Impact of Inflation on Economic Growth in Developing European Countries

Getoar Lubeniqi, Artan Haziri[*] and Kestrim Avdimetaj

Faculty of Management and Business and Economics, University for Business and Technology, Str. "Kalabria", 10000 Pristina, The Republic of Kosovo.

Abstract: The recent crisis between Russia and Ukraine resulted in most European countries experiencing high inflation rates from early 2022. Therefore, analysis the relationship between the inflation rate and economic growth in developing European countries is the primary objective of this research. In addition, this study will analyze the relationship between inflation and growth in a sample of 20 European developing countries from 1995 to 2022. We applied several methods to substantiate the hypotheses and test the data, including econometric measurements based on regression techniques such as OLS, Fixed Effects, Random Effects and GMM's Dynamic Panel Data Estimator. The relationship between inflation and economic growth based on the results of the study show a non-linear relationship, where a 1% increase in inflation levels expected to negatively impact economic growth in developing European countries by -0.017%. In addition, the results of this study also show a negative correlation between the inflation rate and private consumer spending. The limitations of this study are that the data only covers the period up to 2022. Therefore, in the future, this study should support more measurements considering the following years, when the inflation rate in European developing countries remains high.

INTRODUCTION

The relationship between inflation and economic growth has always been a vital segment that has been widely discussed and researched in academic scrutiny for developed countries and for developing countries as a substantial determinant in the design of economic policy frameworks. Therefore, it is significant for the policymakers of the governments of developing countries or developed countries to analyze the relationship between the level of inflation and economic growth. Many researchers have investigated the non-linearity between inflation and economic growth. When the inflation rate is at a moderate level, this means that the relationship between inflation and growth is significantly positive. On the contrary, the unbalanced inflation rate growth could harm economic growth. Therefore, if such a relationship exists, it is possible to evaluate the ratio between inflation and economic growth, which would cause positive or negative effects for countries with developing economies. In this way, many researches examined analyze the relationship between inflation and economic growth and, and at the same time have tried to test the non-linearity in the function of the relationship between inflation and economic growth (Niyimbanira, 2013; Kremer, Bick & Nautz, 2009; Thanh, 2015; Valdovinos, 2003; Ndoricimpa, 2017; Hussain & Malik, 2011;

Özyılmaz, 2022; Ahmed & Mortaza, 2005; Doguwa, 2012; Sare, Ibrahim & Musah, 2019; Al-Khulaifi, 2018; Risso & Carrera, 2009).

Consequently, the purpose of this paper is to analyze and research the relationship between inflation and economic growth, examining that if the inflation rate is above the average level, will it have positive effects on economic growth for developing European countries. Therefore, we propose the following two research hypotheses to fulfill the purpose of researching the relationship between inflation and growth:

H1: The increase in the inflation rate above the moderate level for developing European countries has a negative effect on economic growth.

H2: The inflation rate increase is likely to negatively impact the reduction of private consumption expenses for developing European countries.

To test the relationship between inflation and growth and to reach at the main findings of this paper, in this paper different econometric models and different techniques were used, such as OLS, Fixed Effects, Random Effects, and GMM. While the data from the World Bank, Kosovo Agency of Statistics, and the Central Banks of the respective countries for 1995-2022 have been collected for this paper.

According to the study's findings, there is a negative correlation between the inflation rate and economic growth in developing European countries. From this point of view of the findings of the study, among the main factors that have im-

*Address correspondence to this author at the Faculty of Management and Business and Economics, University for Business and Technology, Str. "Kalabria", 10000 Pristina, The Republic of Kosovo,
E-mail: artan.haziri@ubt-uni.net

plicated the hostile increase in the level of prices and the negative impact on economic growth for developing European countries is the beginning of the war between Russia and Ukraine that affected the increase in energy prices and goods in general. Additionally, the COVID-19 pandemic caused disruptions in global markets. Initially, the pandemic caused interruptions in the supply chain due to closures and restrictions imposed by various countries. However, even after the lift of restrictions and markets reopened, the effects of the pandemic continued to influence the increase in demand across all developing European countries. Also, the Western Balkans countries have experienced an increase in the level of prices as a direct result of the factors mentioned before. Also, the Western Balkans countries have a high level of import of goods from international markets, which means that this increase in prices is also a result of the import of inflation. However, this increase in prices did not come only as a result of external and internal factors, such as, for example, the increase in demand within the Western Balkans countries also manifested the growth.

