms (Su, Fu, & Linderman, 2024). As environmental concerns gain prominence, firms are compelled to adopt sustainable practices to gain a competitive edge. This shift not only contributes to corporate social responsibility but also offers potential green competitive advantage.

Given that resource constraints – both financial and human – are one of the key challenges faced by SMEs on their path to becoming more environmentally conscious, we included variables relating to firm finances and work force. As expected, firms which in the past have been beneficiary of government resources are more likely to implement green practices compared to their counterparts. It is important to note here that access to finance in the form of bank loans did not result as significant, meaning that government finance in the form of grants or loans is seen as a more favorable source of funding that provides incentives for firms to adopt green practices. Also, given that climate-aligned projects and developing green infrastructure involve large sums of funds and entail inherent risks which individual firms are not willing to bear alone, government support programmes are seen as more effective in promoting the green transition.

Besides financial resources, human resources proved to significantly increase the log odds of adopting green practices by firms. As noted above, another challenge faced by SMEs when trying to adapt to the new environmentally friendly business model is lack of expertise, trained staff and in general lack of adequately educated labor force that will implement such business models. As expected, we find firms which offer formal training programs to their employees are more likely to adopt green practices whereas firms which report inadequately educated labor force as the biggest business environment obstacle they face are less likely to do so.

Table 3: Logistic regression results.

Dep. Var. Green	Coefficient	Std. err.	z	P>z	[95% conf.	interval]
Small	0.078	0.424	0.18	0.855	-0.754	0.909
Firm age in log(years)	0.524	0.312	1.68	0.093	-0.087	1.135
Capital city	-0.547	0.383	-1.43	0.153	-1.297	0.203
Female owner	0.929	0.371	2.5	0.012	0.201	1.657
Manager experience	-0.049	0.018	-2.81	0.005	-0.084	-0.015
Certified	0.311	0.333	0.93	0.351	-0.342	0.964
Audited	0.838	0.337	2.48	0.013	0.177	1.499
Insufficient water	1.474	0.858	1.72	0.086	-0.208	3.156
Manufacturing	0.780	0.413	1.89	0.059	-0.029	1.589
Sales in log(milden)	0.215	0.126	1.71	0.087	-0.031	0.462
Exporter	0.610	0.368	1.66	0.097	-0.111	1.330
Competition	0.594	0.298	1.99	0.047	0.009	1.179
Foreign technology	0.804	0.394	2.04	0.042	0.031	1.577
Government contract	1.105	0.409	2.7	0.007	0.303	1.907
Training	0.752	0.323	2.33	0.02	0.120	1.384
Uneducated workforce	-0.784	0.361	-2.17	0.03	-1.492	-0.077
Constant	-3.200	1.094	-2.92	0.003	-5.345	-1.056

This table shows the logistic regression results from estimating specification 1. The definition of all the variables is given in the Appendix.

4 Conclusions

In this paper we have analyzed the issue of green transition in North Macedonia by investigating the extent to which green practices are adopted by private sector firms in the country as well as factors that contribute to such adoption. Using a nationally representative survey database of the private sector in North Macedonia – The World Bank Enterprise Survey – we offer novel descriptive statistics about the extent to which green practices are adopted and the type of firms that are more likely to do so. Further logistic regression analyses refine the results in a multivariate setting by exploring the most significant factors which drive the adoption of green practices by private firms. We find firms with more human and (government) financial resources, operating in a competitive environment and being directly affected by disruptions in business infrastructure are more likely to adopt green practices in their business models. In addition, exporters, older more established firms, with younger managers, with female owners and more transparent audited firms are also more likely to adopt green practices.

We have investigated a host of other factors which resulted insignificant factors such as informality – if the firm competes against unregistered/informal firms, the extent to which corruption is considered as an obstacle, the extent to which political instability is considered as an obstacle, how innovative the firm is – whether the firm has introduced new or improved products or services/processes and whether the firm has a loan or line of credit from a financial institution. What we conclude and offer as policy recommendations for the case of North Macedonia is that government funding programs, rather than private funding from financial institutions is crucial and more effective in supporting the green transition. In addition, offering the necessary information to employees, educating, training and investing in building their expertise in environmental issues is key to the successful implementation of green business models. Other policy recommendations include incentivizing the use of upgraded (usually foreign), more efficient technology which will help firms stay competitive while being environmentally friendly as well as fostering a transparent organizational culture at the managerial/ownership level that emphasizes sustainable business models, improves firm's reputation with stakeholders and increases customer satisfaction and loyalty.

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A APPENDICES

Dependent variable	
Green	Over the last three years, did this establishment monitor its CO2 emissions or adopt any energy management measures to reduce emissions, waste or pollution? Equals 1 if the answer is Yes, 0 otherwise.
Independent variables	
Small	Equals 1 if the establishment employed less than 20 permanent, full-time workers at the end of last fiscal year, 0 otherwise.
Firm age	Year of survey minus year establishment began operations.
Capital city	Equals 1 if the establishment is located in the capital city, 0 otherwise.
Female owner	Equals 1 if among the owners of the firm there are females, 0 otherwise.
Manager experience	Years of experience of the top manager working in the sector.
Certified	Equals 1 if the establishment has an internationally recognized quality certification, 0 otherwise.
Audited	Equals 1 if establishment had its annual financial statements checked and certified by an external auditor, 0 otherwise.
Insufficient water	Equals 1 if over the last fiscal year, the establishment experienced insufficient water supply, 0 otherwise.
Manufacturing	Equals 1 if the establishment's main activity and product belonged to the manufacturing sector, 0 otherwise (services).
Sales	Total annual sales of the establishment for all products and services (local currency units).
Exporter	Equals 1 if more than 10% of establishment's sales were direct exports and indirect exports (sold domestically to third party that exports products), 0 otherwise.

