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RISK PERCEPTIONS OF INSURANCE POLICYHOLDERS IN THE GAUTENG REGION OF SOUTH AFRICA

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ABSTRACT

The insurance industry's product range is diverse, and the risk perception of each product differs from that of insurers, especially given the constantly changing market conditions. Often, insurance companies misunderstand the risk perceptions of their policyholders and inevitably lose clients. To better understand these perceptions of risk, this paper aims to analyze the endogenous factors that influence the perception of risk of insurance policyholders in Gauteng, South Africa. These endogenous factors include demographics, risk perception, risk tolerance, and behavioral finance biases. South African insurance policyholders residing in Gauteng province of South Africa were identified as the target population for this study. From this study, endogenous factors such as age, health status, representativeness, and availability bias, as well as self-control, were identified as significant factors influencing the risk perception of insurance policyholders. The risk tolerance profile of the sample indicated that most participants would take average financial risks as most assets were covered, but not comprehensively. Risk tolerance was also found to be a contributing factor to the risk perception of policy holders. By gaining deeper insights into insurance policyholder risk perceptions and the antecedents thereof, insurance companies could be better position to expand their horizons and provide higher quality insurance services to their clients.

1. INTRODUCTION

Given the increasing caution of the mankind towards risk, the need for insurance emerged. In 1601, marine insurance, which went a long way towards curbing financial losses attributed to lost or damaged cargo, was the first type of insurance introduced in the history of insurance (Rejda, McNamara & Rabel, 2017). Thereafter, fire insurance came into existence, followed by life and liability insurance. In modern times, there are several types of insurance, including property insurance, social insurance, and guarantee insurance. Historically, insurance was considered a formal and protective way of distributing risk among people who were considered to be at risk of losing a certain item or property. Similarly, today insurance is considered a form of financing directed at the desired assets that need to be protected from future related risks that may occur (Bellando, 2016).

Insurance serves as a financial instrument that protects individuals who could potentially suffer misfortunes. Insurance is one of the best means by which one can financially protect human life, property, and liability from various risks (Gurung, 2010). Premiums paid by an insurance policyholder depend on the insured's willingness to pay and how they consider their assets to be 'at risk' (PWC, 2015). Without insurance in our society, various kinds of risk such as death, fire, accident, and theft would go unprotected (OECD, 2021), which could have serious financial implications. As such, individuals try to find a solution to mitigate and protect themselves from various risks by acquiring insurance policies. According to OECD (2021), the purpose of insurance policies is to mitigate and, in some cases, totally avoid social evils, such as theft and unemployment, which are common enemies in every economy. Individuals also invest in insurance policies due to the high value they place on their property, life, and the lives of people important to them.

Over the years, the insurance industry has grown substantially in terms of the number of insurances, products, buyers of insurance as well as policyholders (Binder & MuBhoff, 2016). Over time, the insurance industry has grown and flourished with various insurance companies offering a range of insurance products to policyholders to protect their assets against financial pressures. With the Fourth Industrial Revolution, a wide range of insurance services were also available through technology, reflecting changes in buyers' needs and insurance preferences. (PWC, 2020). In South Africa, this phenomenon also holds. The South African insurance market had no major catastrophic events from 2010 to 2016, except for the severe drought that affected farmers in 2015 (PWC, 2015). Furthermore, flooding caused damage to crop and agricultural

infrastructure, leading to financial losses for farmers in South Africa (Tom, 2021). This has resulted in lower premiums as they did not plant enough crops, leading in fewer claims and refunds of premiums. In addition, the downgrade in credit ratings affected the growth of premiums in the future (Fitch Ratings, 2020). Furthermore, during 2020, COVID-19 led to higher unemployment rates, which inevitably meant higher crime rates, further inhibiting economic growth (United Nations Office on Drugs and Crime, 2020). Consequently, insurance policyholders are inclined to seek affordable insurance solutions. This will further impact insurers if they do not make their products more efficient. Thus, it is of paramount importance that South African insurers remain competitive to retain their policyholders due to the premiums becoming unaffordable (PWC, 2020).

The determinants of risk perception are important in assessing the risk perception of individuals (Makalani, Ferreira-Schenk & Dickason-Koekemoer, 2022). In a study conducted by Du Toit and Vivian (1995), when people manage their risks, their investment choices are largely influenced by how they perceive the risks involved. A follower of behavioral economic theories, Simon (1956) found that it is human nature to act to the point where one feels satisfied with the decision taken in terms of the psychological and social environment in which they function. Moreover, Paul and Peters (2006) found that insurance policyholders view risks differently. Therefore, this paper aims to analyze the relationship between endogenous factors such as demographics, risk tolerance, behavioral finance, and the dependent variable, the risk perception of insurance policyholders.

2. LITERATURE REVIEW

Every action a person takes involves some level of risk. According to Schulmerich, Leporcher & Eu (2015), risk is essentially the uncertainty or possibility of harm, loss, or negative consequences associated with a particular action or event. Similarly, several researchers (Weipers, 2002; Damodaran, 2008; Singh, 2012) define risk management as measures put in place to help individuals in coping with life uncertainties. These uncertainties can cause people to be either less or highly tolerant towards engaging in certain events, causing them to have different perceptions of risk. Perception is defined as the process of organising and interpreting sensory information through the brain (Wade & Tavris, 1996). Risk perception refers to the way individuals subjectively assess and evaluate the level of risk associated with a particular situation or action (Moen, Sjoberg & Rundmo, 2004). This perception of risk can vary widely between

individuals and is influenced by a variety of factors, such as personal experience, emotions, cognitive biases, social and cultural norms, and demographic factors. Understanding the determinants of risk perception is important in assessing how people perceive and respond to different types of risk and can help inform the development of effective risk communication and management strategies.

Weber, Blais & Betz (2002) developed a scale that assesses an individual's attitudes toward risk in five different domains: ethical, financial, health, social, and recreational. This scale provides an opportunity to explore both conventional and perceived risk attitudes in these different areas. For example, an individual may be willing to take risks in the domain of recreation but not in the domain of health. Williams and Noyes (2007) proposed that risk perception is related to the level of uncertainty associated with decision outcomes. This means that when making decisions, people must consider the level of uncertainty involved and the potential consequences of their choices. Uncertainty can lead to certain decision consequences, such as success or failure to achieve specific outcomes. In the context of financial decision-making, investors must predict the future or possible outcomes of their investments. However, the future is often uncertain and can lead to misjudgements and financial losses (Sokolowska & Pohorille, 2000). Therefore, it is essential to understand an individual's attitudes towards risk in the financial domain as well as their perceived level of uncertainty, to make informed investment decisions.

Risk perception and demographic factors

Demographic factors refer to the characteristics that describe individuals such as age, gender, ethnicity, income, and religion (Grable & Joo, 2004). Research has consistently shown that demographic factors play a significant role in shaping an individual's risk perceptions. For example, studies have found that younger people (between the ages of 18 and 34) tend to have a higher tolerance to risk than older individuals. Interestingly, Brooks et al. (2018) found that young, non-white, highly educated, and self-employed individuals tend to have higher levels of risk tolerance than others. This indicates that demographic factors may also influence an individual's attitudes toward risk in specific contexts, such as insurance.

The study conducted by Pilisuk and Acredolo (1988) found that high-income individuals tend to be less concerned about hazards and risks compared to low-income individuals. One possible explanation for this is that high-income individuals often have insurance coverage that can easily replace their possessions, which reduces their perceived risk. On the contrary, low-income

individuals tend to have less insurance coverage, making it more difficult for them to replace their assets and thus tolerate fewer risks (Savage, 1993). Concerning age, Kadoya et al. (2018) found that as people age, they tend to become more informed about risks and are less concerned about risks. This may be since older people feel more exposed to, for example, health risks and are more likely to stay informed about new diseases and potential health risks. Furthermore, young insurance policyholders with children tend to feel more exposed to risks when diagnosed with a health condition (OECD, 2017). This may be because they have dependents who rely on them and are more vulnerable to the consequences of a health condition. Overall, demographic factors can significantly influence the perception of risk of an insurance policyholder. These factors can shape an individual's attitudes towards risk and affect their decision making when it comes to purchasing insurance coverage or making risk-related decisions.

Risk perception and behavioral finance biases

The financial decision-making process of individuals can be irrational. This supports the notion that financial decision making is not always rational and can be influenced by emotions and biases. Ricciardi and Simon (2000) elaborate by explaining that behavioral finance provides an explanation for the impact of emotional processes on financial decision-making and that behavioral finance integrates principles from psychology and economics to better understand the decision-making process of individuals in financial contexts. As such, behavioral finance is based on three elements: financial knowledge, economics knowledge, and cognitive psychology in decision making (Ferreira, 2018). By considering these factors, behavioral finance aims to provide a more comprehensive understanding of how individuals make financial decisions.

Behavioral finance, according to de Bondt and Bange (1992), refers to the underlying psychological factors that drive financial decision-making behavior. Plous (1993) states that behavioral finance examines the impact of biases on financial decision making. Furthermore, Ricciardi (2004) defines behavioral finance as an interdisciplinary field that draws on various decision-making fields, including psychology and behavioral economics, to develop a theoretical basis, expertise, and research methods. Specific concepts such as prospect theory, overconfidence, and loss aversion are examined in behavioral finance to understand how individuals make decisions, as claimed by Fulfer and Maille (2018). Pan (2016) argues that the classical decision theory, which suggests that individuals are rational, is incorrect, since individuals are irrational in the decision-making process. According to Tversky and Kahneman (1979), the

prospect theory of behavioral finance deviates from the classical theory by examining risk-taking behavior.

In 1987, Slovic (1988) (later Slovic, 2000) laid the foundations for further studies on risk perception. Later, Koonce, McAnally & Mercer (2005) defined catastrophic risk as the likelihood of a highly negative outcome and identified a positive correlation between catastrophic risk and individuals' overall risk perception. Subsequent studies adapted Koonce, McAnally & Mercer (2005) work to examine even more extreme outcomes, such as the risk of losing most or all invested funds and discovered a strong positive correlation (Olsen, 1997; Diacon & Ennew, 2001; Chou & Wang, 2011). Furthermore, Chou and Wang (2011) established a nearly perfect positive correlation between overall risk perception and the risk of losing all invested funds. Table 1 highlights behavioral finance biases in the context of insurance policyholders.

Table 1. Behavioral finance biases in the context of insurance policyholders

Theory	Explanation	Source
Representativeness	Insurance policyholders will base financial decisions on past insurance events.	Ricciardi & Simon (2000)
Framing	Insurance policyholders respond more strongly to losses than gains and rely on a single piece of information to make financial decisions.	Ricciardi & Simon, (2000); Duchon, Ashmos & Dunegan (1999)
Loss aversion	Insurance policyholders will tend to stick to their initial insurance cover instead of altering it during certain events.	Ricciardi (2004); Singh (2012)
Regret aversion	Insurance policyholders make incorrect decisions based on past events to avoid feelings of regret or grief.	Dickason and Ferreira (2018)
Self-control	Insurance policyholders will exert self-control to avoid large losses.	Dickason (2017); Ferreira (2018)
Availability bias	Insurance policyholders will base financial decisions on currently available information.	Ricciardi (2004)
Overconfidence bias	Insurance policyholders make decisions based on their superior financial knowledge. Subjective financial knowledge and confidence in financial decisions can influence reasonable risk attitudes from insurance policyholders.	Ricciardi & Simon (2000); Ajemunigbohun & Ipigansi (2022)
Gambler's fallacy	Insurance policyholders will base their insurance decisions on future market predictions.	Ricciardi (2004); Singh (2012)
Mental accounting	Insurance policyholders will trust their analysis of the premiums and benefits of the insurance policy.	Tversky and Kahneman (1971)

Source: Authors' compilation

In general, behavioral finance provides a useful framework for understanding the psychological and emotional factors that can influence financial decision making. This approach recognizes that financial decisions are not always rational and may be subject to biases and other emotional processes that can affect decision making. Behavioral finance biases may impact insurance policyholders' decision-making and may lead them to make suboptimal choices regarding their insurance coverage (Makalani, Ferreira-Schenk & Dickason-Koekemoer, 2022).

Perception and risk tolerance

Risk tolerance is essentially the risks that people are willing to accept in their financial planning. This differs from person to person and tends to influence how one perceives risk (Davies & Brooks, 2014). Risk and perception are closely related concepts that describe an individual's subjective assessment of the severity of a particular risk (Moen, Sjoberg & Rundmo, 2004). While there is a relationship between risk tolerance and risk perception, it is often difficult to differentiate between the two (Hunter, 2002). Risk perception is an essential aspect of an investor's decision-making process (Finucane, 2002), and it is worth noting that perception can involve subjective risk, a concept that is often overlooked by researchers (Epstein & Pava, 1994).

3. METHODOLOGY AND HYPOTHESIS TESTING

This article applied a quantitative research approach, and an online survey was sent to collect the data. A positivistic research paradigm was followed, in which the researcher analyzed individual surveys to obtain a trustworthy understanding of the phenomena in question.

The target population defined for this study consisted of 341 South African insurance policyholders located within the Gauteng province. Purposeful, nonprobability sampling was used to filter insurers who are above 18, insured by any insurance company in South Africa, reside in Gauteng, and have some level of education.

A survey was distributed electronically to participants due to COVID-19 regulations. The survey consisted of the following sections: (A) demographic information age (scale variable); level of education (ordinal variable): a) no matric, b) matric, c) diploma, d) bachelor's degree, d) honours degree, e) master's degree, f) doctoral degree); household size and number of dependents: a) 1-2 individuals, b) 3-5 individuals, c) more than 6 individuals; level of health status: a) poor, b) fair, c) good, d) excellent; and subjective self-report on financial

knowledge: a) little, b) average, c) above-average, d) superior. Annual income was ordinally measured per 100 0000 until 1 million and more than 1 million per annum. Participants also had to report on their income variability: a) My income is very stable & predictable, b) My income is somewhat stable & predictable, c) My income is fluctuating and unpredictable. Net worth was measured on an ordinal scale: a) less than 1 million, b) 1mil – 3.5 mil, c) 3.5 mil – 7mil, d) 7mil -12mil, e) 12mil - 30mil, f) 30 mil and more. Demographic data were required to profile the sample of insurance policyholders in Gauteng. Among these demographics were age, the highest level of education, annual income, income variability, net worth, household size, health status, and level of subjective self-report on financial and insurance knowledge. Refer to Appendix A for the survey items.

The DOSPERT scale was first developed by Weber, Blais and Betz (2002) as a 40-item 6-point Likert-type scale and was later reduced to 30 items (Blais & Weber, 2006). For this study, some items that could have posed an ethical risk to the sample population were removed and 19 items in total (adjusted scale by Dickason, 2017) were used to measure the sample's risk perception based on their attitude towards risky activities (Makalani, Ferreira-Schenk & Dickason-Koekemoer, 2022; Dickason 2017). EFA was utilised to assess the risk-taking that is likely to influence the risk perception of the insurance policyholders. Ethical risk consisted of three items (1, 2 and 3). The KMO index obtained a value of 0.692, which is in the mediocre range. The three items explained 70.108 percent of the total variance with an eigenvalue of 2.103. The ethical factor was deemed reliable because it obtained a desired Cronbach's alpha of 0.786, suggesting good reliability for measuring the perception of insurance policyholders. Three items (4, 5, 6 and 7) made up the financial risk factor of the DOSPERT scale. The KMO index obtained a good value of 0.782, which exceeds the minimum value of 0.5. The items obtained an eigenvalue of 2.760. The financial factor also accounted for 69.010 percent of the total variance. The Cronbach's alpha obtained was 0.786, which can be regarded as good reliability as it exceeded the minimum required of 0.6**.** The DOSPERT scale also looked at the health factor (items 8-11) and assessed how likely the policyholders were to make certain health decisions. The KMO index achieved a satisfactory value of 0.799, exceeding the minimum required value of 0.5. Bartlett's test of sphericity achieved a p-value of 0.000, which was statistically significant at $p<0.05$. To determine the reliability of the financial factor, Cronbach's alpha was computed. It obtained a desirable value of 0.903, which exhibited very good reliability as it was above the minimum required of 0.6. The adjusted dospert scale also assessed the social domain (Items 12-15) to assess how policyholders were likely to engage in certain social

events. KMO and Bartlett's test of sphericity for the social factor achieved satisfactory results. The KMO index obtained a value of 0.845, suggesting very good adequacy for factor analysis as it exceeded the minimum required value (0.5). The Cronbach's alpha was computed and obtained a value of 0.902, which indicated very good reliability. The last factor of the DOSPERT scale was recreational (items 16-19), which aimed to assess policyholders' likelihood of taking part in several recreational events. The KMO index obtained a value of 0.805, signifying very good adequacy which is higher than the minimum value of 0.5. Bartlett's test of sphericity also achieved satisfactory results as it obtained a null hypothesis of $p<0.05$, which is statistically significant. This suggests that the variable correlate with itself but not with other variables. Ultimately this proves that the variables are related to the data in the DOSPERT scale of factor analysis. A high Cronbach's alpha (0.910) was obtained, making this factor a reliable scale for measuring the insurance policyholders' risk perceptions due to risky recreational events.

A nine-biases behavioral finance bias scale was included using a nine-item behavioral finance scale developed by Ferreira (2018), which included statements aimed at elucidating the biases which individual investors base on their financial decisions (Makalani, Ferreira-Schenk & Dickason-Koekemoer, 2022). The behavioral finance bias scale had a Cronbach α-value of 0.69, thereby making it reliable.

The Survey of consumer finance (SCF) by Grable and Lytton (2001) measures risk tolerance behavior. It is acknowledged that the SCF scale omitted some variables known to the financial market but is a comprehensive measure (including a four-item scale) for investment choice behavior and experience (Makalani, Ferreira-Schenk & Dickason-Koekemoer, 2022).

Correlation analysis was done to analyze the strength and direction of the relationship between insurance policyholders' risk perception, demographics, risk tolerance, and behavioral finance biases. Linear regression analysis was used to indicate how the determinant factors explained the variance in the dependent variable.

The following regression formula was used in the study:

$$Y_i = f(X_i, \beta) + e_i \quad \text{.....(1)}$$

Where,

Y_i = dependent variable (risk perception scale)
f = function

X_i = independent variable (demographics, risk tolerance, behavioral finance)
β = unknown parameters
e_i = error terms

The null and alternative hypotheses were formulated as stated below:

H_{01}: *There is no significant relationship between demographics (age, highest level of education, annual income, income variability, net worth, household size, health, level of financial knowledge) and insurance policyholder risk perception.*

H_{a1}: *There is a significant relationship between demographics (age, highest level of education, annual income, income variability, net worth, household size, health, level of financial knowledge) and insurance policyholder risk perception.*

H_{02}: *There is no significant relationship between risk tolerance and insurance policyholder risk perception.*

H_{a2}: *There is a significant relationship between risk tolerance and insurance policyholder risk perception.*

H_{03}: *There is no significant relationship between behavioral finance biases and insurance policyholder risk perception.*

H_{a3}: *There is a significant relationship between behavioral finance biases and insurance policyholder risk perception.*

4. RESULTS AND DISCUSSION

Table 2 shows the nonparametric correlation of the determinant factors that influence the perception of risk of insurance policyholders assuming a level of significance, level for a two-tailed level of significance ($p<0.01$). There were no autocorrelation between these factors.

As shown in Table 2, Spearman's correlation coefficient ($r = -0.418$) for age had a medium statistically significant negative relationship at a level of 99 percent significance level ($p<0.01$) with risk perception. This relationship indicates that higher levels of risk perception are associated with insurance policyholders in a lower age category. Therefore, young insurance policyholders will engage in risky activities that could expose them to greater risk. The association between the level of education and risk perception had a coefficient of $r = 0.197$, which represents a small positive linear effect at a level of significance of 99 percent significance level ($p<0.01$). Therefore, there is a small relationship between the

policyholders of risk perception and their level of education, indicating that a higher level of education could be associated with a higher risk to a small degree.

Table 2. Non-parametric correlation of risk perception

Determinant factor	Spearman correlation with risk perception
Age	-.418*
Highest level of education	.197*
Annual income	.717
Income variability	-.080
Net worth	-.084
Household size	-.130*
Health status	.320*
Level of financial and insurance knowledge	.139*
Representativeness	.177*
Regret aversion	.084
Framing	-.006
Overconfidence	.150*
Availability	.189*
Gambler's fallacy	.184*
Mental accounting	.140*
Loss aversion	.009
Self-control	-.343*
Risk tolerance	-.468*

* $p < 0.01$

Source: Authors' compilation

Table 2 also indicates a small negative relationship between household size and risk perception significant at the 99 percent significance level ($p<0.01$). This indicates that households want to be exposed to less risky activities (high perception towards risk and behavioural activities) the more their family or households grow. A significant association was also found between insurance policyholder health status and their risk perception towards risky activities. This could indicate that individuals with better health status will take part in more risky activities and those with a poor health status will be less inclined to participate in such activities in perceiving risk differently and not engaging in risky activities. Table 2 also indicates an association (small positive linear effect at the 99 percent significance level $p<0.01$) between the perceived risk and their level of financial and insurance knowledge.

The association between representativeness bias and risk perception was r = 0.177, showing a small positive linear effect at the level of significance of 99

percent significance level ($p<0.01$). As mentioned in Section 2 of the article, those individuals subjected to representativeness bias tend to make financial decisions based on the past performance of the insurance company. Therefore, there is a slight association between their financial biases and their perception towards taking part in risky activities. Similarly, the association between overconfidence bias (r = 0.150) and risk perception was found where the superior financial knowledge drives their decisions. The association between availability bias (r =0.189) and risk perception indicates a positive relationship with how these insurance policyholders make decisions based on their instincts when engaging in risky activities. For the fallacy bias (r = 0.184) a small linear association was also found for these individuals who base their insurance decisions on future market predictions. For mental accounting (r = -0.140), a significant association was also found. These individuals trust their analysis over the premiums and benefits from the insurance company and will be less likely to engage in risky activities. A negative association was found between self-control (r = -0.343) and risk perception at the level of significance of 99 percent significance level ($p<0.01$). Therefore, there is a negative relationship between these individuals who exercise self-control when making decisions and their intention to participate in risky activities. Overall, behavioral finance biases may impact insurance policyholders' decision-making and may lead them to make suboptimal choices regarding their insurance coverage (Makalani et al., 2022).

In Table 2 it can also be seen that there is a medium association between the perception of insurance policyholders of risk taking (r = -0.343) at the 99 percent significance level ($p<0.01$). Therefore, those who take substantial financial risk are also categorised as those who only have one or a few insured assets associated with taking part in risky activities as a function of risk perception. Subsequently, a multiple linear regression analysis was conducted to analyse the influence of the determinant factors on the insurance policyholders' risk perception.

Next, multiple linear regression analysis was performed to explain the variance in the dependent variable. Table 3 shows the summary of the regression model calculated, where R^2 shows that the determinant factors explained 45.90 percent of the total variance in risk taking as a product of risk perception. Furthermore, the F-ratio ($p<0.01$) was statistically significant at the level of 99 percent significance, which means that the variables influence risk taking as a product of risk perception.

Table 3. Model summary

Model	Sum of squares	Df	Mean Square	R^2	F-value	P-value
Regression	5290.363	19	278.440			
Residual	6231.208	321	19.412	0.459	14.344	0.000*
Total	11521.571	340				

*Significant level (0.01)

Source: Authors' compilation

As shown in Table 3, all the determinants were statistically significant at the level of 99 percent significance level ($p<0.01$), signifying that they influence the perception of risk of insurance policyholders. Variables are explained independently in Table 4. The age of insurance policyholders influences their perception of engaging in risky events. A statistically significant value for age ($p <0.000$) was obtained for age ($p<0.000$) at the level of significance of 99 percent. As shown in Table 4, when there is a unit change in age, the likelihood of policyholders engaging in risky events will result in a -0.247 change in their perception of risk toward risky events. The beta coefficient also indicated that age is the third largest contributing variable in predicting the risk perception of insurance policyholders. Hence the alternative hypothesis can be concluded which indicate there is a relationship between demographic factors such as age and risk perception. These results agree with the findings of Bonem, Ellsworth & Gonzalez (2015) who found older individuals to have a higher risk perception and found risky behaviors and situations less enjoyable and less likely to produce gains compared to younger individual. Overall, the findings suggest that risk perceptions may vary based on age.

The health status of insurance policyholders was also found to influence their perception of risk to engage in risky events. A person with a better health status will be more likely to participate in risky events and will perceive risk differently from those with a lower health status. Hence the alternative hypothesis can be concluded which indicate there is a relationship between demographic factors such as health status and risk perception. Bonem, Ellsworth & Gonzalez (2015) found that older individuals with a lower health status will have a higher risk perception and are less likely risky behaviors and situations compared to younger individual who might have a better health status. According to Hanoch, Rolison & Freund (2018) throughout adulthood, people face increasingly serious medical problems and decisions. Hanoch, Rolison & Freund (2018) also found individuals of an older age with more medical complications and a deteriorated health status will be less likely to engage in risky behaviour.

The results in Table 4 show that insurance policyholders subject to representativeness bias would likely engage in risky events. The representativeness bias was significant at a level of 99 percent significance level ($p<0.01$). Therefore, a unit change in the coefficient of representativeness bias would result in a 0.133 change in the scale of the risk perception variable. These results concur with Ricciardi and Simon (2000). Regarding availability bias, the results indicate significance at a 98% level ($p<0.01$). This suggests that a unit change in the availability bias would result in a 0.120 change in the risk perception variable scale. Insurance policyholders subject to self-control bias are less likely to engage in risky events. Self-control bias was statistically significant at a 99 percent significant level ($p<0.01$), indicating that it influences risk perception. A unit change in the self-control bias of insurance policyholders will result in a -0.343 beta coefficient change on the risk perception variable scale. The beta coefficient also indicated that self-control bias is the largest contributing variable in influencing the perception of insurance policyholders. These results are similar to Xu (2023) who found these behavioral finance biases to have a significant relationship with risk perception. Similar to Almansour, Elkrghli & Almansour (2023) the overconfidence bias did not have an influence on risk perception.

The risk tolerance of insurance policyholders influences their perception of engaging in risky events. A statistically significant value for age ($p <0.000$) was obtained for age ($p<0.000$) at the level of significance of 99 percent. As shown in Table 4, when there is a unit change in the risk tolerance level of insurance policyholders, their likelihood of engaging in risky events will result in a -0.274 change in their risk perception. The beta coefficient also indicated that risk tolerance is the second largest contributing variable in influencing the perception of risk of insurance policyholders and their likelihood of engaging in risky events. These results are similar to Ricciardi and Rice (2014) who found a significant relationship between risk tolerance and risk perception.

Table 4. Summary of the independent variables model

Variables	B	T	P-value
Age	-0.247	-4.294	0.000*
Highest level of education	-0.012	-0.250	0.803
Annual income	0.039	0.733	0.464
Income variability	-0.060	-1.344	0.180
Net worth	0.080	1.553	0.121
Household size	0.022	0.465	0.642
Number of dependents	-0.009	-0.180	0.858
Health status	0.133	2.672	0.008*

Variables	B	T	P-value
Level of knowledge of financial and insurance product knowledge	-0.013	-0.270	0.787
Representativeness	0.133	2.280	0.023*
Regret aversion	0.038	0.709	0.479
Framing	-0.064	-1.216	0.225
Overconfidence	-0.015	-0.236	0.814
Availability	0.120	2.099	0.037
Gambler's fallacy	0.116	1.688	0.092*
Mental accounting	0.032	0.482	0.630
Loss Aversion	0.028	0.506	0.613
Self-control	-0.343	-6.877	0.000*
Risk tolerance	-0.274	-5.887	0.000*

*Significant level (0.01)

Source: Authors' compilation

5. CONCLUSIONS

Risk is an inherent part of life, and the insurance industry is no exception, being exposed to various risks. However, people perceive risk differently, which is why insurers need to understand the factors that influence their policyholders' risk perceptions to retain them. Therefore, this article aimed to identify the endogenous factors that could affect policyholders' risk perception and their likelihood of engaging in risky events. The study targeted South African insurance policyholders residing in Gauteng province, and a sample of 341 such policyholders was collected by electronic data collection using validated scales in the questionnaire due to the Covid-19 pandemic.

Correlation analysis revealed that several factors influence the perception of insurance policyholders. Specifically, demographic factors such as age, level of education, household size, level of health status subjective self-report on financial knowledge were found to have a relationship with policyholders' perception of risk concerning their likelihood of participating in risky events. Behavioral finance biases, including representativeness bias, overconfidence bias, availability bias, gamblers' fallacy, mental accounting and self-control bias, also explained risk perception to some extent. The level of risk tolerance of policyholders was found to have the strongest relationship with their perception of risk. All three null hypotheses were rejected, concluding the alternative hypothesis indicating a significant relationship between demographic factors, behavioral finance biases, risk tolerance, and policyholder risk perception levels.

Over the past decade, the importance of understanding insurance risk perception has increased considerably both nationally and globally. As such, this study represents a valuable contribution to the literature and empirical analysis of the insurance industry, particularly in terms of the profile of insurance policyholders and their risk perception. The study's findings can help insurers gain insight into the factors that shape policyholders' risk perception and how they perceive risky events. By incorporating this analysis into their operations, insurance companies can design better suited products and enhance their client profiles.

Conflict of interests

The authors declare there is no conflict of interest.

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Appendix A. Scale items

Demographic information *Age* (scale variable) level of education (ordinal variable, a) no matric, b) matric, c) diploma, d) bachelor's degree d) honours degree e) master's degree f) doctoral degree); Household size and number of dependents a) 1-2 individuals b) 3-5 individuals c) more than 6 individuals. Number of dependents a) 0 individuals b) 1-2 individuals c) 3-5 d) more than 6 individuals. Level of health status a) poor b) fair c) good d) excellent. Subjective self-report on financial knowledge a) little b) average c) above-average d) superior. *Annual income ordinally scale measured per 100 0000 until 1 million and more than 1 million per annum.* *Income variability a)* My income is very stable & predictable b) My income is somewhat stable & predictable c) My income is fluctuating and unpredictable. Net worth was measured on an ordinal scale a) less than 1 million b) 1mil – 3.5 mil c) 3.5 mil – 7mil d) 7mil-12mil e) 12mil-30mil f) 30 mil and more.	

