

INFLATION PRESSURES AND INTERNATIONAL FINANCIAL SYSTEM DYNAMICS: EVIDENCE FROM THREE HIGH-INFLATION G20 ECONOMIES

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Abstract:

Using a simultaneous equation approach, this study examines the international financial system in three G20 member countries with the highest inflation rates, namely Argentina, Turkey, and Russia. The analysis focuses on the interaction between key macroeconomic variables, including inflation, exchange rates, money supply, imports, and interest rates. Secondary data covering the period 2013–2022 were obtained from the World Bank and Trading Economics. A simultaneous equation model was employed as the analytical method, using EViews 12 as the estimation tool. The empirical results indicate that inflation exerts a positive and persistent influence on exchange rate depreciation in the long run across the three countries. In addition, changes in money supply and interest rates significantly affect inflation dynamics and exchange rate stability, while imports contribute to inflationary pressures through higher import prices. These findings highlight the importance of effective and coordinated monetary policy in managing inflation and maintaining exchange rate stability, particularly in G20 countries experiencing high inflation episodes.

Keyword: Inflation, Exchange Rate, Money Supply, Imports, Interest Rates, G20

1. Introduction

Inflation remains a major challenge for macroeconomic stability, particularly in countries with high exposure to global financial shocks. Persistent inflationary pressures can undermine purchasing power, weaken exchange rate stability, and complicate the effectiveness of monetary policy. Within the framework of the G20, several member countries have experienced exceptionally high inflation rates in recent years, raising concerns about the resilience of their international financial systems.

Argentina, Turkey, and Russia represent three G20 economies that have faced prolonged inflationary episodes accompanied by significant exchange rate volatility. These conditions highlight the complex interaction between inflation, exchange rates, money supply, interest rates, and international trade. Understanding how these macroeconomic variables interact is crucial for designing policies that support financial stability in an increasingly interconnected global economy.

Previous studies have shown mixed empirical results regarding the relationship between inflation and exchange rates. While some findings suggest that rising inflation leads to currency depreciation, others indicate that the impact depends on monetary policy responses, trade openness, and structural characteristics of the economy. This divergence in empirical evidence suggests the need for further investigation using alternative modeling approaches and cross-country perspectives.

This paper contributes to the literature by analyzing the international financial system in Argentina, Turkey, and Russia using a simultaneous equation model. By examining the dynamic interactions between inflation, exchange rates, money supply, imports, and interest rates over the period 2013–2022, this study provides empirical insights into the mechanisms driving inflation and exchange rate instability in high-inflation G20 countries. The findings are expected to offer policy-relevant implications for monetary authorities in managing inflation and maintaining exchange rate stability.

2. Methods

2.1. Data and Variables

This study employs secondary data covering the period 2013–2022 for three G20 member countries with the highest inflation rates, namely Argentina, Turkey, and Russia. The data were obtained from the World Bank and Trading Economics. The variables used in the analysis include inflation rate, exchange rate, money supply, imports, and interest rates. Inflation and exchange rates are treated as

endogenous variables, while money supply, imports, and interest rates serve as exogenous macroeconomic determinants.

2.2. Model Specification

To capture the interdependent relationship between inflation and exchange rates, this study applies a simultaneous equation model. The first equation explains inflation as a function of money supply, imports, interest rates, and exchange rates. The second equation explains exchange rate movements as a function of money supply, imports, interest rates, and inflation. This approach allows the analysis to account for bidirectional causality and interaction among key macroeconomic variables.

2.3. Data Collection Technique

This study employs a quantitative research approach using secondary data. The data were collected through documentation techniques by compiling macroeconomic indicators from reputable international sources, namely the World Bank and Trading Economics. The dataset consists of annual time-series data for the period 2013–2022 covering three G20 member countries with the highest inflation rates: Argentina, Turkey, and Russia. The variables collected include inflation rates, exchange rates, money supply, imports, and interest rates. The use of secondary data ensures data consistency and comparability across countries and over time.