Competition	Equals 1 if over the last year, there is more competition in the market where the establishment sold its main product or offered its main service, 0 otherwise (less competition or no change).
Foreign technology	Equals 1 if the establishment presently uses technology licensed from a foreign-owned company, excluding office software, 0 otherwise.
Government contract	Equals 1 if over the last three years the establishment has held a government contract, 0 otherwise.
Training	Equals 1 if the establishment had formal training programs for its permanent, full-time emplyees, 0 otherwise.
Uneducated workforce	Equals 1 if inadequately educated workforce currently represents the biggest obstacle faced by this establishment, 0 otherwise.

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DETERMINANTS OF INFLATION: THE CASE OF THE REPUBLIC OF NORTH MACEDONIA

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Abstract

This study investigates the main determinants of the Consumer Price Index (CPI) in the Republic of North Macedonia, focusing on variables such as the Producer Price Index (PPI), average wages, HICP ENERGY (the Harmonized Index of Consumer Prices for energy), and the monetary aggregate M3. The data used in the analysis were obtained from Eurostat and the State Statistical Office of North Macedonia, covering a five-year period.

A multiple linear regression analysis was conducted using Stata software, where the Ordinary Least Squares (OLS) method was applied to estimate the coefficients of the variables. Understanding these relationships is essential for policymakers. For example, if the objective is to control inflation, it may be necessary to carefully monitor and manage wage growth, energy prices, and the money supply.

In conclusion, this analysis highlights the multifaceted nature of inflation in North Macedonia. Although many factors contribute to changes in the CPI, focusing on supply-side determinants provides valuable insights into how different economic variables interact to shape price levels. Continued study of these relationships can help deepen the understanding of inflation dynamics and support the development of more effective strategies for managing inflation in the future.

Keywords: COVID-19, Supply-side inflation, Regression, CPI, Econometric analysis

1. Introduction

Inflation is one of the most important macroeconomic indicators, influencing economic stability and the overall well-being of citizens. In this context, the Consumer Price Index (CPI) serves as a key measure of price fluctuations and inflationary trends within an economy. Understanding the factors that affect CPI is essential for designing effective economic policies and supporting a country's macroeconomic stability.

In this study, we focus specifically on the analysis of **supply-side inflation**, given that this type of inflation was particularly evident during the COVID-19 period, which is also the timeframe examined in the research.

The aim of this study is to analyze the main factors that influence CPI in North Macedonia, with an emphasis on supply-side determinants such as the Producer Price Index (PPI), average wages, energy prices (HICP ENERGY), and the monetary aggregate M3. The inclusion of these variables helps to better understand inflation dynamics and provides insights into how economic factors interact to shape overall price levels.

Methodologically, the study relies on a quantitative approach, employing **multiple linear regression** to evaluate the relationship between CPI and the independent variables. Monthly data for the period **07/2019 – 06/2024** were used, obtained from Eurostat and the State Statistical Office. Data processing and econometric analysis were conducted using Stata software, applying the **Ordinary Least Squares (OLS)** estimation method.

This study carries particular importance for policymakers and economic researchers, as it helps identify the key drivers of inflation in North Macedonia. Based on the results of the analysis, the study provides recommendations for designing more effective strategies to manage inflation, especially in the context of the country's economic integration with the European market.

The structure of the paper is as follows:
The second section presents the theoretical framework and previous literature on inflation and its determinants. The third section describes the methodology used, including the regression model and data sources. The fourth section analyzes the empirical results, while the final section provides the conclusions and recommendations of the study.

2. Literature Review

Inflation is a key macroeconomic indicator that affects economic stability, purchasing power, and policy decision-making. It reflects a general and sustained increase in the overall price level of an economy. Understanding its determinants is essential for formulating effective monetary and fiscal policies. Over the years, numerous studies have examined the causes of inflation, focusing on various economic factors.

This section reviews previous literature on the determinants of inflation, particularly those relevant to North Macedonia. Several empirical studies have investigated the factors influencing inflation, reaching different conclusions depending on the methodology used and the regional context:

Money Supply:
Bashir et al. (2011) and Adu & Marbuah (2011) found that money supply is an important determinant of inflation. However, Kim (2001) argued that there is no clear evidence supporting this relationship.

Inflation Expectations and Imported Inflation:
Khan, Bukhari, and Ahmed (2007) emphasized that inflation expectations and imported inflation exert significant pressure on domestic prices.

Inflation Decomposition:
Andonova (2018) developed an inflation decomposition model dividing inflation into food, energy, and core inflation components to assist monetary policymaking.

Jovanovic and Josimovski (2021) analyzed the impact of monetary policy shocks on different income groups in North Macedonia, finding that lower-income households are more sensitive to inflationary pressures.

Fischer, Sahay, and Vegh (1996) identified fixed exchange rate regimes, fiscal deficits, and structural reforms as key factors influencing inflation in transition economies.