Risk perception: Likelihood of engaging in each activity or behavior in 5 domains Ethical: Item1-3 Financial: Item 4-7 Health/safety: Item8-11 Social: Item12-15 Recreational: Item 16-19 Measured on a six-point Likert-type scale – (1) very unlikely (6) very likely 1. Taking some questionable deductions on your income tax return 2. Downloading proprietary software from the Internet 3. Not returning a wallet you found that contains R500 4. Investing 10% of your annual income in a moderate growth mutual fund 5. Betting a day's income on the horse races 6. Spending all your money on an unauthorised business venture 7. The wager of a week's income at a casino 8. Driving a car without a seat belt 9. Swim far out from shore on an unprotected lake or ocean. 10. Riding a motorcycle without a helmet 11. Sunbathing without sunscreen 12. Talk about an unpopular issue in a meeting at work 13. Moving to a city far from your extended family 14. Disagreeing with an authority figure on a major issue 15. Choosing a career that you truly enjoy over a more prestigious one 16. Going camping in the wilderness 17. Going down a ski run that is beyond your ability 18. Taking a weekend sky diving class 19. Bungee-jumping off a tall bridge	*DOSPERT scale, Weber, Blais & Betz (2002) Adjusted scale from Dickason (2017)*
Behavioral finance biases: Measured on a six-point Likert-type scale – (1) strongly disagree (6) strongly agree 1. I base my financial decision on the past performance of the insurance company 2. I regret insuring when I try to claim but I get complications 3. I insure with a company only when I hear positive word of mouth 4. My superior financial knowledge drives my decisions 5. I insure at a company based on my instincts 6. My financial decisions are based on future market predictions 7. I trust my own analysis over my premiums and benefits from the insurance company 8. I would rather forfeit a lower premium for more cover 9. I exercise self-control when making financial decisions	*Ferreira (2018), (Makalani et al., 2022).*
Risk tolerance: 1. Take substantial financial risks, as I only have insurance on one of my assets 2. Take an above-average financial risk, as most of my assets are not covered 3. Take average financial risks as most of my assets are covered, but not comprehensively 4. Not willing to take any financial risks, I have comprehensive insurance cover	*The Survey of consumer finance (SCF) by Grable and Lytton (2001*

ПЕРЦЕПЦИЈА РИЗИКА ВЛАСНИКА ПОЛИСА ОСИГУРАЊА У РЕГИОНУ ГАУТЕНГ ЈУЖНОАФРИЧКЕ РЕПУБЛИКЕ

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САЖЕТАК

Асортиман производа индустрије осигурања је разнолик, а перцепција ризика за сваки производ се разликује од перцепције осигуравача, посебно имајући у виду континуирано промјенљиве тржишне услове. Осигуравајућа друштва често погрешно схватају перцепцију ризика својих осигураника и неизбјежно губе клијенте. Да би се боље разумјеле ове перцепције ризика, овај рад има за циљ да анализира ендогене факторе који утичу на перцепцију ризика власника полиса осигурања у Гаутенгу, Јужноафричка Република. Ендогени фактори укључују демографију, перцепцију ризика, толеранцију ризика и предрасуде у складу с бихејвиоралним финансијама. Јужноафрички власници полиса осигурања који живе у јужноафричкој провинцији Гаутенг идентификовани су као циљна популација за ову студију. Из ове студије, ендогени фактори као што су старост, здравствено стање, репрезентативност и предрасуде доступности, као и самоконтрола, идентификовани су као значајни фактори који утичу на перцепцију ризика власника полиса осигурања. Профил толеранције ризика узорка показао је да би већина учесника прихватила просјечне финансијске ризике пошто је већина средстава била покривена, али не свеобухватно. Такође је утврђено да је толеранција ризика фактор који доприноси перцепцији ризика код власника полиса. Стицањем дубљег увида у перцепцију ризика власника полиса и његових претходника, осигуравајућа друштва би могла да буду у бољој позицији и прошире своје хоризонте, те пруже квалитетније услуге осигурања својим клијентима.

Кључне ријечи: *перцепције ризика, осигурање, толеранција ризика, предрасуде бихејвиоралних финансија, Јужноафричка Република*

DO MACROECONOMIC FACTORS SIGNIFICANTLY AFFECT ECONOMIC GROWTH? EVIDENCE FROM GHANA

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ABSTRACT

Macroeconomics examines the entire economy using various indicators such as investment, exchange rate, unemployment rate, and trade. These indicators contribute either positively or negatively to economic growth. Following Ghana's economic reforms in 1983, its economy underwent significant transformations, impacting it in various ways. This study investigated selected macroeconomic variables (external debt, FDI, inflation, real effective exchange rate, and trade openness) that influence Ghana's economic growth. The study analyzed time series data from the World Bank spanning from 1991 to 2021 using econometric methods, including the Johansen cointegration, Ordinary Least Squares (OLS), and distributed lagged model. The cointegration results revealed a long-run relationship between the variables. The OLS findings indicated that external debt, FDI, and trade openness positively impacted economic growth, while inflation and unemployment rates had negative effects, with GDP serving as a proxy for economic growth. Additionally, the results showed that the real exchange rate had no significant effect on Ghana's economy. Conversely, findings from the distributed lagged model provided evidence that inflation, external debt, and FDI impact spread over a certain period. Based on these findings, the study recommends that the Ghanaian government invest external loans in sectors capable of boosting economic growth and provide investment incentives to attract more investors.

1. INTRODUCTION

Several factors contribute to the economic development of a country. These indicators can be classified as macroeconomic elements. Major macroeconomic indicators such as gross domestic product (GDP), GDP per capita, inflation, unemployment rate, trade openness (trade ratio to GDP), net investment inflows, and public debt are considered when measuring the economic growth of an economy. Over the past centuries, many economies have implemented strong macroeconomic policies that led to economic growth, and different channels through which this goal is achieved have been carried out by many nations (Evans, Samuel & Prince, 2021). The effectiveness of macroeconomic policy implementations is often seen as successful when indicators like GDP, investment inflows (FDI), GDP per capita, trade balance (trade surplus), and human development index (HDI) expand. However, factors like high inflation, unemployment, and public debt are used to determine non-performing economies. Conversely, economic indicators such as debt, inflation, trade, investment, and unemployment are seasonally adjusted variables and are inevitable in all economies (Yeboah, 2022). The impact of any of these variables influences the welfare and standard of living of the people. For instance, high inflation and unemployment rates reduce people's purchasing power and income.

The interdependence sees the globalization of economic actors across different economies (Hobbs, Dimitrios & Mostafa 2021); any economic shock in the most advanced economies affects the supply chain and the circular economy, eventually affecting developing and least-developed countries. Theories and models of economic growth underscore the diverse ways in which present economic activities can influence future economic developments and identify potential sources of long-term economic growth (Boldeanu & Constantinescu, 2015). It's worth noting that economic growth theories have evolved over time in response to changing economic dynamics. The key to solving the unemployment problem and turning economic development into rising standards of living in industrialized nations, which have mostly mastered their macroeconomic strategies, lies in small-scale change (Blanchard, Jaumotte & Loungani, 2014). If change efforts in developing countries continue to focus on macroeconomic transformation in the style of the International Monetary Fund system (IMF), economies may see a continued trend of unhappiness (Siyal et al., 2016).

Over the past years, Ghana's economic activities have depended on foreign direct investment (FDI) inflows, external debt, and domestic debt. The sum of external and domestic debt makes up the aggregate public debt of a country. The United Nations Conference on Trade and Development (UNCTAD) investment

report in 2022 indicated that the FDI inflow in Ghana was 2.6 United States dollars ($USD), reflecting a 39% expansion from 2022. However, many empirical studies confirm that FDI in the Ghanaian economy has yielded a positive impact. According to Okwu, Oseni & Obiakor (2020), every economy's aggregate expenditure is influenced by investment, which also significantly affects growth by raising productivity and creating jobs. However, FDI can also support a nation's development efforts by enhancing the nation's total factor of productivity or by accumulating physical and human capital (Rodan, 1997). On the contrary, according to the World Bank, FDI is advantageous to the host country since it aids in market expansion, cost-cutting initiatives, and other tariff reductions. Additionally, it has been found that the quantitative effects of FDI on global employment are more restrained and significant in host developing countries than in most developed countries, particularly in production areas (UNCTAD, 1999).

As a result, the surge in Ghana's external debt has triggered numerous controversies over the years, causing widespread concern. The escalating GDP-to-debt ratio in the country has raised economic apprehensions, as highlighted by Agyapong and Bediabeng (2019). The capacity to utilize external debt for various investment-oriented projects, such as those related to infrastructure, power, or the agricultural sector, can be advantageous for a nation's development. Studies suggest that external debt can positively impact the socioeconomic development of a country when used judiciously. However, when employed excessively, it can have detrimental effects, as indicated by Shamim, Jawaid & Madiha (2017). However, indicators such as unemployment, inflation, trade openness, and real exchange rate also contribute to economic growth in Ghana's economy. This study considered these variables in assessing economic growth. This study investigated the impact of some macroeconomic indicators (external debt, FDI, inflation, unemployment rate, real exchange rate, and trade openness) on the economic advancement of Ghana. The study hypothesized that these selected variables positively or negatively affect economic growth. Conversely, the study is organized into the following: section one covers the introduction, section two is a literature review, section three is material and method, section four is results and discussions, and section five covers the conclusion.

2. LITERATURE REVIEW

Foreign direct investment has a lengthy, albeit major, history in Ghana. The involvement of the first international businesses can be traced back several centuries. More recently, in the 1970s, FDI was predominantly used in

manufacturing to replace imports. According to UNCTAD, annual inflows peaked at $68 million for approximately two years but were generally much lower. By the late 1970s, net outflows reached negative levels, and by the mid-1980s, they were hovering around $5 million. Ghana completed a largely successful transition from an administrative system of economic management to a market economy with the launch of the Economic Reform Programme (ERP) in 1983. Regardless of the time horizon, institutional quality has a positive and considerable impact on FDI (Yakubu, 2020). However, many studies have been conducted on FDI's impact on economic growth in Ghana and other parts of the globe, but they are considered in line with this study. According to Antwi et al. (2013), empirical studies on FDI's impact on economic growth in Ghana using ordinary least squares demonstrate a significant and positive association between foreign direct investment and economic growth. However, Evans, Frank & Rebecca (2017) found in their study that FDI and the other two control variables considerably impact Ghana's economic progress. According to the study, the rising trend in FDI inflows has also had a considerable positive impact on the nation's GDP. Conversely, Antwi and Zhao (2013) established a long-term equilibrium and causal connection between the dependent variable, FDI, and the two variables, GDP and GNI, that are being considered. The short-term effects of GDP and GNI volatility on FDI were found to be almost nonexistent. Additionally, Kulu, Mensah & Sena (2021) showed that the combination of foreign direct investment and a high-quality institutional index has a significantly beneficial impact on a nation's economic growth over the long and short terms in Ghana's economic growth. Consequently, the study findings of Benedict, Tutu & Salase (2021) support Ghana's FDI-led growth by showing that FDI has a favorable long-term causal influence on economic growth. Furthermore, the findings of Antwi et al. (2021) support Ghana's FDI-led growth by showing that FDI has a favorable long-term causal influence on economic growth.

Sub-Saharan African countries often have a development strategy that heavily depends on foreign funding from official and private sources. Unfortunately, this has led to the accumulation of external debt to an unsustainable level for several regional countries during the past few decades. According to the IMF, the stock of sub-Saharan Africa's external debt was roughly $18 billion in 1975; by 1995, it had increased to almost $220 billion. The portion of a country's debt owing to foreign creditors, such as commercial banks, international financial institutions, or governments, is known as its external debt. Nonetheless, the World Bank defines external debt as the overall gross amount of current liabilities that residents of an economy owe to nonresidents, which are slated for future principal and interest payments but are not contingent at any specific moment. In accordance

with Isaac, Tinashe & Mensah (2021) study on the influence of external debt on Ghana's economy, it revealed an adverse and statistically significant correlation between external debt and economic growth. Conversely, Hilton (2021) revealed that there is no unidirectional Granger causality running from public debt to GDP in the short run; there is one in the long run in Ghana. Consequently, Epaphra and Mesiet (2021) stated in their empirical findings that African nations must quickly implement effective and efficient external debt management methods that will favor on-time repayment since the burden of foreign debt and debt payments have been a notable cause of a lack of finances for public expenditures and growth. Furthermore, Lucy, Collins & Ernest (2016) analyzed the impact of public debt on Ghana's economic expansion. According to the study, Ghana's domestic and foreign debt negatively link the country's economic growth. Additionally, Senadza, Fiagbe & Quartey (2017) revealed that external debt negatively links to growth. It does not always mean that Sub-Saharan African nations should reduce their foreign borrowing to increase growth. Moreover, Fumey, Bekoe & Imoru (2022) employed the Autoregressive Distributed Lag (ARDL) model and discovered that the tax disincentive effect has a negative long- and short-term impact on the service of external debt in Ghana.

There is much ongoing discussion about the connection between trade openness and economic growth in the world's theoretical and empirical literature (Khobai, Kolisi & Moyo, 2018). Theoretical arguments show that even though trade openness increases economic efficiency, trade liberalization may harm nations due to market imperfections, technological variations, and endowments (Silajdzic & Mehic, 2018). Trade openness's impact on an economy may depend on the restrictions that still exist in some nations. However, Keho (2017) employed the Toda and Yamamoto Granger causality tests and the Autoregressive Distributed Lag limits to test for cointegration. The findings demonstrate that trade openness has favorable long- and short-term benefits on economic growth. Conversely, based on long-term empirical findings from Malefane and Odhiambo (2018), the study concludes that trade openness influences economic growth positively and substantially when the ratio of total trade to GDP is considered. On the contrary, evidence from a study on trade openness in African countries by Kinfack and Lumengo (2022) identifies a divergence between openness and growth in low-income economies. Conversely, for upper-income nations, the coefficients of trade indicators are positive and significant. Conversely, Umme, Munshi & Shamim (2012) studied the effect of trade openness in Bangladesh using the OLS method, and the findings showed that liberalization led to higher GDP growth. Sheng et al. (2019) results reveal that while trade openness negatively impacts economic growth when fixed capital formation is considered a mediating

factor and threshold, it tends to positively influence developing economies. Furthermore, Olufemi (2004) outcomes suggested that openness and growth have a one-way relationship, and this demonstrates that, depending on Nigeria's economic development level, a higher level of openness will be advantageous. Consequently, Elijah and Musa (2019) results indicated that trade openness has a detrimental effect on short-term and long-term economic growth.

The unemployment rate in Ghana has been a major challenge for the government over the years. The OECD defines unemployment as the status of individuals of working age who are not employed, available for work, and have actively sought employment. The labor market is conventionally perceived as transparent under the neoclassical framework, assuming flexible wages and perfect information. However, if this assumption is distorted due to wage rigidity caused by institutional factors, such as minimum wage laws, the labor market may not be transparent, resulting in classical involuntary unemployment (Baah-Boateng, 2013). Key measures of the state of an economy include the quantity and quality of available jobs, as determined by unemployment and joblessness rates, poverty incidence, and income inequality. Nonetheless, Shackleton (1985) states that when an individual is unable to secure employment while being willing to accept lower real pay or worse working conditions compared to similarly qualified individuals who are currently employed, it is considered involuntary unemployment. Baah-Boateng (2013) provides evidence supporting the claim that employment growth in Ghana lags behind economic growth due to the rapid expansion of sectors with low employment generation and the slow expansion of sectors with high labor absorption. Conversely, Sulemana, Anarfo & Doabil (2019) found in their study that there is an inverse relationship between unemployment and self-rated health among Ghanaians. Additionally, Adarkwa, Donkor & Kyei (2017) indicated that only the service sector, according to the study, significantly impacted Ghana's unemployment rate negatively.

However, the highest inflation rate in Ghana occurred in 1983, which was 122.87%, compared to 116.45% and 116.50% in 1997 and 1981, respectively. The high inflation rate was due to pressures on demand brought on by monetary and fiscal expansion. Ghana became one of the first emerging market economies and one of the first low-income nations to embrace inflation targeting when it did so legally in 2007 (Nchor & Darkwah, 2015). The post-Covid-19 period has shown that Ghana's inflation has risen to a double-digit 37.2% as of September 2022. Some studies have empirically captured the impact of inflation in Ghana. For instance, Olusola et al. (2022) indicated that inflation expectations harm consumer attitudes toward private consumption expenditure among consumers in extremely advantageous financial situations. Philip et al. (2015) found in their

study results of the Economic Recovery Program led to a 0.018% decrease in inflation. Additionally, Solomon, Kweku & Felicia (2014) found that inflation significantly impacted people's quality of life, forcing them to take out loans and put in extra hours at the office to make ends meet. It was also discovered that, because of the significant inflation in 2013, the population's standard of living declined the most. Kyereboah-Coleman (2012) found in their results that IT significantly affected the decline of the inflation series in recent years and significantly decreased the persistence of the inflation series in Ghana. Furthermore, Akingbade and Nicholas (2021) found in their study that Ghana's state debt has inflationary repercussions.

3. MATERIALS AND METHODS

The research employed both ordinary least squares (OLS) and distributed lagged models to examine the correlation between the independent variables and the dependent variable. This technique minimizes the sum of squared vertical distances between observed responses in the dataset and those predicted by the linear approximation. The OLS estimator is considered optimal among linear unbiased estimators when errors are homoscedastic and serially uncorrelated, and it remains consistent when regressors are exogenous without multicollinearity (Vaclav, 2014). In cases where errors have finite variances, OLS yields a minimum-variance, mean-unbiased estimate. Economic theory assumes a linear connection between the dependent variable and independent explanatory variables, accounting for arbitrary (unexplained) deviations, errors, and residuals. A distributed lag model is a dynamic model where the impact of a regressor on the dependent variable unfolds gradually over time rather than occurring suddenly (Vaclav, 2014). The values of the regressors in many economic models' regression equations have lagged values. For example, public investments like roads and highways require time. The size of an explanatory variable's coefficient, presented as a function of the lag, is provided by a lag distribution function (Vaclav, 2014). The easiest strategy to account for economic growth inertia is to incorporate both prior and present growth changes into the regression model. A distributed lag model is one in which an independent variable appears more than once at various temporal lags. However, this study investigated the impact of macroeconomic factors (unemployment, external debt, trade openness, real exchange rate, FDI inflows, and inflation) on the Ghanaian economy's economic advancement. Time series data required a different approach to analyze from an economic standpoint. The application of these methods is based on past literature from (Nketiah et al., 2020; Papi, 2019; Antwi et al., 2013; George, James &

Poku, 2013). Conversely, Søren (1988) cointegration test is used to investigate the long-run relationship between the variables towards economic growth. The cointegration test helps to understand the dynamics in the effect of series inter-dependencies over many periods and indicates whether the variables have a positive or negative impact on growth.

Data Source

The study utilized time series data with an annual frequency sourced from the World Bank covering the period from 1991 to 2021. Time series data was chosen due to its ability to capture the dynamics in the trend of the variables and their impact on economic growth over a specific period. The size of the observations was influenced by the aim to capture the post-economic effects of the implementation of the structural adjustment program. GDP data were computed using 2015 as the base year and measured in constant prices. Trade openness was calculated as the ratio of exports and imports of goods and services to GDP. All variables were converted into logarithm for analysis.

Model Framework

As Ghana's economy expands, it increasingly relies on imports, foreign direct investment (FDI), and external debt to fund its development projects. However, recent episodes of hyperinflation and high unemployment rates have sparked significant controversies regarding the economy's performance. In light of these developments, the study seeks to address the research question: "Are there significant relationships among the unemployment rate, external debt, trade openness, real exchange rate, FDI inflows, and inflation towards economic advancement in Ghana?" If such relationships exist, what impacts do they exert? To answer this question, a regression model is employed, as outlined in Equation 1, to examine the causal relationship between these variables.

$$lnGDP_t = \beta_0 + \beta_1 lnUnem_t + \beta_2 lnEtd_t + \beta_3 lnTop_t + \beta_4 lnReer_t + \beta_5 lnFDI_t + \beta_6 lnfl_t + \varepsilon_t \quad (1)$$

In the study, GDP represents the real gross domestic product, Unem represents the unemployment rate, Etd stands for external debt, Top indicates trade openness, Reer represents the real effective exchange rate, FDI stands for foreign direct investment inflows, and Infl denotes inflation. To further enrich the scope of the study, the distributed lagged model depicted in Equation 2 is employed to investigate the dynamics of some variables and how their past events influence the current trend.

$$lnGDP_t = \beta_0 + \beta_1 lnUnem_t + \beta_2 lnEtd_{t-1} + \beta_3 lnTop_t + \beta_4 lnFDI_{t-1} + \beta_5 lnfl_{t-1} + \varepsilon_t \quad (2)$$

The subscript t_{-1} attached to external debt, FDI inflows, and inflation indicate time, and 1 is one period lagged length of the variables. The aim of testing this hypothesis is to determine whether these variables' past events affect their present influence on economic growth in the Ghanaian economy. β_1, β_2, β_3, β_4, β_5, and β_6 are the regression coefficients, and ε_t represents the error term. The β_0 stands for the constant term obtained from the model.

4. RESULTS

Table 1 shows the variables' summary statistics, which indicate their mean, median, standard deviation, maximum and minimum values. The mean GDP value of 33.0 suggests the average economic output of the country, with a moderate standard deviation of 16.8 indicating variability in GDP among observations. The range from a minimum of 13.9 to a maximum of 66.2 reflects significant disparities in economic performance across different periods or regions. The mean unemployment rate of 6.15 represents the average proportion of the labor force that is unemployed, with a standard deviation of 1.77 indicating variability in unemployment rates over time or across different segments of the population. The range from 3.49% to 10.5% illustrates the extent of fluctuations in employment levels and potential challenges in maintaining consistent job opportunities. The mean external debt level of 11.4 suggests the average amount of debt owed by the country to foreign creditors, with a standard deviation of 8.17 indicating considerable variability in the country's indebtedness. The range from 3.69 to 31.3 reflects differences in borrowing practices and economic policies. The mean real effective exchange rate of 96.2 indicates the average value of the country's currency relative to a basket of foreign currencies, adjusted for inflation, with a standard deviation of 19.3 suggesting moderate variability in the exchange rate. The range from 67.1 to 144. reflects significant fluctuations in the country's currency value over time, potentially affecting import and export dynamics. The mean FDI value of 1.48 represents the average inflow of foreign investment into the country's economy, with a standard deviation of 1.46 indicating variability in the amount of FDI received. The range from 0.020 to 3.88 demonstrates the diversity in the scale of foreign investment, contributing to economic growth, technology transfer, and job creation. The mean inflation rate of 17.8 indicates the average annual increase in the general price level of goods and services, with a standard deviation of 11.9 suggesting moderate variability in inflation rates. The range from 0.410% to 59.5% highlights significant fluctuations in price levels, impacting consumers' purchasing power, savings, and investment decisions.

Table 1: Summary Statistics

Variable	Mean	Median	S.D.	Min	Max
GDP	33.0	27.3	16.8	13.9	66.2
Unemployment	6.15	5.62	1.77	3.49	10.5
External debt	11.4	7.23	8.17	3.69	31.3
Real effective exchange rate	96.2	94.2	19.3	67.1	144.
FDI	1.48	0.636	1.46	0.020	3.88
Inflation	17.8	14.8	11.9	0.410	59.5

Source: Authors calculations

Multicollinearity test

The collinearity test was conducted using the Belsley-Kuh-Welsch (BKW) test to examine whether certain variables can explain others. The variance inflation factor (VIF) was utilized in this test, with a range of 1 representing the lowest value and 10 as the maximum acceptable value. However, values exceeding 10 are deemed problematic. The collinearity test output is summarized in Table 2.

Table 2: Collinearity test

Variable	Variance Inflation Factor
Unemployment	2.665
External debt	3.536
Trade openness	2.712
Real effective exchange rate	4.261
FDI	3.045
Inflation	1.674

Source: Authors calculations

The outcome of the collinearity test indicates that there is no excessive correlation between the variables. The multicollinearity assumption asserts that there should not be a perfect linear relationship among the independent variables, as the presence of such a relationship would violate the classical assumption.

Cointegration test

The Johansen Cointegration test assesses the presence of cointegration among variables, examining multiple ranks as potential indicators of cointegration relationships within the system. For each rank, the test provides eigenvalues, trace test statistics, probabilities, likelihood maximum test statistics, and

associated probabilities in Table 3. Upon analysis, the results indicate a robust rejection of the null hypothesis of no cointegration for ranks 0, 1, 2, and 3. These ranks exhibit significant probabilities for both the trace test and the likelihood maximum test, suggesting strong evidence of cointegration up to rank 3. Specifically, for rank 0, the probabilities for both tests are smaller than 1%, indicating at least one cointegrating equation at the chosen significance level. Ranks 1 and 2 similarly demonstrate probabilities lower than 1% for both tests, further supporting the presence of cointegration within the system. Rank 3 also exhibits significant probabilities lower than 1% for both tests, providing additional evidence of cointegration up to this rank. However, for higher ranks (4 and above), the probabilities exceed the chosen significance level, suggesting insufficient evidence to reject the null hypothesis of no cointegration. Based on the Johansen Cointegration test results, there is evidence of cointegration present among the selected variables.

Table 3: Johansen Cointegration test

Rank	Eigenvalue	Trace test	Probability	likelihood maximum test	Probability
0	1.000	1237	0.000	978.46	0.000
1	0.985	258.81	0.000	118.61	0.001
2	0.895	140.20	0.000	63.171	0.000
3	0.800	77.030	0.000	45.130	0.000
4	0.507	31.900	0.027	19.853	0.074
5	0.340	12.047	0.156	11.673	0.124
6	0.013	0.374	0.540	0.374	0.540

Source: Authors calculations

Regression results

The regression results for model equations 1 and 2 are indicated in Tables 4 and 5, with GDP as the dependent variable. The regression analysis in Table 4 reveals the relationship between GDP and various independent variables. The intercept term, representing the predicted GDP when all independent variables are zero, is statistically significant, indicating that even without any explanatory variables, there is a base level of economic activity. Unemployment exerts a negative influence on GDP, implying that higher levels of unemployment are associated with lower GDP levels. External debt shows a positive relationship with GDP, suggesting that countries with higher levels of external debt tend to have higher GDP, potentially indicating investment or spending funded by debt. Trade openness has a positive but statistically insignificant effect on GDP, indicating that while increased trade may contribute to economic growth,

this relationship is not significant within the given model. The real effective exchange rate exhibits a negative relationship with GDP, although it is not statistically significant, implying that changes in the real exchange rate may not have a substantial impact on GDP within the scope of this analysis. Foreign Direct Investment (FDI) has a strong positive impact on GDP, indicating that higher levels of FDI are associated with increased economic output. Inflation negatively affects GDP, suggesting that higher inflation rates are associated with lower GDP levels, possibly due to reduced purchasing power and investment. Overall, the regression model explains a large proportion of the variance in GDP ($R^2 = 0.98$), indicating a good fit, with significant explanatory power provided by the included variables. However, there was no specification problem and autocorrelation of first-order. The normality of the residual shows that the error is normally distributed. The normality test result shows a p-value of 0.16, which is greater than the 5% significance level; hence the null hypothesis is not rejected.

Table 4: Multiple regression estimation

Variable	Coefficient	Std. Error	Test-ratio	probability
Constant	22.294**	8.436	2.643	0.014
Unemployment	−1.129**	0.444	−2.546	0.017
External debt	1.206***	0.111	10.90	0.000
Trade openness	0.079*	0.045	1.759	0.091
Real effective exchange rate	−0.060	0.051	−1.175	0.251
FDI	3.870***	0.573	6.759	0.000
Inflation	−0.111**	0.052	−2.116	0.045
R^2=0.98	R^2 adjusted=0.97	D.W.=1.546		

Significant codes: ***1%, **5%, *10%;

Source: Authors calculations

The regression analysis in Table 5 indicates significant association between GDP and the independent variables considered, with a lag of one period for external debt, FDI, and inflation. The intercept term, representing the predicted GDP when all lagged independent variables are at their previous period's values, is highly statistically significant, suggesting a fundamental base level of economic activity. Unemployment, without a lag, demonstrates a negative association with GDP, indicating that current levels of unemployment correspond to lower GDP levels in the same period. This relationship appears to be statistically significant, indicating its immediate impact on GDP. External debt with a lag of one period exhibits a positive impact on GDP, implying that higher levels

of external debt in the previous period are associated with higher GDP in the current period. Trade openness, without a lag, shows a positive relationship with GDP, suggesting that increased trade in the same period is associated with higher economic output. FDI, with a lag of one period, has a strong positive impact on GDP, indicating that higher levels of foreign direct investment in the previous period correspond to increased economic output in the current period. Inflation, with a lag of one period, negatively affects GDP, suggesting that higher inflation rates in the previous period are associated with lower GDP levels in the current period. Overall, the regression model with lagged variables explains a substantial proportion of the variance in GDP, with the included lagged variables collectively providing a robust explanation of economic output dynamics over time. Additionally, the Durbin-Watson statistic (D.W.) suggests no significant autocorrelation in the residuals.

Table 5: Distributed lagged estimation

Variable	Coefficient	Std. Error	Test-ratio	probability
Constant	17.115***	3.132	5.465	0.000
Unemployment	−1.448***	0.464	−3.122	0.005
External debt_1	1.194***	0.097	12.36	0.000
Trade openness	0.103**	0.042	2.444	0.022
FDI_1	4.732***	0.552	8.576	0.000
Inflation_1	−0.117**	0.052	−2.264	0.032
R^2=0.97	R^2 adjusted=0.97	D.W.=1.674		

Significant codes: ***1%, **5;

Source: Authors calculations

5. DISCUSSIONS

The study investigated the impact of external debt, FDI, real effective exchange rate, unemployment rate, and trade openness on Ghana's economy, utilizing GDP as a proxy. It sought to answer the research question of whether there exists a long and short-run relationship among these variables. The Johansen cointegration test revealed a long-run relationship between the variables toward economic advancement. However, the regression results showed that external debt, FDI, and trade openness significantly and positively affect economic enhancement, whereas unemployment and inflation rates exert a detrimental effect. Trade openness emerged as the main factor influencing growth, consistent with the empirical results of Nketiah et al. (2020). Additionally, Mireku, Agyei

& Domeher (2017) found that changes in trade openness have a favorable impact on the volatility of both long- and short-term economic growth, corroborating the evidence on trade openness. George, James & Poku (2013) identified trade openness and exchange rate as drivers of Ghana's FDI inflows, with Boakye and Gyamfi (2017) further confirming a positive causal relationship between trade openness and economic growth which contradicts our findings. Trade openness remained significant due to the government's implementation of various trade policies supporting imports into the economy. The coefficient of FDI inflows from the regression results demonstrated its significant contribution to Ghana's GDP due to yearly increment inflows over the past decades. The high FDI flow to the country is attributed to government investment policy and incentive implementations under the Ghana Investment Promotion Center formation. The hypothesis that FDI stimulates economic growth was confirmed by the study, supported by empirical findings from Nketsiah & Quaidoo (2017), Evans, Frank & Rebecca (2017), Rahman (2014), and Sokang (2018). However, the Granger causality results revealed a short-term relationship between FDI and GDP, while empirical outcomes from Musah et al. (2018) showed that FDI is positively connected and significant with economic growth in both the short and long run. On the other hand, the distributed lagged models found inflation to hinder growth, in line with the results of Ho and Iyke (2018). The real exchange rate was found not to affect growth based on the study's results, although evidence from cointegration suggested a positive impact on growth. Additionally, external debt was found to positively support growth in Ghana, consistent with a study by Yeboah (2022) The relationship between external debt and economic advancement, which was confirmed in a similar study by Isaac, Tinashe & Mensah (2021). The unemployment rate was identified to harm Ghana's economic growth based on the regression outcome.