Such a study has never been done for European developing countries before, so the main objective of this work is to fill this missing deficit.

The structure of this paper is organized as follows: Section 1 begins with an introduction; Section 2 contains the literature review; Section 3 covers methodology and data; Section 4 presents the empirical results, and Section 5 contains the conclusions.

LITERATURE REVIEW

A series of studies have been conducted in the last decades on the relationship between inflation and growth by different authors who have analyzed and researched this relationship for different countries in general or one country in particular. More specifically, in academic scrutiny, many empirical studies have been addressed which have analyzed the impact of the increase in the level of inflation on economic growth (Khan & Senhadji, 2001; Hasanov, 2011; Kremer, Bick & Nautz, 2009; Hussain & Malik, 2011; Niyimbanira, 2013; Thanh, 2015; Ndoricimpa, 2017; Drukker, Gomis-Porqueras & Hernandez-Verme, 2005; Al-Khulaifi, 2018; Özyılmaz, 2022; Bawa & Abdullahi, 2012; Mubarik, 2005; Ahmed & Mortaza, 2005).

According to Bic (2010), Fischer (1993) was the first to identify the non-linear relationship between inflation and economic growth. Fischer (1993), according to Dammak and Helali (2017), examined 87 different countries in the period 1970-1990 and using annual panel data from Gross Domestic Product (GDP), rates of investment and government spending, terms of trade, the Consumer Price Index (CPI), and the real exchange rate, managed to discover a function of the relationship between inflation and economic growth by identifying a threshold of 8% in their function, where the inflation rate lower than 8% has a positive effect on economic growth. The opposite, the effects will be adverse when inflation rates are increasing. Later, similarly, Khan and Senhadji (2001), in their study analyzing 140 countries and including developing countries, industrial countries and those in general, manage to examine the threshold level in function of the inflation relationship economic growth, applying Hansen's

(2000) estimation technique in a panel. Their findings result and suggest the existence of a threshold level at which inflation would have a significant adverse effect on economic growth. Estimates for developing countries were 11-12%, and for industrial countries, they were 1-3%. Hussain and Malik (2011) conducted a study in Pakistan using annual data from 1960-2006 and discovered the one-way existence between inflation and growth arguing that there exists a positive correlation between these two variables. Similarly, Niyimbanira (2013) investigated inflation and growth in South Africa for the period 1980-2010, and the research findings were that inflation and growth have a one-way relationship in the long run. Sarel (1996), using data on GDP, consumer price indices, real exchange rates, population, investment rates, government expenditures and terms of trade for the years 1970-1990 in 87 different countries, analyzed the non-linearity of inflation in economic growth by discovered the existence of a threshold of 8% between inflation and growth. When inflation is lower than 8%, the effects will not be negative, on the contrary, it can have positive effects, while when inflation is above the 8% rate, the effects will be adverse. Vinayagathasan (2013) analyzed 32 Asian countries from 1980-2000, revealing a borderline level of the relationship between inflation and economic growth at a threshold of 5.43%. Inflation will have adverse effects when it crosses this threshold of 5.43%, while it will have no effect below the rate of 5.43%. Azam and Khan (2020), in their empirical study of 27 countries analyzed (16 developing and 11 developed economies) covering the period 1975-2018, revealed the finding that inflation and growth have a non-linear relationship and the threshold level for developed countries was 5.28, while for developing economies 12.23%. Al-Khulaifi (2018), in the empirical study conducted on inflation and growth in Qatar for the years 1980-2016, argues that there is a one-way relationship in the long term between inflation and growth. Empirical research conducted by Pypko (2009), which analyzed the relationship between inflation and economic growth for the CIS countries for the period 2001-2008, found that between inflation and growth there is a threshold level of 8% in function of their relationship. In addition, if the rate is higher than 8%, the impact would be harmful and vice versa. Using (PSTR) - a panel smooth transition regression model, another study examining inflation and growth was conducted by Omah and Kan (2010) for six developed countries from 1972-2005. The study's empirical results showed a threshold of 2.52%, and the effects are adverse when the inflation rate exceeds this threshold. In the study for the 27 EU countries for the years 1999-2019 on inflation and growth, conducted by Özyılmaz (2022) and using the causality of Dumitrescu and Hurlin (2012), it concluded that there is a two-way relationship of causality, from the impact of inflation on economic growth and vice versa.