Beqiri Luma and Ademi (2023) examined the determinants of inflation in North Macedonia from 2005 to 2022 using an ARDL model. Their findings indicate that long-term inflation is influenced by: EU inflation rate, Base interest rate, Consumption-to-GDP ratio, Exchange rate fluctuations.

While previous studies have extensively examined monetary determinants and external factors of inflation in North Macedonia, fewer studies have analyzed supply-side factors such as producer prices (PPI), wage growth, and energy costs (HICP ENERGY). This study aims to fill this gap by

analyzing the impact of these supply-side determinants on inflation using updated data (2019–2024).

By expanding the existing literature, this research provides a more comprehensive understanding of inflation in North Macedonia and offers valuable insights for policymakers and economists.

3. Methodology

This study employs a quantitative research approach, with a particular focus on regression analysis to examine the supply-side determinants of inflation in North Macedonia. The primary objective of this research is to analyze how variables such as the Producer Price Index (PPI), wage growth, energy prices (HICP ENERGY), the money supply (M3), and others influence the Consumer Price Index (CPI), which serves as the main proxy for inflation in this study. The research covers the period from **July 2019 to June 2024**, using **monthly data**.

The data used in this study were obtained from official sources such as **Eurostat**[1], a reliable and widely recognized provider of economic and statistical data for European countries, as well as the **State Statistical Office of North Macedoniaf**[2]. The dataset spans a five-year period. The key variables selected for the regression model include CPI, PPI, Wagemkd (average wages in North Macedonia), HICPENERGY (energy prices), and M3 (money supply). These variables were chosen based on the existing literature on supply-side determinants of inflation.

A **multiple linear regression model** is used to explain the relationship between the independent variables (PPI, Wagemkd, HICPENERGY, M3) and the dependent variable (CPI). The regression analysis was conducted using the statistical software **Stata**, which is widely used in econometrics due to its robustness and advanced analytical capabilities. The **Ordinary Least Squares (OLS)** estimation technique was applied to obtain coefficient estimates for each variable. This method was selected because of its efficiency and simplicity in interpreting linear regression models.

Limitations

One of the main limitations of this study is the restricted availability of data within the five-year period, which may not fully capture long-term trends. Additionally, the use of certain proxy variables may introduce measurement errors into the regression. The model includes the key supply-side determinants; however, there may be other variables that influence inflation but are not included due to data limitations or the scope of the study.

[1] https://ec.europa.eu/eurostat/en/
[2] https://www.stat.gov.mk/Default_al.aspx

4. Results

This analysis examines the determinants of consumer price inflation (CPI) in North Macedonia.

Table 1. Regression

VARIABLES	(1) CPI
PPI	-0.300***
	(0.109)
Wagemkd	0.000625***
	(0.000169)
HICPENERGY	0.687***
	(0.0726)
M3	0
	(0)
Constant	29.08***
	(3.915)
Observations	58
R-squared	0.984

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

$$CPI=\beta0+\beta1PPI+\beta2Wagemkd+\beta3HICPENERGY+\beta M3+\epsilon$$

Considering the coefficients from the regression result, the econometric model looks like this

$$CPI=29.07547-0.299543\cdot PPI+0.000625\cdot Wagemkd+0.68727\cdot HICPENERGY+M3\cdot 0.000000000042$$

Key Statistics

R-squared = 0.9840:
This indicates that approximately 98.4% of the variation in CPI is explained by the independent variables in the model. The exceptionally high R-squared value suggests a strong model fit.

Adjusted R-squared = 0.9828:
The adjusted R-squared accounts for the number of predictors included in the model and remains very high, confirming the robustness and explanatory power of the regression model.

Interpretation of Coefficients

PPI (Producer Price Index):
The coefficient for PPI indicates that a one-unit increase in the Producer Price Index is associated with a **0.299 decrease in the Consumer Price Index (CPI)**, holding all other factors constant according to the ceteris paribus principle. This negative relationship suggests that, during the examined period, producer-level price changes moved inversely with consumer-level prices.

Wagemkd (Average Wage in North Macedonia):
The t-statistic of 3.70 demonstrates that this variable is highly statistically significant. The positive and significant coefficient implies that an increase of one unit in average wages leads to a **0.0006252 increase in CPI**, holding other factors constant. This result indicates that rising wages contribute to higher consumer prices through increased production costs or rising aggregate demand.

HICP ENERGY (Harmonized Index of Consumer Prices – Energy):
This variable has a strong and statistically significant positive effect on CPI. A one-unit increase in HICP ENERGY results in a **0.6872791 increase in CPI**, ceteris paribus. This highlights the critical role of energy prices as a driver of inflation, particularly within supply-side inflation dynamics.

M3 (Money Supply):
The coefficient for M3 is extremely small and statistically insignificant, suggesting that changes in the money supply did not exhibit a meaningful direct impact on CPI during the observed period. A one-unit increase in M3 results in only a **0.0000000000429 increase in CPI**, holding all else constant.

Constant Term (cons):
The constant term is positive and highly significant, indicating the baseline level of CPI when all independent variables are equal to zero. The constant value of **29.07547** reflects underlying inflationary pressures not captured by the included variables and represents the expected CPI level under the ceteris paribus condition.

