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IS THE EXCHANGE RATE PASS-THROUGH EFFECT VALID IN SERBIA? EMPIRICAL EVIDENCE USING COINTEGRATION TECHNIQUES

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Abstract:
The aim of this paper is to examine the presence and extent of the exchange rate pass-through effect on consumer prices in Serbia. In a small and open economy operating under a managed floating exchange rate regime, understanding the impact of exchange rate changes on inflation is crucial for effective monetary policy. Since this topic has been extensively studied, the contribution of this paper lies in applying several cointegration techniques to monthly data spanning a specific time period from 2007 to 2021, with a focus on the Serbian context. The research results show that the exchange rate pass-through effect on prices is incomplete. Additionally, it has been found that the effect is more significant over the long run and that the strength of the impact depends on the cointegration technique used.

Keywords:
exchange rate; inflation; ARDL; case study.

JEL Classification:
E42

INTRODUCTION

The evaluation of the exchange rate pass-through (ERPT) effect can provide essential insights that significantly enhance the management of macroeconomic policy. A thorough analysis may lead to more accurate inflation forecasts, support the selection of an appropriate exchange rate policy, and inform the choice of monetary policy measures and instruments. This is especially relevant in Serbia, where inflation targeting has frequently fallen short of its objectives; the key policy rate has often been applied inefficiently, and the sustainability of the current exchange rate regime continues to be debated. In this context, evaluating the ERPT effect and understanding its implications can undoubtedly contribute to more effective monetary policy management, and by extension, to improved macroeconomic policy.

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The most significant factors influencing inflation in Serbia include regulated prices, inflation expectations, external shocks, and exchange rate fluctuations. Given Serbian characteristics - its small, underdeveloped economy, and a long history of poorly managed exchange rate policy (e.g., from the 1950s to the 1980s, 23 devaluations were implemented despite a formally fixed exchange rate regime; in the 1990s, the problem escalated into hyperinflation) - exchange rate movements carry particular importance. Persistent trade imbalances further underscore the relevance of ERPT analysis. The exchange rate has often served as a tool for maintaining price stability, especially in the context of major systemic changes, such as capital account liberalization, WTO accession, EU candidacy, and the global financial crisis when the exchange rate becomes even more relevant, particularly in relation to achieving price stability. It continues to be the primary source of inflationary pressure, requiring policymakers to carefully assess the relative costs and benefits of adopting a more flexible exchange rate regime before making any definitive decisions.

The primary motivation behind this analysis lies in the specific characteristics of the Serbian economy - notably, its high level of euroization and its status as a small and open economy - which make it essential to investigate the exchange rate's effect on prices. Accordingly, the aim of this paper is to re-examine the exchange rate pass-through effect on prices in Serbia. The central research question is whether the exchange rate pass-through effect on prices is present in Serbia?

While this topic has already been extensively explored, the contribution of this paper lies in applying multiple cointegration techniques and focusing on a specific time frame relevant to the Serbian context.

Following this introduction, the structure of the paper is as follows: a literature review summarizing key studies on the topic; a section on data and methodology, where the variables and empirical approach are defined; a section presenting the main empirical results; and finally, a conclusion that summarizes the findings and discusses their macroeconomic implications.

LITERATURE OVERVIEW

The degree of exchange rate pass-through to domestic prices of imported goods and overall inflation depends on several factors, including the share of imports in the economy, the size and timing of currency appreciation or depreciation, and the broader macroeconomic characteristics of the national economy (Kara & Ogunc, 2005). Broadly speaking, empirical studies on exchange rate pass-through can be categorized into two groups. The first distinction is based on the scope of analysis: whether the effect is examined across groups of countries (such as developed, developing, or emerging economies), as seen in McCarthy (2000), Loungani & Swagel (2001), Campa & Goldberg (2002), Ca' Zorzi *et al.* (2007), Barhoumi (2009), and Ristanović & Tasić (2018); or whether the analysis focuses on individual countries, including studies by Vilaret & Palić (2006), Tasić (2008), Cozmanca & Manea (2009), and Fetai *et al.* (2011).