2.4. Data Analysis Method

The identification test in the Two-Stage Least Squares (2SLS) method shows that the equation is overidentified, indicating that the model can be consistently estimated. The result of the identification test is as follows:

Table 1. The Identification Test Result

Equation	K – k	m – 1		
I	5 – 2	4 – 1	3 = 3	Exactly identified
II	5 – 2	4 – 1	3 = 3	Exactly identified

The analysis is conducted using a simultaneous equation model to examine the interdependent relationship between inflation and exchange rates. This method is applied to capture the bidirectional effects among key macroeconomic variables. The estimation is carried out using the Two-Stage Least Squares (2SLS) technique to address potential endogeneity problems inherent in macroeconomic relationships.

Prior to estimation, several diagnostic tests are performed to ensure the robustness of the model, including tests for normality, autocorrelation, and multicollinearity. All statistical analyses are conducted using EViews 12. The results are interpreted to assess the influence of money supply, imports, and interest rates on inflation and exchange rate dynamics in the selected countries.

3. Results and Discussion

3.1. Results

The estimation results from the simultaneous equation model reveal significant interactions between inflation, exchange rates, and key macroeconomic variables in Argentina, Turkey, and Russia during the period 2013–2022. Overall, the findings confirm the presence of interdependence between inflation and exchange rate dynamics in the three high-inflation G20 countries.

To test the normality of the data, the Jarque–Bera test was employed. The criterion used is that if the probability value of the Jarque–Bera (JB) test is greater than the alpha level (0.05), then the data are considered to be normally distributed. In this study, the probability value was found to be 0.0786, which is greater than 0.05; therefore, the normality assumption has been satisfied.

Based on the degrees of freedom (df) for the approximate chi-square distribution in the autocorrelation test, it is known that all lag movement indicators over time do not show any autocorrelation effect in the data movement. The probability values of the Q-statistic and the adjusted Q-statistic (Adj Q-stat) are all greater than 0.05, indicating that the data do not exhibit autocorrelation.

Equation I

$$\text{LOG}(\text{INF}) = C(10) + C(11) * \text{LOG}(\text{MS}) + C(12) * \text{LOG}(\text{IMP}) + C(13) * \text{LOG}(\text{IR}) + C(14) * \text{LOG}(\text{ER}) + e1$$

$$\text{LOG}(\text{INF}) = 15.46332 + 0.015404 * \text{LOG}(\text{MS}) + 0.050819 * \text{LOG}(\text{IMP}) + 1.069530 * \text{LOG}(\text{IR}) + 0.050453 * \text{LOG}(\text{ER}) + e1$$

Coefficient and Elasticity of Money Supply on Inflation. The coefficient of the money supply variable is 0.01. This means that a 1 percent increase in the money supply will lead to a 0.01 percent increase in inflation. Based on the regression coefficient, the elasticity of the money supply is positive and inelastic, indicating that an increase in the money supply results in a smaller percentage increase in inflation.

Coefficient and Elasticity of Imports on Inflation. The import coefficient is 0.050819. This implies that a 1 percent increase in imports will increase inflation by 0.050819 percent. The elasticity of imports, as indicated by the regression coefficient, is positive and inelastic, meaning that an increase in imports will result in a smaller percentage increase in inflation.

Coefficient and Elasticity of Interest Rates on Inflation. The interest rate coefficient is 1.069530. This indicates that a 1 percent increase in interest rates will increase inflation by 1.069530 percent. The elasticity of interest rates, based on the regression coefficient, is positive and elastic, meaning that an increase in interest rates will result in a larger percentage increase in inflation.

Coefficient and Elasticity of Exchange Rate on Inflation. The exchange rate coefficient is 0.050453. This means that a 1 percent increase in the exchange rate will increase inflation by 0.050453 percent. The elasticity of the exchange rate, as indicated by the regression coefficient, is positive and inelastic, suggesting that an increase in the exchange rate will result in a smaller percentage increase in inflation.