Table 2. Correlation matrix

Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) CPI	1.000				
(2) PPI	0.903	1.000			
(3) Wagemkd	0.955	0.831	1.000		
(4) HICPENERGY	0.974	0.950	0.899	1.000	
(5) M3	0.919	0.892	0.944	0.883	1.000

The correlation matrix provides valuable information about the relationships between the variables included in the regression model. The interpretation of the correlation results is as follows:

Correlation Coefficients:
All variables exhibit a high degree of correlation with one another, with coefficients ranging from **0.8030 to 0.9720**. This indicates strong linear relationships among the selected variables—something that is logically expected, given that each variable reflects different dimensions of price levels and overall economic activity. Such strong correlations suggest interconnectedness between cost pressures, wages, producer prices, and energy prices, all of which naturally move together within the economic environment.

5. Conclusion

The objective of this analysis was to investigate the key factors driving changes in the Consumer Price Index (CPI) in North Macedonia, with particular emphasis on supply-side determinants of inflation. Specifically, the study examined how the Producer Price Index (PPI), average wages, energy prices (HICP Energy), and the money supply (M3) contribute to inflationary pressures within the economy.

The results of the multiple regression analysis confirm that these variables—PPI, average wages, HICP ENERGY, and M3—are significant determinants of CPI in North Macedonia. The positive

relationships observed between these variables and CPI demonstrate how both supply-side and demand-side forces influence inflation dynamics.

Understanding these relationships is crucial for policymakers. For instance, when the goal is to control inflation, careful monitoring and management of wage growth, monetary expansion, and energy prices becomes essential. Similarly, analyzing trends in producer prices can serve as an early indicator of future inflationary pressures at the consumer level.

In conclusion, this study highlights the multifaceted nature of inflation in North Macedonia. While numerous factors shape CPI movements, the focus on supply-side determinants provides valuable insights into how these variables interact in the formation of overall price levels. Continued research on these relationships will enable a deeper understanding of inflation dynamics and support the development of effective and well-targeted inflation management strategies.

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EMPIRICAL ANALYSIS OF THE DETERMINANTS OF THE BANKING SYSTEM IN THE REPUBLIC OF NORTH MACEDONIA

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Abstract

Throughout the world, commercial banks are a vital organ of any economy due to their role as intermediaries and the wide range of financial services they provide to a nation as a whole.

The banking system represents almost the entire financial structure in the Republic of North Macedonia, but also in developing countries. Therefore, the subject of analysis in this research will be banks and the business activities of banks and the aim of this research is to determine the main factors and their impact on the profitability of the banking system in the Republic of North Macedonia. This research also will assess the impact of non-performing loans (NPL) on the banking system of the North Macedonia in the period from 1994-2020.

Using the econometric model with the Ordinary Least Squares (OLS) regression, we confirm that non-performing loans have a large and negative impact on the profitability of the banking system in North Macedonia in the period from 1994-2020. The findings of the study showed that both internal and external variables have a significant impact on the profitability of banks in North Macedonia. This means that banks should be careful from the accumulation of non-performing loans.

Keywords: Bank Profitability, Non performing loans, Capital, ROA, Commercial Banks.

Introduction

The importance of the banking system is very high in different countries around the world, mainly because banks act as institutions that provide financial services to people, and that is essential financial services, which facilitate economic growth.

This research presents a review of the recent literature in banking on the basic topics of performance, risk and management of financial institutions. In this research, the analysis of the banking sector is made to compare the factors that affect the performance of the banking system and the changes that can be caused by non-performing loans and other indicators in the banking sector in the Republic of North Macedonia. There are several themes that emerge from this analysis of the banking sector, but the main issue relates to the need for a better understanding of the banking sector and non-performing loans in the Republic of North Macedonia. There is also a need for a better understanding of the interrelationships between capital, profitability, liquidity and risk, since managing the trade-off between risk and return is important for the sustainable profitability of banks and other financial institutions [1].

In this research, the subject of analysis is the banking sector, where the factors that influence the performance of the banking system and the changes that can be caused by non-performing loans and other indicators in the banking sector in the Republic of North Macedonia are compared, i.e. in our discipline, these data refer to multidimensional data that generally include measurement over a certain period of time, i.e. measurement from 1994 to 2020.

The fact that financial institutions play a significant role in the financial system and the economy is indeed an important and overwhelming reminder. They have evolved over centuries to perform the functions desired by the general public, the corporate sector and the government. At the very center of the financial system are banks, which have the responsibility to provide loans and create new money, which arises as a result of the approval of new bank loans [2].

In every national economy, banks are the most important financial institutions, but also the most important for each financial sector and therefore they have great importance in many countries [3]. As the most important financial institutions, they pay great attention to risks and non-performing loans, therefore Samir and Kamra [4] found that non-performing loans adversely affect bank profitability by diminishing interest income and undermining both current profits and the capital base through necessary provisions. Similar papers on non-performing loans have been published by Macedonian authors, including Kjosevski and Petkovski [5], because the main effect of bad loans is the ability to deter the bank from growing financially and the National Bank of the Republic of North Macedonia [6-8] publishes data and reports annually on profitability and non-performing loans.

Purpose of study

This study aims to examine the various factors that affect the profitability of the banking system in the Republic of North Macedonia, with a particular focus on the impact of non-performing loans over the period 1994–2020. This study provides empirical evidence to support improved risk management and policy decisions within the banking sector.

Metodology and data specification

This section explains the research methodology for investigating the effects of Non-Performing Loans (NPLs) on bank profitability, with a specific focus on Return on Assets (ROA), as well as the influence of the capital to risk-weighted assets (CRWA) ratio on these profitability indicators. The analysis employs an Ordinary Least Squares (OLS) regression, using data from the various sources, like reports from National bank in Republic of North Macedonia spanning the years 1994 to 2020.