Secondly, studies differ based on the type of prices affected by exchange rate fluctuations. Some authors (Goldberg & Knetter, 1997; Kumar-Dash & Narasimhan, 2011; Veličkovski & Pugh, 2011; Herger, 2012; Kurtović *et al.*, 2019) focus on the pass-through effect to import prices, while others (Beirne & Bijsterbosch, 2011) examine the relationship between exchange rate movements and consumer prices. Mihaljek and Klau (2008) found that pass-through is strongest for import prices and weakest for consumer prices. In the post-COVID-19 period, Alexius & Holmberg (2024) demonstrated that pass-through to import prices fluctuates significantly over time, consistent with microeconomic pricing models and macroeconomic theory. The exchange rate pass-through effect is most pronounced

in countries with high trade volumes and a high degree of economic openness (McCarthy, 2000). Furthermore, several studies (Calvo & Reinhart, 2002; Korhonen & Wachtel, 2005; Choudhri & Hakura, 2006) confirm that the impact of exchange rate changes on prices tends to be greater in less developed countries, partly due to the lower credibility of their central banks. In such contexts, temporary exchange rate shocks are often perceived as permanent.

Recent geopolitical tensions have contributed to increased exchange rate pass-through rates for both import and consumer prices, particularly in advanced economies (Chekih *et al*., 2023). However, some studies suggest that this effect may decline over time (Arsova, 2021). For instance, Jašova *et al*. (2016) found that the pass-through effect decreased in developing countries following the 2008 global financial crisis, primarily due to lower inflation rates, while it remained relatively low and stable in developed countries.

These findings are consistent with earlier studies by Olivei (2002), MacDonald & Égert (2006), Campa *et al*. (2006), Marazzi & Sheets (2007), and Cheikh & Rault (2016). Coricelli *et al*. (2006) argue that variations in monetary policy credibility largely explain differences in exchange rate pass-through across countries. Moreover, several authors (Taylor, 2001; Bouakez & Rebei, 2008; Maria-Dolores, 2010; Aleem & Lahiani, 2014; de Mendonça & Tostes, 2015; Carrière-Swallow *et al.*, 2016; Kabundi & Mlachila, 2019) have established a positive correlation between inflation levels and the magnitude of pass-through, indicating that more credible monetary policy frameworks tend to reduce the degree of exchange rate pass-through.

Kinda & Barry (2021), using data from West African countries, demonstrated that the exchange rate pass-through to inflation is incomplete and varies depending on the level of inflation. This suggests that the pass-through effect is heterogeneous across countries. Naqvi *et al.* (2025) analyzed exchange rate pass-through in Asian economies, distinguishing between countries that have adopted inflation targeting and those that have not. Their findings indicate that exchange rate pass-through has been largely absent in both groups since the 1990s. The introduction of inflation targeting did not significantly change the degree of pass-through when comparing inflation-targeting countries to their own pre-targeting periods, nor when compared to non-inflation-targeting countries after the 2000s, which is considered the average period for adopting inflation targeting. The study also found that domestic inflation in these economies has historically been influenced more by global commodity prices than by exchange rate depreciation. Orhan & Turel (2022), using the case of Turkey, showed that exchange rate pass-through tends to increase with the magnitude of exchange rate shocks. Furthermore, positive shocks have a stronger effect on domestic prices than negative ones, especially during periods of high inflation. A clear positive correlation exists between inflation and exchange rate pass-through: during episodes of elevated inflation, the pass-through to domestic prices becomes more pronounced.

The strength of the exchange rate pass-through channel also depends on the exchange rate regime in place. Goeltom (2008) emphasizes that exchange rate transmission tends to be stronger under flexible exchange rate regimes compared to fixed regimes. Similarly, Al-Mashat & Millmeier (2007) note that fixed regimes constrain exchange rate movements, resulting in weaker and delayed effects on inflation and output. Dollarization presents an additional challenge for monetary policy. In highly dollarized economies, exchange rate pass-through tends to be stronger, complicating inflation control (Calvo & Reinhart, 2002).