5. CONCLUSIONS

This study evaluated the impact of external debt, foreign direct investment, inflation, real effective exchange rate, trade openness, and unemployment rate on economic growth in Ghana, utilizing Gross Domestic Product (GDP) as a proxy. Time series data from the World Bank spanning the period 1991 to 2021 at a yearly frequency were employed. The analysis involved various statistical techniques, including the Johansen cointegration test, ordinary least squares (OLS), and distributed lagged models. The Johansen cointegration test identified a long-run relationship among the variables contributing to economic advancement. The OLS output shows that inflation and unemployment harm

economic growth, whereas external debt, FDI, and trade openness positively stimulate growth. The distributed lagged model with one period lags of FDI, external debt, and inflation proves that their impacts are distributed over some periods, and it further revealed their variables' impact expands yearly. The study outcomes concluded that FDI, external debt, and trade openness positively impact economic growth if managed well, confirming that hypotheses stimulate growth. The findings from the OLS regression and distributed lagged model offer several detailed policy implications for Ghana. Firstly, in the context of the Ghanaian economy, addressing inflation and unemployment is imperative due to their negative impacts on economic growth. Policy measures should prioritize controlling inflation rates and implementing strategies to reduce unemployment through monetary policies focusing on price stability and fiscal policies targeting job creation through investments in infrastructure, education, and skills development programs. Secondly, effective management of external debt is crucial for sustaining economic growth in Ghana. While external borrowing can positively influence growth, policies should ensure prudent utilization of borrowed funds for productive investments in infrastructure development and human capital enhancement. Diversifying funding sources and reducing reliance on external borrowing could enhance financial stability in the long run. Thirdly, given the significant contribution of FDI to Ghana's economic growth, policies should aim to attract and retain foreign investors by creating a conducive business environment, improving infrastructure, enhancing regulatory frameworks, and providing investment incentives. Strengthening institutions responsible for investment promotion and facilitation could further encourage FDI inflows. Fourthly, promoting trade openness is essential for stimulating economic growth in Ghana. Policy efforts should continue to focus on trade liberalization, reducing trade barriers, and promoting export-oriented industries through trade agreements, trade facilitation measures, and investments in trade-related infrastructure.

The distributed lagged model emphasizes the importance of considering the long-term impact of policy interventions. Policy frameworks should prioritize stability and consistency to foster sustained economic growth, supported by long-term development plans with clear objectives and monitoring mechanisms. Investing in human capital development is critical for enhancing productivity and competitiveness in the Ghanaian economy. Policies aimed at improving access to quality education and healthcare services, promoting vocational training, and supporting entrepreneurship can help develop a skilled workforce and drive innovation and technological advancement. To ensure equitable and sustainable development outcomes, policy interventions should be designed to address

income inequality, promote social inclusion, and mitigate regional disparities. By implementing inclusive growth strategies, Ghana can ensure that the benefits of economic growth are widely shared across society, fostering a more resilient and prosperous economy.

Conflict of interests

The authors declare there is no conflict of interest.

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ДА ЛИ МАКРОЕКОНОМСКИ ФАКТОРИ ЗНАЧАЈНО УТИЧУ НА ЕКОНОМСКИ РАСТ? ДОКАЗИ ИЗ ГАНЕ

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САЖЕТАК

Макроекономија испитује цјелокупну економију користећи различите индикаторе као што су инвестиције, девизни курс, стопа незапослености и трговина. Ови индикатори доприносе или позитивно или негативно привредном расту. Након економских реформи у Гани 1983. године, њена привреда је претрпела значајне трансформације, утичући на њу на различите начине. Ова студија је истраживала одабране макроекономске варијабле (спољни дуг, стране директне инвестиције, инфлацију, стварни ефективни курс и отвореност трговине) које утичу на привредни раст Гане. Студија је анализирала податке временских серија Свјетске банке у периоду од 1991. до 2021. коришћењем економетријских метода, укључујући Јохансенову коинтеграцију, обичне најмање квадрате (ОЛС) и дистрибуирани модел са кашњењем. Резултати коинтеграције открили су дугорочну везу између варијабли. Налази ОЛС-а су показали да су спољни дуг, стране директне

инвестиције и отвореност трговине позитивно утицали на привредни раст, док су инфлација и стопе незапослености имале негативне ефекте, при чему је бруто домаћи производ (БДП) служио као показатељ привредног раста. Поред тога, резултати су показали да реални девизни курс није имао значајан утицај на економију Гане. Насупрот томе, налази из дистрибуираног модела са кашњењем пружили су доказ да се утицај инфлације, спољног дуга и страних диектних инвестиција проширио током одређеног периода. На основу ових налаза, студија препоручује да влада Гане инвестира спољне зајмове у секторе који могу да подстакну економски раст и да обезбеде подстицаје за улагања како би привукли више инвеститора.

Кључне ријечи: *спољни дуг, стране директне инвестиције, бруто домаћи проузвод, отвореност трговине, привредни раст*

Прегледни научни чланци
Review Scientific Papers

ENTREPRENEURIAL FRAMEWORK CONDITIONS AND ECONOMIC GROWTH: INSIGHTS FROM MIDDLE-INCOME ECONOMIES

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ABSTRACT

This article implements correlation analysis and a fixed effects model to assess the influence of entrepreneurial framework conditions (EFCs) on economic growth in middle-income countries. The implemented panel data set for EFCs is unearthed from the Global Entrepreneurship Monitor website and that for gross domestic product (GDP) per capita, a surrogate for economic growth, is extracted from the World Bank website over the observation period 2001 – 2021. We have discovered that there are statistically significant positive correlations between GDP per capita and 'entrepreneurial finance' and 'post-school entrepreneurial education and training', and statistically significant negative correlations between GDP per capita and 'taxes and bureaucracy', 'internal market openness', and 'physical and service infrastructure'. Moreover, we have exposed that EFCs positively and significantly impact economic growth in middle-income countries. This article contributes to the discourse on the connection between economic growth and conditions for entrepreneurship in middle-income economies. As a recommendation, policymakers should consider EFCs when developing policies to kindle economic growth in middle-income economies. Further, the study results could assist policymakers in selecting and applying suitable measures to eradicate the impediments in the businesses where entrepreneurs operate.

1. INTRODUCTION

Economic growth is a crucial objective to be achieved by both developing and developed countries. Nonetheless, countries face a big challenge to stimulate economic growth after the Great Depression (i.e. the 2007 – 2009 global crisis) and the COVID-19 pandemic. They continue to feel the economic effects of the Great Depression and the COVID-19 pandemic. Their recovery has been slow. The COVID-19 pandemic activated the severest downturn in the world economy since the 2007 - 2009 crisis (International Monetary Fund, 2022). Against this backdrop, the critical issue is how economies can stimulate economic growth. In practice, a multiplicity of frameworks, strategies, and policies has been designed to stimulate economic growth in developing and developed countries. Nevertheless, economies face a problem of recognising the determinants of economic development and growth (Stoica, Roman & Rusu, 2020).

Interestingly, existing literature indicated that entrepreneurship is one of the key drivers of economic development and growth (Matenda & Sibanda, 2023a; Matenda & Sibanda, 2023; Matenda & Sibanda, 2022; Gomes et al., 2022; Nwagu & Enofe, 2021; Stoica, Roman & Rusu, 2020; Urbano & Aparicio 2016). It influences economic growth in a number of ways, such as, job creation, knowledge spillovers, and innovation promotion (Wang & Shao, 2023; Vatavu et al., 2021; Stoica, Roman & Rusu, 2020; Savrul, 2017). Therefore, in reality, the role of entrepreneurship cannot be ignored. Gomes et al. (2022) propounded that the influence of entrepreneurship on economic growth is a topic that is under continuous scrutiny and, due to endless changes as a result of globalisation, it is regarded as one of the apposite studies. Nevertheless, several authors indicated that not every entrepreneurship results in growth (see, for instance, Gomes et al., 2022; Xu, Yu & Li, 2021; Dvoulety, Gordievskaya & Prochazka, 2018; Naude, 2013), since regions and countries are associated with diverse entrepreneurial behaviour and attitudes, entrepreneurial framework conditions (EFCs), and there are varied classes of entrepreneurship (Stoica, Roman & Rusu, 2020; Acs et al., 2018; Stam & Van Stel, 2011, 2009). Entrepreneurial attitudes and behaviour denote the behaviour and attitudes of individuals regarding entrepreneurship and EFCs signify contextual issues of the economic atmosphere (Matenda & Sibanda, 2023a). Bosma et al. (2008) pronounced that EFCs are 'the necessary oxygen of resources, incentives, markets, and supporting institutions to the growth of new firms'. The interdependence of contextual variables of the economic atmosphere, the entrepreneur and the entrepreneurial venture is referred to as the entrepreneurship ecosystem (Gomes, Ferreira & Lopes, 2023; Steigertahl & Mauer, 2023; Pita, Costa & Moreira, 2021a; and references therein). Stam & Spigel (2016) specified that an entrepreneurial ecosystem is 'a set of

interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory'. Moreover, some studies (see, for instance, Urbano & Aparicio, 2016; Van Stel, Carree & Thurik, 2005) indicated that the association between entrepreneurship and economic growth cannot be well-defined except when particular circumstances are encountered. This indicates that, in the extant literature, there is no harmony on the influence of entrepreneurship on economic growth. Therefore, understanding the association between entrepreneurship and economic growth still needs clarification.

Xu, Yu & Li (2021) postulated that numerous research articles revealing that entrepreneurship drives economic growth are usually directed toward advanced countries and regions. Under the same line of reasoning, Cao & Shi (2021) indicated that entrepreneurial ecosystem research has been essentially static and theoretical, and has stereotypically devoted to advanced economies. In developing nations, entrepreneurship and entrepreneurial ecosystem are basically poorly researched. Since advanced and developing economies are dissimilar (Gomes et al., 2022; Cao & Shi, 2021; Crowley & McCann, 2018; Roundy, 2017), results found in advanced economies do not reflect a true depiction of what is the state of affairs in unadvanced economies (see, for example, Cao & Shi, 2021). Some studies indicated that there are significant variations in the determinants of economic growth in developing and advanced countries (Farinha, Ferreira & Nunes, 2018; Valliere & Peterson, 2009).

Existing literature has also indicated that several studies have assessed the impact of entrepreneurship on economic growth at the industry or firm stage and that studies that examined the connection between economic growth and entrepreneurship at the economy level are generally limited (see, for instance, Munyo & Veiga, 2022; Savrul, 2017; Acs, Autio & Szerb, 2014). One of the reasons is the problem of measuring and defining entrepreneurship (see Gomes & Ferreira, 2022; Wong, Ho & Autio, 2005). Therefore, Farinha et al. (2020) and Stoica, Roman & Rusu (2020) opined that further studies with massive and more diverse samples are needed to assess the effect of entrepreneurship on economic growth at the economy or national stage.

Against this backdrop, this article implements correlation analysis and a fixed effects model to analyse the influence of EFCs on economic growth in middle-income economies. In this article, we answer this research question: How can EFCs influence the economic growth of middle-income countries? The implemented panel data set for EFCs is extricated from the Global Entrepreneurship Monitor (GEM) website and that for gross domestic product (GDP) per capita, a surrogate for economic growth, is extracted from the

World Bank website over the observation period 2001 – 2021. We discover that there are statistically significant positive correlations between GDP per capita and 'entrepreneurial finance' and 'post-school entrepreneurial education and training', and statistically significant negative correlations between GDP per capita and 'taxes and bureaucracy', 'internal market openness', 'physical and service infrastructure' and 'cultural and social norms'. Moreover, we expose that EFCs positively, significantly impact economic growth in middle-income countries.

This research article adds a voice to the discourse on the connection between economic growth and entrepreneurship by tendering insights into EFCs' effects on economic growth at the economy stage in middle-income countries. First, we comprehensively assess the connections between EFCs and economic growth over an elongated observation period of 21 years, i.e. 2001 – 2021. Second, we implement panel data for 17 middle-income countries in our effort to analyse the influences of EFCs on economic growth in middle-income economies. We employ the 2021 classification by the World Bank. To the finest of our knowledge, no such study was conducted before.

The rest of the article is arranged as follows. Section 2 is devoted to literature review, and Section 3 outlines data and methodology issues. Section 4 articulates the study results, which are discussed in Section 5. Last of all, Section 6 presents the conclusions of the study, and provides study recommendations, limitations and areas for further research.

2. LITERATURE REVIEW

2.1 The concept of entrepreneurship

It is challenging to design a single entrepreneurship definition (Gomes & Ferreira, 2022). Therefore, in the existing literature, there is no accord when it comes to the definition of entrepreneurship (see Peprah & Adekoya, 2020 and references therein). Several definitions have been proposed in the literature. Gomes & Ferreira (2022) proposed that entrepreneurship 'can be understood as the intention or action aiming to generate value through products, new methods or through new businesses', and Xu, Yu & Li (2021) postulated that entrepreneurship may be defined as the 'enterpriser's spirit of adventure, reform and innovation to maximize profits and introduce new economic opportunities and economic ideas into the market under the condition of uncertain risks'. Naudé (2011) indicated that entrepreneurship can be described using three components: new enterprise formation, innovation and resource coordination. Since it is difficult

to define entrepreneurship and there is not accord in the extant literature on how entrepreneurship can be defined, Gomes & Ferreira (2022) posited that it is not easy to unearth a sound entrepreneurship measure that permits comparisons among economies. The authors (Gomes & Ferreira, 2022) further pronounced that this challenge is worsened by the presence of several global databases that implement different dimensions and measures of entrepreneurial activity.

For long, quantitative metrics have been implemented to assess entrepreneurship, with the quantity of new companies and the self-employment rate normally implemented in this respect (Acs & Szerb, 2010; Carree & Thurik, 2007). Nonetheless, quantitative measures are associated with several shortcomings and they do not give us a true picture because entrepreneurship is a complex and multi-dimensional phenomenon (see, for instance, Kim et al., 2022; Gomes & Ferreira, 2022; Doran, McCarthy & O'Connor, 2018; Baliamoune-Lutz, 2015). To address the shortcomings of the quantitative entrepreneurship metrics, more than a few novel entrepreneurship measures have been designed, e.g. EFCs indicators, and entrepreneurial attitudes and behaviour (Acs & Szerb, 2010; Doran, McCarthy & O'Connor, 2018; Vatavu et al., 2022).

2.2 Entrepreneurial ecosystem

The ecosystem for entrepreneurship or entrepreneurial ecosystem concept is fairly novel (Walsh & Winsor, 2019; Malecki, 2018). There is no extensively shared definition of it (Stam, 2015), since among other issues, ecosystems are defined in diverse manners, at diverse levels, and with diverse research data and designs, and there are numerous diverse types of ecosystems, of which the entrepreneurial ecosystem is one of them (Malecki, 2018; Acs et al., 2017; de Vasconcelos Gomes et al., 2016). Therefore, numerous diverse definitions were designed in the existing literature by different scholars (see, for instance, Malecki, 2018 and references therein). Malecki (2018) further indicated that numerous definitions of an entrepreneurial ecosystem highpoint the interconnection of elements, usually through networks, resulting in common cultural morals that promote entrepreneurial action.

Ecosystems of entrepreneurship are societies comprising of numerous separate players, e.g., governments, universities, investors, media, mentors, service providers, and huge corporates that can significantly partake in the advancement of and stage of entrepreneurial action for a particular area (Hechavarría & Ingram, 2019). The ecosystem comprises of elements that influence the system's condition. The GEM pronounced that these factors include 'entrepreneurial finance', 'government support and policies', 'taxes and bureaucracy',

'government programmes', 'basic school entrepreneurial education and training', 'post-school entrepreneurial education and training', 'research and development', 'commercial and professional infrastructure', 'internal market dynamics', 'internal market openness', 'physical and service infrastructure', and 'cultural and social norms'. Hechavarría & Ingram (2019) proffered that such factors generate multifaceted interdependences among actors that stimulates them to design an entrepreneurial community. From the above discussion, it can be seen that an entrepreneurial ecosystem is an independent and dynamic web of numerous diverse kinds of interdependent factors and actors that can promote productive entrepreneurship. Summarily, the ecosystem of entrepreneurship concept highpoints that entrepreneurship occurs in a society of inter-reliant factors and parties.

Of late, research focus has been devoted to entrepreneurial ecosystems since they provide a framework that promote economic growth in an economy or region through encouraging and exploring entrepreneurial opportunities that can lead to entrepreneurial business actions (see, for example, Gomes, Ferreira & Lopes, 2023; Gomes et al., 2022; Farinha et al., 2020; Sitaridis & Kitsios, 2020; Lopes & Franco, 2019). Economic growth refers to a recurrent improvement in an economy's GDP over a particular time period (Matenda & Sibanda, 2023). However, some scholars, such as, Alaassar, Mention & Aas (2022), Lux, Macau & Brown (2020), and Xie et al. (2021), indicated that entrepreneurial ecosystems can hinder the exploring and discovery of business opportunities. This indicates that there is no harmony in the extant literature regarding the bearing of entrepreneurial ecosystems on economic growth. In the same vein, Roundy & Lyons (2023) and Yan & Guan (2019) indicated that the effect of ecosystems of entrepreneurship on entrepreneurs recognising business prospects, organisational performance and structures, and the achievement or nonachievement of competitive edges is indistinct. Moreover, Gomes, Ferreira & Lopes (2023) postulated that the impact of EFCs on entrepreneurial ecosystems and economic growth is indistinct as well. Therefore, there is a need for further analysis, especially examining the impact of entrepreneurial ecosystems on economic growth. This will help policy-makers, governments, and decision-makers to formulate effectual and efficient interferences to encourage economic growth.

2.3 Connection between entrepreneurship and economic growth

In the existing literature, the connection between entrepreneurship and economic growth has been widely examined. The hunt of economic growth is a central goal for many economies (Peprah & Adekoya, 2020; Wennekers & Thurik, 1999).

Economic growth studies indicate that economic growth can be explained using the following theories: classical growth theory, neoclassical growth theory, new growth theory, and endogenous growth theory. The neoclassical growth theory shows how economic growth results when labour, technology, and capital come into play. Solow (1999) postulated that the neoclassical growth theory posits that the build-up of labour and capital is the driver of economic growth, whereas productivity and technological advancement augment the rate of economic growth. The endogenous growth theory postulates that economic growth is affected by interior issues, including innovation, human capital investment, innovation, and public sector role (Rijal, Idrus & Ahmad, 2023). Basically, the endogenous growth model postulates that economic growth is caused by endogenous factors and contrasts with the neoclassical growth theory which specifies that economic growth is caused by external factors. The new growth theory proposes that the growth and productivity of the economy are connected straight to people, particularly to what they need and want. The idea behind this theory is that the needs and wants of people stimulate their investing and purchasing decisions, whereas investing and purchasing drive the economy, i.e. investments and purchases of people result in the increase of real GDP per person. Lastly, the classical growth theory suggests that the economic growth of an economy will decline with a rising population and restricted resources.

Since economic growth can lead to augmented marginal productivity, resulting in higher incomes, more spending, and enhanced quality of life, the focus of governments worldwide is on how they can stimulate economic growth. Of late, research by scholars and policymakers devoted to the detection of factors that influence economic growth has been on the increase. Further, given the sophistication of global problems, e.g. the COVID-19 pandemic and the 2007 – 2009 crisis, it is essential for economies to design efficient and effective strategies to stimulate economic growth.

In reality, economic growth is determined by many issues. One of them is entrepreneurship. Entrepreneurship enacts a substantial part in promoting economic growth. The idea that entrepreneurship promotes economic growth initially arose at the start of the 19th century (see, for instance, Schumpeter, 1911). Recently, several researchers confirmed a positive connection between entrepreneurship and economic growth and development (Gomes et al., 2022; Munyo & Veiga, 2022; Sagar et al., 2023; Tahir & Burki, 2023; Wang & Shao, 2023; Lopes, Antunes & Rodrigues, 2018; Urbano & Aparicio, 2016; Raoofi, Afghah & Hoshyar, 2014; Stefanescu, 2012). Bosma et al. (2018) combined entrepreneurship, institutions, and economic growth employing a parsimonious growth model in a three-stage least squares setup and discovered that productive

entrepreneurship results in economic growth. Existing literature indicated that entrepreneurship impacts economic growth in a multiplicity of ways embracing competition, job formation, productivity, industrial agglomeration, employment, knowledge spillovers, and innovation promotion (Kim et al., 2022; Tahir & Burki, 2023; Wang & Shao, 2023; Gaba & Gaba, 2022; Vatavu et al., 2021; Xu, Yu & Li., 2021; Stoica, Roman & Rusu, 2020; Savrul, 2017; Galindo & Mendez, 2014).

Tahir & Burki (2023) examined the link between economic growth and entrepreneurship in BRICS economies over the observation period 2002 – 2021. This article employed the following estimation techniques: fixed effects, generalised least squares, pooled least squares, and two stages least squares. The authors discovered that entrepreneurship is significantly, positively linked to economic growth. Khyareh (2023) assessed the moderating influence of governance quality incorporating six sub-indices (i.e. political stability, voice and accountability, rule of law, government effectiveness, control of corruption, and regulatory quality) premised on a data set of 54 economies over the sample period 2008 – 2020. This study revealed that the governance quality augments the positive link between economic growth and entrepreneurial activity. Implementing the Method of Moments Quantile Regression technique, Chikh-Amnache & Mekhzoumi (2023) examined the connection between female entrepreneurship and economic growth in Southeast Asian economies. The authors observed that the female entrepreneurship stimulates economic growth. Savrul (2017) examined the influence of entrepreneurial actions on economic growth at national level implementing a data set for 35 countries for the period 2006 - 2015 and revealed that, in the long term, entrepreneurship is positively connected to economic growth. Employing the DOLS squares model, Gaba & Gaba (2022) adopted a data set for the BRICS economies over the observation period 2014 - 2018 to analyse the connection between economic growth, and total early-stage entrepreneurial activity, entrepreneurial intention, established business ownership rate, and high job creation expectation rate. This article revealed that entrepreneurial intention is a substantial determinant of economic growth in the BRICS economies.

However, it should be noted that several scholars (see, for instance, Chhabra et al., 2023; Gomes et al., 2022; Dvoulety et al., 2018; Xu et al., 2021) articulated that it is not always the case that entrepreneurship leads to economic growth. Xu et al. (2021) postulated that not all entrepreneurship results in growth. Gomes et al. (2022) proffered that several articles which have assessed the connection between entrepreneurship and regional economic growth have confirmed this to be valid. Over the sample period 2004 – 2014, Zaki & Rashid (2016) assessed

the link between economic growth and entrepreneurship in seven emerging countries, i.e., Egypt, Mexico, Indonesia, Turkey, Romania, Hungary and India, and exposed that there is an adverse connection. Salgado-Banda (2005) and Reynolds, Bygrave & Autio (2003) are some of the authors that discovered an adverse link between economic growth and entrepreneurship. Further, adopting a panel data set for 111 emerging and developing economies as well as developed economies over the observation period 2001 – 2019 (i.e. 19 years), Kim et al. (2022) discovered that there is no evidence of a positive link between aggregate entrepreneurship and economic growth.

From the discussion above it can be revealed that the outcomes concerning the link between entrepreneurship and economic growth are assorted. This can be motivated by the fact that the relationship is influenced by the macroeconomic atmosphere in which the economic growth happens, the business environment and governance quality in a territory, the entrepreneurship type under deliberation (Gomes et al., 2022; Gu et al., 2021; Hamdan et al., 2022; Khyareh & Amini, 2021; Stam & Van Stel, 2009; Wong, Ho & Autio, 2005).

2.4 Link between entrepreneurship and economic development

The link between entrepreneurship and economic growth is conditional on the economic development level of an economy (Kim et al., 2022; Doran, McCarthy & O'Connor, 2018; Ferreira et al., 2017; Urbano & Aparicio, 2016; Naude, 2013; Gries & Naude, 2010; Bosma et al., 2009; Valliere & Peterson, 2009). The results concerning the bearing of entrepreneurship on economic growth in advanced and unadvanced countries are different (Zaki & Rashid, 2016; Stam & Van Stel, 2009; Sternberg & Wennekers, 2005). The reason can be that unadvanced and developed countries are associated with different economic situations (Matenda & Sibanda, 2023a; Valliere & Peterson, 2009). In the same vein, Sendra-Pons, Comeig & Mas-Tur (2022) articulated that the influence of institutional issues on entrepreneurship level differs depending on the socioeconomic features of each economy. Further, the authors postulated that an extensive array of institutional conformations results in absence or presence entrepreneurship.

Some scholars have pronounced that entrepreneurship has more affirmative influence on economic growth in advanced economies than in developing economies. Doran, McCarthy & O'Connor (2018) analysed a panel data set for 55 economies through the observation years 2004–2011 and revealed that entrepreneurial attitudes have an affirmative influence on GDP per capita in high-income economies, and entrepreneurial activity has an adverse effect on GDP per capita in low/middle-income economies. Ivanović-Djukić et al. (2018)

adopted a dataset for 21 European economies and discovered that the contribution of entrepreneurship to economic growth is lesser in South-East European transition economies compared to higher developed European economies. In 2005, Van Stel et al. (2005) adopted a data set for 36 economies and exposed that entrepreneurial activity has a negative consequence on economic growth in poor economies and a positive impact on economic growth in rich economies. Sautet (2013) opined that entrepreneurship has an affirmative effect on economic growth in advanced economies, and discovered that, in developing economies, there is no evidence of such. Stam & Van Stel (2009) adopted a sample of 36 economies over the sample years 2002 - 2005, and discovered that entrepreneurship has no impact on economic growth in low-income countries and the converse is true for high-income and transition countries. Using a data set for 44 economies over the observation period 2004 – 2005, Valliere & Peterson (2009) discovered that entrepreneurship has no influence on economic growth in developing economies. Sabella et al. (2014) adopted data spanning over 16 years and exposed that entrepreneurship has no significant influence on economic growth in the West Bank of the Palestinian territories.

Kim et al. (2022), Peprah & Adekoya (2020) and Adusei (2016) propounded that the assessment of the existing literature indicates that research concerning the linkage between economic growth and entrepreneurship is hugely devoted to advanced economies, whereas in the developing countries, the literature is restricted. This is also supported by Naude (2011), Anokhin & Schulze (2009) and Bruton, Ahlstrom & Obloj (2008). Therefore, the results of the link between economic growth and entrepreneurship cannot give a true picture of the association between economic development and growth and entrepreneurship in developing and emerging economies (Naudé, 2011).

It appears there is some skepticism when it come to the significance of entrepreneurship to the growth dynamics of unadvanced economies (Adusei, 2016). The author (Adusei, 2016) indicated that this skepticism emanates from the fact that some scholars believe that replicative entrepreneurship, which is prevalent in unadvanced economies, is usually deemed not to be growth-supporting.

Peprah & Adekoya (2020) analysed the bearing of entrepreneurship on economic growth employing data for 10 African economies (South Africa, Morocco, Botswana, Sierra Leon, Nigeria, Namibia, Senegal, Zambia, Rwanda, and Mauritius). The authors (Peprah & Adekoya, 2020) exposed that entrepreneurship has an affirmative bearing on economic growth. Adusei (2016) analysed the influence of entrepreneurship on the growth dynamics of 12 African economies

and exposed that entrepreneurship is positively correlated to the variations in the growth these economies. Stam & Van Stel (2011) discovered that entrepreneurship has no noteworthy bearing on economic growth in high-income economies, but has a profound affirmative influence in low-income economies.

The examined literature indicates that the link between economic growth and entrepreneurship should be further assessed in both advanced and developing countries. Crowley & McCann (2018) postulated that further studies are required to deal with entrepreneurial issues in both transition-driven countries and innovation-driven countries. They further propounded that it is vital to differentiate countries since the dynamics of entrepreneurial innovation in advanced countries and transition-driven countries are dissimilar; diverse economies function in diverse innovative, institutional, and competitive atmospheres. Moreover, the extant literature concerning the link between economic growth and entrepreneurship in unadvanced economies reveals contradictory outcomes. Some scholars indicated that entrepreneurship has no impact on economic growth (Valliere & c, 2009), while others discovered an affirmative connection (Wong et al., 2005), and hitherto others exposed an adverse connection (Doran, McCarthy & O'Connor, 2018; van Stel, Carree & Thurik, 2005). This lack of harmony highpoints the need for further examination of the association between economic growth and entrepreneurship.

2.5 Hypotheses development

Implementing a balanced panel approach premised on the GEM dataset over eight years, i.e. 2010-2017, containing 18 countries, Pita, Costa & Moreira (2021) indicated the ineptitude of institutions in promoting the craving to act entrepreneurially and opined that entrepreneurship has to be part of the acculturation process showing the significance of cooperative normative. The authors further stated that offering the structures and instruments is not adequate to promote people to begin an entrepreneurial expedition and exposed that contextual drivers are essential in promoting entrepreneurial inclination to begin a business.

Contextual issues of the economic atmosphere cause variations in entrepreneurial activity rates among economies (Acs et al. 2018). Interestinglymat, Xu, Yu & Li (2021) propounded that designing environments and institutions favourable to innovative entrepreneurship growth is crucial to upholding economic growth in developing economies. The GEM outlines EFCs which signify contextual factors. These EFCs appraises the business ecosystems existing in economies and the manners in which they can influence economic growth and entrepreneurial

actions (Gomes, Ferreira & Lopes, 2023). The authors (Gomes, Ferreira & Lopes, 2023) further postulated that the GEM business ecosystem model presumes that entrepreneurial actions react to interconnecting environmental and business factors.

In the existing literature, the general consensus is that economies with fertile and high-quality EFCs are attractive to entrepreneurs, which usually leads to high economic growth. That is to say, EFCs are drivers of economic growth. Nevertheless, economies are associated with dissimilar EFCs, which can influence entrepreneurial activity's outputs and inputs in a negative or positive manner (Amoros, Felzensztein & Gimmon, 2013). For instance, Vatavu et al. (2021) revealed that EFCs are associated with a momentous role in escalating economic stability in Group of 7 countries plus Russia, whereas Matenda & Sibanda (2023a) discovered that EFCs have an insignificant influence on GDP per capita in BRICS countries. Therefore, there is a need for more research concerning the influence of EFCs on economic growth.

As presented by the GEM, the main elements of the EFCs are the following 12 factors: (1) 'entrepreneurial finance'; (2) 'government support and policies'; (3) 'taxes and bureaucracy'; (4) 'government programmes'; (5) 'basic school entrepreneurial education and training'; (6) 'post-school entrepreneurial education and training'; (7) 'research and development'; (8) 'commercial and professional infrastructure'; (9) 'internal market dynamics'; (10) 'internal market openness'; (11) 'physical and service infrastructure'; and (12) 'cultural and social norms'. These factors generate sophisticated interconnections among partakers that stimulates them to develop an entrepreneurial community (Hechavarría & Ingram, 2019).

Entrepreneurial finance denotes the obtainability of financial resources (both equity and debt) for SMEs (as well as subsidies and grants). Generally, access to finance affects entrepreneurship (see, for instance, Wennekers & Thurik, 1999). Several authors show that financing is an essential institutional component for entrepreneurship (see, for example, Sendra-Pons, Comeig and Mas-Tur, 2022; Kumar & Borbora, 2016; Estrin & Mickiewz, 2010). Dutta & Meierrieks (2021) proffered that greater financial development stages result in greater entrepreneurial activity levels through meeting the request for cheap, handy and wide-ranging credit by entrepreneurs and through the request for the cost-effective and efficient management of risk and information by investors. Restrictions on entrepreneurial actions financing negatively affect the formation of new businesses and development and existence of those corporations in operation (Brown & Earle, 2017). This indicates that the deficiency of investment funds is

one of the key challenges in the entrepreneurial world. So, generally speaking, funding has a positive effect on entrepreneurial actions and economic growth. Consequently, we design the succeeding hypothesis:

H_1: 'Entrepreneurial finance' has a positive impact on the economic growth of middle-income economies.