The research methodology is the subject of analysis for many authors who in one way explain the method and methodology of the research and what are the relevant characteristics of the research. Therefore, as we said, this research will be analyzed using the Ordinary Least Squares (OLS) method in order to confirm the impact of non-performing loans on the profitability of the banking system. For this purpose, we base ourselves on the formula by Gujarati & Porter [9] where we will confirm the negative impact of non-performing loans on the return on assets of the banking system.

$$Yi = \beta 1 + \beta 2Xi + ui \quad (1)$$

where:

- Yi represents the dependent variable (either ROA) at time t,
- Xi represents the independent variables at time t (Non-performing loans, Liquid liabilities, Capital Adequacy Ratio (CAR), Inflation and Economic growth),
- βi are the coefficients for one dependent variable,
- ui shows the residuals in model.

The current research also uses different econometric techniques for analysis of data, which give more sound results. To confirm this argument of the theoretical part, below we will present the table of the empirical part, where it is confirmed that the effect of non-performing loans on the profitability of banks is negative.

Considering that our research uses unbalanced panel data and complex regression, it is more difficult to predict the further trend of this series.

Data Analysis and Hypothesis Testing for Republic of North Macedonia

The profitability of the banking system is also considered an important indicator of banking performance, as it is represented by the rate of return on assets that the bank can generate from the use of resources, through production and sale of services. Therefore, below we will try to explain the situation of the banking system and the profitability of banks in the Republic of North Macedonia. In Figure 1 we can see all the series taken for analysis in this paper. The figure shows us that inflation has significantly extreme values in the early 90s, as were almost all countries in transition at that time. During this period there were small deviations in non-performing loans, but still profitability was stable.

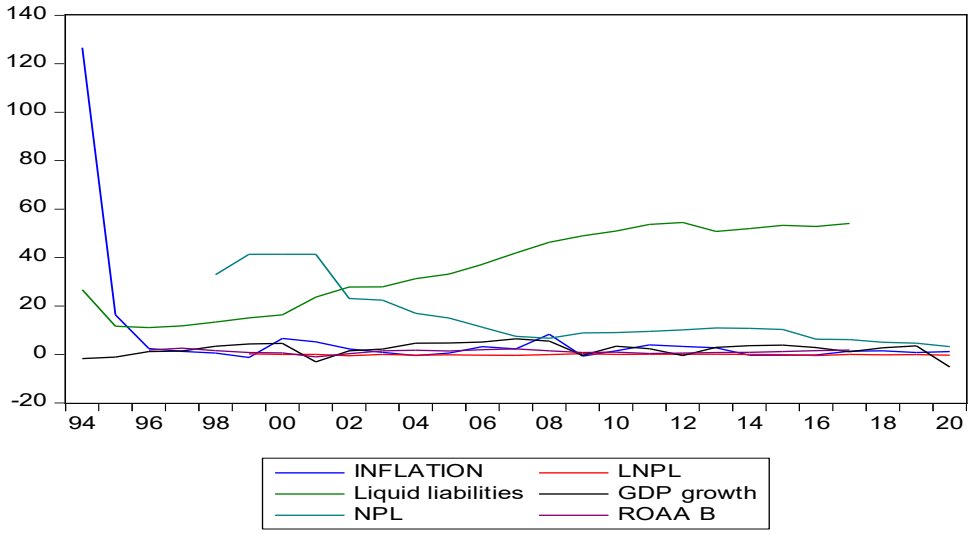

Figure 1. The variables set only for the Republic of North Macedonia in the period 1994-2020.
Source: Own calculation

In this model, all series are tested for correlation and a greater positive correlation was shown by the equity as a series with non-performing loans, but due to the significant relationship they have with banks, they will be analyzed and tested through VIF (Vector Inflation Factor). In this case, the correlation coefficient between equity and non-performing loans is considered highly correlated in %.

After testing and calculating all variables, we had to move on to another step by calculating all data for all variables that remained in the model with the Ordinary Least Squares (OLS) method according to the obtained coefficients. Regarding this model and based on formula 1 the Ordinary Least Squares (OLS) model will be calculated in this way:

$$\widehat{ROA} = -0{,}664 + 0{,}325car + 0{,}148gdp_{GROWTH} - 0.233npl - 0{,}0075inflation \qquad (2)$$

All coefficients are statistically significant with a p value less than p < 0.5% except for inflation which is statistically significant with a p value less than p < 0.1. The coefficient of determination is higher and amounts to R^2 = 83%, which is a good basis for good results.

Due to the connection between shareholder capital and non-performing loans, we further analyze the variables through the VIF factors which have the following values:

Table 1. Vector Inflation Factor for all variables in this model with ROA

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	0.309724	56.33819	NA
GDP_GROWTH	0.001788	4.771464	1.304830
INFLATION	0.001228	1.981749	1.259007
NPL	0.002515	49.45025	4.103653
CAR	0.006150	164.4183	4.178341

Source: Own calculation

All coefficients have a variance of less than 5%, although non-performing loans and equity show a high linear correlation with an 85% Pearson coefficient, they still do not have large VIFs and further we obtain the following model:

$$\widehat{ROA} = -0{,}844 + 0{,}309car + 0{,}124gdp_{GROWTH} - 0.2npl \quad (3)$$