Equation II

$$\begin{aligned} \text{LOG(ER)} &= C(20) + C(21)\text{LOG}(\text{MS}) + C(22)\text{LOG}(\text{IMP}) + C(23)\text{LOG}(\text{IR}) + C(24)\text{LOG}(\text{INF}) + e_2 \\ \text{LOG(ER)} &= 306.4913 - 0.305319\text{LOG}(\text{MS}) - 1.007259\text{LOG}(\text{IMP}) + 21.19865\text{LOG}(\text{IR}) + \\ & 19.82054\text{LOG}(\text{INF}) + e_2 \end{aligned}$$

Coefficient and Elasticity of Money Supply on the Exchange Rate. The coefficient of the money supply variable is -0.305 . This means that a 1 percent increase in the money supply will lead to a 0.305 percent decrease in the exchange rate. Based on the regression coefficient, the elasticity of the money supply is negative and elastic, indicating that any change in the money supply results in a proportionally larger percentage change in the exchange rate.

Coefficient and Elasticity of Imports on the Exchange Rate. The import coefficient is -1.007 . This implies that a 1 percent increase in imports will reduce the exchange rate by 1.007 percent. The elasticity of imports, as indicated by the regression coefficient, is negative and elastic, meaning that any increase in imports will result in a larger percentage change in the exchange rate.

Coefficient and Elasticity of Interest Rates on the Exchange Rate. The interest rate coefficient is -21.198 . This indicates that a 1 percent increase in interest rates will decrease the exchange rate by 21.198 percent. The elasticity of interest rates, based on the regression coefficient, is negative and elastic, suggesting that changes in interest rates lead to a proportionally larger percentage change in the exchange rate.

Coefficient and Elasticity of Inflation on the Exchange Rate. The inflation coefficient is 19.820. This means that a 1 percent increase in inflation will increase the exchange rate by 19.820 percent. The elasticity of inflation, as indicated by the regression coefficient, is positive and elastic, implying that an increase in inflation results in a proportionally larger percentage increase in the exchange rate.

The results indicate that money supply has a positive and statistically significant effect on inflation across the observed countries. An expansion in the money supply tends to increase aggregate demand, which subsequently leads to higher price levels. This finding supports the theoretical view that excessive monetary growth contributes to inflationary pressures in the long run.

Imports also exhibit a positive influence on inflation. Higher import volumes, particularly in economies that rely heavily on imported intermediate and energy goods, increase domestic prices through the import price transmission mechanism. This effect is more pronounced during periods of currency depreciation, when imported goods become relatively more expensive.

Interest rates show a significant relationship with inflation, although the direction and magnitude vary across countries. In general, higher interest rates are associated with attempts to control inflation; however, in high-inflation environments, increases in interest rates may reflect policy responses rather than immediate inflation-reducing effects. The results suggest that interest rate adjustments alone may not be sufficient to stabilize prices without complementary monetary and fiscal measures.

The estimation results for the exchange rate equation show that inflation has a positive and significant effect on exchange rate depreciation. Higher inflation reduces the purchasing power of domestic currency, leading to weaker exchange rate performance over time. This finding is consistent with purchasing power parity theory, which predicts that countries with higher inflation tend to experience currency depreciation.

Money supply also plays a significant role in influencing exchange rates. An increase in the money supply tends to depreciate the domestic currency by increasing liquidity and reducing currency value

relative to foreign currencies. This effect is particularly evident in periods of sustained monetary expansion.

Imports contribute to exchange rate movements by increasing demand for foreign currency. Rising import demand places pressure on the balance of payments, which can lead to currency depreciation, especially in economies with limited export growth.

Interest rates affect exchange rates through capital flow channels. Higher interest rates may attract short-term capital inflows, supporting currency appreciation; however, in high-inflation economies, this effect is often offset by inflation expectations and economic uncertainty. As a result, the net impact of interest rates on exchange rates appears mixed across the selected countries.

The simultaneous estimation confirms that inflation and exchange rates are mutually reinforcing in high-inflation G20 countries. Monetary variables such as money supply and interest rates, together with trade-related factors such as imports, play a crucial role in shaping inflation dynamics and exchange rate stability. These results underline the importance of integrated monetary policy frameworks that consider both domestic price stability and external sector conditions.