Government support and policies indicate the degree to which public policies stimulate entrepreneurship as a pertinent economic phenomenon. Government support can be provided through subsidies, business training programmes, consultancy, etc. The scientific harmony in the extant literature is that government support and policies promote the creation and new businesses. In support of this, Gomes, Ferreira & Lopes (2023) opined that government support, given through innovation-oriented policies, can drive entrepreneurial actions. Gomes et al. (2022) discovered that government programmes positively affects economic growth for OECD countries irrespective of their development stage. Nonetheless, the association between entrepreneurship and government support is not consensual, since diverse social contexts can result in diverse policy outcomes (Hechavarría & Ingram, 2019). Under the same line of reasoning, Vatavu et al. (2021) articulated that the influences of policies on entrepreneurship and economic development are diverse. Even though several studies connect government policy to entrepreneurial action (McMullen, Bagby & Palich, 2008), some authors find no connection between government policy and entrepreneurial action (Levie & Autio, 2008). This indicates that government programmes can influence entrepreneurship in a different way. Nevertheless, the general accord in the existing literature is that government support and policies promote entrepreneurship and economic growth (see, for example, Saberi & Hamdan, 2019). Therefore, we develop the following hypothesis:

H_2: 'Government support and policies' has a positive influence on the economic growth of middle-income economies.

In this regard, bureaucracy and taxation refers to the degree to which bureaucracy, taxation and other regulations are size-neutral or inspire new businesses and SMEs. Bureaucracy, taxation and other regulations can act as a blockade to entrepreneurial actions and, ultimately to economic growth (see Acs, Desai & Hessels, 2008). Levie & Autio (2008) proffered that taxes result in an upsurge in direct financial costs for corporates and they eliminate enticements for entrepreneurial actions. Nevertheless, appropriately administered tax policies may give inducements for corporates to grow and innovate (Keuschnigg & Nielsen, 2004). The authors further articulated that progressive tax may strengthen entrepreneurship, but it may have no influence as well. Bureaucracy

can adversely influence the economy (see: Stenholm, Acs & Wuebker, 2013). The reason being that entrepreneurs can become demotivated when they try to start new corporates; thereby suffering higher start-up costs and failing to exploit entrepreneurial openings (Audretsch et al., 2019; Mullins & Forlani, 2005). Hechavarría & Ingram (2019) stated that compliance with regulations can increase costs for entrepreneurs. Therefore, the following hypothesis is generated:

H_3: 'Taxes and bureaucracy' has a negative influence on the economic growth of middle-income economies.

Government programmes indicate the existence and quality of programmes unswervingly helping SMEs at all government stages, i.e., municipal, regional, and national. In practice, several governments have been playing a vital part in entrepreneurial investments success. Government programmes such as subsidies, skills development, and consultancy and guidance promote entrepreneurship in countries (see, for example, Saberi & Hamdan, 2019; Pickernell et al., 2013; Méndez-Picazo, Galindo-Martín, & Ribeiro-Soriano, 2012). Chowdhury, Audretsch, & Belitski (2019) postulated that government programmes reduce the costs of forming novel businesses and correct market failures. Even though some studies discovered that government interventions have an adverse influence on entrepreneurship by ebbing its innovative tendencies (see, for instance, Cheng et al., 2017), we design the following hypothesis:

H_4: 'Government programmes' has a positive influence on the economic growth of middle-income economies.

Basic school entrepreneurial education and training denotes to the degree to which training in forming or managing SMEs is included in the education and training fabric at secondary and primary stages. Similarly, post-school entrepreneurial education and training denotes the degree to which training in forming or managing SMEs is included in the education and training fabric in higher education. Interestingly, research interest in entrepreneurship education has been on the increase of late. Entrepreneurship education is usually associated with experiences concerning business activities. Greater levels of entrepreneurship education promote the formation of new corporates, create job, stimulate growth of SMEs and reduce poverty, and ultimately lead to higher levels of economic growth (Bakar, Islam & Lee, 2015; Isaacs et al., 2007). Candiya Bongomin et al. (2018) indicated that, at the basic stage, entrepreneurial education amplifies inherent motivation and invigorates business formation exploits, particularly in developing economies. Here, the following hypotheses are developed:

H_5: 'Basic school entrepreneurial education and training' has a positive influence on the economic growth of middle-income economies.

H_6: 'Post-school entrepreneurial education and training' has a positive influence on the economic growth of middle-income economies.

In this context, research and development transfer refers to the degree to which state research and development result in novel commercial prospects and is obtainable by SMEs. In other words, Amorós & Bosma (2014) specified that research and development denote to the degree to which state research and development outcomes results in novel openings in commercial stipulations and the manner they become accessible to SMEs. Extant literature postulated that SMEs promote knowledge transfer and its revolution into economic value; thus, stimulating economic growth. Fascinately, Audretsch & Lehmann (2005) indicated that the transfers of knowledge are associated with greater entrepreneurship levels and, ultimately, results in economic growth. Thus, in this study, we design the ensuing research hypothesis:

H_7: 'Research and development transfer' has a positive influence on the economic growth of middle-income economies.

Commercial and professional infrastructure denotes the presence of property rights, commercial, accounting, and other legal and assessment services and establishments that promote or support SMEs. Hechavarría & Ingram (2019) and Levie & Autio (2008) indicated that commercial and professional infrastructure comprises of professional support services vital to starting a novel business, e.g., consultant and supplier contracts, etc. Existing literature propounded that entrepreneurs can focus on their businesses when commercial and profession infrastructure exists and work efficiently and effectively; thereby promoting the formation of new corporates. Against this backdrop, we present the following hypothesis:

H_8: 'Commercial and professional infrastructure' has a positive influence on the economic growth of middle-income economies.

Internal market dynamics refers to the degree of alteration in markets from one year to the other. More dynamic markets are associated with greater levels of risk, uncertainty and unpredictability; thereby, creating possibilities for entrepreneurs to maximise the values of their corporates as compensation for the risks they take and trying to warrant the optimum mixture of resources to attain the greatest stages of competitiveness and efficiency (Magnani & Zucchella, 2018). This indicates that dynamic markets are associated with higher levels of economic growth and entrepreneurship. Therefore, we develop the following hypothesis:

H_9: 'Internal market dynamics' has a positive influence on the economic growth of middle-income economies.

Internal market openness refers to the degree to which new businesses are unrestricted to infiltrate current markets. In other words, Amorós & Bosma (2014) postulated that internal market openness indicates the freedom of new corporates to penetrate present markets. Basically, if it is difficult to penetrate new markets, prospective entrepreneurs become demotivated to infiltrate these markets. More opportunities for new corporates to penetrate the existing markets may stimulate entrepreneurship (see, for instance, Fuentelsaz et al., 2015), thereby affecting economic growth (Aparicio, Urbano & Audretsch, 2016). Against this background, the hypothesis below is suggested:

H_{10}: 'Internal market openness' has a positive influence on the economic growth of middle-income economies.

Physical infrastructure shows that effortlessness of passage to physical resources at a price that does not differentiate against SMEs. These physical resources include utilities, communication, transportation, and space or land. Gomes, Ferreira and Lopes (2023) postulated that physical and service infrastructure consists of, among other things, communication services, and rail, road and air transport networks. Physical and service infrastructure is indispensable to entrepreneurial actions. It connects external and internal markets (Acs et al., 2014). Thus, we design the hypothesis below:

H_{11}: 'Physical and service infrastructure' has a positive influence on the economic growth of middle-income economies.

Cultural and social norms represent the degree to which social and cultural norms endorse or allow actions leading to new business methods or actions that may possibly amplify personal wealth and income. Hofstede (2001) articulated that culture is 'the collective programming of the mind that distinguishes the members of one group or category of people from another.' A community that values entrepreneurship culture via appreciating the attitudes of entrepreneurs, affirmative media depictions of entrepreneurial actions and an institutional atmosphere that is not antagonistic to entrepreneurial actions stimulates the will and desire of people to be entrepreneurs (Guerrero et al., 2021). Hechavarría & Ingram (2019) postulated that norms and culture of social acceptance of entrepreneurial actions affects entrepreneurship positively and boost economic growth. Hence, the following hypothesis is designed:

H_{12}: 'Cultural and social norms' has a positive influence on the economic growth of middle-income economies

3. MATERIALS AND METHODS

3.1 Sample and data

This paper adopts a sample of 17 upper-middle-income and lower-middle-income economies as categorised by the World Bank in 2021, i.e., Argentina, Colombia, South Africa, Russia, Brazil, China, Ecuador, Egypt, Guatemala, India, Turkey, Iran, Mexico, Peru, Thailand, Malaysia, and Jamaica. Of all these 17 economies, only Egypt, India, Iran, and Thailand are categorised as lower-middle-income economies. Lower-middle-income economies possess a gross national income (GNI) per capita between $1 086 and $4 255, and upper-middle-income economies possess a GNI per capita between $4 256 and $13 205. The 2021 GNI per capita value is considered when classifying countries. The panel data for the study is gathered over an observation period of 21 years, i.e. 2001 – 2021. The choice of the period 2001 - 2021 is due to data availability. The GDP per capita is implemented as a surrogate for economic growth because it is one of the most imperative and broadly applied economic growth indicators. Data for EFCs is collected from the GEM website, and data for GDP per capita is pooled from the World Bank's World Development Indicators (WDI) database.

3.2 Measurement

This article examines the bearing of EFCs on economic growth in middle-income countries. The GDP per capita (as a logarithm) is implemented as the dependent variable. We use 12 variables (presented by the GEM) that represent EFCs as independent variables. This study includes gross capital formation and unemployment rate as control variables since entrepreneurship is closely associated with the external environment. Table 1 below outlines the variables implemented in this article.

Table1: Dependent and independent covariates

Acronyms	Variables	Definition
	Dependent variable	
loggdp	GDP per capita (current US$)	GDP per capita refers to GDP divided by mid-year population
	Independent variables	
fin	Entrepreneurial finance	The obtainability of financial resources (i.e. debt and equity) for SMEs (incorporating subsidies and grants)

Acronyms	Variables	Definition
govsup	Government support and policies	The degree to which public policies promote entrepreneurship as an essential economic phenomenon
tax	Taxes and bureaucracy	The degree to which public policies promote entrepreneurship – regulations or taxes are size-neutral or promote novel businesses and SMEs
govpro	Government programmes	The existence and quality of programmes unswervingly helping SMEs at all government levels, i.e. municipal, regional and national
basch	Basic school entrepreneurial education and training	The degree to which training in managing or forming SMEs is included in the training and education fabric at secondary and primary stages
postsch	Post-school entrepreneurial education and training	The degree to which training in managing or forming SMEs is included in the training and education fabric in higher education
rnd	Research and development transfer	The degree to which national research and development will result in new commercial openings and is accessible by SMEs
compro	Commercial and professional infrastructure	The existence of property rights, accounting, commercial and other legal and evaluation services and establishments that promote or support SMEs
mktdyn	Internal market dynamics	The degree of alteration in markets from year to year
mktope	Internal market openness	The degree to which novel businesses are unrestricted to penetrate prevailing markets
physerv	Physical and service infrastructure	Ease of passage to physical and service resources at a price that does not differentiate against SMEs
culsoc	Cultural and social norms	The degree to which social and cultural norms endorse or allow actions leading to novel business actions or methods that can possibly amplify personal wealth and income
	Control variables	
grossc	Gross capital formation (% of GDP)	Gross capital formation (previously gross domestic investment) contains outlays on additions to the fixed assets of the economy in addition to net changes in the inventory level
unempl	Unemployment, total (% of the total labour force)	Unemployment is the proportion of the labour force that is not working but is open for and looking for employment

Source: GEM (2023), World Bank (2023)

3.3 Method

In this study, we implement a panel data set with yearly scores for the data gathered from 2001 – 2021. The data set comprises 357 observations. Some variables have missing data. This article imputes the missing data using mean imputation. In this procedure, for each country, we calculate the mean values for nonmissing values for variables with missing data and then replace missing values with the computed mean values. The study implements mean imputation because it is easy and quick to perform.

First, we compute the descriptive statistics to reveal the essential features of the implemented variables as the first stage in statistical data analysis. These descriptive statistics include maximum and minimum values, standard deviations, and means. Second, we calculate correlation coefficients between independent and dependent covariates to check multicollinearity between covariates. Considering the correlation coefficients between the variables, we observe that some variables are highly correlated. To deal with the multicollinearity challenge, we apply principal component analysis (PCA), a variable reduction procedure, instead of deleting some of the highly correlated covariates. Deleting variables would eliminate variables that have vital information when explaining economic growth. PCA upholds the original explanatory ability of the indicators. Third, we assess the stationarity of the implemented panel data. Fourth, we evaluate the bearing of EFCs on economic growth in middle-income economies implementing a fixed effects model for panel data which permits us to examine the bearing of EFCs variables that shift over time on economic growth. In addition to control variables, PCA indexes extracted from EFCs are used as independent variables.

The fixed effects model employed in this analysis is given by

$$GDP_{it} = c_i + \beta_1 PC_{1it} + \beta_2 PC_{2it} + \ldots + \beta_k PC_{kit} + \beta_{k+1} UR_{(k+1)it} + \beta_{k+2} GC_{(k+2)it} + \varepsilon_{it},$$

where, for the i^{th} economy at time t, GDP_{it} is GDP per capita (logarithm), c_i represents the intercept, $\beta_1 \ldots \beta_{k+2}$ denote coefficients of regression, $PC_{1it} - PC_{kit}$ signify PCA indexes, $UR_{(k+1)it}$ is the unemployment rate, $GC_{(k+2)it}$ is the gross capital formation, and ε_{it} is the error term

4. RESULTS

Descriptive statistics for dependent and independent covariates adopted in this study are indicated in Table 2.

Table 2: Descriptive statistics

	Min.	Max.	Avg.	SD
loggdp	2.65	4.20	3.69	0.30
fin	2.48	6.82	4.19	0.72
govsup	2.27	6.32	4.13	0.75
tax	2.03	5.87	3.58	0.64
govpro	2.23	5.73	3.95	0.66
basch	0.94	5.13	3.20	0.52
postsch	2.90	6.25	4.75	0.63
rnd	2.42	5.53	3.68	0.55
compro	2.10	6.65	4.75	0.51
mktdyn	3.07	7.25	5.16	0.82
mktope	2.15	5.88	4.08	0.48
physerv	3.87	7.40	6.01	0.56
culsoc	3.37	7.63	4.82	0.61
unempl	0.25	33.56	8.18	6.15
grossc	10.85	46.66	24.22	7.77

Source: Authors' calculations.

Table 3 indicates the correlation coefficient matrix. From the correlation coefficient matrix, we observe high correlation coefficients between some of the indicators. Therefore, our model can be affected by multicollinearity. Thus, we use PCA to deal with the multicollinearity challenge.

Bearing in mind the correlation coefficients' magnitudes and statistical significances, we ascertain that there are statistically significant positive correlations between GDP per capita and 'entrepreneurial finance' and 'post-school entrepreneurial education and training', and statistically significant negative correlations between GDP per capita and 'taxes and bureaucracy', 'internal market openness', 'physical and service infrastructure' and 'gross capital formation'. Negative correlation coefficients show that as the values of the covariate rise, economic growth declines. On the other hand, positive correlation coefficients indicate that as the values of the covariates increase, economic growth surges up. The correlation coefficients for all other covariables (i.e., govsup (+), govpro (+), basch (+), rnd (+), compro (-), mktdyn (+), culsoc (-), and unempl (+)) are not statistically significant. Based on the correlation coefficients, we deduce that EFCs have a bearing on economic growth in middle-income countries. We employ PCA to obtain indexes from the adopted entrepreneurship variables to deal with the multicollinearity challenge in regression and to reduce the number of variables to avoid overfitting.

Table 3: Correlation matrix

	loggdp	fin	govsup	tax	govpro	basch	postsch	rnd	compro	mktdyn	mktope	physerv	culsoc	unempl	grossc
loggdp	1														
fin	0.114*	1													
govsup	0.003	0.059	1												
tax	-0.153**	-0.046	0.640**	1											
govpro	0.101	0.022	0.743**	0.596**	1										
basch	0.085	0.116*	0.468**	0.446**	0.516**	1									
postsch	0.153**	-0.029	0.191**	0.245**	0.488**	0.590**	1								
rnd	0.029	0.114*	0.686**	0.634**	0.778**	0.587**	0.395**	1							
compro	-0.068	-0.104	0.258**	0.379**	0.368**	0.514**	0.482**	0.461**	1						
mktdyn	0.082	0.157**	0.379**	0.346**	0.266**	0.095	-0.242**	0.478**	0.124*	1					
mktope	-0.203**	-0.115*	0.536**	0.614**	0.654**	0.562**	0.363**	0.648**	0.578**	0.237**	1				
physerv	-0.169**	-0.094	0.294**	0.548**	0.329**	0.182**	0.236**	0.418**	0.257**	0.323**	0.408**	1			
culsoc	-0.016	-0.015	0.433**	0.511**	0.653**	0.596**	0.660**	0.587**	0.440**	0.086	0.675**	0.438**	1		
unempl	0.045	0.016	0.002	-0.328**	-0.291**	-0.159**	-0.343**	-0.244**	-0.167**	-0.143**	-0.214**	-0.452**	-0.323**	1	
grossc	-0.148**	0.169**	0.286**	0.380**	0.134*	0.118*	-0.067	0.411**	-0.107*	0.439**	0.105*	0.323**	0.202**	-0.242**	1

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' calculations.

The adopted variable data must be stationary to avoid spurious regression results. We perform the unit root tests to assess whether the data is stationary or not. In this paper, we test the panel data stationarity using the ADF - Fisher Chi-square and Im, Pesaran and Shin panel unit root tests. In these tests, H_0 (the null hypothesis) asserts that there is a unit root. If the panel unit root tests are significant (i.e., $p \leq 0.05$), we discard H_0 and resolve that the panel data has no unit root. Outcomes of the conducted unit root tests (see Table 4) reject H_0 of the existence of the unit root. We conduct the unit root tests in level and with individual intercept term in each testing equation. We conclude that, at the 5% level, the data is stationary.

Table 4: Panel unit root tests

Variable	Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square	
	Statistic	Prob**	Statistic	Prob**
loggdp	-4.62930	0.0000	79.4531	0.0000
fin	-6.22944	0.0000	102.041	0.0000
govsup	-4.40967	0.0000	78.3028	0.0000
tax	-5.45890	0.0000	97.9725	0.0000
govpro	-4.50776	0.0000	75.4391	0.0001
basch	-5.36232	0.0000	90.5789	0.0000
postsch	-5.28513	0.0000	91.9090	0.0000
rnd	-5.33467	0.0000	88.0200	0.0000
compro	-6.46540	0.0000	107.562	0.0000
mktdyn	-4.26952	0.0000	74.9463	0.0001
mktope	-5.82113	0.0000	100.073	0.0000
physerv	-4.73510	0.0000	84.6310	0.0000
culsoc	-5.25358	0.0000	90.8301	0.0000
grossc	-2.74861	0.0030	57.5087	0.0071
unempl	-2.98450	0.0014	63.9431	0.0014

**Fisher test probabilities are computed by implementing an asymptotic Chi-square distribution. Nevertheless, all other tests assume asymptotic normality.
Source: Authors' calculations.

The principal components (and their respective eigenvalues) extricated from the adopted 12 EFCs using PCA are outlined in Table 5. As a standard, principal components associated with eigenvalues smaller than 1 are disregarded from the assessment, and those associated with eigenvalues greater than 1 are embraced for analysis (see Scholes, 2010; Kaiser, 1970). Hence, only three components, i.e., PC1, PC2 and PC3, have eigenvalues bigger than 1. These three indexes explain 70.24% of the variance as shown by the cumulative proportion. This percentage is greater than the 50% limit needed for a tolerable extraction (Stern, 2010).

Table 5: Variance explained

Component	Eigenvalues	Variance explained
PC1	5.617	46.806
PC2	1.652	60.569
PC3	1.160	70.239
PC4	0.795	76.862
PC5	0.750	83.113
PC6	0.473	87.053
PC7	0.411	90.478
PC8	0.382	93.661
PC9	0.258	95.809
PC10	0.226	97.692
PC11	0.156	98.988
PC12	0.121	100.000

Source: Authors' calculations.

Table 6 below presents the factor loadings, which indicate the correlations between the variables and the components (Matenda & Sibanda, 2023).

Table 6: Factor loadings

Variable	PC1	PC2	PC3
fin	0.006	0.251	0.851
govsup	0.740	0.342	0.111
tax	0.773	0.255	-0.202
govpro	0.847	0.056	0.110
basch	0.731	-0.290	0.307
postsch	0.582	-0.671	0.136
rnd	0.867	0.216	0.135
compro	0.620	-0.311	-0.110
mktdyn	0.354	0.770	-0.005
mktope	0.826	-0.048	-0.162
physerv	0.544	0.207	-0.448
culsoc	0.801	-0.294	0.005

Source: Authors' calculations.

On PC1, the most significant impact comes from 'research and development transfer', and the smallest influence comes from 'entrepreneurial finance.' All EFCs variables are positively related to PC1. Thus, economies with larger scores for EFCs indicators have a larger PC1 value. Considering PC2, the most significant effect originates from 'internal market dynamics', and the least influence emanates from 'internal market openness'. 'Cultural and social norms,'

'internal market openness,' 'commercial and professional infrastructure,' 'post-school entrepreneurial education and training', and 'basic school entrepreneurial education and training' are the only variables with a negative impact on PC2; the rest have a positive bearing. Hence, countries get greater PC2 scores when the values for 'cultural and social norms,' 'internal market openness,' 'commercial and professional infrastructure,' 'post-school entrepreneurial education and training', and 'basic school entrepreneurial education and training' are low, whereas those for 'entrepreneurial finance', 'government support and policies', 'tax and bureaucracy', 'government programmes', 'research development transfer', 'internal market dynamics' and 'physical and service infrastructure' are high.

Lastly, on PC3, the greatest effect comes from 'entrepreneurial finance', and the most negligible impact originates from 'internal market dynamics' and 'cultural and social norms.' 'Taxes and bureaucracy,' 'internal market openness,' 'commercial and professional infrastructure,' 'internal market dynamics,' and 'physical and service infrastructure' are the only indicators with an adverse influence on PC3; the rest have a positive bearing. Therefore, economies get higher PC3 scores when the values for 'taxes and bureaucracy,' 'internal market openness,' 'commercial and professional infrastructure,' 'internal market dynamics,' and 'physical and service infrastructure' are low, whereas the values for 'entrepreneurial finance', 'government support and policies', 'government programmes', 'basic school entrepreneurial education and training', 'post-school entrepreneurial education and training' and 'cultural and social norms' are high.

Table 7 presents regression results with 95% confidence. We regress EFCs indexes and control variables on the GDP per capita using a fixed effects model. To select the suitable model between a random effects model for panel data and a fixed effects model for panel data, we implement the Hausman test. Since the Hausman test p-value is 0.0001, which is less than 0.05, we adopt a fixed effects model.

Table 7: Regression results

Variable	Coefficient	Prob.
PC1	-0.003591	0.8665
PC2	0.080899	0.0040
PC3	-0.025348	0.0963
Unempl	-0.026459	0.0000
Grossc	0.009105	0.0182
C	3.688307	0.0000

Source: Authors' calculations.

Our results indicate that, in addition to unemployment rate and gross capital formation, EFCs represented by PC2 significantly impact the economic growth in middle-income countries. PC2 has a positive coefficient of regression. PC1 and PC3 have an insignificant negative influence on the economic growth in middle-income countries. The unemployment rate has an adverse influence and gross capital formation has a positive impact on economic growth in middle-income economies. Interestingly, the designed model has an adjusted R-squared, a measure of goodness of fit, of 61.80%. This implies the model can explain 61.80% of the GDP per capita variance. Consequently, the developed model can be deemed a good model.

The findings of this study indicate that EFCs have a significant positive bearing on economic growth in middle-income economies. Specifically, as the PC2 score surges up, GDP per capita rises up. Now we turn our focus on the configurations of PC2 to understand the dynamics of the influence of EFCs on economic growth in middle-income economies. Considering PC2, the most significant effect originates from 'internal market dynamics' (0.770), followed by 'post-school entrepreneurial education and training' (-0.671), 'government support and policies' (0.342), 'commercial and professional infrastructure' (-0.311), 'cultural and social norms' (-0.294), 'basic school entrepreneurial education and training' (-0.290), 'tax and bureaucracy' (0.255), 'entrepreneurial finance' (0.251), 'research development transfer' (0.216), 'physical and service infrastructure' (0.207), 'government programmes' (0.056), and 'internal market openness, (-0.048).

This suggests that 'entrepreneurial finance', 'government support and policies', 'tax and bureaucracy', 'government programmes', 'research development transfer', 'internal market dynamics' and 'physical and service infrastructure' have a positive bearing on economic growth in middle-income economies. Further, low levels of 'cultural and social norms,' 'internal market openness,' 'commercial and professional infrastructure,' 'post-school entrepreneurial education and training', and 'basic school entrepreneurial education and training' lead to greater levels of economic growth in middle-income economies.

Table 8 below provides a results summary with respect to the stated research hypotheses.

Table 8: Results summary

Research hypothesis	Supported?
H_1: 'Entrepreneurial finance' has a positive impact on the economic growth of middle-income economies.	Yes
H_2: 'Government support and policies' has a positive influence on the economic growth of middle-income economies.	Yes
H_3: 'Taxes and bureaucracy' has a negative influence on the economic growth of middle-income economies.	No
H_4: 'Government programmes' has a positive influence on the economic growth of middle-income economies.	Yes
H_5: 'Basic school entrepreneurial education and training' has a positive influence on the economic growth of middle-income economies.	No
H_6: 'Post-school entrepreneurial education and training' has a positive influence on the economic growth of middle-income economies.	No
H_7: 'Research and development transfer' has a positive influence on the economic growth of middle-income economies.	Yes
H_8: 'Commercial and professional infrastructure' has a positive influence on the economic growth of middle-income economies.	No
H_9: 'Internal market dynamics' has a positive influence on the economic growth of middle-income economies.	Yes
H_{10}: 'Internal market openness' has a positive influence on the economic growth of middle-income economies.	No
H_{11}: 'Physical and service infrastructure' has a positive influence on the economic growth of middle-income economies.	Yes
H_{12}: 'Cultural and social norms' has a positive influence on the economic growth of middle-income economies.	No

Source: Authors' compilation

5. DISCUSSIONS

Premised on the results discovered, 'entrepreneurial finance' positively impacts economic growth in middle-income economies. That is to say, in middle-income economies, 'entrepreneurial finance' promotes economic growth. In agreement with our finding, Gomes, Ferreira & Lopes (2023) and Gomes et al. (2022) revealed that 'entrepreneurial finance' positively influences economic growth in OECD countries, irrespective of their development stages. Dutta & Meierrieks (2021), Liu et al. (2021), Shaikh, Tunio & Qureshi (2021), and Brown & Earle (2017) are some of the authors that have indicated that funding has an affirmative action on entrepreneurship and ultimately, economic growth. Nonetheless, Pita, Costa & Moreira (2021) exposed that funding measures discourage entrepreneurial initiatives.

As in Gomes et al. (2022), we discovered that 'government programmes' positively influences economic growth. This is not surprising since government programmes promote intelligent cities' development, help transform industries to achieve sustainable goals, and encourage the innovative spirit of entrepreneurs (Kim et al., 2016; Martinez-Fierro, Biedma-Ferrer & Biedma-Ferrer, 2015; Acs & Amoros, 2008). Gomes, Ferreira & Lopes (2023) postulated that, in OECD economies, government programmes have an adverse influence in high-income countries and a positive influence in upper-middle-income countries.

Unexpectedly, we exposed that 'taxes and bureaucracy' and economic growth are positively associated. This may be due to the fact that taxes and bureaucracy can drive down the informal economy, and business regulations are vital in ensuring that the market economy functions suitably, thereby leading to economic growth. Our finding is supported by Gomes et al. (2022), Vatavu et al. (2021) and Khyareh, Khairandish & Torabi (2019). Gomes et al. (2022) articulated that 'taxes and bureaucracy' positively influences economic growth in innovation-driven economies. Gomes, Ferreira & Lopes (2023) discovered that 'taxes and bureaucracy' has a positive effect on economic growth in OECD economies; specifically, in high-income countries. However, Gomes et al. (2022) exposed that 'taxes and bureaucracy' adversely affects economic growth in transition-driven countries. Gomes, Ferreira & Lopes (2023) exposed that 'taxes and bureaucracy' has an adverse influence on economic growth in upper-middle-income countries. Matenda & Sibanda (2022), Aralica et al. (2018) and Domanska & Zajkowski (2018) are some of the authors who stated that there is an adverse connection between 'taxes and bureaucracy' and economic growth.

As in Vatavu et al. (2021), 'government support and policies' has a positive influence on economic growth. The reason being that governments can support corporates in different dimensions such as the provision of subsidies and consultancy services, which promote economic growth. In support of this, Gomes, Ferreira & Lopes (2023) postulated that government support, given through innovation-directed policies, can assist as an entrepreneurial actions driver. Innovation can promote the formation of novel businesses. However, Gomes et al. (2022) and Matenda & Sibanda (2022) exposed that 'government support and policies' negatively affects economic growth. Gomes, Ferreira & Lopes (2023) propounded that 'government support and policies' has an adverse effect on economic growth in OECD economies, irrespective of their development stages.

We expose that low levels of 'basic school entrepreneurial education and training' lead to high levels of economic growth. This is unsurprising since learners in several middle-income economies are trained to be job seekers rather than

entrepreneurs, which negatively impacts the degree of entrepreneurial pursuits (see, for instance, Matenda & Sibanda, 2022). In the same vein, Gomes et al. (2022) articulated that 'basic school entrepreneurial education and training' adversely influences the economic growth in OECD economies, regardless of their development stages. However, Gomes, Ferreira & Lopes (2023) opined that 'basic school entrepreneurial education and training' has a positive influence on economic growth in OECD economies, regardless of their income stages. In addition, we found that low levels of 'post-school entrepreneurial education and training' are related to high levels of economic growth in middle-income economies. This finding agrees with the findings of Gomes et al. (2022), Matenda & Sibanda (2022) and Lopes et al. (2021a). Matenda & Sibanda (2022) opined that qualified people are risk averse and this adversely affects the level of entrepreneurial pursuits, resulting in low levels of economic growth. However, our finding contradicts the finding of Lopes, Antunes & Rodrigues (2018). Gomes, Ferreira & Lopes (2023) stated that 'post school entrepreneurial education and training' has a positive impact on economic growth in OECD economies, regardless of their income stages.

The study results indicate that 'research and development transfer' positively influences economic growth in middle-income economies. In line with our findings, Gomes, Ferreira & Lopes (2023) exposed that research and development transfer has a positive influence on economic growth in OECD economies, regardless of their income stages. Gomes et al. (2022) discovered that 'research and development transfer' is positively related to economic growth in transition-driven economies and is adversely connected to economic growth in innovation-driven economies. Pita, Costa & Moreira (2021) exposed that research and development transfer discourage entrepreneurial initiatives.

