

## DETERMINANTS OF THE INFLATION RATE: EVIDENCE FROM PANEL DATA

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### Original article



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### ABSTRACT

This study analyzes the relationship between macroeconomic factors that affect the inflation rate. Through our research, we will analyze the impact of money supply growth, economic growth, import level and export level on the inflation rate for 40 countries that we have taken. There are: 6 Latin American countries, 2 Western Balkan countries, 19 European countries, 10 countries of Asia, 2 countries of Africa and Australia, within 12 years, from 2012 to 2023. The data for the execution of the work were obtained from the World Bank as a credible institution for the publication of statistics and Trading Economics, Another important institution in terms of statistics where 320 observations which are included in the analysis, so the data of this study are second-hand data. Since we have a group of study countries, then the data type of the study is Panel. The econometric model that we used for analysis is the model with the method of small squares. The findings of this paper show that countries that increase the money supply will also face an increase in the inflation rate, so the impact of the money supply on the inflation rate is positive. In the research countries, the results show us that we have a very small difference in the average import and export, which results in a very small average economic growth.

**Keywords:** Inflation rate, Money supply, Import, Export

## 1. INTRODUCTION

Inflation has consistently posed significant challenges to both developed and developing economies. The pervasive and evolving nature of inflation not only impacts economies but also affects the daily lives of consumers and the strategic decisions of businesses. According to **Dornbusch** and **Fischer** (1994), inflation indicates that "your money will not be able to buy today as much as it could buy yesterday". Such periods of inflation often lead to discontent among the public, especially when incomes do not adjust at the same pace as rising prices.

Research on inflation's causes and effects has spanned several decades, but the specific factors contributing to it in different regions remain a subject of debate. This ambiguity becomes even more pronounced when analyzing countries with diverse economic characteristics, such as those in Latin America, Europe, Asia, and Africa.

The fact that esteemed international financial bodies such as the World Bank and the IMF are forecasting that global economic growth for this year will hit its lowest point in the past three decades is a source of significant concern. It should serve as a clear warning for the entire global community. Alongside the nearly unbridled surge in inflation and the upward trajectory of interest rates, unexpected developments like the declaration of a banking and financial crisis in the United States, the ongoing conflict in Ukraine, and the deepening geopolitical tensions involving the USA, Russia, and China are all contributing factors to long-term risks that were challenging to foresee (Đukić, 2023).

The core challenge this study seeks to address is understanding the influence of various driving variables on the inflation rate, with a special focus on regions that have not been extensively studied. To this end, this research aims to evaluate the impact of factors like money supply, economic growth, and trade balances (import and export) on inflation rates in a selection of 40 countries. These countries, chosen for their diverse economic landscapes, span across six regions and over an 11-year period (2012-2023).

This paper addresses a range of significant issues related to inflation, offering valuable contributions to the field of economics. Firstly, it delves into the complex problem of inflation's impact on both developed and developing economies. Inflation is a pervasive economic phenomenon that affects the lives of everyday individuals and shapes the strategic decisions of businesses. By examining the evolution of inflation and its consequences, the paper contributes to a better understanding of this multifaceted issue. Secondly, the paper recognizes the problem of regional variations in inflation. It acknowledges that the causes and effects of inflation can differ significantly across diverse economic regions, such as Latin America, Europe, Asia, and Africa. This variation is a critical problem in economics that requires careful analysis to inform effective policy-making. By selecting 40 countries from these regions for study, the paper aims to shed light on the unique dynamics of inflation in less-explored areas, making a valuable contribution to the literature. Lastly, the paper addresses the problem of the role of central bank policies in influencing inflation rates. It acknowledges that central banks have a crucial role to play in managing inflation through adjustments in money supply.

By delving into these particular regions and timeframe, this study contributes to the literature in two significant ways:

- (i) Providing insights on inflation trends in countries that have not been at the center of most inflation studies.
- (ii) Analyzing the role of central bank policies in influencing inflation through money supply adjustments across these nations.