Kurtović *et al*. (2018) examined the exchange rate pass-through effect on import prices in Southeast European countries, finding that Bulgaria, Croatia, Romania, and Slovenia experienced full pass-through in both the short and long term. In contrast, Macedonia showed no significant pass-through effect in either time frame. Fetai (2011) found that in Macedonia, a 1% depreciation of the domestic currency led to a 0.5212% increase in prices. For Croatia, Billmeier and Bonato (2002) reported a long-term pass-through coefficient of 0.3 on retail prices, which is relatively modest considering Croatia's small, open, and highly euroized economy with widespread price and wage indexation in foreign currency. Empirical evidence from Serbia supports the notion that inflation targeting helps reduce inflation, which - according to Taylor's hypothesis - should also decrease the exchange rate pass-through effect. Petreski (2013), who studied 24 transition economies from 1993 to 2011, confirmed earlier findings that pass-through was high (ranging from 0.7 to 1.1) in these countries, but significantly lower - around 0.2 - in those that adopted inflation targeting, even during crisis periods.

For Serbia, Vilaret and Palić (2006) found evidence of an incomplete but significant exchange rate pass-through effect during the period from 2001 to 2006. Their estimated pass-through coefficient did not exceed 0.6, even in the long term. Similarly, Tasić (2008), using data from 2001 to 2007, reported pass-through coefficients below 0.5, though still relatively significant. These findings suggest that the exchange rate remains an important driver of inflation in Serbia. The relatively high pass-through coefficients are consistent with Serbia's status as a small, open economy characterized by a high import-to-GDP ratio, which indicates strong import dependence. Additionally, the country's reliance on external factors and fluctuations in the foreign trade balance - including a substantial trade deficit -further reinforces this relationship. Moreover, the elevated pass-through values can be attributed to the significant share of imported goods within the retail price basket, limited competition in the domestic market, and the high degree of euroization. These factors collectively strengthen the link between exchange rate fluctuations and inflation expectations in Serbia. Post-crisis studies suggest that the exchange rate pass-through in Serbia persists but has weakened compared to earlier periods. This attenuation is likely due to stronger interventions by monetary authorities during the global financial crisis, as well as a general decline in inflation levels (Ristanović & Tasić, 2018). Although the estimated pass-through effect remains relatively high, findings indicate a decline relative to previous periods, irrespective of the methodology employed. Estimates derived from the Autoregressive Distributed Lag (ADRL) model show that, in the short run, the pass-through effect is strongest for prices of tradable goods, while in the long run, it is most pronounced in retail prices. Moreover, domestic price categories exhibit asymmetric responses to exchange rate fluctuations: the pass-through effect is significantly stronger during periods of domestic currency depreciation and weaker during appreciation. This asymmetry applies to both nominal and real exchange rate changes.

This study addresses a gap in previous research on Serbia by extending the time frame for analyzing the exchange rate pass-through effect. Additionally, it employs multiple econometric techniques to test the robustness of the results. The observed period also encompasses intervals of significant exchange rate fluctuations, enabling a more comprehensive and objective examination of the dynamics between the variables under analysis.

DATA AND METHODOLOGY

The relationship between the exchange rate and the price level is examined using data from the Republic of Serbia. The study period spans from January 2007 to December 2021 (2007M01–2021M12). Table 1 provides an overview of the variables used in the analysis, along with concise descriptions. All variables have been transformed into their logarithmic form for statistical purposes.

Table 1. Variable Description

Abbreviation	Source (number of observations)	Variable description
CPI_t	Statistical Office of the Republic of Serbia (180)	Consumer price index (2006=100)
NER_t[1]	National Bank of Serbia (180)	Nominal effective exchange rate (2005=100)
ER_t	National Bank of Serbia (180)	Exchange rate RSD/EUR, period average
$M1_t$	National Bank of Serbia (180)	Money Supply, in million dinars, end of period

Source: Authors

To examine whether the time series are stationary, the traditional Augmented Dickey-Fuller (ADF) test was applied (Dickey & Fuller, 1981). The Akaike Information Criterion (AIC) was used to determine the optimal lag length in the ADF test. If the time series are found to be non-stationary at levels, the existence of cointegration is subsequently tested. In cases where cointegration is confirmed, the parameter estimates obtained using the Ordinary Least Squares (OLS) method can be interpreted as estimates of long-run relationships, possessing the property of super-consistency. The stationary residuals from the cointegration equation are used as the error correction term, which is then included in the formulation of the Error Correction Model (ECM).