In this study, it is discovered that low values of 'commercial and professional infrastructure' are related to high levels of economic growth. In support of this, Gomes et al. (2022) and Matenda & Sibanda (2022) exposed that 'commercial and professional infrastructure' is adversely related to economic growth. This result may be due to the fact that middle-income economies' commercial and professional infrastructure is not well organised and implemented to stimulate economic growth (see, for instance, Matenda & Sibanda, 2022). On the other hand, Gomes, Ferreira & Lopes (2023) discovered that 'commercial and professional infrastructures' has a positive association with economic growth in OECD economies, regardless of their income stages.

Results of this study indicate that 'internal market dynamics' is positively connected to economic growth in middle-income countries. That is to say,

internal market dynamics generate positive influences on economic growth in middle-income economies. In dynamic markets, new corporates can be formulated easily, leading to high economic growth levels. Under the same line of reasoning, Gomes et al. (2022), Matenda & Sibanda (2022), and Vatavu et al. (2021) propounded that 'internal market dynamics' is positively related to economic growth. Gomes, Ferreira & Lopes (2023) opined that 'internal market dynamics' has a positive influence on economic growth in OECD economies (regardless of their income stages) and, particularly, in high-income countries, whereas having an adverse impact in upper-middle-income economies.

In contradiction to Matenda & Sibanda (2022), we exposed that 'internal market openness' has a negative impact on economic growth. Several middle-income economies deregulated and opened their internal markets with the aim of promoting efficiency and increasing economic growth. However, as the internal markets become more open, competition among companies becomes stiffer. Tough competition may reduce the profitability levels of corporates, resulting in a slowdown in economic growth. Our finding is supported by Gomes et al. (2022), who indicated that internal market openness has an adverse influence on economic growth in OECD economies. Nevertheless, Gomes, Ferreira & Lopes (2023) propounded that 'internal market openness' has a positive influence on economic growth in OECD economies, regardless of their income levels. Further, the authors indicated that 'internal market openness' has a positive impact on economic growth in high-income countries and a negative effect on economic growth in upper-middle-income countries.

In this study, we exposed that 'physical and service infrastructure' is positively related to economic growth in middle-income countries. This implies that corporates in middle-income countries are making use of the existing infrastructure, thereby increasing the levels of economic growth. Gomes, Ferreira & Lopes (2023) stated that 'physical and service infrastructure' has a positive effect on economic growth in OECD economies regardless of their levels of income, although their influence is superior in upper-middle-income countries. Our finding contracts the findings of Matenda & Sibanda (2022) and Vatavu et al. (2021). Gomes et al. (2022) discovered that 'physical and service infrastructure' positively influences economic growth in innovation-driven economies and adversely influences economic growth in transition-driven countries.

As in Matenda & Sibanda (2022) and Vatavu et al. (2021), we discovered that 'cultural and social norms' negatively impacts economic growth. Matenda & Sibanda (2022) indicated that cultural and social norms adversely influence entrepreneurs' objectives of starting businesses, leading to a fall in entrepreneurship

pursuits and ultimately, a fall in economic growth. Pita, Costa & Moreira (2021) exposed that social and cultural norms discourage entrepreneurial initiatives. However, our finding is in contradiction with Gomes, Ferreira & Lopes (2023) and Gomes et al. (2022), who indicated that cultural and social norms have a positive influence on economic growth in OECD economies, irrespective of their development stages.

Finally, gross capital formation positively affects economic growth. This is not surprising since a high capital formation level results in an upsurge in productivity that encourages economic growth as propounded by the neoclassical synthesis (Onyinye, Idenyi & Ifeyinwa, 2017). Aslan & Altinoz (2021) and Ewubare & Ogbuagu (2015) are some of the authors who postulated that gross capital formation has a positive influence on economic growth. On the other hand, Stoica, Roman & Rusu (2020) articulated that gross capital formation has a significant, negative influence on economic growth. Ajose & Oyedokun (2018) discovered that there is an insignificant, adverse association between growth and capital formation. In line with the findings of Hjazeen, Seraj & Ozdeser (2021) and Stoica, Roman & Rusu (2020), unemployment rate has an adverse influence on economic growth in middle-income economies. That is to say, an upsurge in the unemployment rate results in a decline in economic growth. This is not surprising since a high unemployment rate is an indication that the economy is not using the labour resource efficiently.

6. CONCLUSIONS

This study implements correlation analysis and a fixed effects model to assess the influence of EFCs on economic growth in middle-income countries. The implemented panel data set for EFCs is unearthed from the GEM website and that for GDP per capita, a surrogate for economic growth, is extracted from the World Bank website over the observation period 2001 – 2021. We have discovered that there are statistically significant positive correlations between GDP per capita and 'entrepreneurial finance' and 'post-school entrepreneurial education and training', and statistically significant negative correlations between GDP per capita and 'taxes and bureaucracy', 'internal market openness' and 'physical and service infrastructure'. Moreover, we expose that EFCs positively, significantly impact economic growth in middle-income countries.

This article contributes to the discourse on the connection between economic growth and conditions for entrepreneurship in middle-income economies. The findings of this assessment are vital because the nonexistence of evidence

regarding the determinants of entrepreneurship in middle-income countries can result in the designing of flawed entrepreneurship policies. These study findings can be generalised to other middle-income economies. As a recommendation, policymakers should consider EFCs when developing policies to kindle economic growth in middle-income economies. Also, the study results could assist policymakers in selecting and applying suitable measures to eradicate the impediments in the businesses where entrepreneurs operate. Further, the results are crucial for developing the effectiveness and efficiency of entrepreneurial ecosystems.

Even though the study has produced fascinating results, it has some limitations. First, the study only considered the EFCs. For future research, the study can be extended by including entrepreneurial behaviour and attitudes in addition to EFCs to get more insights into the impact of entrepreneurship on economic growth in middle-income economies. Second, several adopted variables had missing data, which to some degree may adversely affect the integrity of the study sample. This study used mean imputation to deal with the challenge of missing data. Sophisticated data imputation approaches can be applied in future to enhance the predictive ability of the designed models. Third, only fixed effects regression had been used to assess the connection between entrepreneurship and economic growth. Hence, more advanced techniques can be implemented to improve the forecasting capabilities of the models. Fourth, downturn conditions such as the COVID-19 pandemic and the Great Depression were not considered in this assessment. The influence of entrepreneurship on economic growth under downturn conditions is a challenge that needs to be assessed.

Conflict of interests

The authors declare there is no conflict of interest.

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ПРЕДУЗЕТНИЧКИ ОКВИРНИ УСЛОВИ И ЕКОНОМСКИ РАСТ: УВИД ИЗ ЕКОНОМИЈА СРЕДЊЕГ НИВОА ДОХОТКА

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САЖЕТАК

Овај чланак имплементира анализу корелације и модел фиксних ефеката за процјену утицаја предузетничких оквирних услова на економски раст у земљама са средњим нивоом дохотка. Примијењени скуп података панела за предузетничке оквирне услове је извучен са веб-странице Global Entrepreneurship Monitor, а за бруто домаћи производ (БДП) по глави становника, сурогат за економски раст, са веб-странице Свјетске банке током периода посматрања од 2001. до 2021. године. Утврђено је да постоје статистички значајне позитивне корелације између БДП-а по глави становника и „предузетничких финансија“ и „послијешколског предузетничког образовања и обуке“, те статистички значајне негативне корелације између БДП-а по глави становника и „пореза и бирократије“, „интерне тржишне отворености“ и „физичке и услужне инфраструктуре“. Штавише, откривено је да предузетнички оквирни услови позитивно и значајно утичу на економски раст у земљама са средњим нивоом дохотка.

Овај чланак доприноси дискурсу о повезаности економског раста и услова за предузетништво у привредама са средњим нивоом дохотка. Као препоруку, креатори политике треба да размотре предузетничке оквирне услове када развијају политике за подстицање економског раста у привредама са средњим нивоом дохотка. Надаље, резултати студије би могли да помогну креаторима политике у одабиру и примјени одговарајућих мјера за отклањање препрека у предузећима у којима предузетници послују.

Кључне ријечи: *предузетништво, економски раст, предузетнички оквирни услови, економије са средњим нивоом дохотка, корелациона анализа, модел фиксних ефеката.*

TRADE OPENNESS AND POVERTY REDUCTION IN SOUTH AFRICA

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ABSTRACT

The study examined the impact of trade openness on poverty rate in South Africa. The ARDL bounds testing approach was used with annual data covering the period from 1990 to 2021. The study estimated four models, that is, an income-based model and a consumption-based model using two measures of trade openness which are total trade and exports as a percentage of GDP. For the income-based model 1, the findings confirmed that trade openness has a long-run negative impact on the poverty rate, while it has no significant impact in the short run. For model 3, it was found to be insignificant in the long run while in the short run, it was found that exports lead to a decrease in poverty rates. The finding confirmed that for the consumption-based model 2, trade openness leads to a decrease in the poverty rate in the long and short run. For model 4, in which exports are used as a measure for trade openness, it was found that it leads to a decrease in household consumption in the long run. Based on the results the study recommends that governments in developing countries should engage with other countries to increase their export capacity and in turn reduce their respective poverty levels.

1. INTRODUCTION

For developing countries, trade openness is important, as it gives them access to markets, technology, goods, services, as well as capital. However, the level of poverty in Africa, including South Africa, remains a cause for concern. In South Africa, the government has introduced initiatives to reduce poverty since 1994 through policies such as the Reconstruction and Development Programmean (RDP). Nevertheless, the number of people living in poverty has been on the

rise. In 2015, just about half of the adult population, which is 49.2%, were found to be living below the upper-bound poverty line (StatsSA, 2019). Therefore, the government aims to reduce poverty by 2030 through the National Development Plan (NDP).

The effect of trade openness on poverty reduction has attracted numerous studies in recent years. However, there is no clear consensus on the nature of the relationship between the two variables. Previous studies on trade openness and poverty have found support for trade openness to have a positive effect on poverty reduction (Ezzat, 2018; Anetor, Esho & Verhoef, 2020; Mbah et al. 2022). On the other hand, studies such as Onakoya Johnson & Ogundajo (2019) and Fauzel (2022), among others have found trade openness to have a negative impact on poverty.

In South Africa, several studies have examined the impact of trade openness on various economic variables, for example, Malefane & Odhiambo (2018), Udeagha, & Ngepah (2021) on economic growth, and Maluleke (2020) on government expenditure. However, very few studies have looked at the impact of trade openness on the poverty rate (see: Mabugu & Chitiga, 2007; Onakoya Johnson & Ogundajo, 2019; Gonese et al., 2023). Most of the studies in South Africa have used panel data, which may not satisfactorily address the country-specific issues as the countries included are at different stages of development and have different policies in place. Our study differs from these studies in that it employs a different estimation technique, which is the Autoregressive Distributive Lag (ARDL) method. In addition, their studies used one proxy for poverty, while the current uses two proxies, that is, a consumption-based proxy and an income-based proxy in a single-country study. In addition, the study also uses two measures of trade openness which are total trade (imports plus exports) and exports as a percentage of GDP.

In light of the aforementioned, the study aims to examine the effect of trade openness on poverty reduction in South Africa covering the period from 1990 to 2021 using the ARDL methodology. The study contributes to the existing literature by focusing on two aspects of poverty, that is income-based poverty and consumption-based poverty. By using more than one measure of poverty, it provides policymakers with a broad overview of how the openness of an economy affects poverty. Examining the impact of trade openness on poverty reduction is important for South Africa, as it is the objective of the government to eliminate poverty by 2030 as stated in its National Development Plan. Over the years, the country has developed policies with the aim of alleviating poverty and opening the economy. As South Africa is a relatively open economy with a trade

to GDP ratio of 56% (World Bank, 2021), the study aims to establish whether the openness of the economy has a significant impact on poverty in South Africa.

The remaining sections of the study are organised as follows: Section 2 presents the trends of openness and poverty in South Africa. The literature that focuses on the relationship between trade openness and poverty is presented in Section 3. Section 4 presents the empirical models, data sources as well as the estimation techniques. Section 5 provides the empirical analysis, while the last section provides a summary of the study and recommendations.

2. OVERVIEW OF TRADE OPENNESS AND POVERTY IN SOUTH AFRICA

Trade openness remains a critical component of South Africa's economic performance. Its prominence and contribution can be seen through the increase in the trade of goods and services as a percentage of the gross domestic product. This has almost doubled since the country's advent to democracy in 1994. The contribution of trade to economic growth increased from 37.1% in 1994 to 56.2% in 2021 (World Bank, 2021). This has, *inter alia*, been accelerated by the increase in the number of trade agreements that the country entered into over the years and the commitment to trade policy reforms. According to Malefane and Odhiambo (2017), trade liberalisation process in South Africa commenced in the early 1990s and involved the removal of import surcharges and the introduction of promotion policies that encouraged both imports and exports. Since then, the country has pursued a number of trade policy reforms and signed several regional, bilateral, and multilateral trade agreements with various countries and regions. This includes, *inter alia,* the SADC protocol, SA-EU Trade, Development and Co-operation Agreement, Preferential Trade Agreement between MERCOSUR and SACU, EFTA-SACU agreement, SADC-EAC-COMESA Tripartite Free Trade Area, SACU and MERCOSUR preferential agreement, EU-SADC Economic Partnership Agreement and SACU-Mozambique EPA (Vacu, 2019; Stern & Ramkolowan, 2021). The country has also become a member of the World Trade Organization (WTO).

Trade policy reforms in South Africa are part of the government's broader strategy to fast-track economic growth in a manner that addresses the socio-economic issues faced by the country's society, such as unemployment, poverty and inequalities, among other factors (Department of Trade, Industry and Competition, 2021). Furthermore, the theoretical literature also confirms that trade openness should reduce poverty as it leads to higher labour prices (Goff

& Singh, 2014). Figure 1 below presents the trends on trade openness and the percentage of people living below the poverty line in South Africa.

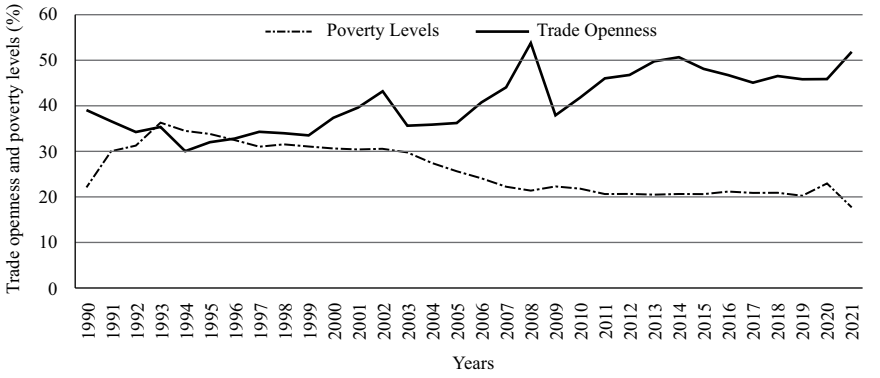

Figure 1: Trade Openness and Poverty Rate in South Africa (1990-2021)
Source: Authors' computation using data from World Bank (2021) and Quantec Easy Data (2021)

Although the South African government has made strides in reforming trade policies and integrating the country's economy into the global environment, poverty alleviation seems to have been moving at a very slow pace. As shown in Figure 1 above, there has been a significant increase in trade openness over the past 16 years, from 39% in 1990 to 52% in 2021. However, poverty levels have remained stubborn, at an annual average of 26%. The number of people living in extreme poverty or food poverty line1 increased from 22% in 1990 to 36% in 1993. In 1994, this started declining to 35% and further declined to 18% in 2021. Over this period, trade openness increased at an average annual rate of 1.4%, while poverty levels declined at an annual average annual rate of 0.3% (see World Bank 2021; Quantec Easy Data, 2021).

3. LITERATURE REVIEW

Over the years, the literature has shown that the effect of trade openness on poverty levels is mixed and inconclusive. There have been three outcomes, namely positive, negative and no impact. The empirical evidence indicates that the effect of trade openness on poverty differs from developed to developing countries. Using the GMM technique and dynamic panel data for Middle East and North Africa (MENA) countries for the period from 1995 to 2015, Ezzat (2018) examined the effect of trade openness on poverty intensity and

1 The amount of money that an individual will need to afford the minimum required daily energy intake (StatsSA, 2021)

multidimensional poverty. The findings from the study established that trade openness has a positive effect on both poverty severity and multidimensional poverty. Anetor, Esho & Verhoef (2020) examined how FDI, trade, and foreign aid affects poverty reduction using the Feasible Generalized Least Square (FGLS) methodology for 29 countries in sub-Saharan Africa for the period from 1990 to 2017. The study found that trade has a positive and significant impact on poverty reduction, especially in low-income countries. Mbah et al. (2022) studied the link between trade openness and the poverty rate in Nigeria. The study used the ARDL technique and quarterly data from 1986Q1 to 2019Q4. The results indicate that in the long- and short-run, trade openness has a positive and significant effect on the poverty rate in Nigeria.

Gnangnon (2019) examined the effect of multilateral trade liberalisation on poverty in developing countries. The study found that multilateral trade liberalisation is conducive to reducing poverty. In a study on 21 African countries, Onakoya, Johnson & Ogundajo (2019) examined the link between trade liberalisation and poverty using data for the period from 2005 to 2014. The findings of the study revealed that trade openness has a negative and significant relationship with the poverty rate. In Mauritius, Fauzel (2022) explored how trade affects poverty reduction for the period from 1990 to 2017. The study used the vector error correction model and found that in the long-run trade reduces poverty.

In Indonesia, Agusalim (2017) studied the dynamic effect of trade liberalisation on the poverty of Indonesians for the period from 1978 to 2015 using the vector error correction mechanism (VECM). The study revealed that trade liberalisation insignificantly impacted poverty in the short run while in the long run, it was found to lead to a reduction in poverty. Yameogo and Omojolaibi (2021) investigated the relationship between trade openness, economic growth and poverty level from 1990 to 2017 in 40 countries in sub-Saharan Africa using the Panel Autoregressive Distributed Lag and the System of Generalised Method of Moment Technique. The findings from the study revealed that trade openness has adverse effects on poverty in the short run while it has a positive effect in the long run.

In a study for developing countries, Santos-Paulino (2017) investigated the effect of trade specialisation on poverty. The study found that in low-income countries, manufacturing exports contribute to poverty reduction. On the other hand, agricultural exports were found to have a more significant effect on poverty. The findings further confirm that trade specialisation led to poverty reduction; however, this is only under specific trade specialisation patterns and policy conditions.

In another study on sub-Saharan African countries, Sunge, Kumbula & Makamba (2021) explored the link between trade and poverty by disaggregating trade by sources. Using data from 2003 to 2017 and the GMM estimation technique, the study found that the positive influence of trade openness on poverty varies depending on the source of trade. Trade within SSA and from MENA countries were found to offer more gains while poverty gains from trade were found to be reinforced with improved institutional quality. The study recommended the promotion of intra-Africa trade and trade with MENA countries to accelerate poverty gains from trade openness.

The reviewed studies have shown that the empirical evidence on the impact of trade openness on poverty reduction is inconclusive. This can be due to the sample period, specific countries and the estimation methods used.

4. MATERIALS AND METHODS

4.1 Model Specification and Definition of Variables

The study examines the impact of trade openness on poverty levels in South Africa over the period from 1990 to 2021. The study followed the model used in Mbah et al (2022), which specified poverty as a function of trade openness, total output, inflation rate, and institutional quality. Due to data availability issues in the case of South Africa, the model is modified to exclude the corruption perception index variable used as a proxy for institutional quality. Following Goff and Singh (2014) and Yameogo and Omojolaibi (2021), the model is further modified to include financial development and labour force, respectively. Unlike previous studies, the study estimated four models, that is, an income-based poverty model (Model 1) and a consumption-based poverty model (Model 2). In the income-based poverty model (POV1), poverty is measured through the number of people living below the poverty line, while it is measured through household consumption in the consumption-based model (POV2). The same Models 1 and 2 are also estimated in Models 3 and 4, however, in this case, trade openness is measured through exports as a share of economic growth. The use of exports as a proxy is meant to determine whether exports as a single factor would have a significant impact on poverty levels in South Africa as it has the potential to drive employment and income levels. The models are specified as follows:

Model 1: Income-based poverty model

$$POV1 = f(TOP, GDP, FD, INFR, LF) \quad \text{.....(1)}$$

$$POV1 = \alpha_0 + \alpha_1 TOP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(2)}$$

Model 2: Consumption-based poverty model

$$POV2 = f\left(TOP, GDP, FD, INFR, LF\right) \quad \text{.....(3)}$$

$$POV2 = \alpha_0 + \alpha_1 TOP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(4)}$$

Model 3: Income-based poverty model with exports as a proxy for trade openness

$$POV1 = f\left(EXP, GDP, FD, INFR, LF\right) \quad \text{.....(5)}$$

$$POV1 = \alpha_0 + \alpha_1 EXP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(6)}$$

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

$$POV2 = f\left(EXP, GDP, FD, INFR, LF\right) \quad \text{.....(7)}$$

$$POV2 = \alpha_0 + \alpha_1 EXP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(8)}$$

The variables are converted to logarithms to obtain elasticity coefficients on these variables and minimise the impact of outliers. Therefore, equations of the four models are specified as follows:

Model 1: $lPOV1 = \alpha_0 + \alpha_1 lTOP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ .....(9)

Model 2: $lPOV2 = \alpha_0 + \alpha_1 lTOP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ ...(10)

Model 3: $lPOV1 = \alpha_0 + \alpha_1 lEXP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ ...(11)

Model 4: $lPOV2 = \alpha_0 + \alpha_1 lEXP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ ...(12)

Where POV1 is the income-based poverty level, POV2 is the consumption-based poverty level, TOP is trade openness, EXP is exports, GDP is the gross domestic product, FD is the financial development, INFR is the inflation rate, LF is the labour force and εt is the white noise error term. Table 1 provides a description of the variables used and sources of data.

Table 1: Description of Variables and data sources

Variable	Description and a priori expectation	Data source
POV1	POV1 represents the income-based poverty rate. This variable is measured through the number of people living below the income poverty line as a share of the total population. The income poverty line is defined as the extreme poverty line plus the average amount derived from non-food items of households whose total expenditure is equal to the food poverty line (StatsSA, 2021). This study used the poverty headcount index (percentage of population) as a proxy for poverty rate. The use of this study is supported in studies such as Yameogo & Omojolaibi (2021); Gnangnon (2019).	Quantec EasyData
POV2	POV2 represents the consumption-based poverty rate and is measured by the household consumption per capita in this study. The variable has been used as a proxy for poverty by other studies such as Magombeyi & Odhiambo (2018), Maluleke (2018) and Togo (2020). This variable is viewed to be a good proxy for poverty levels as an increase in trade openness is expected to lead to a rise household consumption through the expansion of labour or the export channel (Vo & Nguyen, 2021).	World Bank database
TOP	Trade openness is measured as the sum of imports and exports as a share of GDP. This variable is expected to have a negative impact on poverty levels and has been used in previous studies such as (Togo, 2020)	Quantec EasyData
EXP	Exports are measured as the total of goods and services exported to other countries in the world as a share of GDP. This variable is expected to have a negative impact on the poverty rate as it is associated in increased employment and income levels.	Quantec EasyData
GDP	Gross domestic product per capita is used as a measure of total output. The variable is used to capture economic development and is expected to have a positive impact on the poverty rate. It has been used in other studies such as Goff & Singh (2014) and Onakoya, Johnson & Ogundajo (2019), among others.	World Bank database
INFR	The inflation rate is used to measure macroeconomic stability (Gnangnon, 2019). In this study, inflation as measured by the consumer price index. The variable is expected to lead to an increase in the poverty rate as it leads to a decline in the purchasing power of a household.	Quantec EasyData
FD	Financial development is a measure of financial deepening, which provides a perspective into a country's performance in terms of access to financial services. This variable is measured by domestic credit provided by the financial sector as a percentage of GDP. The variable is expected to have a negative effect on the poverty rate. This variable is supported by literature, as it has been used in studies such as Goff & Singh (2014).	South African Reserve Bank
LF	Labour force is measured as the total number of employed persons and unemployed persons that are actively seeking employment. This variable is used to capture the county's population of working age. The use of this variable is supported by literature and has been used in studies such as Yameogo & Omojolaibi (2021). It is expected to lead to a decline in poverty levels.	World Bank database and the South African Reserve Bank

4.2 Estimation Techniques

To examine the impact of trade openness on poverty levels in South Africa, the study uses the ARDL technique developed by Pesaran, Shin & Smith (2001). The ARDL approach requires that the estimated variables should not be integrated of I(2). To ascertain this, it is important to first test for unit root (see Presaran et al, 2001). Furthermore, testing for unit root is important because time series data is known for unit root problems, which may lead to spurious results (Mbah et al., 2022). The Dickey-Fuller Generalised Square (DF-GLS) and Phillips-Perron (PP) tests are used to test stationarity in this study. After confirming stationarity, the next step is to determine the long-run relationship. To test the long-run relationship between trade openness and poverty, the study employs the ARDL method. This method is preferred over other econometric cointegration methods because of its numerous advantages. Firstly, it can be used even if the variables are integrated with a mix of I(0) and I(1) (Pesaran, Shin & Smith, 2001). Secondly, the model can be applied regardless of the sample size and on variables that have different optimal lags. The ARDL model for both models 1 and 2 are specified as follows:

Model 1: Income-based poverty model

$$\begin{aligned} LPOV1_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV1_{t-1} + \alpha_2 LTOP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} + \alpha_5 LLF_{t-1} \\ & + \alpha_6 LGDP_{t-1} + \mu_{1t} \end{aligned} \quad ..(13)$$

Model 2: Consumption-based poverty model

$$\begin{aligned} LPOV2_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV2_{t-1} + \alpha_2 LTOP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} \\ & + \alpha_5 LLF_{t-1} + \alpha_6 LGDP_{t-1} + \mu_1 t \end{aligned} \quad .(14)$$

Model 3: Income-based poverty model with exports as a proxy for trade openness

$$\begin{aligned} LPOV1_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV1_{t-1} + \alpha_2 LEXP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} + \alpha_5 LLF_{t-1} \\ & + \alpha_6 LGDP_{t-1} + \mu_{1t} \end{aligned} \quad ..(15)$$

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

$$\begin{aligned} \Delta LPOV2_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV2_{t-1} + \alpha_2 LEXP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} + \alpha_5 LLF_{t-1} \\ & + \alpha_6 LGDP_{t-1} + \mu_{1t} \end{aligned} \quad .(16)$$

Where Δ is the first difference, L is the logarithm, where: Δ is the first difference, L is the logarithm, u_t is the white noise error term, Ω_0 is a constant, $\Omega_1 - \Omega_6$ are the coefficients of the long-run ARDL model, and $\alpha_1 - \alpha_6$, are short-run coefficients.

After confirmation on the cointegration relationship, the next stage of the ARDL procedure involves the estimation of the short-run relationships. The short-run coefficients will be obtained by estimating error-correction model (ECM) associated with long-run estimates. The error correction models in this study are specified as follows:

Model 1: Income-based poverty model

$$\begin{aligned} \Delta LPOV1_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \pi_1 ECM_{t-1} + u_t \end{aligned} \quad .(17)$$

Model 2: Consumption-based poverty model

$$\Delta LPOV2_t = \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} + \pi_1 ECM_{t-1} + u_t \quad (18)$$

Model 3: Income-based poverty model with exports as a proxy for trade openness

$$\Delta LPOV1_t = \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} + \pi_1 ECM_{t-1} + u_t \quad ..(19)$$

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

$$\Delta LPOV2_t = \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} + \pi_1 ECM_{t-1} + u_t \quad .(20)$$

5. RESULTS

5.1 Descriptive statistics

The results for the study are discussed in this section. The descriptive statistics results show that POV1 (income-based poverty rate) has a maximum and minimum values of 36.243 and 17.830 respectively and has a mean value of 25.919. POV2 (consumption-based poverty rate) has a mean of 167.724 and a standard deviation of 47.849. It also has a higher value of minimum and maximum when compared to POV2, which are 100.831 and 235.033, respectively. The descriptive statistics of the data are presented in Table 2.

Table 2: Descriptive statistics

	FD	GDP	INFR	LF	TOP	POV1	POV2	EXP
Mean	61.74	5285.380	6.848	19960313	40.960	25.919	3312.235	21.254
Median	64.158	5705.899	5.8315	20205324	40.230	23.517	3452.896	22.855
Maximum	75.886	8799.477	15.153	24142656	53.659	36.243	4067.991	29.333
Minimum	47.777	126.027	1.387	15502719	30.291	17.830	2414.485	16.155
Std. Dev.	8.514	1953.706	3.237	2678934	6.469	5.387	616.819	3.336
Skewness	-0.128	-0.341	1.098	-0.103	0.197	0.317	-0.159	0.089
Kurtosis	9.006	2.746019	3.787	1.824516	1.853	1.592	1.330	2.265

Source: Authors' compilation

5.2 Unit Root Test

The stationarity tests results show that none of the variables used in the study are integrated of order of more than I (1), and this allows for the use of the ARDL model. The stationarity test results are presented on Table 3.

Table 3: Unit Root Test

DF-GLS Test					
Variable	**Levels**		**First Difference**		**Stationarity**
	Without Trend	With Trend	Without Trend	With Trend	
POV1	-0.721	-5.460***	-6.144***	-6.100***	I(1)
TOP	-1.609	-4.259**	-7.073***	-7.001***	I(1)
GDP	-2.800*	-2.157	-4.045***	-3.924***	I(1)
INFR	-3.585**	-3.949	-5.377***	-5.771***	I(1)
LF	-0.980	-2.491	-6.286***	-6.268***	I(1)
FD	-1.286	-1.565	-4.251***	-4.199***	I(1)
POV2	-0.024	-1.386	-4.074***	-4.167***	I(1)
EXP	-1.758	3.143	-6.336*	-6.762*	I(1)
PP Test					
Variables	**Levels**		**First Difference**		
	Without Trend	With Trend	Without Trend	With Trend	
POV1	-0.9594	-4.915***	-6.357***	-6.219***	I(1)
TOP	-1.379	-4.316**	-13.380***	-15.280***	I(1)
GDP	-2.756*	-3.015	-6.173***	-6.173***	I(1)
INFR	-3.157**	-2.827	-5.527***	-8.587***	I(1)
LF	-0.997	-2.491	-6.283***	-6.265***	I(1)
FD	-1.286	-1.760	-4.238***	-4.221**	I(1)
POV2	-0.897	-2.044	-3.537**	-3.322**	I(1)
EXP	-0.680	-1.546	-4.263***	-4.218**	I(1)

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.
Source: Authors' compilation

5.3 Cointegration Test

Having confirmed that all the variables are integrated of order one I(1), the next step is to examine the long-run and short run relationship between the dependent variable and the explanatory variables using the ARDL bounds test. To test this, the F-statistics for Models 1 and 2 are first computed. The results are then compared to the two asymptotic critical values provided by Pesaran, Shin & Smith (2001). The results for the F-statistics for the two models are presented in Table 4 below.