The research is divided into the following sections and subsections: an introduction, a review of the literature from a theoretical perspective, a description of the methodology and an elaboration of the econometric model, and finally a statistical analysis of the inflation rate. The econometric results of the STATA program will be reported in the following paragraphs, and conclusions and suggestions will be given at the end.

## 2. LITERATURE REVIEW

Research has repeatedly underlined the role of money supply and exchange rate adjustments in influencing inflation, especially in developing countries. Swagel et al. (2001) analyzed data from 53 developing nations spanning 1964 to 1998 and concluded that these factors predominantly steer the inflationary processes in emerging economies. A common thread in empirical studies has been the examination of the relationship between inflation and the exchange rate

regime. In a comprehensive study covering 59 countries, [Al Sabaey \(2012\)](#) differentiated between the primary variables affecting inflation in affluent versus developing nations. The research indicated that for industrialized countries, inflation was majorly influenced by factors like government spending, money supply augmentation, oil prices, interest rates, and population growth. In contrast, for developing countries, the main culprits were the growth in money supply, fluctuations in global oil prices, and nominal effective exchange rates.

[Bilgrami and Maryam \(2022\)](#) and [Beckmann et al. \(2022\)](#) both focus on elucidating the determinants of inflation, albeit in differing geographies and through varying lenses. Bilgrami and Maryam's study centers on South Asian economies, particularly Pakistan, India, Bangladesh, and Sri Lanka. Utilizing World Bank panel data from 1980–2020 and deploying the Robust System GMM model, their research reveals that trade factors, notably the current account balance and exchange rates, are crucial drivers of inflation in these nations. Moreover, the Real Interest Rate (RIR) is identified as another determinant influencing inflation in this regional context. Their findings underscore the need for these countries to factor in these determinants when formulating inflation-controlling policies. On the other hand, Beckmann et al. embark on an exploration of inflation expectations within the G7 economies. They recognize the paramount importance of these expectations in influencing monetary policy transmission, especially in the age of unconventional monetary policies. The Bayesian VAR analysis of survey data from Consensus Economics unveils that professional inflation expectations in the G7 are significantly swayed by international spillovers, primarily originating from the United States. This influence of the US, especially its monetary policy, further echoes in the impulse-response functions and forecast error decompositions. Additionally, determinants like oil price shocks, changes in the trajectory of monetary policy, and fluctuations in uncertainty measures have notable impacts on inflation expectation updates. Connecting the two works, it's evident that both studies underscore the multifaceted determinants of inflation and its expectations. While Bilgrami and Maryam highlight the profound role of trade-related factors and interest rates in South Asia, Beckmann and colleagues shed light on the pronounced influence of international spillovers, especially from a hegemonic economy like the US, on the G7 nations. This juxtaposition offers a comprehensive insight, emphasizing both regional-specific and global factors impacting inflationary trajectories. Moreover, both studies accentuate the importance of understanding these determinants to craft effective monetary and fiscal policies tailored to specific economic contexts.

A strong connection between economic growth and factors influencing exports is evident from the works of [Gylfason \(1997\)](#). The study underscored that high inflation often coexisted with subdued economic growth and a surplus of natural resources. Gylfason's research leveraged various statistical tools to discern the correlation between export propensity and a myriad of factors like population, per capita income, and primary exports. Delving into a country-specific scenario, [Okpe \(2021\)](#) studied Nigeria's economy, particularly examining the interplay between inflation and its food import-export dynamic. Utilizing data from 1981 to 2017 and employing the vector error correction model, Okpe found that inflation was beneficial for food imports but had an inverse relationship with the country's exports. In summary, the literature broadly suggests a multifaceted relationship between inflation, money supply, and various economic variables, which differ across developed and developing nations. These insights guide our approach to the current research, framing our analysis of the factors driving inflation across diverse regions. Using monthly time series data for Bangladesh's economy from 1994 to 2011, [Muki \(2014\)](#) examines the relationship between inflation and export and import. The notion of cointegration, an error correction model, and variance decomposition analysis were used in this study to ascertain the long-run and short-run correlations between the variables. To investigate

causal connections, the Granger causality test was applied. Research using the cointegration technique shows that over the long run, a 1% increase in imports and exports causes a 3.21% increase and a 1.91% decrease in inflation, respectively. The annual deviation of the inflation rate from the long-term equilibrium level of 0.09% is corrected based on the estimated error correction coefficient. Export had the biggest impact on inflation among the elements of the inflation system, according to the variance decomposition data. Granger causality research indicates that there is unidirectional causality between inflation and import as well as between inflation and export.