Research by Burdekin et al. (2004) empirically examined when inflation affects economic growth, covering the period 1967–1992 for 51 developing countries and 21 developed countries using the generalized least squares (GLS) fixed-effects estimator. Their results showed marked differences in non-linearity between developed and developing countries. For example, the existential threshold showing that inflation will have severe adverse effects was 3% for developed economies and 8% for developed countries. Dammak and Helali

(2017), for the period 1993-01–2012-11, examined inflation and growth for Tunisia based on the economic model by Hansen (2001). They discovered that the relationship between inflation and growth is not linear, proving the existence of a threshold in Tunisia. Their findings revealed a boundary between inflation and growth in Tunisia. Their findings were that inflation will have positive effects on growth when the rate of 3.48% is below this rate and vice versa. Similarly, Mubarik (2005), in his study between inflation and growth to investigate the threshold level in Pakistan for the years 1973-2000 using annual dataset, found in the results of the study the threshold of 9%, suggesting that inflation rises above this rate will have adverse effects. Hasanov (2011), in his study on the relationship between inflation and economic growth in the Azerbaijani economy covering the period from 2000 to 2009, concluded that when the inflation rate exceeds the rate 13% the effects are negative, and vice versa. On the other hand, Munir, Mansur & Furuoka (2009) used Hansen's (2000) endogenous autoregressive threshold model to study inflation and growth in Malaysia and the discovery of a threshold level in the period 1970-2005, arrive at the end by finding the threshold level of 3.89%. This result suggests that above this threshold, the inflation rate will have a negative impact on economic growth. On the other hand, the inflation impact will be positive on economic growth below this threshold. Similarly, Ahmed and Mortaza (2005), analyzed inflation and economic growth in Bangladesh during the period 1981-2005 using real annual GDP and CPI data through two economic models Engle-Granger (1987) and the Error Correction Model (ECM). Based on the empirical evidence found by the study, the breaking point was estimated at 6%, and above this rate, the impact of inflation will negatively affect economic growth. Other studies done for different countries for thresholds showing the relationship between inflation and economic growth include 6% for Vietnam (Tien, 2021), 13% for Nigeria (Bawa & Abdullahi, 2012), 11% for Ghana (Frimpong & Oteng-Abayie, 2010), 2.5% for China (Hwang & Wu, 2011), 6% for India (Singh, 2010), 8.89% for Turkey (Esen, Aydin & Aydin, 2016).

In the same way, in research in 47 African countries covering 1970-2013, Ndoricimpa (2017) argued the presence of non-linearity between inflation and growth. In his study, he discovered that the threshold level of inflation was 9% for low-income countries, while for middle-income countries, he discovered a threshold of 6.5%. In contrast, in the examination of the whole sample, the level of the inflation threshold was 6.7%. On the other hand, Thanh (2015), in the research conducted in 5 Asian countries for the years 1980-2011 and using the model (PSTR - Panel Smooth Transition Regression), found that if the inflation rate exceeds the threshold level of 7.84%, inflation will have negative effect in growth, and confirmed a positive relationship between inflation and growth if the inflation rate is at the rate of 7.84%

From this point of view of the literature review, the focus of empirical studies on the examination of inflation and growth has been more oriented towards the identification of the threshold level. Therefore, as we have emphasized before, the main purpose of this study is to analyze inflation and economic growth and the relationship between them, contributing to finding results that are statistically significant for

developing European countries based on the fact that most of these countries have faced high levels of inflation since the beginning of 2022.