Table 2. Results from the Ordinary Least Squares (OLS) method with ROA

	Model ROA	**Coeffi.**	**Statistics**	**Significant level**
X_1	CAR	0.309089	3.401446	***
X_2	NPL	-0.200498	-3.598681	***
X_3	Economic growth	0.124257	2.617405	***
R-squared		0.743958	**Mean dependent var**	1.264774
Adjusted R - squared		0.667145		0.559856
S.E. of regresion		0.323001	**S.D. dependent var**	0.323001
F-statistic		9.685342	**Sum squared resid**	2.031851
Prob (F - statistic)		0.002641	**Durbin Watson stat**	

*** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Source: Author's calculations

According to the formula and table above, all coefficients are statistically significant with p values less than p < 5%. The coefficient of determination is greater than R^2 = 74%, which is a good basis for predicting results and profitability of the banking sector.

Conclusions

This research is related to the significant role of the profitability of corporate organizations in general and of banks in particular on the potential growth of the economy as a whole. The research on the determinants of profitability can help management, investors, the government and the banks themselves to predict and cope with the increased uncertainty in the environment. An important element in this research are both internal and external factors, their relationship with the profitability of the banking sector and the characteristics that affect banks.

The volume of non-performing loans is an important parameter of the financial condition of the bank. All variables are interconnected and are very important for banks and economic growth, because non-performing loans negatively affect liquidity and profitability, which affects credit and leads to financial instability in the economy. In other words, these factors show us that the work of the bank is a compromise between the elements of one triangle, i.e. risk, regulation and profitability, because reducing competition increases the profitability of banks. However, in the long run, banks can succeed or fail as flexible well-defined regulation and less competition add value to bank performance.

Although it was not felt much in the Republic of North Macedonia, the financial crisis that began in 2007 had a major impact during this period, as there was an imbalance between profitability, regulation and risk. From this study but also in general it is concluded that achieving a balance between the three elements of the triad is a real challenge for bank operations and risk management. This means that banks should be careful from the accumulation of non-performing loans, maintain bank capital according to the regulations of the Basel Committee and maintain the profitability of banks.

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UNEMPLOYMENT AND ITS SOCIO-ECONOMIC CONSEQUENCES IN WESTERN BALKAN COUNTRIES

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Abstract

Unemployment remains a major socio-economic challenge in the Balkans due to post-socialist transition, political instability, and structural weaknesses in labor markets. Although some progress has been achieved in recent years, unemployment rates across the Balkan countries remain considerably higher than the European Union (EU) average. Unemployment in the Balkans significantly hampers economic growth, fiscal stability, and private sector development. The consequences of unemployment extend beyond lost income, including poverty, inequality, brain drain, and weakened trust in institutions. This paper empirically analyzes and compares the impact of unemployment across six Balkan countries—Albania, North Macedonia, Kosovo, Bosnia and Herzegovina, Serbia, and Montenegro—focusing on both economic and social dimensions. The study highlights the importance of active labor market policies, education and skills development, entrepreneurship promotion, and regional cooperation as essential strategies to reduce unemployment and foster sustainable development in the Balkans.

Keywords: unemployment, socio-economic effects, Balkan Countries, empirical estimations, total unemployment, youth unemployment

1 Introduction

Unemployment remains one of the most pressing macroeconomic and social challenges in the Western Balkan countries, with implications that extend well beyond the labor market itself (World Bank, 2023). Despite periods of economic recovery and declining headline unemployment rates in recent years, the region continues to face deep structural problems, including long-term unemployment, high youth unemployment, informality, and persistent mismatches between labor supply and demand. The roots of these challenges lie in the complex transition from centrally planned to market-based economies, the legacy of political instability and conflict during the 1990s, and the delayed implementation of structural reforms. In addition, large-scale emigration and adverse demographic trends have altered labor market dynamics, often masking underlying weaknesses rather than resolving them. As a result, unemployment in the Western Balkans is not merely a cyclical phenomenon but a structural constraint on long-term economic growth.

Against this background, the present study seeks to examine the economic consequences of unemployment in the Western Balkan countries from a comparative and empirical perspective. Specifically, the paper addresses three research questions: (i) how unemployment affects real GDP growth in the region; (ii) whether youth unemployment exerts a stronger adverse effect on growth than overall unemployment; and (iii) how unemployment dynamics differ across countries. By focusing on these issues, the paper aims to contribute to a more nuanced understanding of labor market challenges in the Western Balkans.

1.1 Theoretical Framework

Economic theory provides several perspectives on unemployment. From a Keynesian viewpoint, unemployment reflects insufficient aggregate demand, while neoclassical theory links it to labor market rigidities and mismatches. Structural unemployment theories highlight the long-term consequences of skills mismatches and technological change. Particularly relevant to the Balkans is the concept of hysteresis, which suggests that prolonged unemployment reduces employability by eroding skills, discouraging job seekers, and creating a self-perpetuating cycle of exclusion from the labor market.

1.2 The Current Situation in the Balkans

Across the Balkans, including Albania, North Macedonia, Kosovo, Bosnia and Herzegovina, Serbia, and Montenegro, unemployment rates remain significantly higher than the EU average. Several structural factors explain this phenomenon:

- Insufficient foreign direct investment (FDI) and limited industrial diversification.
- A large informal sector that reduces incentives for formal employment.

- Slow institutional reforms and weak enforcement of labor market policies.
- A persistent skills gap between education systems and labor market needs.