Understanding the relationship between inflation and economic growth has been a focal point of several studies. [Xiao \(2009\)](#) explored this relationship in China from 1978 to 2007 using a variety of statistical methods, concluding that inflation and economic growth are inextricably linked over the long term. Similarly, Behera's 2014 study on South Asian countries found a significant correlation between the two variables, though the long-term relationship varied across countries. One consistent takeaway from these studies is that rapid economic development can sometimes lead to temporary inflationary pressures, and nations often consider price levels in their economic growth strategies. The causes of inflation and their macroeconomic implications have also received significant attention in the literature. [Van \(2019\)](#) stressed that inflation, as a currency phenomenon, often results from the monetary policies of countries, echoing views of renowned economists like Marx, Fisher, and Friedman. The consistent narrative here is that inflation often emanates from an unchecked increase in the money supply.

Further widening the lens, research has evaluated how trade dynamics influence inflation. Ulfah's 2018 study on Indonesia between 1990 and 2016 discovered a pronounced positive impact of imports on inflation, whereas exports exerted a more subdued influence. Such findings are paramount for policymakers aiming to strike a balance between fostering trade and maintaining inflationary stability. Moreover, [Korkmaz \(2017\)](#) analyzed nine Mediterranean countries, emphasizing the crucial role of monetary authorities in controlling money supply to achieve macroeconomic goals. While there was a one-way causality between money supply and inflation, the same was not true for economic growth, underscoring the nuanced relationship between these variables.

Lastly, [Yilmazkuday \(2013\)](#) provided a distinctive perspective by identifying specific inflation thresholds, beyond which various economic determinants affect growth differently. The study detailed optimal inflation ranges for maximizing benefits from factors such as the catch-up effect, human capital, financial development, government size, and trade. In essence, the literature consistently demonstrates a multifaceted relationship between inflation, economic growth, and various determinants across different regions and timeframes. These insights provide a solid foundation for further exploration in this domain.

The intricate relationship between inflation and economic growth has been the subject of numerous academic pursuits. For instance, [Xiao's \(2009\)](#) evaluation of China's economic dynamics from 1978 to 2007 revealed a long-term beneficial relationship between inflation and growth, hinting at China's consideration of price levels during economic expansion. A parallel can be drawn with Behera's 2014 examination of South Asian countries, where a significant correlation was identified between these two variables. However, the nuances of these relationships differ across nations, highlighting the complexity of the inflation-growth dynamic.

Contributing to the discourse on inflation's origins, Van (2019) noted that inflation often arises from certain monetary policies, a sentiment shared by notable economists like Marx, Fisher, and Friedman. This shared viewpoint elucidates inflation as a product of unchecked increases in the money supply. Exploring the intersection of trade and inflation, Ulfa (2018) discovered a nuanced influence of imports and exports on Indonesia's inflation. This research accentuates the importance of understanding trade dynamics in inflation considerations, as imports, in this case, had a more pronounced effect than exports.