METHODOLOGY AND DATA

RESEARCH METHODOLOGY

This scientific research methodology utilizes a comprehensive approach that involves several techniques. Through the models, we will test data about inflation, economic growth, government spending, and gross savings for developing European countries from 1995 to 2022. Statistics and data from the World Bank and the European Statistics Agency demonstrate that European countries in development have encountered high inflation rates, primarily in import-oriented countries, since the first quarter of 2022. The increase in inflation is caused directly by the conflict between Russia and Ukraine, where these countries have been essential sources of raw materials for many products produced in the European market. To ensure the reliability of the hypotheses, this paper uses various methods to ensure the high scientific significance of the results. Some methods were used in the first and second parts of the research, while in this part, we will focus on econometric methods and techniques, which will be presented and discussed in the following.

Econometrics is the application of statistical methods to economic data to provide empirical content in economic relationships (Pesaran & Hall, 1988). More precisely, it is the quantitative analysis of current economic phenomena based on the development of theory and observation, connected with appropriate methods of conclusion. The econometric method as a research procedure uses content analysis and data collection for different characteristics. We utilized econometric methods using data from 1995 to 2022. However, we analyzed an "unbalanced data" approach in all econometric models analyzed for developing European countries, covering 1995 to 2022.

This paper uses OLS, Fixed Effects, Random Effects, and the Dynamic Panel Data GMM estimator based on the Arellano Bond and Arellano and Bover tests to investigate the relationship between the inflation rate and economic growth. These methods analyzed how an increase in the inflation rate affects economic growth in European developing countries, specifically in the following countries:

Estonia, Lithuania, Latvia, Czech Republic, Slovenia, Poland, Bulgaria, Belarus, Hungary, Moldova, Romania, Slovakia, Ukraine, Croatia, Albania, Bosnia and Herzegovina, Macedonia, Serbia, Montenegro, and Kosovo. This paper used data from several sources, including the World Bank, the International Monetary Fund, and the European Central Bank, to test and support the hypotheses. The data will cover the period from 1995 to 2022.

EVALUATION OF MODELS

We will use the simple regression method by building the linear regression model, which can predict the value of the dependent variable in this scientific research, specifically to present the influence of the independent variable (inflation rate) on economic growth (Gdp Annual Growth) in develop-

ing European countries. Other statistical methods will also test the data. "Panel Data" is a statistical method widely used in social sciences and econometrics that deals with the observation of data during two dimensions: "Cross-Sectional and Times Series Davies" (Lahiri, Landers & Hollyfield, 1995). Panel data regression techniques allow researchers to take advantage of two types of information represented in "Cross-Sectional and Time Series Data". To investigate the relationship between inflation and economic growth in developing European countries, we will also use "Fixed Effects" and "Random Effects" statistically in this paper. "Fixed Effects" is always a reasonable approach for panel data since it provides stable results. However, it may only sometimes be the most efficient model to use in the treatment of econometric models. While "Random Effects" will provide better "P" values because it is a more efficient preventive, which can be useful if it is statistically justifiable. Both "Fixed Effects" and "Random Effects" are models designed to handle a particular structure of longitudinal data or

"Panel" series data, where the heterogeneity of no individual observable is taken into account in both models. To investigate which of these methods presents the most reliable results, we use the "Hausman" test, which is a mainly statistical test that, in econometrics, makes it possible to test hypotheses and was developed by Jerry A. Hausman.

Unlike the methods we highlighted above, during this study, we will also use the "GMM" evaluation method, which differs from those mentioned earlier. Econometricians and statisticians apply the general method of moments, "GMM", a generic method for estimating parameters in statistical models. They typically apply it in the context of semi-parametric models. When investigating the relationship between inflation and economic growth, we will use the "GMM" estimator developed by Arellano and Bond (1991), Blundell and Bond (1998), and Blundell, Bond and Windmeijer (2000) as it is an appropriate estimator.