3.2. Discussion

The findings of this study demonstrate a strong interdependence between inflation and exchange rate dynamics in Argentina, Turkey, and Russia. The positive relationship between money supply and inflation confirms the relevance of monetary expansion as a key driver of persistent inflation in high-inflation economies. This result is consistent with monetary theory, which emphasizes that excessive liquidity growth, when not matched by output expansion, leads to sustained increases in the general price level.

The positive effect of exchange rate depreciation on inflation highlights the importance of exchange rate pass-through in the selected countries. In economies with a high dependence on imported goods, particularly energy and intermediate inputs, currency depreciation directly raises domestic production costs and consumer prices. This mechanism helps explain why inflationary pressures remain strong even when monetary authorities attempt to tighten policy through interest rate adjustments.

The relationship between interest rates and inflation suggests that interest rate policy in high-inflation environments often functions as a reactive rather than preventive instrument. In Argentina and Russia, interest rate increases appear to reflect policy responses to existing inflation rather than immediate tools for inflation reduction. In contrast, Turkey's relatively accommodative interest rate stance during periods of high inflation illustrates how non-conventional policy choices can weaken inflation control and exacerbate exchange rate instability.

The exchange rate equation results further support purchasing power parity theory, as higher inflation is associated with currency depreciation over time. The role of money supply in driving exchange rate movements reinforces the view that monetary discipline is essential for maintaining currency stability. Additionally, the positive impact of imports on exchange rate depreciation indicates that persistent trade deficits can intensify external pressures on domestic currencies.

Overall, the discussion suggests that inflation and exchange rate instability in high-inflation G20 countries cannot be addressed through a single policy instrument. Instead, effective stabilization requires a coordinated policy framework that integrates monetary control, exchange rate management, and trade policy. Without such coordination, efforts to stabilize inflation may be undermined by external sector vulnerabilities and structural economic constraints.

3.3. Discussion in Relation to Research Objectives

This study was designed to analyze and identify the interaction between money supply, imports, interest rates, inflation, and exchange rates in three G20 countries with the highest inflation rates, namely Argentina, Turkey, and Russia. The empirical findings demonstrate that these objectives have been achieved, as the results reveal clear and statistically meaningful relationships among the selected macroeconomic variables.

The first research objective was to examine the influence of money supply, imports, interest rates, and exchange rates on inflation. The results confirm that money supply expansion and exchange rate depreciation significantly contribute to higher inflation levels. Imports also play an important role in transmitting external price pressures into domestic inflation, particularly in economies that rely heavily on imported goods. These findings indicate that inflation in high-inflation G20 countries is driven not only by domestic monetary factors but also by external sector dynamics.

The second research objective was to analyze the effect of money supply, imports, interest rates, and inflation on exchange rate movements. The findings show that inflation has a positive effect on exchange rate depreciation, supporting the theoretical prediction that higher inflation weakens currency

value over time. In addition, increases in money supply and import demand exert downward pressure on exchange rates, while interest rate adjustments show mixed effects depending on country-specific policy frameworks and inflation expectations. The results demonstrate that inflation and exchange rates are mutually reinforcing in the selected countries, confirming the suitability of the simultaneous equation approach adopted in this study. By addressing both research objectives, this study provides empirical evidence that macroeconomic stabilization in high-inflation G20 economies requires coordinated policies that simultaneously target inflation control and exchange rate stability.

4. Conclusion

The results show that money supply expansion and exchange rate depreciation significantly contribute to rising inflation, while imports transmit external price pressures into domestic markets. Interest rates play a more limited role in directly controlling inflation, as they often function as a policy response rather than an effective preventive instrument in high-inflation environments. On the other hand, inflation, money supply, and import demand exert considerable influence on exchange rate depreciation, highlighting the importance of monetary discipline and external sector management.

The study concludes that achieving macroeconomic stability in high-inflation G20 countries requires an integrated policy approach that simultaneously addresses inflation control and exchange rate stability. Monetary policy alone is insufficient without coordination with exchange rate and trade policies. These findings provide empirical insights for policymakers in designing more effective stabilization strategies in economies facing persistent inflationary pressures.

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