Both Iqbal et al. (2022) and Ridwan (2022) delve deeply into the determinants of inflation from differing yet intersecting perspectives. While Iqbal and colleagues emphasize the Pakistani context, assessing the influence of variables such as GDP, money supply (M2), oil prices, and exchange rates on inflation, Ridwan adopts a more generalized approach, investigating the broader monetary and macroeconomic factors that impact inflation. A common thread between these studies lies in their recognition of the monetary sector's pivotal role in influencing inflation. Iqbal et al. notably point out the significance of the money supply (M2) and its positive impact on the Consumer Price Index in the long run, aligning with Ridwan's assertion that adept management of economic instruments, particularly within the monetary sector, can help mitigate inflation's repercussions. Ridwan's emphasis on the circulation of money, both in trade activities and savings, offers a complementary lens to Iqbal et al.'s focus on Pakistan-specific monetary factors. Furthermore, the methodologies of both works lean heavily on econometric analyses – with Iqbal et al. using the ARDL approach and the ADF test for stationarity, and Ridwan employing regression analysis on secondary data. These analytical methods allow both studies to produce evidence-based insights, illuminating the intricate connections between monetary dynamics and inflationary outcomes. Lastly, the studies underscore the intricate and gradual nature of inflation. While Iqbal et al. spotlight the complexities and interplays of inflationary factors within Pakistan, Ridwan emphasizes the prolonged and slow emergence of inflation influenced by financial and economic changes. These shared insights suggest that regardless of the geographical or economic context, inflation is a multifaceted phenomenon that requires a deep understanding of both macroeconomic and monetary determinants.

Korkmaz (2017) analysis of Mediterranean countries unveiled another layer of this multifaceted relationship. While there was a discernible causality between money supply and inflation, the linkage between money supply and economic growth remained elusive, underscoring the complexities of these macroeconomic variables. Building upon this, Yilmazkuday (2013) offered an innovative angle by delineating specific inflation thresholds that influence economic growth determinants in varied manners. This exploration brings to the forefront the significance of maintaining inflation within optimal bounds to harness its potential benefits. Collectively, these studies weave a narrative that underscores the multifarious relationship between inflation, economic growth, and other pivotal determinants.

In recent years, the significance of monetary policy has grown considerably due to a range of economic challenges affecting both developing and developed nations. According to a recent article authored by Ahmić and Isović (2023), which examines shifts in the European Union's monetary policy conducted by the European Central Bank, it is underscored that there has been a rise in interest rates aimed at curbing the upward movement of inflation's core rates. Specifically, the European Central Bank increased the refinancing rate from 0.5% to 2.5% in 2022 and terminated asset purchase initiatives, such as the Pandemic Emergency Purchase Program, which had previously acted to boost liquidity levels.

### 3. METHODOLOGY

In this work, we are based on empirical research methodology where we aim to measure the impact of independent variables on the inflation rate. These independent variables are: Market Money Supply, Economic Growth, Export, Import, Dummy GDP and Dummy Country. This study was carried out for 40 countries which are: 6 Latin American countries, 2 Western Balkan countries, 19 European countries, 10 countries of Asia, 2 countries of Africa and Australia, within 12 years, from 2012 to 2023. The data will be imported from the database of the World Bank, trading economics, as more serious and credible institutions for the publication of statistics.

#### 3. 1. ECONOMETRIC MODEL

To measure the impact of independent factors on the inflation rate, we used this econometric model:

$$\text{Inflation rate} = \alpha + \beta_1 (\text{Money supply in the market}) + \beta_2 (\text{Economic growth}) + \beta_3 (\text{Import}) + \beta_4 (\text{Export}) + U_i \quad (1)$$

The inflation rate is the dependent variable of the study, while the variables in parentheses are the independent variables of the study. At the very bottom, the standard error term ( $\mu$ ) is presented.  $\alpha$  and  $\beta$  are parameters estimated by running the model, while the data will be processed with the STATA program.

The choice of our model's specific independent variables is deeply rooted in existing literature. The role of the money supply in the market, for instance, has been highlighted by Van (2019) and Korkmaz (2017), who noted that unchecked increases in money supply can frequently lead to inflation. In fact, Korkmaz's study on Mediterranean countries documented the direct causal relationship between money supply and inflation. Additionally, the interplay between economic growth and inflation has been a focal point in studies by Xiao (2009) and Behera (2014). Both emphasized the enduring relationship between these two factors, accentuating the importance of incorporating economic growth into our model. Shifting the lens to trade components, Ulfa's 2018 research on Indonesia drew attention to the notable influence of imports on inflation, contrasting with a more muted impact from exports. This research lends credence to our decision to include both imports and exports as determinants in the model. Anchoring our approach in such a comprehensive backdrop of prior studies allows us to build on the groundwork laid by past researchers, offering deeper insights into the intricate mechanisms driving inflation dynamics.