Table 4: Cointegration Results

	Dependent Variable	Function	F-Statistic	Cointegration Status
Model 1	POV1	F(POV1/TOP, GDP,FD,INFR,LF)	19.172***	Cointegrated
Model 2	POV2	F(POV2/TOP, GDP,FD,INFR,LF)	8.732***	Cointegrated
Model 3	POV1	F(POV1/EXP, GDP,FD,INFR,LF)	15.783***	Cointegrated
Model 4	POV2	F(POV2/EXP, GDP,FD,INFR,LF)	10.866***	Cointegrated

Asymptotic Critical Values						
	1%		5%		10%	
Critical Values	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
	3.410	4.680	2.620	3.790	2.260	3.350

Note: *** denotes statistical significance level 1%
Source: Authors' compilation

The results presented in Table 4 show that a cointegration exists between the dependent variable and the explanatory variables. The F-statistics for Models 1, 2, 3 and 4 are 19.172, 8.732, 15.783 and 10.866, respectively. Given that the variables are cointegrated, the study proceeds to estimate the long-run and short-run relationships. The results for the long-run coefficients are presented in Table 5.

Table 5: Long-Run Results

Panel A: Long- Run Results				
Regressor	**Model 1**	**Model 2**	**Model 3**	**Model 4**
LTOP	-0.136 [-2.244]*	0.177 [0.2601]**	_	_
LEXP	_	_	0.054[0.493]	-0.161 [-3.413]***
LGDP	-0.252 [-10.060]***	0.184 [7.152]***	-0.284[8.004]***	-0.082 [-3.505]***
LINFR	0.022 [1.160]	-0.014 [-0.872]	0.0001[0.008]	0.660 [7.942]***
LLF	-0.411 [-3.828]***	0.624 [5.748]***	-0.634[-4.238]***	0.260 [3.083]***
LFD	-0.421 [-4.454]***	0.169 [1.742]*	-0.338[-2.651]**	0.203 [10.151]***
C	14.264[12.202]***	-3.941 [-8.030]***	17.545[11.153]***	-4.596 [-9.727]***

Note: *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.
Source: Authors' compilation

As shown in Table 5, the findings for Model 1 confirm a negative long-run impact of trade openness on poverty rate in the long run. The long-run coefficients of this variable suggest that 1% increase in trade openness leads to 0.14 % decrease in poverty rate in South Africa. The negative long-run relationship between the two variables is expected as trade openness is likely to boost exports and in turn lead to an increase in income levels (Mohsen, 2015; Gnangnon, 2019; Tsai & Huang, 2007). The findings also confirmed that total output, labour force and financial development have a negative long-run impact on poverty rate. The long-run coefficients confirmed that 1% increase in each of these variables leads to 0.25%, 0.41% and 0.42% decrease in poverty levels, respectively. Inflation rate is also found to have no significant effect on the poverty rate. The findings are consistent with the results from Togo (2020) and Onakoya, Johnson & Ogundajo (2019).

For Model 2, the long-run results confirmed that trade openness has a positive and significant impact on the poverty rate when the household consumption proxy is used. The long-run coefficients of this variable suggest that 1% increase in trade openness leads to 1.77% increase in household consumption (decline in poverty rate). The positive link between household consumption and trade openness is consistent with theory. The long-run results also confirm that total output, labour force and financial development positively affect household consumption. The coefficients of these variables suggest that 1% increase in GDP, labour force and financial development leads to 1.84%, 6.24% and 1.69% increase in household consumption (decrease in poverty levels), respectively. Inflation rate has no significant effect on poverty rate when household consumption is employed as a proxy. The results for the short-run coefficients are presented in Table 5.

For Model 3, the results confirm that trade openness has no significant long-run impact on poverty levels when exports as a share of economic growth are used as a proxy for openness. In terms of control variables, the findings confirm that economic growth, labour force and financial development have a negative impact on poverty rate. The coefficients of these variables confirm that 1% increase in each lead to 0.28%, 0.63% and 0.33% decline in poverty levels. These findings are in line with the theoretical expectations. Inflation rate is also found to have no long-run significant impact on poverty levels under Model 3. The long-run findings for Model 4 also confirm that when export as a share of economic growth is used as a proxy, trade openness has a negative significant impact on household consumption. This suggests that an increase in exports will lead to a decline in household consumption. For control variables, the results confirm a positive impact of both labour force, inflation and financial development, on household consumption, which implies that these variables lead to a decline in

poverty levels. The long-run coefficients for economic growth confirm that 1% increase in poverty rate leads to a decrease in household consumption.

Table 6: Short-Run Results

	Model 1	Model 2	Model 3	Model 4
DLPOV(-1)	-0.325 [5.074]***	0.358 [2.947]***	-0.384 [-5.343]	_
DLTOP	0.001 [0.030]	0.132 [2.534]**	_	_
DLEXP	_		-0.091[-2.379]**	-0.032 [-1.600]
DLEXP(-1)			-0.069[1.727]*	-0.051 [-2.406]**
DLGDP	-0.221 [-7.194]***	0.137 [5.656]***	-0.234[-6.739]*	0.081 [4.597]***
DLGDP(-1)	0.116 [3.218]***		0.113[2.945]***	_
DLINFR	-0.006 [-5.611]	-0.010 [-0.911]	0.0001[0.008]	0.015 [2.496]**
DLINFR(-1)	_			0.072 [8.252]***
DLINFR(-2)	_			0.048 [6.109]***
DLLF	-1.025 [-5.611]***	0.465 [3.919]***	-1.258[-6.176] ***	0.959 [9.124]***
DLLF(-1)				0.154 [1.481]
DLFD	-0.075 [-0.882]***	-0.010 [-0.137]	0.005[-0.050]	-0.146 [-3.341]***
DLFD(-1)				-0.548 [-7.018]***
DLFD(-2)			_	-0.227 [-4.464]***
ECM(-1)	-0.616 [-10.912]***	-0.745 [-8.054]***	-1.080[-11.148]***	-0.893 [-9.738]***
R-Squared	0.930	0.740	0.924	0.952
DW-statistic	1.823	1.821	2.034	2.857
F-Statistics	41.902 [0.000]	24.686 [0.000]	31.772[0.000]	34.324[0.000]
Serial Correlation	0.438[0.653]	1.088 [0.357]	0.278 [0.761]	3.743[0.067]
Normality	0.799[0.671]	1.452 [0.484]	1.481 [0.477]	1.230 [0.541]
Heteroscedasticity	1.654[0.438]	1.723 [0.151]	0.658 [0.774]	1.883[0.144]

Note: *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.
Source: Authors' compilation

The findings presented in Table 6 confirm that for Model 1, trade openness has no significant short-run effect on the poverty rate. The findings also confirmed that total output, labour force and financial development have a negative significant impact on the poverty rate, in the short run. In the short run, coefficients confirmed that 1% increase in total output, labour force and financial development leads to 0.23%, 1.02% and 0.07% decline in poverty levels, respectively. The findings also confirmed that the poverty rate is also negatively affected by its lagged values and the lagged values of the total output, suggesting that 1% increase in the lagged values of poverty levels and total output leads to 0.33% and 0.12% decrease in poverty levels. Signs of the coefficients of these variables are in line with theory and are supported by the results in studies such as Yameogo & Omojolaibi (2021) and Onakoya, Johnson & Ogundajo (2019). The inflation rate is also found to have no significant impact on poverty in the short run. The

findings are consistent with the results from Togo (2020) and Onakoya, Johnson & Ogundajo (2019).

The short-run results for Model 2 confirm that trade openness has a positive impact on the poverty rate when household consumption is used as a proxy. The short-run coefficients of this variable suggest that 1% increase in trade openness leads to 0.132% increase in household consumption (decrease in poverty rate). The short-run results further show that total output and labour force have a positive effect on household consumption (negative effect on poverty). This is consistent with the theory. The inflation rate and financial development are found to have a negative impact on household consumption.

The short-run results for Model 3 confirm that trade openness has a negative short-run impact on the poverty rate when export as a share of economic growth is used as a proxy of trade openness. The coefficient of trade openness in Model 3 suggests that 1% increase in this variable leads to 0.09% decrease in poverty levels. For Model 4, the results show that export has a statistically insignificant effect on household consumption. The findings further confirm that 1% increase in trade openness in the previous period leads to 0.05% decrease in consumer households (increase in poverty rate). In terms of control variables under Model 3, the findings confirm that labour force and economic growth have a negative impact on poverty levels. The coefficients of these variables suggest that 1% increase in each of them leads to 1.25% and 0.23% decline in poverty, respectively. The coefficients of these variables carry the theoretically expected signs. Inflation rate and financial development are found to have no significant impact on poverty levels under Model 3. For Model 4, total output, inflation and inflation are found to have a positive impact while financial development has a negative effect on household consumption in South Africa.

In all Models 1-4, the error correction terms are negative and statistically significant at 1% level of significance. This confirms that there is a long-run relationship between poverty and the explanatory variables. To further confirm the reliability of the ARDL results, diagnostic tests were conducted, and the results are presented in Table 4 above. The result of the normality test shows that the estimates are normally distributed. The diagnostic tests also show that there is no serial correlation in the model and that it passes the heteroscedasticity test. The Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) results confirm that the estimated models are stable. The CUSUMSQ and CUSUM tests are presented in Figure 2.

Model 1: Income-based poverty model

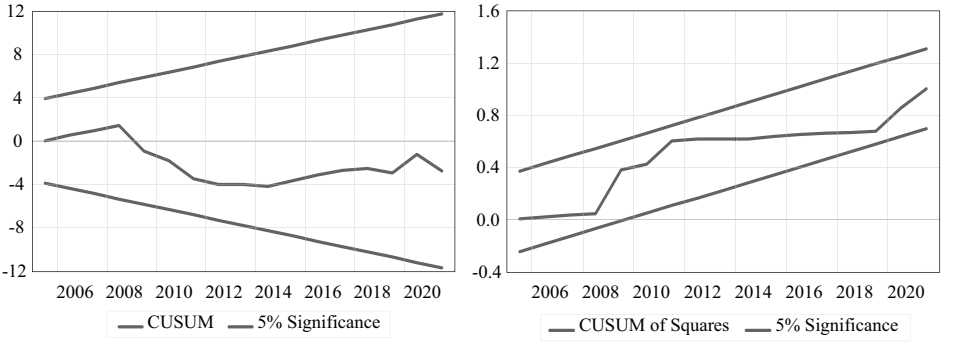

Figure 2A: CUSUM and CUSUMSQ tests for Model 1
Source: Authors' compilation

Model 2: Consumption-based poverty model

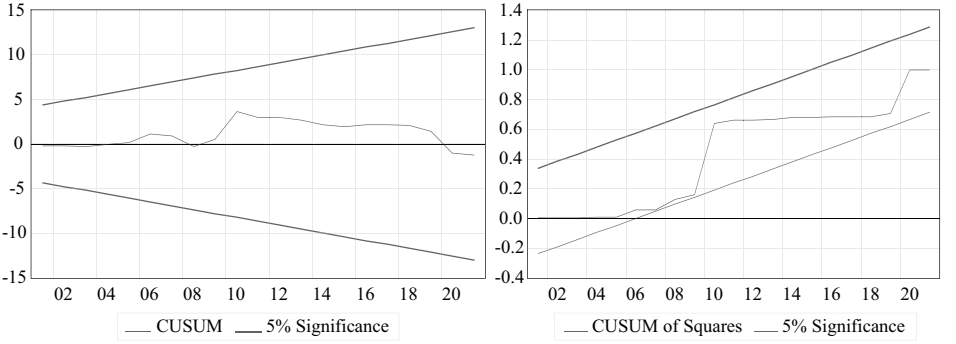

Figure 2B: CUSUM and CUSUMSQ tests for Model 2
Source: Authors' compilation

Model 3: Income-based poverty model with exports as a proxy for Trade openness

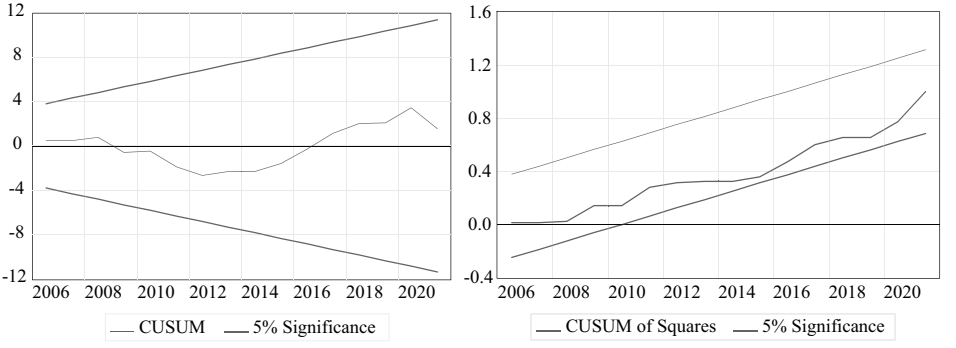

Figure 2C: CUSUM and CUSUMSQ tests for Model 3

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

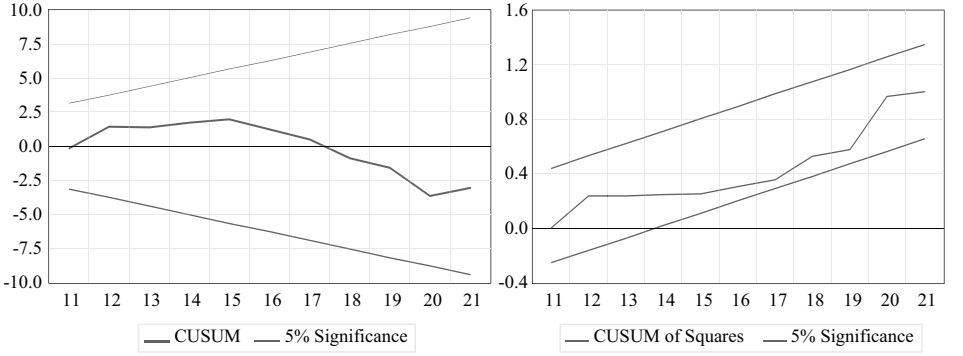

Figure 2D: CUSUM and CUSUMSQ tests for Model 4

6. CONCLUSIONS

The objective of the study was to investigate the effect of trade openness on poverty in South Africa using annual data for the period from 1990 to 2021. Although many studies have been conducted to establish how trade openness affects poverty, the findings have been mostly varied and inconclusive. The study used the ARDL bounds testing approach, which has the best small sample size properties to study the impact of trade openness on poverty. The overall findings from Models 1 and 2 of the study confirmed that trade openness leads to a long-run reduction in poverty levels when the number of people living below the poverty line is used as a proxy while it has no significant effect in the short run. On the other hand, when household consumption is used as a proxy for poverty rate, the results showed that poverty levels are positively impacted by trade openness both in the long run and short run. In terms of the control variables, the findings confirmed that total output and labour force lead to a reduction in the long and short run under both Models 1. Financial development leads to a decline in poverty levels both in the long and short run while inflation rate is found to have no significant effect in Model 1. For Model 2, the long-run results confirmed that trade openness has a positive and significant impact on the poverty rate when the household consumption proxy is used. The long-run results also confirm that total output, labour force and financial development positively affect household consumption. Inflation rate has no significant effect on poverty rate when household consumption is employed as a proxy.

For Model 3, the results confirm that trade openness has no significant long-run impact on poverty levels when exports as a share of economic growth are

used as a proxy for openness. In terms of control variables, the findings confirm that economic growth, labour force and financial development have a negative impact on poverty rate. Inflation rate is also found to have no long-run significant impact on poverty levels under Model 3. The long-run findings for Model 4 also confirm that when exports as a share of economic growth are used as a proxy, trade openness has a negative significant impact on household consumption. For control variables, the results confirm a positive impact of both labour force, inflation and financial development on household consumption, which implies that these variables lead to a decline in poverty levels. The long-run coefficients for economic growth confirm that 1% increase in poverty rate leads to a decrease in household consumption.

The study recommends that governments in developing countries should engage with other countries to increase their export capacity and in turn reduce their respective poverty levels. Governments should make it easier for businesses to import machinery and equipment needed for production through the reduction of tariffs. Since economic growth and labour force have been found to lead to an increase in household consumption, more resources should be channeled towards infrastructure development and encourage job creation.

Conflict of interests

The authors declare there is no conflict of interest.

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ОТВОРЕНОСТ ТРГОВИНЕ И СМАЊЕЊЕ СИРОМАШТВА У ЈУЖНОЈ АФРИЦИ

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САЖЕТАК

Студија је испитала утицај отворености трговине на стопу сиромаштва у Јужноафричкој Републици. Приступ тестирању граница АРДЛ коришћен је са годишњим подацима који покривају период од 1990. до 2021. Студија је процијенила четири модела, односно модел заснован на приходу и модел заснован на потрошњи користећи двије мјере отворености трговине: укупна трговина као проценат БДП-а и извоз као проценат БДП-а. За модел 1 заснован на приходима, налази су потврдили да отвореност трговине има дугорочни негативан утицај на стопу сиромаштва, док на кратак рок нема значајан утицај. За модел 3 утврђен је безначајан утицај на дуги рок, док је краткорочно утврђено да извоз доводи до смањења стопе сиромаштва. Резултати су потврдили да за модел 2 заснован на потрошњи, отвореност трговине доводи до смањења стопе сиромаштва на дуги и кратки рок. За модел 4, у којем се извоз користи као мјера за трговинску отвореност, утврђено је да доводи до смањења потрошње домаћинстава у дугом року. На основу резултата, студија препоручује владама земаља у развоју сарадњу са другим земљама како би повећале своје извозне капацитете и заузврат смањиле нивое сиромаштва.

Кључне ријечи: *отвореност трговине, стопа сиромаштва, приход, потрошња, АРДЛ, Јужна Африка*.

INFLATION, INFLATIONARY TAX AND TAX EVASION IN ALGERIA: AN EMPIRICAL ANALYSIS OF UNDERLYING CAUSAL INTERACTIONS

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JEL Classification: E31; H26; C51.

ABSTRACT

This article is an empirical study that aims to deeply examine the effects of the underlying interactions of inflation and inflationary tax on the size of tax evasion in Algeria. Accordingly, the analysis is grounded in the application of the Granger causality test within a vector autoregressive (VAR) model, covering an annual period ranging from 1980 to 2022. The findings reveal that, in the short term, the inflation rate has a positive impact on tax evasion, whereas the inflationary tax exerts a negative influence on it. Our approach strives to interpret these findings through the lens of inflationary financing theory. This theory elucidates how the inflation rate and the implicit revenues it generates contribute to the regulation of the scope of tax evasion in the country.

1. INTRODUCTION

In an environment characterised by frequent fluctuations in the economy, nations consistently encounter issues concerning inflation. This issue becomes especially pronounced when there is a decline in tax revenues, primarily caused by an increase in tax evasion, disrupting the equilibrium between government income and expenditure. Consequently, governments might adopt the strategy of increasing the money supply and may resort to printing more money, particularly in situations where inflation persists at elevated levels. Nonetheless, it is crucial to acknowledge that such actions frequently lead to a further escalation in prices, subsequently boosting the valuation of assets. This, in turn, generates implicit income for the government, surpassing the revenues obtained through taxation (OECD, 2013, p. 28-29).

Fiscal economic theory demonstrates that when inflation is very high within a country, it complicates how revenues are collected to finance expenditures due to the heavy tax burden. There are two distinct ways in which high inflation impacts the fiscal system: Firstly, to combat inflation, governments tend to lower tax rates. However, this may result in reduced public spending due to a lack of fiscal revenues, thereby impeding economic growth (Crane & Nourzad, 1986, p. 217 and Caballé & Panadés, 2004, 568-571) Secondly, heightened inflation entails individuals paying an indirect tax in the form of diminished purchasing power as the value of their money decreases. This directly affects fiscal policy, particularly in the long term. Indeed, most tax systems in developing countries are not automatically adjusted to inflation, causing a discrepancy between the timing of tax payment and/or revenue receipt and the actual value of post-payment revenues (Kwon et al., 2020, 1-3).

Algeria is notable for its consideration of this discrepancy, given that its economy is largely reliant on oil rent and characterised by limited productivity beyond hydrocarbon resources. In order to mitigate long-term financial losses, the Algerian State has consistently pursued policies leading to sustained inflation, thereby creating an implicit revenue stream that significantly supports public budgetary commitments (Dermechi, 2017, 116). However, when real incomes remain unchanged, inflation increases fiscal costs, leading individuals to avoid tax payments and engage in various forms of tax evasion.

Despite the acknowledged effects of inflation on tax evasion, empirical studies on the income effects of inflation remain limited. Thus, this article examines the short- and long-term consequences of inflation and inflationary taxes on the scale of tax evasion in Algeria. Our primary question is: What impact does the inflationary tax, driven by the inflation rate, have on the magnitude of tax evasion in Algeria? To address this, we formulate two hypotheses: H1: Inflation positively influences tax evasion; H2: Inflationary tax positively impacts tax evasion.

We adopt a multivariate analysis approach using the Vector Autoregressive (VAR) model to test our hypotheses. The selection of the VAR model stems from its capacity to address the endogeneity requirements of variables. As previously mentioned, inflation intrinsically interacts with the fiscal system, while the fiscal system itself reacts to inflation rates (Tabandeh et al., 2013, 101). Furthermore, the advantage of this approach lies in its ability to test the type of interactions between variables in terms of causality.

The remainder of the article is structured as follows: section two provides a concise overview of the relationship between inflation and tax evasion as discussed in

economic literature. Section three outlines the empirical methodology used in this study. Section four presents the study's findings. Section five offers an interpretation of these findings within the framework of economic theory. Section six highlights the novelty and contribution of this article. Finally, section seven summarises the key conclusions drawn from this study.

2. THE INTERPLAY OF TAX EVASION WITH INFLATION AND INFLATIONARY TAX IN ECONOMIC STUDIES

Existing research indicates that various factors, including institutional, demographic, and economic aspects, can influence tax evasion. This study aims to delve into the economic aspect of tax evasion, particularly focusing on the role of inflation. To shed light on this, we will refer to significant research in the economic literature, with particular attention to Fishburn's pioneering work (1981).

Fishburn's study, building upon Srinivasan's (1973), examined how inflation impacted the tendency for individuals to default on tax payments. Fishburn investigated the influence of income on tax evasion within an unindexed tax framework, adapting it to account for changes resulting from inflation-induced increases in nominal income. His findings revealed that defaults in payment are not linked to price levels when nominal income rises but real income remains constant. According to Fishburn's (1981) research, tax evasion increases alongside inflation due to households' efforts to maintain stable purchasing power.

Crane & Nourzad's, (1986, p. 221) analysed how inflation affected overall tax evasion in the United States between 1947 and 1981. They used a simple regression model based on the Ordinary Least Squares (OLS) method, finding a positive correlation between tax evasion and inflation. They also explored other determinants of tax evasion, concluding that it increases with tax rates and decreases with penalty rates.

A descriptive study on Latin American countries by Dornbusch & Simonsen (1987), pp. 68-69) followed by a study by Kiguel & Liviatan in 1988, found that moderate inflation rates boost tax revenue collection by limiting inflationary funding. However, as inflation rises, the collected financial resources diminish due to the burden of inflationary financing. On the other hand, tax payments are deferred until inflation rates rise. These findings are largely based on the Tanzi-Olivera effect (Tanzi, 1977), explaining the negative correlation between tax revenues and inflation rates.

Roubini & Sala-i-Martin (1992), p. 17) examined the enduring relationship between tax evasion, inflationary taxation, and inflation rates through the taxpayer's decision-making process. Their findings revealed that in countries with widespread tax evasion, governments often resort to repressive financial regimes to boost revenues through inflation. However, this strategy hampers financial operations' efficiency by reducing interest rates, leading to increased demand for money, fiscal burdens, and inflation rates.

Fishlow & Friedman's (1994, p. 121) analysis in 1994 of three Latin American nations (Chile, Brazil, and Argentina) provided substantial empirical evidence demonstrating a positive influence of inflationary taxes on tax evasion.

Nicolini (1996, p. 792) analysed the effect of tax evasion on optimal inflationary tax using an equilibrium model, highlighting a positive correlation between inflationary tax and tax evasion.

Caballé & Panadés' (2004, pp. 583-587) analysis of American data explored the link between inflation rates and tax evasion. Their results indicated that tax evasion grows parallel to an increase in inflation rates. A similar conclusion was observed by Tabandeh et al., (2013, pp. 105-106), who used artificial neural network methodology on Malaysian data, covering the period from 1663 to 2011, asserting that inflation has a positive impact on tax evasion, particularly concerning government size and tax system complexity. This trend was further confirmed by Abdixhiku et al (2018, p. 28), who employed a fixed-effect panel model to examine 24 transitioning economies, revealing a direct correlation between tax evasion and rising inflation rates.

Nurunnabi's (2018, p. 44) analysis, using a sample of 38 nations and employing simple regression techniques on data from 1999 to 2007, found that, unlike other variables like fiscal governance, high inflation lowers tax evasion.

Despite a considerable lack of recent studies concerning the relationship between the inflation rate, inflationary tax, and tax evasion, we can conclude in summary that those examining the relationship between the inflation rate and tax evasion often yield similar results, suggesting that inflation is a factor that determines the level of tax evasion. However, the existing relationship between tax evasion and inflationary tax should be further emphasised, as studies analysing the level of tax evasion following changes in the degree of inflation are likely to lead to ambiguous and suboptimal outcomes. This is because the inflation rate generates implicit income, which in turn alters policy parameters in response to changes in levels of tax evasion.

3. DATA AND METHODOLOGICAL FRAMEWORK

3.1. Data

In order to analyse the relationship between inflation, inflationary taxation, and tax evasion, it is necessary to carefully choose relevant factors in order to explain the phenomena of tax evasion in relation to inflation and inflationary taxation. Our methodological stage is essential to building the model (VAR) that we have selected for our investigation. The following is a representation of the chosen variables:

Tax evasion: The measurement of tax evasion serves as a representation of the dependent variable, which is intrinsically unobservable.

The independent variables are instantiated by:

Inflation rate: Studies conducted in the literature suggest that the increase in general price levels is the main driver of tax evasion (Nicolini, 1996 and (Abdixhiku et al., 2018).

Inflationary tax: It serves as one of the factors influencing the fiscal system and, consequently, tax evasion within economies employing a repressive financial system (Roubini & Sala-i-Martin, 1992 and (Nicolini, 1996)

Government size: Within this study, we explore the government's role through the magnitude of its public expenditures. Previous research has shown that this variable can have both positive and negative impacts on tax evasion (Dell'Anno et al., 2007 and (Schneider & Savasan, 2007), particularly in Algeria, public expenditures are largely sustained by revenues generated from hydrocarbons, including income from the inflation tax and financial repression (Dermechi, 2017).

Tax Burden: represents a burden for economic agents, especially for producers. It is recognised as one of the key elements influencing tax avoidance (Tabandeh et al., 2013, p. 104 and Duan et al., 2018).

Corruption Perception Index: it stands as one of the primary determinants of tax evasion (Gang et al., 1996) and Tahseen & Eatzaz, 2010). Indeed, as the tax burden becomes excessively high, households often resort to the avenue of corruption by offering a portion of their funds to those responsible for tax design. The Corruption Perception Index, which is expressed as a percentage, is used to quantify corruption.

A significant issue that emerged during this study pertains to data collection as the statistical system in Algeria is not fully efficient, and certain data is subject to disclosure constraints. To address this, we had to independently estimate some data and gather others from various sources. Data collection frequency is annual, spanning from 1980 to 2022 (Table 1).

It is worth mentioning that all data has undergone logarithmic transformation.

Table 1: Description and source of data

Variable	Description and source of data
Tax Evasion (*TEV*)	The data from 2000 to 2020 is sourced from the Touhami, (2022) study. We estimated the data for the period between 1980 and 1999, as well as from 2021 to 2022, using the estimation method outlined in Touhami's (2022) study.[1]
Inflation rate (*P*)	Expressed using the Consumer Price Index (CPI) at constant prices (100=2012), extracted from the World Bank database: https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=DZ
Inflationary Tax (*FT*)	Expressed as a percentage of total tax revenues. Calculated by using Giovannini & De Melo (1991, p. 4-6) formula: $FT = \pi (Mo - Md)$ where: π represents the annual change in the inflation rate while $(M_o - M_d)$ denotes the real stock of central bank money. [2]
Government size (*EX*)	Represented by public expenditures, expressed as a percentage of real GDP, extracted from Federal Reserve Economic Database: https://fred.stlouisfed.org/
Corruption Perception Index (*COR*)	Index ranging from 0 to 100, obtained from «The global economy.com » database: https://www.theglobaleconomy.com/Algeria/heritcorruption/
Tax Burden (*TB*)	Includes all taxes that companies are obligated to remit to the government, encompassing the corporate income tax (CIT) and the value-added tax (VAT). The data is sourced from the official document "Retrospective Statistics: 1963–2024" of the General Directorate of Prospective and Policy Analysis (DGPP-DRI) within the Algerian Ministry of Finance. These figures are presented as a percentage of the GDP.

Source: Authors' compilation.

1 There are two steps in this estimation process. Firstly, we utilise the formula: tax rate = total income taxes/GDP to ascertain the proportion of income taxes relative to the size of the economy. Secondly, we estimate the magnitude of tax evasion using the relationship: Tax evasion = (hidden income) * (tax rate). Data concerning hidden income is obtained from: https://data.albankaldawli.org/country/DZ.
For further information, refer to (Table 9) in the Additional Data section.
2 Idem.

3.2. Methodology

The multivariate (VAR) technique is the foundation of the econometric methodology used in this work, and it provides a number of important benefits. Firstly, it tackles the issue of endogeneity in variables. Endogenous variables are frequently intrinsically linked to the explanatory aspects of tax evasion. Indeed, if inflation is acknowledged in economic literature as a determinant of tax evasion, it is equally important to consider that this inflation itself is influenced by the level of tax evasion because, tax evasion, being a violation of the law, can disrupt the monetary sphere, leading to general price fluctuations (Tabandeh et al., 2013, p.101.); Secondly, Granger causality tests aid in determining how each variable impacts tax evasion, with the VAR technique playing a pivotal role in this process. These tests illustrate the pathways through which shocks are transmitted between inflation, inflation-related taxes, and tax evasion. Thirdly, by employing cointegration tests, the VAR technique facilitates the estimation of the short- and long-term relationships between inflation, inflationary tax, and tax evasion. The VAR model used in this study is therefore given by Equation (1):

$$Y_t = \sum_{i=1}^{p} \alpha_i Y_{t-i} + S_t + \varepsilon_t \quad \text{.....(1)}$$

In which:

$Y_t = (TEV_t, P_t, FT_t, EX_t, COR_t, TB_t)'$ is a vector (6×1) comprising the endogenous variables at time t. The causal coefficients α_i are matrices (6×6) for lags from 1 to p where p is the number of optimal lags in the model, i = 1, 2,…p. i is the notation, in this case, it means that the series starts from i and ends in p. S_t vector determines elements, which may include constants, linear, or polynomial trends. ε_t is a white noise vector at time t.