DESCRIPRIVE STATISTIC

Table 1. The Statistical Description of Exogenous and Endogenous Variables.

Variables	Defenition, Description and Source	OBS	Mean	Std.Dev	Min	Max
GDP Growth	Annual percentage growth rate of GDP at market prices based on constant local currency. From World Bank Data	523	3.48	6.13	-15.16	88.96
Inflation, Consumer Prices	Annual percentage growth of general government final consuption expenditure based on constant local corrency. From World Bank Data	529	13.31	60.68	-2.41	1058.37
Final Consuption Expenditure	General guvernment expenditure on education (current, capital, and transfers) is expressed as a percentage of expenditure on all sectors. From World Bank Data	345	12.04	3.00	6.70	28.33
Gross Savings	Gross savings are calculated as gross national income less total consuption, plus net transfers. Worls Bank national accounts data, and OECD National Accounts data files. From World Bank Data	429	19.88	6.16	-8.29	33.84
Final Consuption Expenditure	Gross savings are calculated as gross national income less total consuption, plus net transfers. Worls Bank national accounts data, and OECD National Accounts data files. From World Bank Data	476	3.00	4.956	-32.021	19.04

Source: Authors' calculations

EMPIRICAL RESULTS

Table 2. Regression results of the relationship between inflation rate and economic growth in European Developing countries

Variables	OLS	Fixed Effects	Random Effects	GMM
GDP_lag				-0.402***
T-Statistics				(-6.96)
Inflation, Consumer Prices	-0.01***	-0.02***	-0.02***	-0.017***
T-Statistics	(-6.11)	(-8.40)	(-8.37)	(-7.83)

Government Expenditure	-0.19***	0.20***	-0.20***	-0.14***
T-Statistics	(-3.01)	(4.05)	(-4.02)	(-3.01)
Gross Savings	0.08***	0.05***	0.06***	0.06***
T-Statistics	(2.66)	(2.25)	(2.35)	(2.55)
Constant	4.97	5.75***	5.84***	--
T-Statistics	(0.54)	(4.97)	(4.58)	
Observation	424	424	3424	356
Arellano - Bond test for AR (1)				(-2.97) (0.003)
Arellano - Bond test for AR (2)				(-3.53) (0.000)
Sargan Test	--	-	-	(329.94) (0.000)

Source: Authors' calculations.

Note: Significance will be based on the T-Statistics coefficient, where parameters 1 to 1.5 results are significant at *, parameters 1.5 to 2 are at **, and over 2 at ***.

Table 3. Regression results of the relationship between inflation rate and private consumption in European Developing countries

Variables	OLS	Fixed Effects	Random Effects	GMM
Finalconsumption_lag				-0.290***
T-Statistics				(-4.84)
Inflation, Consumer Prices	-0.02*	-0.003	-0.002	-0.002
T-Statistics	(-0.92)	(-0.79)	(-0.62)	(-0.49)
Government Expenditure	-0.07*	0.10*	-0.07	-0.038
T-Statistics	(-0.81)	(-1.10)	(-0.81)	(-0.44)
Gdpannualgrowth	0.05*	0.11**	0.05*	0.09*
T-Statistics	(0.91)	(1.37)	(0.91)	(1.06)
Constant	4.15***	4.59***	4.12***	--
T-Statistics	(2.26)	(2.47)	(2.46)	
Observation	436	436	436	365
Arellano - Bond test for AR (1)				(-7.21) (0.000)
Arellano - Bond test for AR (2)				(0.03) (0.977)
Sargan Test	--	-	-	(324.99) (0.000)

Source: Authors' calculations.

Note: Significance will be based on the T-Statistics coefficient, where parameters 1 to 1.5 results are significant at *, parameters 1.5 to 2 are at **, and over 2 at ***.