A set of data in which the behavior of people is followed over time is known as panel data, sometimes referred to as longitudinal or cross-sectional time series data. These organizations may be countries, corporations, states, or people. Panel data models shed light on how individuals interact with one another and within their own groups. Cross-sectional and time-series dimensions are included in both the data and the models. When all individuals are taken into account throughout all time periods, panel data can be balanced; otherwise, they may be imbalanced (Hsiao, 2022). Examples include assessing the effects of income on savings utilizing data spanning years and countries, as well as calculating the effects of education on income using time and person data. The pooled model (OLS), the fixed effects model, and the random effects model are examples of panel data models. The fixed-effects model examines connections between predictors and results within an economic unit (a nation, an individual, a business, etc.) (McNeish and Kelley, 2019). Each unit has distinctive qualities that may or may not have an effect on the predictor variables (for example, a person's gender may influence their opinion on a particular issue, a country's political situation may have an effect on trade or GDP, or a compa-

ny's business practices may have an effect on its share price). To properly use FE, we must consider the possibility that an individual's attributes may skew or change the predictor or outcome variables. For this reason, it is presumed that the unit error term and the predictor variables are associated. By utilizing FE to lessen the impact of such time-invariant characteristics, we can assess the total impact of the predictors on the outcome variable (Clark and Linzer, 2015).

The results that we will present in this chapter include these 40 countries, which are: 6 Latin American countries, 2 Western Balkan countries, 19 European countries, 10 Asian countries, 2 African countries and Australia, in a period of 12 years, respectively from 2012 to 2023. The Stata program's econometric results that were produced were previously provided. The World Bank database, which is the trade economy and one of the most popular sources for statistics. The characteristics of the variables, the relationships between the variables and finally the econometric models are described in the empirical results. First, we will provide univariate and bivariate descriptive statistics. The method of least squares (OLS), the method of fixed effects (FE) and the method of random effects (RE) were the three techniques used for the econometric models. In this study, we employed three distinct econometric methods (OLS, FE, and RE) to analyze the relationships between our independent and dependent variables. The choice of econometric technique had significant implications for our findings and the inferences we could draw. Our use of OLS allowed us to identify an average linear relationship between the variables, providing insights into the overall trends in our dataset. However, as our data included panel data with repeated observations for each unit, we recognized the potential presence of unobserved time-invariant individual-specific effects. To address this concern, we turned to fixed effects estimation, which controlled for such effects. The results from the FE model highlighted the importance of accounting for these individual-specific factors, offering a more nuanced understanding of our variables' relationships. Importantly, we observed variations in the coefficients for some variables, suggesting that the effects of these factors differed significantly across individuals. Additionally, we explored the random effects model as an alternative approach. Our findings using RE indicated that while individual-specific effects exist, they were better characterized as random and uncorrelated with the independent variables (Gomes, 2010). This choice allowed us to obtain more efficient estimates compared to FE, under the assumption that these random effects were not systematically related to our variables of interest. Thus, our decision between FE and RE hinged on the underlying assumptions regarding the nature of individual-specific effects in our dataset. Our discussion highlights the importance of carefully considering these assumptions when selecting the appropriate econometric technique for panel data analysis (Gurka et al., 2012).

The hypotheses of this research are:

- H1: Money supply has a positive impact on the inflation rate
- H2: Economic growth has a positive impact on the inflation rate
- H3: Imports have a positive impact on the inflation rate
- H4: Export has a positive impact on the inflation rate

Table 1. Description of research variables

| Variable | Abbreviations | Unit     | Source     | Expected impact |
|----------|---------------|----------|------------|-----------------|
| INF      | INF           | %        | World Bank |                 |
| OP       | OP            | Milions  | World Bank | +               |
| GDP      | GDP           | %        | World Bank | +               |
| IMP      | IMP           | % of GDP | World Bank | -               |
| EXP      | EXP           | % of GDP | World Bank | -               |

Source: Authors Calculation

The variables of the study are described in the table above. There are five variables in total, and all of them were obtained from the World Bank.