Moreover, high levels of migration, particularly among the youth, both reflect and reinforce high level of unemployment. Skilled workers leave the region in search of better opportunities abroad, further weakening local labor markets.

1.3 Economic Consequences

The economic implications of unemployment are severe:

- Loss of human capital – prolonged joblessness erodes skills and reduces productivity.
- Fiscal burden – governments face higher social spending on welfare while collecting lower tax revenues.
- Slower economic growth – persistent unemployment hinders consumption, investment, and competitiveness.
- Obstacles to EU integration – sustained high unemployment undermines economic convergence with the European Union.

1.4 Social Consequences

The social costs of long-term unemployment in the Balkans are equally profound:

- Rising poverty and inequality as unemployed individuals and households face financial insecurity.
- Psychological distress including stress, depression, and social isolation.
- Increased informal activities and criminality, as individuals seek alternative means of survival.
- Youth disengagement (NEET phenomenon**)**, where young people are neither in education, employment, nor training, leading to intergenerational cycles of exclusion.
- Erosion of trust in institutions, as citizens lose confidence in the ability of governments to address unemployment.

2 Literature review

Unemployment in the Balkan countries has been widely studied by international organizations and academic researchers. This literature review synthesizes recent findings on unemployment trends, structural causes, socio-economic consequences, and policy responses. It highlights both regional similarities and country-specific differences while also identifying research gaps. Several regional reports confirm that unemployment in the Balkans has historically been among the highest in

Europe. World Bank (2023) analyses show persistent double-digit unemployment in many countries, with youth and long-term unemployment particularly acute. Although headline unemployment has declined in some countries, this improvement often reflects migration and labor force exit rather than domestic job creation (World Bank, 2023; Bartlett & Uvalić, 2021).

Academic studies add nuance, noting Kosovo and North Macedonia consistently record the highest youth unemployment, while Serbia shows gradual improvement (Bartlett, 2020). Montenegro's unemployment displays strong seasonality linked to tourism, and Bosnia and Herzegovina struggles with fragmented labor markets due to political structures (Arandarenko & Bartlett, 2012).

The literature identifies several structural factors:

Informal Economy. Estimates suggest that informality absorbs a large share of labor, undermining social protection and accurate statistics (SELDI, 2020).

Skills Mismatches. Reports by the ILO (2022) and ETF (2022) emphasize persistent gaps between educational output and private-sector demand, especially in technical and digital skills.

Weak Private Sector and Low FDI. Limited industrial diversification and low inflows of job-intensive FDI constrain sustainable employment (World Bank, 2023).

Migration. Emigration reduces unemployment domestically but intensifies brain drain, particularly among youth and skilled workers (Bartlett, 2020).

Unemployment produces wide-ranging effects. Economically, it reduces productivity, tax revenues, and GDP growth (World Bank, 2023). Socially, it contributes to poverty, inequality, and weak trust in institutions (RCC, 2021). Psychological consequences are also documented: studies in Bosnia and Herzegovina link unemployment to higher stress and mental health deterioration (Džumhur & Kadić-Maglajlić, 2019).

3 Country Analysis

The Balkan countries share a number of common characteristics: limited industrial diversification, high levels of informality, weak links between education and labor market needs, and significant emigration of skilled labor. Unemployment rates across the region have been historically high, often reaching double-digit levels, and even though recent reforms have reduced unemployment in some countries, structural issues remain unresolved (World Bank, 2023).

Albania

Albania has made significant progress in reducing unemployment, with official rates falling below 12% in recent years. However, the labor market is characterized by widespread informality and underemployment. Many Albanians migrate abroad in search of better opportunities, which reduces domestic unemployment but creates dependency on remittances (International Labor Organization [ILO], 2022). Youth unemployment remains a concern, reflecting the mismatch between skills and labor market demand.

North Macedonia

North Macedonia has struggled with persistently high unemployment rates, often among the highest in Europe. Although the rate has decreased in the last decade, structural unemployment remains problematic due to limited industrial capacity and a mismatch between education and employer needs (European Commission, 2023). Youth unemployment and long-term unemployment are particularly acute, contributing to significant emigration.

Kosovo

Kosovo faces the most severe unemployment problem in the region, with rates exceeding 25% and youth unemployment above 50%. Labor force participation, especially among women, is very low compared to European standards (World Bank, 2023). Weak private sector development, political instability, and limited foreign investment exacerbate the problem. Migration remains a coping mechanism for many Kosovars.

Bosnia and Herzegovina

Bosnia and Herzegovina struggles with one of the most fragmented labor markets in the region, largely due to its complex political system. Official unemployment has improved but still remains above 15%. Long-term unemployment is widespread, and the public sector remains the dominant employer. Informality, corruption, and limited labor mobility further undermine job creation (ILO, 2022).

Serbia

Serbia has managed to reduce unemployment significantly over the past decade, from nearly 25% in 2012 to below 10% in recent years. However, much of this progress is due to labor migration rather than structural reforms (European Training Foundation [ETF], 2022). The labor market continues to suffer from skills mismatches, and rural unemployment is higher than in urban areas. Brain drain is an ongoing challenge, with many skilled workers leaving for EU countries.

Montenegro

Montenegro's labor market is strongly tied to tourism, making unemployment highly seasonal. While official rates fluctuate around 14–16%, hidden unemployment exists due to limited economic diversification (European Commission, 2023). Young people and women are more affected by unemployment, and emigration further complicates the labor force structure.