Table **2** presents the results from the regression analysis. We examined the correlation between economic growth and the inflation rate in developing European countries. We used multiple models such as OLS, Fixed Effects, Random Effects, and Dynamic Panels Data estimator to GMM. Notably, the results obtained from all the models tested exhibit a high degree of statistical reliability. Furthermore, the results show a negative relationship between inflation and economic growth. More specifically, the increase in the inflation rate of 1% in developing European countries negatively affects economic growth by -0.017%, which offers high statistical reliability. Moreover, the results are in harmony with other studies which have analyzed the relationship between inflation and economic growth (Barro, 1979). Also, the results show a non-linear relationship between government spending and economic growth, where an increase in government spending by 1% is likely to negatively affect economic growth in developing European countries by -0.14%. This result also provides a reliable, very high statistical. Again, this result is in complete harmony with other studies (Loizides & Vamvoukas, 2004; Poku et al., 2022). On the contrary, gross savings are in a more linear relationship with economic growth, where the increase in gross savings positively affects economic growth by 0.06% in developing European countries.

Table **3** presents the results from the regression analysis. By applying several models such as OLS, Fixed Effects, Random Effects, and GMM, we have analyzed the relationship between the inflation rate and private consumption expenditures in developing European countries where the results from all tested models show a high degree of statistical reliability.

Furthermore, the above results show a non-linear relationship between inflation and private consumption expenditures. For example, the increase in the inflation rate by 1% negatively affects the reduction of private consumption expenses by -0.002% in developing European countries. Likewise, a negative ratio appears between government expenditures and private consumption expenditures. Increasing government spending by 1% will likely reduce private investment opportunities and private consumption by 0.038%. This result is also in harmony with economic theory. On the contrary, gross savings show a linear relationship, where the increase in savings is likely to positively influence the stimulation of private consumption expenditures in developing European countries.

CONCLUSION

Academic researchers have examined the correlation between inflation and economic growth in different countries. However, according to many empirical studies, inflation positively affects economic growth (Sarel, 1996; Mubarik, 2005; Munir, Mansur & Furuoka, 2009, among others). From this point of view, the purpose of this study was to shed light on the relationship and interaction between inflation and economic growth in developing European countries. Moreover, the outcomes of this scientific study, which relied on econometric methods and techniques, indicate an inverse correlation between inflation and economic growth, indicat-

ing a negative association between inflation and economic growth. Specifically, the significant empirical findings of this study show that an increase in the inflation rate by 1% in developing European countries negatively affects economic growth by -0.017%.

According to empirical results, the evaluation between government spending and economic growth shows a non-linear relationship. As a result, our findings strongly indicate that each increase in government spending by 1% is likely to negatively affect economic growth in developing European countries by -0.14. On the other hand, the study shows a linear relationship between gross savings and economic growth. The results show that the increase in gross savings positively affects economic growth by 0.06% in developing European countries. The work further investigated the relationship between inflation and private consumption expenditures. The research findings show a non-linear relationship between inflation and private consumption expenditures. More specifically, according to the results achieved, inflation has a negative effect on the reduction of private consumption expenditures by -0.002% in developing European countries if the inflation rate increases by 1%. According to the results of the empirical study, a negative relationship also appears between government and private consumption expenditures. More specifically, an increase in government spending by 1% is likely to reduce private investment opportunities and private consumption by 0.038%. While the study's findings show that gross savings show a linear relationship, the increase in savings is likely to positively influence the stimulation of private consumption expenditure in developing European countries.

In conclusion, these results are essential for governments and policymakers of developing European countries who design economic policies. "From this point of view, developing European countries' governments must maintain the optimal level of inflation through appropriate economic policies. High imports of products and services pose difficulties for these countries' governments to implement sound economic policies to curb and control the inflation rate. "From this point of view, based on the economic structure of these countries, we recommend that governments draft policies that promote production and increase productivity, thus reducing dependence on imports. Therefore, by implementing these recommendations, developing European countries will have an easier time controlling a moderate level of inflation concerning economic growth.

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