### 3. 2. DESCRIPTIVE STATISTICS

In this part, the descriptive statistics of the variables are presented in different forms, first the variables with all the observations are presented, then the descriptive statistics for developed countries and developing countries are presented, and finally a comparison of the inflation rate before and during is presented pandemic

Table 2. Descriptive statistics

| Variable | Obs | Mean     | Std.dev  | Min   | Max      |
|----------|-----|----------|----------|-------|----------|
| INF      | 440 | 4.21     | 5.54     | -1.7  | 48.7     |
| OP       | 440 | 7.51E+08 | 1.29E+09 | 26935 | 6.63E+09 |
| GDP      | 440 | 2.56     | 2.53     | -9.6  | 13.9     |
| IMP      | 440 | 44.16    | 26.85    | 10.6  | 174.6    |
| EXP      | 440 | 46.86    | 31.56    | 9.2   | 205.4    |

Source: Authors Calculation

The study was conducted in 40 states over an 11-year period, totaling 440 study observations, as shown in the table above, which provides descriptive data for all study variables. The states of the study model have an average inflation rate of 4.21%, these states have a money supply level of around 751 million euros. These countries have a positive economic performance on average of 2.56%. The import level of the states is 44.16% of the value of gross domestic production, while the level of export is 45.86% of the value of gross domestic production.

From the 40 countries of the study model, the highest level of inflation was recorded in the state of Ukraine in 2015 with a rate of 48.7%. The country with the highest positive economic performance is Iraq in 2012 with 13.9% economic growth, while the country with the biggest economic decline is Ukraine in 2015 with a rate of 9.6%.

Table 3. Comparison between developed countries and developing countries

| Variable | Developed Countries | Countries still developing |
|----------|---------------------|----------------------------|
|          | Mean                | Mean                       |
| INF      | 3.34                | 3.39                       |
| OP       | 1.28E+09            | 9040494                    |
| GDP      | 2.25                | 2.85                       |
| IMP      | 46.06               | 41.05                      |
| EXP      | 50.28               | 40.55                      |

Source: Authors Calculation

The table above presents a comparison of the averages in developed countries and countries still developing, based on the results presented, the average inflation is approximately similar, where in developed countries this average is 3.34% while in countries still developing it is 3.39% . So, we do not have high differences in this indicator based on the comparison of countries.

Table 4. Comparison of the inflation rate before and during the pandemic

| Variable  | Before Pandemic |      |          | During Pandemic |      |          |
|-----------|-----------------|------|----------|-----------------|------|----------|
|           | Obs             | Mean | Std. Dev | Obs             | Mean | Std. Dev |
| Inflation | 280             | 3.42 | 4.711    | 160             | 5.61 | 7.761    |

Source: Authors Calculation

Based on the results presented above, where a comparison of the inflation rate is presented during the period before the pandemic and during the pandemic, then in the period before the

pandemic occurred, we have 280 observations and the average rate of inflation in the research countries is 3.42%, while during the period of the pandemic (from 2019 until now) where we have 160 observations, the average inflation rate is 5.61%. So, we have a difference of 2.22% of the highest inflation rate in Peru from 2019 onwards.

#### 4. EMPIRICAL RESULTS

In this chapter the empirical results of the research are presented, first the correlation analysis is presented to identify the relationship of the variables among themselves, then in a tabular summary the results of the econometric models are presented and finally, based on the presented results, the hypotheses of raised.