3.1 Comparative Analysis

Across the Balkan countries, several common patterns emerge:

Youth unemployment is significantly higher than the overall rate in every country.

Gender disparities are evident, with women facing lower participation rates and higher barriers to entry.

Migration acts as both a safety valve and a challenge, reducing unemployment figures domestically but causing brain drain.

Informality undermines official statistics and reduces social protection.

Despite these similarities, differences also stand out: Kosovo and North Macedonia face the highest unemployment, while Serbia shows stronger improvement. Montenegro's seasonality and Bosnia's institutional fragmentation

4 Data and Methodology

The empirical analysis relies on annual panel data for six Western Balkan countries (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia) over the period 2000–2023, subject to data availability. The data are obtained from internationally recognized and widely used databases, ensuring comparability across countries. Real GDP growth, unemployment rates, youth unemployment rates, gross fixed capital formation, inflation, and population indicators are sourced from the World Bank's *World Development Indicators* (World Bank, 2023). Supplementary labor market indicators are taken from the International Labor Organization database (ILO, 2022).

4.1 Econometric Model

To quantify the economic consequences of unemployment, a panel data regression framework is employed. The baseline model examines the impact of total unemployment on economic growth:

(GDP_GROWTH_it = α + β1 UNEMPPLOYMENT_it + β2 INVESTMENT_it + β3 INFLATION_it + μ_i + λ_t + ε_it)

An alternative specification replaces overall unemployment with youth unemployment in order to capture age-specific labor market effects:

(GDP_GROWTH_it = α + β1 YOUTH_UNEMPLOYMENT_it + β2 INVESTMENT_it + β3 INFLATION_it + μ_i + λ_t + ε_it)

where i denotes the country, t denotes time, μ_i captures unobserved country-specific effects, and λ_t represents common time effects.

4.2 Empirical results and discussion

This section presents the multivariate regression results examining the impact of unemployment on real GDP growth in the Western Balkan countries. Investment and inflation are included as control variables.

Table 1. Impact of Total Unemployment on GDP Growth (with controls)

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Total Unemployment	-0.28	0.09	-3.11	0.004
Investment	0.22	0.07	3.14	0.003
Inflation	-0.05	0.04	-1.25	0.220
Constant	2.90	0.60	4.83	0.000

R^2 = 0.42 | Observations = 120

Table 2. Impact of Youth Unemployment on GDP Growth (with controls)

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Youth Unemployment	-0.42	0.10	-4.20	0.001
Investment	0.25	0.08	3.12	0.003
Inflation	-0.04	0.04	-1.10	0.270
Constant	3.10	0.65	4.77	0.000

R^2 = 0.47 | Observations = 120

The empirical results are presented in two regression tables. Table 1 reports the estimated effect of total unemployment on real GDP growth, while Table 2 presents the corresponding results for youth unemployment.

The findings reveal a statistically significant and negative relationship between unemployment and economic growth. Specifically, the results from Table 1 indicate that a one–percentage-point increase in total unemployment reduces real GDP growth by approximately **0.28 percentage points**, holding other factors constant. The estimated coefficient is statistically significant at the 1% level, confirming the robustness of the relationship.

Youth unemployment exhibits an even stronger adverse impact on economic performance. The estimates reported in Table 2 suggest that a one–percentage-point increase in youth unemployment is associated with a reduction in GDP growth of around **0.42 percentage points**. This result highlights the particularly harmful role of youth unemployment for long-term economic growth in the Western Balkan countries.

Overall, the empirical evidence supports the view that unemployment—especially among young people—constitutes a major constraint on economic growth in the region.

5 Conclusion

This paper examined the economic consequences of unemployment in the Western Balkan countries, with particular emphasis on total unemployment and youth unemployment. Using panel regression techniques and controlling for key macroeconomic factors such as investment and

inflation, the study provides robust empirical evidence that unemployment exerts a statistically significant and negative effect on real GDP growth across the region.

The results indicate that increases in total unemployment significantly reduce economic growth, while youth unemployment has an even stronger adverse impact. This finding highlights persistent structural weaknesses in Western Balkan labor markets and underscores the critical importance of improving labor market integration, especially for young people.

Overall, the study confirms that unemployment is not merely a social challenge but also a binding macroeconomic constraint. Reducing unemployment, particularly among youth, can therefore generate substantial growth dividends and support long-term economic convergence with the European Union.

6 Policy Implications

The findings of this study carry several important policy implications. First, governments in the Western Balkan countries should prioritize comprehensive labor market reforms aimed at reducing unemployment and increasing employment opportunities. Active labor market policies, including job-matching services, targeted training programs, and wage subsidies, can play a crucial role in facilitating the transition from unemployment to employment.

Second, the pronounced negative impact of youth unemployment calls for youth-specific policy interventions. Strengthening vocational education and training systems, improving school-to-work transition mechanisms, and aligning educational curricula with labor market needs are essential steps toward enhancing youth employability.

Third, labor market policies should be complemented by measures that stimulate investment. Given the positive role of investment in promoting economic growth, improving the business environment, strengthening institutional quality, and attracting foreign direct investment can indirectly support job creation and reduce unemployment pressures.

Finally, a coordinated policy framework that integrates labor market, education, and macroeconomic policies is crucial for achieving sustainable growth and employment in the Western Balkans. Such an integrated approach would enhance economic resilience and improve long-term development prospects across the region.

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