Hence, if we convert the mathematical Equation (1) into an equation system using the six (6) random variables, then we will have the VAR (p) model as follows:

$$TEV_t = \sum_{i=1}^{p} \alpha_{1i} TEV_{t-i} + \sum_{i=1}^{p} \alpha_{2i} P_{t-i} + \sum_{i=1}^{p} \alpha_{3i} FT_{t-i} + \sum_{i=1}^{p} \alpha_{4i} EX_{t-i} + \sum_{i=1}^{p} \alpha_{5i} COR_{t-i} + \sum_{i=1}^{p} \alpha_{6i} TB_{t-i} + S_{1t} + \varepsilon_{1t}$$

$$P_t = \sum_{i=1}^{p} \alpha_{1i} TEV_{t-i} + \sum_{i=1}^{p} \alpha_{2i} P_{t-i} + \sum_{i=1}^{p} \alpha_{3i} FT_{t-i} + \sum_{i=1}^{p} \alpha_{4i} EX_{t-i} + \sum_{i=1}^{p} \alpha_{5i} COR_{t-i} + \sum_{i=1}^{p} \alpha_{6i} TB_{t-i} + S_{2t} + \varepsilon_{2t}$$

$$FT_t = \sum_{i=1}^{p} \alpha_{1i} TEV_{t-i} + \sum_{i=1}^{p} \alpha_{2i} P_{t-i} + \sum_{i=1}^{p} \alpha_{3i} FT_{t-i} + \sum_{i=1}^{p} \alpha_{4i} EX_{t-i} + \sum_{i=1}^{p} \alpha_{5i} COR_{t-i} + \sum_{i=1}^{p} \alpha_{6i} TB_{t-i} + S_{3t} + \varepsilon_{3t}$$

$$EX_t = \sum_{i=1}^{p} \alpha_{1i} TEV_{t-i} + \sum_{i=1}^{p} \alpha_{2i} P_{t-i} + \sum_{i=1}^{p} \alpha_{3i} FT_{t-i} + \sum_{i=1}^{p} \alpha_{4i} EX_{t-i} + \sum_{i=1}^{p} \alpha_{5i} COR_{t-i} + \sum_{i=1}^{p} \alpha_{6i} TB_{t-i} + S_{4t} + \varepsilon_{4t}$$

$$COR_t = \sum_{i=1}^{p} \alpha_{1i} TEV_{t-i} + \sum_{i=1}^{p} \alpha_{2i} P_{t-i} + \sum_{i=1}^{p} \alpha_{3i} FT_{t-i} + \sum_{i=1}^{p} \alpha_{4i} EX_{t-i} + \sum_{i=1}^{p} \alpha_{5i} COR_{t-i} + \sum_{i=1}^{p} \alpha_{6i} TB_{t-i} + S_{5t} + \varepsilon_{5t}$$

$$TB_t = \sum_{i=1}^{p} \alpha_{1i} TEV_{t-i} + \sum_{i=1}^{p} \alpha_{2i} P_{t-i} + \sum_{i=1}^{p} \alpha_{3i} FT_{t-i} + \sum_{i=1}^{p} \alpha_{4i} EX_{t-i} + \sum_{i=1}^{p} \alpha_{5i} COR_{t-i} + \sum_{i=1}^{p} \alpha_{6i} TB_{t-i} + S_{6t} + \varepsilon_{6t} \quad .....(2)$$

By following the approach delineated by Sims, (1980) in the context of estimating a VAR model, we adhere to the subsequent procedural steps:

- Test for unit root hypotheses to assess the stationarity of time series using the optimal lag (p) test based on the Akaike Information Criterion (AIC) and Schwarz Criterion (SC).
- Validate the VAR model by checking the normality of residuals through Skewness, Kurtosis, and Jarque-Bera tests, as well as the autocorrelation of residuals through the LM test and the stationarity of the model.
- Conduct the Granger causality test to ascertain whether a set of parameters in the VAR model is zero. This test is employed to analyse the extent to which tax evasion is influenced by inflation and inflationary tax, and/or vice versa.
- Perform simulation and analyse the impulse response of tax evasion to inflation and inflationary tax. This step involves conducting variance decomposition analysis using the Cholesky decomposition method. The ordering of variables is crucial, based on Granger non-causality test results and economic theory, to establish an appropriate variables order. Variance analysis provides insights into the significance of impulses on inflation and inflationary tax in the variation of each variable, especially the variable of interest, "tax evasion." This analysis assists in determining the direction in which inflation and inflationary tax shocks exert the greatest impact on tax evasion.

For an expanded analysis of the VAR model, the estimation in the short and long term necessitates the following progression: We estimate the long-term model using the Fully Modified Ordinary Least Squares (FMOLS) method to test the null hypothesis of "non-cointegration". This method provides consistent results with the standard Engel-Granger method, with parameters converging more rapidly (Stock & Watson, 2001, p. 113). In this step, the Augmented Dickey-Fuller (ADF) test is not suitable for analysing the stationarity of residuals as they are unobservable (Stock & Watson, 1988, pp. 1101-1102). Therefore, we test the stationarity of model residuals through the Engel-Granger test and the Phillips-Ouliaris test. If cointegration is significant, we proceed to short-term estimation using the Error Correction Model (ECM).

4. EMPIRICAL RESULTS

Initially, the statistical description of the variables employed is given in (Table 2).

Table 2: Statistical description of the variables

	TEV	COR	FT	P	TB	EX
Mean	729.395	41.65116	2.563325	8.688080	16.07349	17.03672
Median	689.0000	50.00000	2.065301	5.700000	16.01000	16.76379
Maximum	1167.000	50.00000	9.153517	31.70000	18.83000	22.78596
Minimum	412.0000	26.00000	0.108128	0.300000	13.41000	11.23158
Std.Dev.	213.0121	9.329635	2.180338	8.000965	1.366044	2.786875
Sum	31364.00	1791.000	110.2230	373.5875	691.1600	732.5789
SumSq.Dev.	1905714.	3655.767	199.6628	2688.649	78.37518	326.2002
Observations	43	43	43	43	43	43

Source: Authors' compilation using Eviews results.

4.1. VAR model estimation

The first step prior to estimating VAR involves conducting an analysis of the stationarity [3] of the variables (Table 3).

The VAR model with a lag of p=4 is ideally fitted based on the minimisation of the Akaike Information Criterion (AIC) and the Schwarz Criterion. [4]

At a lag of p = 4, we see that the inflation rate (*P*) and the inflation tax (*FT*) have positive influences on tax evasion: (+6.60 and +4.75, respectively). In contrast, corruption (*COR*), tax burden (*TB*), and government size (*EX*) all have a significant negative impact on tax evasion: (-2.04), (-0.56), and (-0.69), respectively.

3 Refer to (Table 10) in the Additional Data section.
4 Refer to (Table 11) in the Additional Data section.

Table 3: The tax evasion (*TEV*) regression estimation

	TEV	COR	FT	P	TB	EX
TEV (-1)	-0.009 (0.242) [-0.409]	0.436 (0.669) [0.651]	1.097 (1.492) [0.735]	1. 927 (1.663) [1.158]	0. 179 (0.113) [1.586]	-0. 182 (0.232) [-0.786]
TEV (-2)	-0.806** (0.206) [-3.903]	-2.078** (0.849) [-2.448]	6.270** (1.756) [3.570]	5. 074** (1.957) [2.592]	-0.412** (0.143) [-2.876]	-0.149 (0.273) [-0.547]
TEV (-3)	2.210** (0.526) [4.203]	-0.625 (0.788) [-0.794]	-1.444 (1.986) [-0.727]	1.818 (2.214) [0.821]	-0.412** (0.143) [-2.876]	-0.160 (0.294) [-0.545]
TEV (-4)	0.039 (0.274) [0.143]	-2.048** (0.891) [-2.297]	4.758** (1.891) [2.515]	6.604** (2.108) [3.132]	-0.569** (0.150) [-3.781]	-0.694** (0.309) [-2.247]
R-squared	0.859	0.856	0.928	0.967	0.969	0.934
Adj.R-squared	0.600	0.706	0.815	0.894	0.815	0.745

Source: Authors' compilation using Eviews results. Notes: ( ) Standard errors & [ ] t-statistics. ** Significance at the 5% level.

The results of the residual normality and error autocorrelation tests, which allow us to validate the VAR model, are shown in Tables 4 and 5, respectively. [5]

Table 4: Normality tests of residuals

	Skewness	Kurtosis	Jarque-Bera
Chi-sq	2.4001	2.8564	34.5958
Prob	0.4936**	0.1818**	0.2846**

Source: Authors' compilation using Eviews results. ** Significance at the 5% level.

Table 5: LM test of error correlation

Lag	LRE stat	df	Prob.	Rao F-stat	df	Prob.
1	49.89480	36	0.0818	2.116680	(36,11.5)	0.0964**
2	49.99373	36	0.0905	1.527333	(36,11.5)	0.2238**
3	34.95709	36	0.5180	0.770570	(36,11.5)	0.7365**
4	43.29590	36	0.1880	1.140817	(36,11.5)	0.4261**
5	50.37252	36	0.0582	1.687942	(36,11.5)	0.1714**

Source: Authors' compilation using Eviews results. ** The null hypothesis is accepted at a 5% level.

5 The results of the stability conditions of the VAR model are represented in (Table 12) in the Additional Data section.

The Granger-Causality test demonstrates a bidirectional and highly significant causality between tax evasion (*TEV*), inflation rate (P), and inflation tax (*FT*) at a 5% level. This finding suggests that not only can previous inflation rate and inflation tax values help forecast future values, but also the future value of the tax evasion variable (*TEV*). Furthermore, the results show that all variables included in the study statistically cause the tax evasion variable (Table 6).

Based on the outcomes of the Granger-causality test among the variables and employing economic intuition, we can establish a causal transmission diagram among the variables as follows:

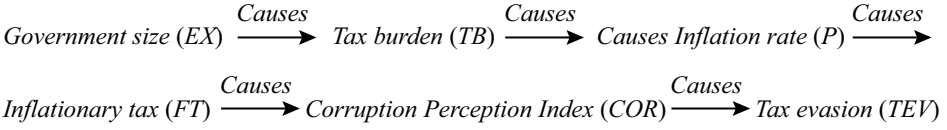

Table 6: Granger's test of non-causality

H_0: does not cause →	COR	FT	P	TB	EX	TEV
COR	-	(0.8257) [1.505]	(0.723) [2.064]	(0.291) [4.955]	(0.851) [1.355]	(0.0036) [15.579]
FT	(0.0125) [12.753]	-	(0.0015) [17.506]	(0.0047) [15.009]	(0.229) [5.617]	(0.0001) [23.324]
P	(0.1884) [6.147]	(0.0209) [11.559]	-	(0.103) [7.686]	(0.131) [7.086]	(0.0011) [18.352]
TB	(0.464) [3.587]	(0.1241) [7.233]	(0.048) [9.570]	-	(0.686) [2.268]	(0.0079) [13.827]
EX	(0.6951) [2.221]	(0.5110) [3.287]	(0.517) [3.246]	(0.004) [14.938]	-	(0.0128) [12.713]
TEV	(0.0721) [8.592]	(0.0011) [18.195]	(0.0165) [12.119]	(0.0004) [20.594]	(0.128) [7.138]	-

Source: Authors' compilation using Eviews results. Notes: ( ) P-value & [ ] Chi-sq statistic; ** The null hypothesis is rejected at a 5% level.

4.2. Simulation

The visual examination of the impulse response reveals that, following an instantaneous positive shock to the inflation rate and government size, there is an initial reaction of increasing tax evasion (+0.08). Similarly, a positive shock

to corruption (*COR*) leads to an increase in tax evasion (+0.06). In contrast, a positive shock to inflationary tax results in a statistically significant decrease in the magnitude of tax evasion (-0.01), and an instantaneous positive shock to the tax burden (*TB*) decreases tax evasion size (-0.06).

Based on the impulse responses obtained for each pair of variables and utilising the established causal transmission pathway, we confirm that a positive impulse on government size leads to a positive response of the tax burden (TB's response to EX: +0.015), followed by a negative response in the inflation rate (P's response to TB: -0.13) and a positive response of inflationary tax (FT's response to P: +0.17). This dynamic also induces a positive response to corruption (COR's response to FT: +0.04), resulting in a decrease in the level of tax evasion (TEV's response to COR: -0.03). [6]

4.3. Variance Decomposition

The variance decomposition of tax evasion indicates that the inflation shock constitutes a substantial portion of the tax evasion dynamics. Specifically, the inflation rate explains nearly 40% of the variance in the tax evasion forecast error. Conversely, the inflationary tax (*FT*) initially contributes a small proportion, approximately 2%, to the variation in tax evasion. However, its contribution gradually increases to over 20% of the tax evasion variable over time.

In the medium and long term, the variance of tax evasion (*TEV*) forecast error is explained by 18% through its innovations, 14.08% by government size (EX), 10.13% by tax burdens (*TB*), and 15.66% by corruption (*COR*).

Within the framework of this study, it is crucial to compare the variance decomposition of inflation forecast error and inflationary tax with that of government size forecast error. In the short term, about 34% of the fluctuation in inflation can be explained by the inflationary tax (*FT*), 2.4% by government size (*EX*), and 3.21% by tax evasion (*TEV*).

The results reveal that 46.06% of the fluctuation in inflationary tax can be explained by inflation, 21.12% by government size, and less than 0.60% by tax evasion.

Regarding the error variation of the government size forecast in the short term, 8.95% can be explained by the inflationary tax (FT) and 2.86% by the inflation rate. In the long term, however, inflation and the inflationary tax account for 24.69% and 10.66%, respectively, of the variation in the government size forecast

6 Refer to (Figure 1) in the Additional Data section.

error. Conversely, tax evasion (*TEV*) accounts for only 0.88% of this variance. A detailed breakdown of the remaining variables is shown in Figure 2. [7]

As a result, inflation-related shocks have a more significant, even significant, impact on tax evasion compared to shocks resulting from tax burdens and government size. However, it is important to note that the causal transmission effect between government size and inflationary tax is what underpins this impact.

4.4. Long run estimation

The Fully Modified Least Squares approach of long-term regression estimate reveals a negative correlation (-0.303) between tax evasion (*TEV*) and the Corruption variable (*COR*). Conversely, there are statistically significant positive correlations between inflationary tax (*FT*) and tax burden (*TB*) (+0.03 and +0.93, respectively). Other variables do not demonstrate significance (Table 7).

Table 7: Estimation results using the FMOLS approach

Variable	Coefficient	Std. Error	t-Statistic	Prob.
P	-0.001035	0.011849	-0.087365	0.9309
FT	0.038141	0.014919	2.556435**	0.0151
COR	-0.303592	0.147790	-2.054212**	0.0475
EX	-0.072470	0.122614	-0.591045	0.5583
TB	0.937529	0.185879	5.043766**	0.0000
C	0.014033	0.012495	1.123085	0.2690

Source: Authors' compilation using Eviews results. ** Significance at the 5% level.

The findings of the Phillips-Ouliaris and Engel-Granger cointegration tests, however, suggest that there is no globally significant cointegration relationship for the set of variables under investigation. Thus, we wrap up the long-term estimation process (Table 8).

Table 8: Results of the cointegration tests

Engle-Granger tau-statistic	-1.2235**
Phillips-Ouliaris tau-statistic	-1.3606**

Source: Authors' compilation using Eviews results. ** Null hypothesis is accepted at a 5% level.

7 Refer to (Figure 2) in the Additional Data section.

5. DISCUSSIONS

The findings obtained from the analysis of VAR model estimation are different from those obtained from impulse response analysis due to their disparate methodological foundations. Indeed, the Cholesky decomposition, which maintains variable order, improves impulse response analysis, whereas the VAR model estimate is based on reduced form. Therefore, instead of evaluating the effect of a disturbance in a single variable, as suggested by Sims, (1980, p. 4-6), it is more instructive to look into the dynamic reaction of all variables.

The examination of impulse reactions indicates a positive correlation between inflation and tax evasion. Specifically, there is a tendency for tax evasion to rise in the short term during periods of high inflation. In the immediate context, this response may be linked to individuals experiencing heightened financial strain, thereby enabling them to evade tax payments. This finding aligns with earlier research conducted by Caballé & Panadés, (2004, p. 581).

The unexpected result about the negative impact of inflationary taxation on tax evasion refutes the first hypothesis. Since inflationary taxation lowers the purchasing power of currency holders, minimal tax evasion in Algeria is indicative of moderate purchasing power. It is challenging to explain this conclusion, nevertheless, without taking into account the psychological factors that influence the agents' behaviours. According to Sims, (1980, pp. p.4-6), economic agents prioritise paying taxes when their purchasing power is limited, in line with the recommendations of Groenland & Van Veldhoven (1983, pp.p. 141-143); Fishlow & Friedman, (1994, p. p. 120) and Engel et al., (2020, pp. p. 4-6).

In our perspective, this view does not fit with the Algerian setting. Algeria's fiscal policy is based on both oil revenues and inflation finance (Boudjema, 2011, pp. 162-164). Taking these variables into consideration, we interpret the negative impact of inflationary tax as a result of dysfunctional revenue collection, particularly due to unequal effective tax rates, a prevalent reality in developing economies (Hoffmann & Zemanek, 2012, pp. 348-349). Therefore, according to our analysis, we posit that the state reduces tax rates by compensating for the deficit caused by inflationary taxation, which proves more profitable than the cost of tax fraud. This practice reflects the negative impact of government size on tax evasion (Vegh, 1989, p. 669). Research on the subject, such as the one by Graetz et al. (1986) has confirmed the negative effect of tax burden on tax evasion. Nonetheless, it is important to take into account that our research is carried out in the context of financial repression. We consider that the practice of a repressive financial system where effective tax rates are low, reflecting

negative real rates, can also account for the negative effect of tax burden on tax evasion. This suggests lower tax receipts, which in turn causes a sizable disparity to arise between revenues and expenses, increasing the level of domestic debt. Algeria's financial repression sustains domestic debt, creating implicit earnings from interest rates and inflationary taxation (Dermechi, 2017, p. 116). This process significantly alleviates the tax burden by financing operational expenses, which is evidenced by the unidirectional causality from the government size to the tax burden.

The negative correlation between the Corruption Perception Index and tax evasion can be explained in two ways in economic literature:

- Increased corruption renders tax evasion more costly than tax payment. Consequently, individuals are more inclined to immediately settle their taxes (Çule & Fulton, 2009, pp. 819-820 and Samadi & Tabande, 2013);
- The corruption encourages the informal sector and, thus, leads to an expansion of economic activity, increasing individual income and reducing the probability of default payment tax.

Given Algeria's quasi-rentier economy, we are inclined towards the first interpretation, which is considered more suitable (Ackerman, 1999, p. 104; Schneider & Enste, 2000).

The impulse response of tax evasion levels following a positive shock in government size is positive. We interpret this result as indicative of the inflationary, implicit, or hidden financing of public expenditure.

6. ORIGINALITY AND VALUE

This study emerges as a pioneering initiative in exploring the impact of inflation and inflationary tax on tax evasion in Algeria. Through its uniqueness, it provides an opportunity to demystify the role and relevance of inflation in controlling the level of tax evasion. The variables used in this article offer a multitude of insights into inflationary finance, an underlying mechanism that continues to significantly impact the Algerian economy despite being concealed. In other words, this study aims to clarify that implicit financing, which proves to be less costly, is the reason behind the state's support for an increased inflation rate. Simultaneously, the causality analysis within the framework of this study proves to be significant, both in terms of contributing to the body of knowledge and aligning the empirical component with the underlying theoretical hypotheses.

7. CONCLUSION

The main objective of this study was to examine the underlying connection between inflation, inflationary tax, and tax evasion in Algeria. The VAR model was employed using annual data spanning from 1980 to 2022. Our hypothesis, grounded in established economic principles, posited that inflation and inflationary taxes would positively impact the extent of tax evasion. However, the Granger causality test and simulation yielded an unexpected result: the inflationary tax seemed to mitigate the increase in tax evasion following an inflation rate shock. Furthermore, correlations were identified among key factors influencing tax evasion, including government size, tax burden, inflationary tax, and corruption. In summary, this study contributed to a better understanding of the role of the inflation rate and inflationary tax in controlling the size of tax evasion. Therefore, we outline some recommendations based on the findings attained:

1. Inflation Monitoring: It is recommended to closely monitor the inflation rate in Algeria to maintain an optimal level. Policymakers should exercise caution to ensure that inflation rates do not exceed this optimal threshold, which could help control the extent of tax evasion. In-depth investigations should be conducted to determine the threshold for inflation rates and inflationary taxes that maximise tax compliance while minimising distortion effects on the economy. Such research could provide crucial information to policymakers for the development of balanced fiscal policies.
2. Tax Compliance Promotion: Fiscal policies should be designed to promote tax compliance while supporting economic growth. This entails balancing incentives for compliance with economic growth objectives.
3. Taxation Management: Policymakers should also closely examine other factors influencing tax evasion, such as government size, tax burden, and corruption. Effective management of these aspects can help reduce tax evasion.

Conflict of interests

The authors declare there is no conflict of interest.

ADDITIONAL DATA

Table 9: Estimate of tax evasion and the inflationary tax in Algeria (1980-2022)

	Inflationary tax (% of total tax revenues)	Tax Evasion (Billion DZD)		Inflationary tax (% of total tax revenues)	Tax Evasion (Billion DZD)
1980	0.88	480	2000	0.10	529
1981	0.67	496	2001	2.06	581
1982	0.28	412	2002	2.71	615
1983	0.36	491	2003	2.20	666
1984	0.51	423	2004	1.91	647
1985	0.85	542	2005	0.58	666
1986	0.80	547	2006	1.04	689
1987	0.90	551	2007	2.87	661
1988	0.92	502	2008	2.44	741
1989	0.89	478	2009	3.26	802
1990	0.93	738	2010	2.10	812
1991	0.73	748	2011	2.45	842
1992	9.15	782	2012	4.79	952
1993	8.93	742	2013	1.79	944
1994	7.27	752	2014	1.78	931
1995	6.52	654	2015	2.92	1082
1996	5.16	776	2016	3.91	1042
1997	2.47	596	2017	3.96	1100
1998	1.87	502	2018	2.83	1052
1999	1.87	520	2019	2.45	1060
2000	0.10	529	2020	1.97	1015
2001	2.06	581	2021	3.42	1036
2002	2.71	615	2022	4.61	1167

Source: Authors' compilation

Table 10: Stationarity tests: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP)

		ADF		PP	
		I(0)	I (1)	I(0)	I(1)
Ln(TEV)	t- statistic	[-2.733]	[-8.040]**	[-2.644]	[-8.170]**
	prob	(0.229)	(0.000)	(0.263)	(0.000)
Ln(COR)	t- statistic	[-2.318]	[6.342]**	[-2.386]	[-6.387]**
	prob	(0.415)	(0.000)	(0.380)	(0.000)
Ln(FT)	t- statistic	[-3.746]**	-	[-3.742]**	-
	prob	(0.029)		(0.030)	
Ln(P)	t- statistic	[-3.085]	[-8.600]**	[-3.060]	[-8.689]**
	prob	(0.122)	(0.000)	(0.129)	(0.000)
Ln(TB)	t- statistic	[-4.299]**	-	[-4.158]**	-
	prob	(0.007)		(0.010)	
Ln(EX)	t- statistic	[-2.466]	[-4.384]**	[-1.838]	[-4.155]**
	prob	(0.342)	(0.006)	(0.668)	(0.011)

Source: Authors' compilation using Eviews results. ** The null hypothesis is rejected at a 5% level.

Table 11: Determining Optimum Lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	38.00181	NA	7.48e-09	-1.684306	-1.425740**	-1.592310
1	94.82308	92.70838	2.56e-09	-2.780162	-0.970198	-2.136191
2	119.6677	32.69027	5.34e-09	-2.193036	1.168325	-0.997090
3	168.6920	49.02435	4.09e-09	-2.878528	2.034230	-1.130607
4	251.1484	56.41748*	9.48e-10**	-5.323598**	1.140558	-3.023701*

Source: Eviews.12. ** Optimal lag order determined by the specified criterion.

Table 12: Stability Test Results

Root	Modulus	Root	Modulus
0.132047 + 0.955226i	0.964309	-0.818619 - 0.328262i	0.881982
0.132047 - 0.955226i	0.964309	-0.818619 + 0.328262i	0.881982
0.429446 + 0.856760i	0.958364	0.051491 + 0.845484i	0.847050
0.429446 - 0.856760i	0.958364	0.051491 - 0.845484i	0.847050
-0.397150 + 0.866750i	0.953406	0.620178 - 0.546560i	0.826649
-0.397150 - 0.866750i	0.953406	0.620178 + 0.546560i	0.826649
0.801160 - 0.467356i	0.927512	-0.483163 + 0.595860i	0.767134
0.801160 + 0.467356i	0.927512	-0.483163 - 0.595860i	0.767134
-0.900240 - 0.168400i	0.915855	0.730124 - 0.219653i	0.762449
-0.900240 + 0.168400i	0.915855	0.730124 + 0.219653i	0.762449
-0.648319 - 0.645398i	0.914799	-0.431804	0.431804
-0.648319 + 0.645398i	0.914799	-0.176883	0.176883

Source: Eviews.12. VAR satisfies the stability condition.

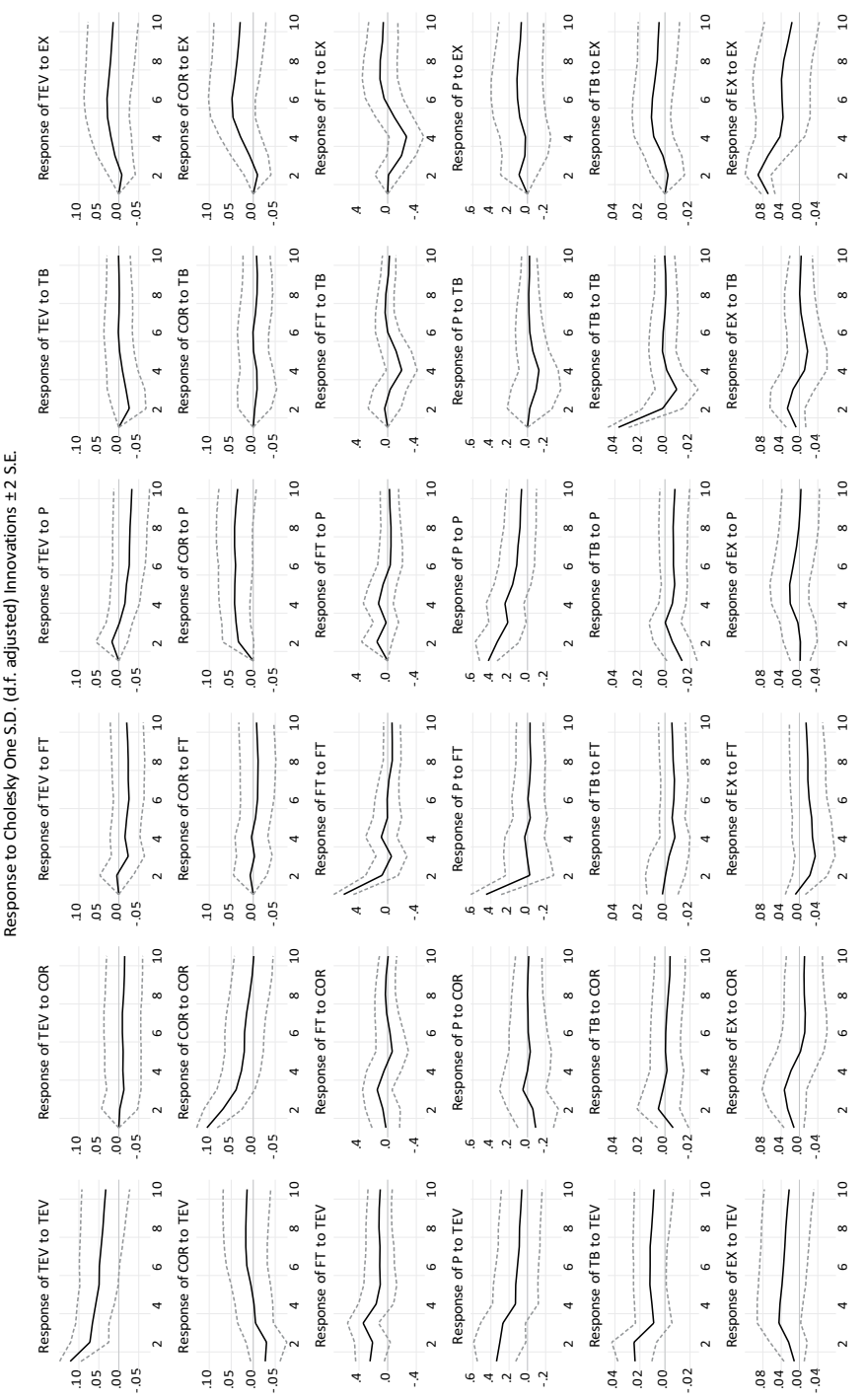

Figure 1: Response to Cholesky Innovations.
Source: Eviews.12

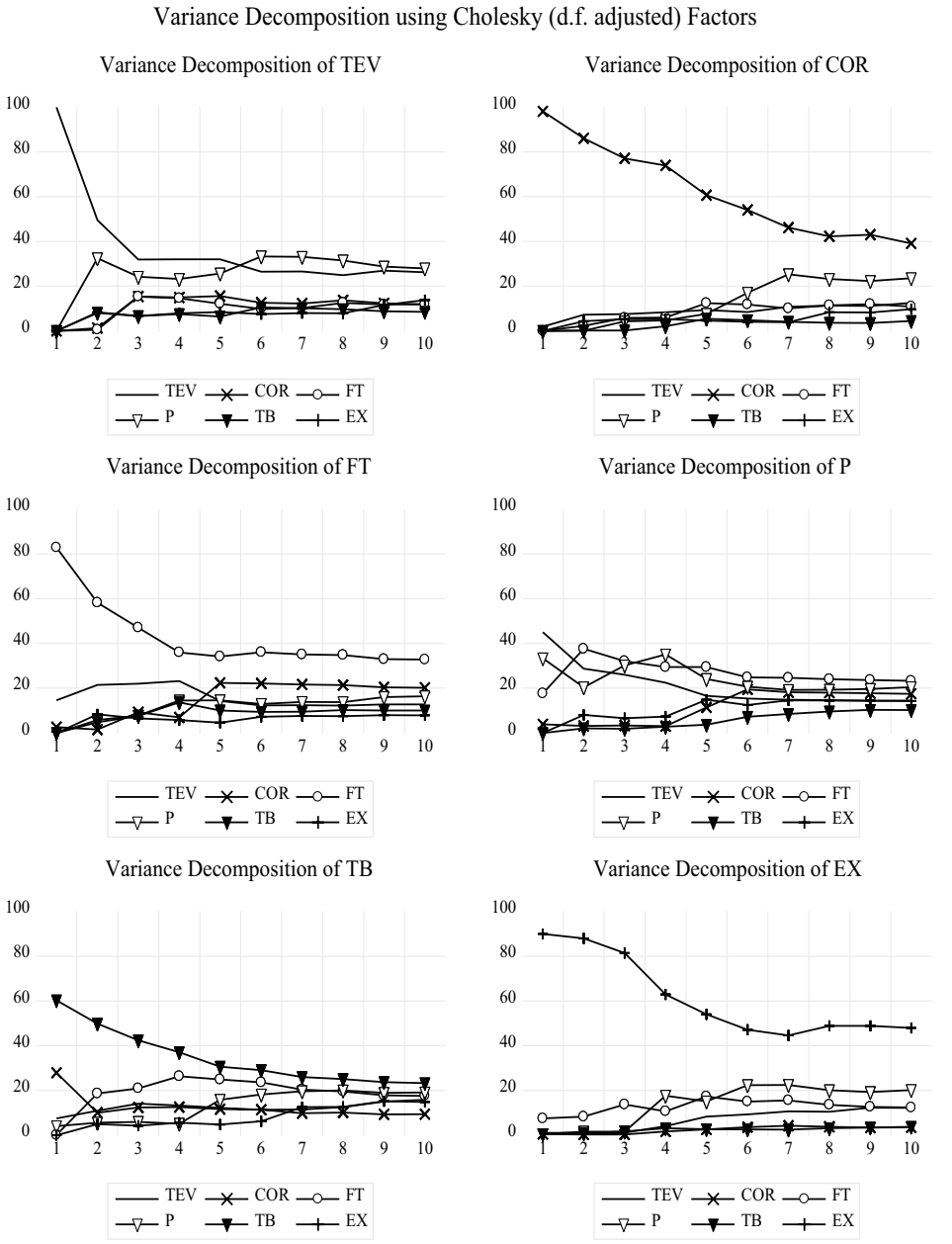

Figure 2: Variance Decomposition using Cholesky Factors.
Source: Eviews.12

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ИНФЛАЦИЈА, ИНФЛАЦИОНИ ПОРЕЗИ И УТАЈА ПОРЕЗА У АЛЖИРУ: ЕМПИРИЈСКА АНАЛИЗА ФУНДАМЕНТАЛНИХ УЗРОЧНИХ ИНТЕРАКЦИЈА

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САЖЕТАК

Овај рад је емпиријска студија која има за циљ да дубље испита ефекте фундаменталних интеракција инфлације и инфлационог пореза на величину утаје пореза у Алжиру. Стога, анализа је заснована на примјени Гренџеровог теста каузалности у оквиру модела векторских ауторегресија (VAR), у периоду од 1980. до 2022. године. Резултати показују да, у кратком року, инфлацијска стопа има позитиван утицај на утају пореза, док инфлациони порез има негативан утицај на утају пореза. Наш приступ настоји да тумачи ове резултате кроз призму теорије инфлационог финансирања. Ова теорија разјашњава како инфлациона стопа и имплицитни приходи које она генерише доприносе регулацији обима утаје пореза у земљи.