Table 5. Correlation analysis

| Variable | INF   | OP    | GDP   | IMP  | EXP  |
|----------|-------|-------|-------|------|------|
| INF      | 1.00  |       |       |      |      |
| OP       | 0.11  | 1.00  |       |      |      |
| GDP      | -0.13 | -0.01 | 1.00  |      |      |
| IMP      | -0.12 | 0.11  | -0.03 | 1.00 |      |
| EXP      | -0.12 | 0.18  | -0.02 | 0.97 | 1.00 |

Source: Authors Calculation

The table above displays the correlation coefficient between the independent and dependent variables. The inflation rate is positively correlated with the availability of money and economic growth, which suggests that each of these factors' respective growths is positively correlated with inflation rate growth. The increase of these two variables has a negative effect on inflation since the other two variables (import and export) have a negative relationship with the inflation rate. The growth of gross local production also has a negative relationship with the rate of inflation with a coefficient of  $r=-0.13$ .

Table 6. Results of econometric models

| Variable | OLS     | OLS R   | FE       | RE       |
|----------|---------|---------|----------|----------|
|          | INF     | INF     | INF      | INF      |
| OP (log) | -0.09   | -0.09   | 0.23**   | 0.04     |
|          | (-0.91) | (-0.79) | (-0.59)  | (-0.20)  |
| GDP      | -0.32** | -0.32   | -0.62*** | -0.55*** |
|          | (-2.86) | (-1.25) | (-6.25)  | (-5.63)  |
| IMP      | 0.01    | 0.01    | 0.14*    | 0.04     |
|          | (0.24)  | (0.22)  | (2.00)   | (0.81)   |
| EXP      | -0.04   | -0.04   | 0.01     | -0.06    |
|          | (-1.23) | (-1.13) | (0.25)   | (-1.24)  |

Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Source: Authors Calculation

Four econometric models' results are shown in the table above, but the model with fixed effects was chosen for interpretation since it was thought to be the most appropriate model for analyzing the outcomes of this research.. The choice of this model is based on the Hausman test, which shows that the difference in the coefficient is systematic when the P value is greater than 0.05 ( $P=0.01 > 0.05$ ). This is why we favor applying the random effects model. According to the results, export (0.14) and import (0.01) also have a positive impact on the rise in inflation, with the import variable showing a statistically significant impact at the 10% significance level. The money supply also has a positive impact on the inflation rate with a coefficient of 0.23; this coefficient is statistically significant at the 5% significance level.. On the other hand, the impact of economic growth has a negative impact on inflation with a coefficient of 0.62, which is statistically significant at the 1% significance level.

Table 7. Hypothesis testing

| H  | Hypothesis                                                  | Testing  |
|----|-------------------------------------------------------------|----------|
| H1 | Money supply has a positive impact on the inflation rate    | Accepted |
| H2 | Economic growth has a positive impact on the inflation rate | Rejected |
| H3 | Imports have a positive impact on the inflation rate        | Accepted |
| H4 | Export has a positive impact on the inflation rate          | Accepted |

Source: Authors Calculation

## 5. DISCUSSION

The persistent discourse in literature surrounding the factors that influence inflation-namely money supply, exchange rates, and economic growth-finds resonance in the empirical findings of our study spanning 40 states over an 11-year period. Reiterating [Swagel et al.'s \(2001\)](#) conclusions regarding the influence of money supply in steering inflationary processes, our results indeed revealed a positive correlation between the availability of money and inflation. This observation is echoed by [Van \(2019\)](#) who identified unchecked increases in the money supply as the precursor to inflation.

The dynamic interplay between inflation and economic growth was further exemplified in our findings. The negative relationship between economic growth and inflation aligns with [Xiao's \(2009\)](#) and [Behera's \(2014\)](#) observations, suggesting that while economic growth can sometimes lead to inflationary pressures, rapid growth can conversely be a counteracting force to rising inflation in certain circumstances. This intricate balance has been a consistent theme in research and our study provides further empirical evidence to support this.

The trade dynamics of a country, particularly imports and exports, have long been suggested as significant influencers of inflation. Our results indicated that both exports and imports had a positive impact on inflation. This finding complements [Ulfa's \(2018\)](#) study on Indonesia, wherein imports exerted a positive impact on inflation. However, while imports in our study were statistically significant, the magnitude of the impact of exports was comparatively higher.

One of the most striking revelations from our research was the stark difference in inflation rates during the pandemic era versus the pre-pandemic phase. A heightened average inflation rate of 5.61% during the pandemic, in comparison to 3.42% prior, points towards the significant macroeconomic disruptions caused by the global health crisis. This disparity underlines the eco-

nomonic volatility of such unprecedented events, wherein conventional determinants of inflation might be outweighed by larger global forces.

Contrasting the inflation rates of developed and developing nations, our results indicate a near parallel in averages. This observation challenges conventional belief and certain empirical findings, such as Al Sabaey's (2012) research, which indicated divergent inflationary factors for affluent and developing nations. It suggests that, in the grand tapestry of globalized economies, the boundaries between developing and developed nations blur in certain macroeconomic contexts.

Conclusively, our findings cement the understanding that inflation is not the result of a singular factor but a nexus of interrelated economic variables. The relationships and correlations identified in our study, corroborated by the vast body of literature on the topic, underscore the importance of a holistic approach when formulating monetary and fiscal policies. As nations navigate the complexities of global economic landscapes, the insights from our research, juxtaposed against the wider academic discourse, will be invaluable in guiding policy decisions.

From the four research hypotheses raised, we find sufficient empirical statistical evidence to accept three of them (H1, H3 and H4). The testing of the hypotheses is done taking into account the results of the analysis of the econometric models, regarding the results of the random effects model, where based on the results of this money supply model, import and export have a positive impact on the increase in the inflation rate, therefore, we have sufficient statistical evidence to accept these hypotheses, while according to the results, economic growth has a negative impact on the increase in the inflation rate, so the second hypothesis is rejected.

## 6. CONCLUSION

The headline inflation rate is important because it reveals changes in a country's average prices, as well as changes in the amount of goods and services that each consumer has access to. These changes in the consumption basket are distinct because they occur when the inflation rate increases and indicate that the consumer will have a poorer consumption basket and vice versa. A stable inflation rate indicates a country with excellent economic well-being, because the inflation rate has a significant impact on it. The various economic crises have caused us to face an unstable rate of inflation over the years, since a small economic change caused the rate of inflation to increase and it is very difficult to stabilize, in this instability the countries that depend the most are affected from import, countries that have a negative economic growth, that is, in general, countries that are still developing. This paper aims to analyze the main determinants of the inflation rate in order to create certain policies in the future that will help to mitigate the inflation rate, since the latter is present in a large percentage in every economic crisis and very difficult to manage, especially for countries that are still developing. The impact of the money supply, economic growth, imports, and exports on the inflation rate has been examined empirically for each of the 40 countries we chose to cover in this research. Over an eight-year period, we conducted the analysis.

*The recommendations for developing countries are as follows:*

- Trade Deficit Management: Given the prevalence of trade deficits leading to imported inflation, it's crucial for governments to implement policies that bolster local producers. This can be achieved through protective measures and subsidies, ensuring domestic needs are met through local production, and eventually propelling the nation towards becoming a net exporter.
- Impose Taxes: To combat imported inflation and promote local industries, it's recommended to introduce taxes on the import of specific products, particularly

those that the country has the capacity to produce locally. This not only nurtures domestic producers but also makes imported goods less attractive, thus reducing the outflow of money. Additionally, the revenue generated from these taxes can be reinvested into sectors that further boost domestic production and self-reliance. Care, however, should be taken to ensure that these taxes don't inadvertently harm consumers, especially in the case of essential goods or where domestic alternatives are not immediately available. Regular reviews and adjustments of the taxation policy based on its outcomes and changing economic conditions are also advisable.

*While the recommendations for developed countries are:*

- **Monetary Policy:** Consider heightening interest rates. This move can curtail borrowing, subsequently reducing consumption, which in turn can lead to a slowdown in both inflation and overall economic growth.
- **Fiscal Adjustments:** Adopt measures like increased income taxation and trimmed government expenditure. Such strategies can diminish aggregate demand, leading to moderated growth and curtailed demand-driven inflation.
- **Supply-side Initiatives:** Implementing policies like privatization and deregulation can foster long-term competition, potentially reducing corporate expenditures and, by extension, inflation.

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