Кључне ријечи: *инфлација, инфлаторни порез, утаја пореза, Гренџерова каузалност, инфлаторно финансирање*.

Претходно саопштење

Preliminary Announcement

ASSESSMENT OF THE QUALITY OF FINANCIAL STATEMENTS OF GOVERNMENT-OWNED ENTERPRISES IN BOSNIA AND HERZEGOVINA

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ABSTRACT

The aim of this paper is to assess the quality of financial statements of government-owned enterprises in Bosnia and Herzegovina based on the information contained in the audit reports of the supreme audit institutions. The research was conducted on a sample of 135 audit reports related to the reporting periods from 2018 to 2022. The method of content analysis was used to collect data. The results of the research show that in over 80% of cases the auditors gave a modified audit opinion indicating that the quality of the financial statements is not at the satisfactory level. Most of the reasons for modifying the audit opinion relate to noncompliance with the provisions of IAS 1, IFRS 9, IAS 36, IAS 16, IAS 37 and IAS 2. In most cases, irregularities in the financial statements of government-owned enterprises are the result of not performing an assessment of the impairment of fixed and current assets and reducing the value of these assets to a recoverable amount. Because of this, the value of the assets is overestimated, the expenses are underestimated and the financial result is overestimated.

1. INTRODUCTION

Government-owned enterprises represent enterprises that perform activities of public interest and in whose equity capital the state or some part of it directly or indirectly has majority ownership. These enterprises are formed to provide electricity production and supply services, water supply services, waste collection and disposal services, rail transport services, etc. Through the establishment of government-owned enterprises, the state strives to improve the quality of life of its citizens and at the same time stimulate economic development and protect strategic resources. In many countries, government-owned enterprises have great

economic and political importance. They play an important role in improving the performance of the economy because they significantly contribute to the increase of the gross domestic product (GDP) and total employment and influence the operations and financial performance of private enterprises (Malinić, 2015).

However, the results of numerous studies have shown that government-owned enterprises do not fulfil their function as expected and that they are less successful than private enterprises (Wang & Shailer, 2018). Often, government-owned enterprises use resources inefficiently, realise large losses and face problems of insolvency. These are the consequences of inadequate management of these enterprises, insufficient transparency of their operations and lack of adequate supervision over their operations (Malinić, 2015). Managers of government-owned enterprises, especially in developing countries, are usually under the influence and protection of political structures, which allows them to behave very offhandedly, even in conditions when enterprises achieve bad results. They do not bear the consequences for poor management and poor performance of the enterprises. Due to the fact that they perform activities of public interest, government-owned enterprises are considered socially necessary. Therefore, their losses and financial recovery are financed from the state budget, with the aim of avoiding their bankruptcy (Malinić, 2015). This gives managers the assurance that government-owned enterprises will survive, and they will retain managerial positions, despite poor performance. Therefore, they do not have to make excessive efforts to improve the quality of management and business efficiency.

Government-owned enterprises in Bosnia and Herzegovina have a great influence on the country's economy. Čegar & Parodi (2019) determined that this impact is mostly negative due to their low profitability, high leverage and low liquidity. Namely, government-owned enterprises affect the labour market, fiscal sustainability and competitiveness of the economy. Of the total number of employees in Bosnia and Herzegovina, 11% are employed in government-owned enterprises. Labour productivity in these enterprises is lower than in private enterprises, but average salaries are 40% higher. Government-owned enterprises own 40% of all fixed assets in the economy, but these enterprises are responsible for only 10% of total turnover. The total debts of government-owned enterprises amount to about 26% of GDP. A significant part of the outstanding obligations refers to obligations for taxes and social contributions. This has a negative impact on the collection of tax revenues and the functioning of the public pension and health insurance system. Almost half of government-owned enterprises are insolvent and rely on government support to survive. There are no official policies that condition government support for government-owned

enterprises. Direct subsidies and loan guarantees are granted to government-owned enterprises without explicit obligations of these enterprises. Government-owned enterprises in Bosnia and Herzegovina do not contribute enough to the development of infrastructure, which calls into question the justification of their existence. All this indicates that it is necessary to reform government-owned enterprises.

Defining and implementing reform activities requires that government-owned enterprises have quality financial statements. Financial statements that give a true and objective view of the financial position and performance of these enterprises are needed. Only on the basis of such financial statements it is possible to objectively assess the current situation, assess the risks government-owned enterprises face and define adequate policies and strategies for future action. Financial statements that do not contain true and objective information can mislead the state as owner, prevent effective business decision-making and increase the risk of making wrong decisions.

Unfortunately, there are numerous examples of fraudulent financial reporting by government-owned enterprises (Malinić, 2015). Poor financial performance is in itself a threat to the integrity of financial reporting. Government-owned enterprises are constantly exposed to criticism for achieving poor results, insufficient operational efficiency, excessive spending of resources, etc (Milojević, 2018). Because of this, managers feel the pressure to show in the financial statements that the financial condition and the achieved results are better than they are. They seek and find all possible ways to avoid showing the real situation (Milojević, 2018).

Auditing plays a significant role in improving the quality of financial statements. It contributes to the strengthening of accounting discipline and the responsibility of those who prepare financial statements (Đorđević & Spasić, 2022). An audit opinion based on objective evidence indicates the quality of the financial information contained in the financial statements. An unmodified audit opinion indicates that the financial statements are true and objective, while a modified audit opinion indicates the poor quality of the financial statements. By issuing a modified audit opinion, the auditor tries to limit the opportunistic behaviour of managers.

The quality of financial statements can be viewed in different ways. There is no single methodology for assessing the quality of financial statements. Researchers use different methods to assess the quality of financial statements such as, for example, the earnings management method, the accounting conservatism method, and accrual-based models (Rudžionienė & Guptor, 2019). The

quality of financial statements can also be evaluated based on the information contained in audit reports (Aljinovic Barac, Vuko, & Šodan, 2017; Vučković Milutinović, 2019). In most cases, a modified audit opinion is a consequence of the auditor's disagreement with management regarding the appropriateness of selected accounting policies, the application of selected accounting policies, or the appropriateness of disclosures in the financial statements. This means that a modified audit opinion usually indicates that, to a greater or lesser extent, the financial statements are not true and objective.

The aim of this paper is to assess the quality of financial statements of government-owned enterprises in Bosnia and Herzegovina based on the information contained in the audit reports of the supreme audit institutions. Based on the type of audit opinion, it will be determined how often the auditors indicate that the financial statements of government-owned enterprises are true and objective and how often they indicate that the financial statements are not of satisfactory quality. In this way, the scope of irregularities in the financial statements of government-owned enterprises in Bosnia and Herzegovina will be assessed. Also, based on the reasons for modifying the audit opinion that the auditors state in their audit reports, it will be determined which International Accounting Standards (IAS) and International Financial Reporting Standards (IFRS), i.e. which provisions of these standards, are most often violated.

The remainder of the paper is structured as follows. The second section provides an overview of previous research. The third section describes the research design. Empirical results are presented and discussed in the fourth section. Concluding remarks are given in the fifth section.

2. LITERATURE REVIEW

In recent years, issues of quality of financial statements, quality of accounting information, quality of disclosure, etc. have attracted more attention from researchers, but the number of studies that have been done on this topic is still insufficient (Aljinovic Barac, Vuko & Šodan, 2017; Chaney, Faccio & Parsley, 2011; Gaynor, Kelton, Mercer & Yohn, 2016; Herath & Albarqi, 2017; Hope, Thomas & Vyas, 2013; Liu & Lu, 2003; Rudžionienė & Guptor, 2019; Tang, Chen & Lin, 2016). Most of the research was done on a sample of private enterprises or listed companies, regardless of their ownership (Aguguom & Ebun, 2021; Aljinovic Barac, Vuko & Šodan, 2017; Demir & Bahadir, 2014; Herath & Albarqi, 2017; Hope, Thomas & Vyas, 2013; Mbawuni, 2019; Robu & Istrate, 2015; Tang, Chen & Lin, 2016; Vučković Milutinović, 2019). Although

the quality of financial statements of government-owned enterprises is equally important, fewer researchers have dealt with this topic (Chaney, Faccio & Parsley, 2011; Đorđević & Spasić, 2022; Istrate, 2018, Rudžionienė & Guptor, 2019).

There is a widespread opinion in the literature that government-owned enterprises are the root of operational inefficiency that affects the level of quality of accounting information (Wang & Yung, 2011). It is believed that state ownership of enterprises is associated with lower quality of accounting information and that there are several reasons leading to this (Chaney, Faccio & Parsley, 2011). Thanks to political connections, government-owned enterprises often receive certain benefits. Their managers try to hide these benefits in the financial statements. There is no manager's responsibility for poor financial reporting. They are not penalised for the low quality of accounting information and therefore do not feel the need and pressure to improve the quality of accounting information. Also, due to political connections, government-owned enterprises do not face the rise in debt prices due to the reporting of poor quality accounting information, which is the case with other enterprises.

Despite strong arguments in favour of the negative impact of state ownership on the quality of financial statements, the results of empirical research give conflicting results. Chaney, Faccio & Parsley (2011) examined the quality of accounting information reported by politically connected enterprises, which include government-owned enterprises. They measured the quality of accounting information by the quality of earnings. The authors found that the presence of political connections is associated with a lower quality of accounting information. Research done by Liu & Lu (2003) and Wang, Aharony & Yuan (2010) also showed that state ownership is related to earnings management.

However, Wang & Yung (2011) found a lower level of earnings for management among state-owned enterprises than among privately-owned enterprises. They found that the difference in the quality of earnings between state-owned and privately-owned enterprises becomes less apparent as the economy becomes more market-driven. Ding, Zhang & Zhang (2007) also found that privately-owned companies manage earnings more than state-owned companies. One possible explanation for these surprising results is that the government's protection of state-owned enterprises may have reduced the pressure on managers to manipulate information contained in financial statements (Wang & Yung, 2011). It should be borne in mind that both of these studies were conducted on a sample of Chinese companies and that the obtained results may reflect the specifics of the Chinese capital market. Chinese privately-owned companies are still in a weaker position due to specific political and historical factors and are therefore under pressure to

present financial results better than the real ones in order to convince the market (Ding, Zhang & Zhang). Conflicting results in existing research suggest that a better understanding of the relationship between state ownership and earnings management is needed.

Comparative analyses of the quality of financial reporting in different countries show that the quality of financial reporting in developed countries is at a higher level compared to developing countries (Tang, Chen & Lin, 2016). Economically developed countries have a developed capital market with established investor protection mechanisms, an efficient legal system, a lower degree of corruption and developed accounting and auditing practice. They have developed mechanisms that oblige managers of state-owned enterprises to operate more transparently and responsibly. Bearing this in mind, it is expected that the quality of financial statements of state-owned enterprises in developed countries is at a higher level than in developing countries. This is confirmed by research. For example, Olmo Vera & Brusca Alijarde (2021) found that 96% of the considered state-owned enterprises in Spain received an unqualified audit opinion, while in only 4% of cases the auditors gave a modified audit opinion indicating insufficient quality of financial statements.

Studies conducted on a sample of state-owned enterprises in Serbia, Romania and Kenya show that the quality of financial statements of state-owned enterprises in developing countries is at an extremely low level. Đorđević & Spasić (2022) determined that 36% of the considered state-owned enterprises in Serbia manipulated information on realised revenues in order to overestimate or underestimate the financial result of the enterprise. By reviewing the audit reports issued by the State Audit Institution, they determined that 83% of state-owned enterprises that made up the sample received a modified audit opinion. Istrate (2018) found that in 78% of the audit reports of the sampled Romanian state-owned enterprises, the auditors expressed a modified audit opinion on the financial statements, indicating that the financial statements contain material misstatements or that they were unable to gather sufficient evidence to express an audit opinion on the truth and objectivity of a particular position of the financial statement or the entire financial statements. Istrate (2018) also determined that the most common materially significant misstatements in financial statements relate to the recognition of certain assets and liabilities, the assessment of provisions, the determination of depreciation of fixed assets, the recognition of potential liabilities in connection with court cases, etc. Oruke, Iraya, Omoro and Otieno (2021) found that in 68% of the analysed audit reports of state-owned enterprises in Kenya, the auditors issued a modified audit opinion on the financial statements of these enterprises. The results of these studies show that the quality

of financial reporting in most state-owned enterprises in developing countries is not at a satisfactory level. Given that Bosnia and Herzegovina belongs to the group of developing countries, it could be expected that the quality of financial statements of government-owned enterprises in Bosnia and Herzegovina is also at a very low level.

3. RESEARCH DESIGN

The aim of this research is to assess the quality of financial statements of government-owned enterprises in Bosnia and Herzegovina based on audit opinions and other information contained in audit reports. The research was conducted on a sample of 135 audit reports on the financial statements of government-owned enterprises in Bosnia and Herzegovina. The research covered the period from 2018 to 2022.

Defining the sample was accompanied by numerous difficulties due to the unavailability of information on the operations of government-owned enterprises. Data on the exact number of government-owned enterprises in Bosnia and Herzegovina is not publicly available. There is no single register of government-owned enterprises. There are registers of government-owned enterprises that are owned by certain parts of the state, but they are not updated regularly. Some of them have not been updated for years, so the reliability of the information they offer is highly questionable. In order to raise the level of transparency of the operations of government-owned enterprises in Bosnia and Herzegovina, certain non-governmental organisations strive to collect and publish as much information as possible about the operations of these enterprises. These organisations determined that there are 582 government-owned enterprises in Bosnia and Herzegovina (Transparency International Bosna i Hercegovina, 2024). Although all government-owned enterprises are obliged to submit to the competent institution the audit reports together with the financial statements that were the subject of the audit no later than the end of June of the current year for the previous year, a significant number of government-owned enterprises, more than 100 of them, do not submit their financial statements and audit reports. Competent institutions to which government-owned enterprises submit financial statements and audit reports have not made these reports publicly available.

Financial statements of government-owned enterprises in Bosnia and Herzegovina are subject to audit by the supreme audit institution, but in years when they are not included in the audit plan of the supreme audit institution, they are required to hire an external audit firm to audit their financial statements. Audit reports on

the financial statements of government-owned enterprises, which were prepared by independent external auditors, are not usually available to the public. In most cases, only audit reports related to listed government-owned enterprises are publicly available. However, the analysis of the audit reports of these enterprises would not give a real insight into the quality of the financial statements of all government-owned enterprises in Bosnia and Herzegovina, because listed companies, including listed government-owned enterprises, usually have a higher level of quality of financial statements compared to enterprises whose securities are not traded on stock exchanges. These companies strive to improve the quality of financial statements in order to meet the requirements for listing their securities on the stock exchange, attract potential investors, increase the turnover of their shares, etc. In this regard, the subject of analysis in this research are the audit reports prepared by the supreme audit institutions.

The supreme audit in Bosnia and Herzegovina is under the jurisdiction of entities (Republic of Srpska and Federation of Bosnia and Herzegovina) and Brčko District. Although the supreme audit offices at the entity level and at the district level have a legal obligation to conduct audits of the financial statements of all government-owned enterprises, audits are conducted only sporadically, due to limited capacity. In this regard, the Audit Office of the Institutions in the Federation of Bosnia and Herzegovina conducted a total of 95 audits of financial statements of government-owned enterprises for the reporting periods from 2018 to 2022. The Supreme Audit Office of the Republic of Srpska, Public Sector and the Office for the Audit of Public Administration and Institutions in the Brčko District each performed 20 audits of financial statements of government-owned enterprises for the same period. This means that for the reporting periods from 2018 to 2022, a total of 135 audits of financial statements of government-owned enterprises were performed in Bosnia and Herzegovina by competent supreme audit institutions. In the considered period, on average, 27 audits of financial statements of government-owned enterprises were performed annually. This means that the financial statements of less than 5% of government-owned enterprises in Bosnia and Herzegovina are audited annually. Only the Office for the Audit of Public Administration and Institutions in the Brčko District audited the financial statements of all 4 government-owned enterprises operating in the Brčko District every year. All completed audit reports are included in the sample.

The collected audit reports were subjected to content analysis. Content analysis was performed to determine the type of audit opinion contained in the audit report and the reasons for issuing a modified audit opinion.

4. RESULTS

Table 1 shows the frequency of certain types of audit opinions on the financial statements of government-owned enterprises in Bosnia and Herzegovina in the period from 2018 to 2022. In only 18.5% of audit reports, auditors expressed an unmodified audit opinion, while in as many as 81.5% of audit reports they expressed one of the modified audit opinions. In the largest number of audit reports (52.6%), the auditors expressed a qualified opinion. A negative audit opinion was expressed in 28.1% of audit reports, while in only one audit report the auditor gave a disclaimer of opinion.

Table 1: Distribution of different types of audit opinions in the period from 2018 to 2022

Type of audit opinion	2018		2019		2020		2021		2022		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Unmodified opinion	6	24.0	7	25.9	4	13.8	3	12.0	5	17.2	25	18,5
Modified opinion	19	76.0	20	74.1	25	86.2	22	88.0	24	82.8	110	81,5
Qualified opinion	7	28.0	15	55.6	17	58.6	14	56.0	18	62.1	71	52,6
Adverse opinion	12	48.0	5	18.5	7	24.1	8	32.0	6	20.7	38	28,1
Disclaimer of opinion	0	0.0	0	0.0	1	3.5	0	0.0	0	0.0	1	0,7
Total	25	100.0	27	100.0	29	100.0	25	100.0	29	100.0	135	100.0

Source: Author's calculation

The presented data show that the financial statements of a relatively small number of government-owned enterprises give a true and objective view of their profitability and financial position. In an extremely large number of financial statements of these enterprises, there are materially significant misrepresentations that distort the picture of the financial performance of enterprise and make the financial statements an unreliable basis for decision-making. The fact that the auditors issued an adverse opinion in 28% of cases is particularly worrying. An adverse opinion indicates that materially significant misstatements pervade the entire financial statements, which is why the financial statements do not give a true and objective view of the achieved results and are not usable for decision-making.

In the audit report in which the modified audit opinion is expressed, the auditor is obliged to describe the reasons for the modification of the audit opinion. The auditor may have one or more reasons for modifying the audit opinion.

The reasons for the modification of the audit opinion may be the existence of a material misstatement in the financial statements or the impossibility to gather enough adequate audit evidence. In this research, attention is focused on the reasons for modifying the auditor's opinion related to the existence of materially significant misstatements, i.e. violations of the provisions of IAS and IFRS.

Table 2 shows the number and percentage of violations of certain accounting standards in the financial statements of government-owned enterprises in the period from 2018 to 2022. Given that auditors in their audit reports usually state several reasons for modifying the audit opinion, the number of violations of accounting standards is greater than the number of audit reports that contain a modified audit opinion. The average number of violated accounting standards per modified audit report is 1.96 for the considered period.

Table 2: Reported number (percentage) of violations of accounting standards in financial statements of government-owned enterprises in the period from 2018 to 2022

IAS/IFRS	2018	2019	2020	2021	2022	Total
IAS 1	13 (26.5)	4 (10.0)	7 (12.7)	9 (16.1)	18 (27.7)	51 (19.2)
IAS 2	6 (12.2)	2 (5.0)	5 (9.1)	6 (10.7)	2 (3.1)	21 (7.9)
IAS 7	1 (2.0)	1 (2.5)	2 (3.6)	0 (0.0)	4 (6.2)	8 (3.0)
IAS 8	0 (0.0)	0 (0.0)	3 (5.5)	0 (0.0)	4 (6.2)	7 (2.6)
IAS 16	6 (12,2)	5 (12.5)	6 (10.9)	9 (16.1)	7 (10.8)	33 (12.5)
IAS 18	0 (0.0)	0 (0.0)	1 (1.8)	0 (0.0)	0 (0.0)	1 (0.4)
IAS 20	2 (4.1)	1 (2.5)	1 (1.8)	0 (0.0)	0 (0.0)	4 (1.5)
IAS 21	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.5)	1 (0.4)
IAS 36	4 (8.2)	5 (12.5)	9 (16.5)	15 (26.7)	12 (18.4)	45 (17.0)
IAS 37	7 (14.4)	4 (10.0)	2 (3.6)	7 (12.5)	6 (9.2)	26 (9.8)
IAS 38	1 (2.0)	2 (5.0)	3 (5.5)	1 (1.8)	0 (0.0)	7 (2.6)
IAS 39	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)
IAS 40	0 (0.0)	0 (0.0)	2 (3.6)	0 (0.0)	1 (1.5)	3 (1.1)
IFRS 5	0 (0.0)	2 (5.0)	0 (0.0)	1 (1.8)	0 (0.0)	3 (1.1)
IFRS 9	7 (14.4)	12 (30.0)	13 (23.6)	7 (12.5)	10 (15.4)	49 (18.6)
IFRS 15	1 (2.0)	1 (2.5)	1 (1.8)	1 (1.8)	0 (0.0)	4 (1.5)
IFRS 16	0 (0.0)	1 (2.5)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.4)
Total	49 (100)	40 (100)	55 (100)	56 (100)	65 (100)	265 (100)

Source: Author's calculation

As can be seen from Table 2, noncompliance with IAS 1 is the most frequently reported reason for modifying the audit opinion (19.2%). A detailed analysis of the reasons for this noncompliance shows that the disagreement between managers

and auditors in almost half of the cases is related to the fact that the enterprise did not make an assessment, nor did it disclose a significant uncertainty regarding the ability of the enterprise to operate as a going concern. Other audit qualifications related to the provisions of IAS 1 relate to the fact that certain assets, liabilities, capital, income or expenses are not recognised in accordance with the accrual basis of accounting, that the disclosures required by this standard are missing and that the appropriate classification of certain liabilities into short-term and long-term and certain assets into fixed and current has not been carried out.

The second most frequently reported reason for modifying the audit opinion refers to noncompliance with IFRS 9 (18.6%). Most of the qualifications refer to the fact that the enterprises did not perform an assessment of expected credit losses for receivables older than one year and, therefore, did not perform a value adjustment of these receivables. One part of the qualifications refers to the fact that enterprises have not written off receivables that they have determined to be uncollectible. The aforementioned violations of the provisions of IFRS 9 result in expenses being understated, and assets (receivables) and the financial result being overstated.

A large number of audit reports state a violation of IAS 36 (17.0%). In almost half of the cases related to the violation of the provisions of this standard, the auditors state that the enterprise did not evaluate whether there are any indicators that the value of an asset is impaired, without specifying the type of assets. Obviously, this relates to all assets that the enterprise owns, which the provisions of this standard apply to. In a smaller number of cases, the auditors state that the enterprise did not assess whether there are any indicators that the value of a certain group of assets is impaired (property, plant and equipment; only property, plant and equipment under construction; or investments in subsidiaries).

The next most frequently reported reason for modifying the audit opinion refers to the violation of the provisions of IAS 16 (12.5%). A more detailed analysis revealed that the auditors state the violation of numerous provisions of this standard. The auditors state in their audit reports that a certain number of enterprises did not recognise all property, plant and equipment, they did not activate property, plant and equipment under construction that were completed, they did not calculate depreciation on all property, plant and equipment, they did not apply the appropriate depreciation method, they did not write off certain assets even though the conditions for that were met, they did not provide all the necessary disclosures, etc.

The auditors also indicate frequent violations of the provisions of IAS 37 (9.8%) and IAS 2 (7.9%). Noncompliance with the provisions of IAS 37 in most cases

refers to the fact that the enterprises did not recognise provisions for court cases against the enterprises and for land restoration. As a result, expenses and liabilities are underestimated, and the financial result is overestimated. Other violations of this standard refer to failure to assess the value of provisions, failure to cancel long-term provisions even though the conditions for this have been met, failure to make necessary disclosures, etc. Inconsistencies with the provisions of IAS 2 mostly relate to the fact that enterprises did not determine the net recoverable value of inventories on the balance sheet date and, therefore, did not perform inventory value adjustments. Other violations of this standard refer to the fact that enterprises do not determine conversion costs of inventory that are necessary to determine the balance sheet value of finished goods inventory and work-in-progress inventory. Violations of the provisions of other IAS and IFRS are less often mentioned in audit reports.

5. CONCLUSIONS

This research has shown that the quality of financial statements of government-owned enterprises in Bosnia and Herzegovina is at an extremely low level. The data show that the financial statements of over 80% of government-owned enterprises in Bosnia and Herzegovina do not provide a true and objective view of the financial position and profitability of these enterprises. This means that the financial statements of the vast majority of government-owned enterprises are not a reliable basis for decision-making. The state, as the owner of these enterprises, does not have at its disposal a reliable instrument for assessing the current situation, assessing risks and defining policies and strategies for future actions that should pull government-owned enterprises out of the financial hole where they find themselves.

Providing data on IAS and IFRS that are most often violated, i.e. about the provisions of these standards that are most often violated, this research allows us to see the ways in which the picture of the achieved financial performance of government-owned enterprises is distorted. In a large number of audit reports, violations of the provisions of IFRS 9, IAS 2 and IAS 36 related to the value adjustments of receivables, inventories and fixed assets were reported. A large number of government-owned enterprises do not assess the impairment of fixed and current assets and do not reduce the value of these assets to a recoverable amount. Because of this, the asset value is overestimated, the expenses are underestimated and the financial result is overestimated. In addition, auditors report a frequent violation of the provisions of IAS 37, which refer to the recognition of provisions for certain categories of expenses. Due to the non-

recognition of provisions, liabilities and expenses are understated and the financial result is additionally overstated. It shows that the financial performance of many government-owned enterprises is much worse than their financial statements show.

In their audit reports, the auditors point to frequent violations of IAS 1, i.e. provisions related to the assessment of the ability of the enterprise to operate as a going concern. Managers of government-owned enterprises are aware of the fact that, despite poor performance, the survival of these enterprises will not be questioned. They will receive financial resources from the budget in order to continue its operations. Because of this, managers probably feel that it is not necessary to assess the ability of the enterprise to continue operating as a going concern because it will not be called into question. Therefore, they probably feel that there is no need to disclose anything about it in the financial statements.

The results of this research could be useful to the state as the owner of government-owned enterprises and the regulatory bodies in charge of designing and implementing initiatives to improve the quality of financial statements. In order to create preconditions for improving the quality of financial statements of government-owned enterprises, it is necessary to increase the capacity of supreme audit institutions in Bosnia and Herzegovina. If audits of the financial statements of less than 5% of government-owned enterprises are carried out annually, this means that up to 20 years can pass between two audits of the financial statements of a government-owned enterprise. An audit of financial statements that is done every 5, 10 or 20 years cannot contribute to strengthening accounting discipline and the responsibility of those who prepare financial statements. Increasing the capacity of supreme audit institutions is necessary, but not sufficient to increase the quality of financial statements of government-owned enterprises. It is crucial to make government-owned enterprise managers accountable for the quality of financial statements and the overall performance of the enterprise. Managers have to bear the consequences for low-quality financial reporting, but also for poor enterprise performance. Only then will they be interested in improving all aspects of the operations of government-owned enterprises, including financial reporting.

When interpreting the results of this research, the limitations that existed in the research should be taken into account. The research was conducted on a relatively small sample. This limitation is of an objective nature and is the consequence of the number of financial audits performed by the supreme audit institutions in Bosnia and Herzegovina in the period covered by the research. However, there is a possibility that the sample is not sufficiently representative and this should

be taken into account when generalizing the results. Also, it should be borne in mind that the type of audit opinion and the reasons for modifying the audit opinion do not only depend on the quality of the financial statements, but also on the quality of the audit. Audit quality is reflected in auditors' ability to identify material misstatements in financial statements and their willingness to disclose information about identified material misstatements in their audit reports.

Finally, there is considerable scope for further empirical research. It would be interesting to determine the reasons for the low quality of financial statements of government-owned enterprises in Bosnia and Herzegovina, to compare the quality of financial statements of government-owned enterprises and enterprises that are privately owned, and to determine whether ownership affects the quality of financial reporting. Also, it would be useful to assess the quality of the financial audit that is being conducted in Bosnia and Herzegovina.

Conflict of interests

The authors declare there is no conflict of interest.

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ОЦЈЕНА КВАЛИТЕТА ФИНАНСИЈСКИХ ИЗВЈЕШТАЈА ЈАВНИХ ПРЕДУЗЕЋА У БОСНИ И ХЕРЦЕГОВИНИ

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САЖЕТАК

Циљ овог рада је да се оцијени квалитет финансијских извјештаја јавних предузећа у Босни и Херцеговини на основу информација садржаних у ревизорским извјештајима врховних ревизорских институција. Истраживање је спроведено на узорку 135 ревизорских извјештаја који се односе на извјештајне периоде од 2018. до 2022. године. За прикупљање података коришћен је метод анализе садржаја. Резултати истраживања показују да су у преко 80% случајева ревизори дали модификовано ревизорско мишљење указујући на то да квалитет финансијских извјештаја није на задовољавајућем нивоу. Већина разлога за модификацију ревизорског мишљења се односи на неусклађеност са одредбама МРС 1, МСФИ 9, МРС 36, МРС 16, МРС 37 и МРС 2. У највећем броју случајева неправилности у финансијским извјештајима јавних предузећа су посљедица тога што се не врши процјена обезвријеђености сталне и текуће имовине и свођење вриједности ове имовине на надокнадив износ. Као резултат тога, вриједност имовине је прецијењена, трошкови су потцијењени и финансијски резултат је прецијењен.

Кључне ријечи: *квалитет финансијских извјештаја, јавна предузећа, ревизорски извјештај, врховна ревизорска институција, кршење одредби МРС и МСФИ.*