$$\Delta Y_t = \gamma_0 ecm_{t-1} + \gamma_{11}\Delta Y_{t-1} + \ldots + \gamma_{1k}\Delta Y_{t-k} + \gamma_{21}\Delta X_{t-1} + \ldots + \gamma_{2k}\Delta X_{t-k} + error\ term \quad (1)$$

This model gained wider acceptance after it was promoted by Engle and Granger (1987), and is known in the literature as the Engle-Granger two-step procedure. The parameter γ_0 is referred to as the speed of adjustment coefficient, and it indicates the proportion of the deviation from the long-run equilibrium that is corrected in each period. The term ecm_t represents the series of residuals from the long-run relationship. The existence of a long-term relationship among the variables is also examined using the Johansen (1991) cointegration test. The basic prerequisites for applying this test are that the variables are non-stationary at levels but become stationary after first differencing. To determine the number of cointegrating vectors, the trace statistic and the maximum eigenvalue statistic are used. Once cointegration is established among the variables, the Vector Error Correction (VEC) model is estimated. The basic form of the VEC model equation can be expressed as follows:

$$\Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-1} + \theta D_t + \varepsilon_t \quad (2)$$

1 According to NBS methodology, indexes above 100 mean the appreciation and those below 100 the depreciation of the dinar.

where Δ is the first difference operator and *k*-1 represents the number of lags, which is reduced by one (an important distinction compared to VAR). The optimal lag length (*k*) was determined based on the Akaike Information Criterion (AIC). *Π* is the corresponding matrix, while *D* denotes dummy variables. *θ* represents the matrix of coefficients that link the dummy variables with changes in the dependent variables. It is assumed that the residuals (ε_t) are normally distributed and exhibit the properties of white noise. X_t represents a 3×1 vector of endogenous variables (consumer price index, exchange rate, and money supply). The term $\Pi = \gamma\beta$, captures the long-run relationship, where vector *β* contains the cointegration parameters, and vector α\alphaα contains the adjustment coefficients.If the adjustment coefficient is statistically significant, it indicates that the time series adjusts toward the long-run equilibrium at a corresponding speed. However, if the coefficient is statistically insignificant, it suggests that the series is a source of non-stationarity and is weakly exogenous. The second part of the equation refers to the short-run causality among variables. Short-run causality is determined based on the sum of the χ^2 tests on the estimated coefficients of the independent variables in first differences.

In the final step, to test the dependence between variables, the ARDL (Autoregressive Distributed Lag) model using the bounds testing approach is applied. The ARDL approach allows for testing the relationship between variables regardless of whether the variables are integrated of order I(0), I(1), or a mix of both. This method is particularly suitable when working with small sample sizes. The only requirement is that none of the variables are integrated of order two or higher (i.e., I(2) or more). The model was developed by Pesaran *et al.* (2001) and can be expressed in the following form:

$$\Delta lnCPI_t = a_0 + a_{lnCPI} lnCPI_{t-1} + a_{lnNER} lnNER_{t-1} + a_{lnM1} lnM1_{t-1} + \sum_{i=1}^{p} a_i \Delta lnCPI_{t-1} + \sum_{j=0}^{q} a_j \Delta lnNER_{t-j} + \sum_{l=0}^{m} a_l \Delta lnM1_{t-l} + \mu_t \quad (3)$$

$$\Delta lnCPI_t = a_0 + a_{lnCPI} lnCPI_{t-1} + a_{lnER} lnER_{t-1} + a_{lnM1} lnM1_{t-1} + \sum_{i=1}^{p} a_i \Delta lnCPI_{t-1} + \sum_{j=0}^{q} a_j \Delta lnER_{t-j} + \sum_{l=0}^{m} a_l \Delta lnM1_{t-l} + \mu_t$$

Where Δ denotes the first-difference operator, *αo* represents the constant (drift component), *p, q* and *m* are the respective lag lengths. In the initial step, the value of the F-statistic is calculated and compared to the critical values provided by Pesaran *et al.* (2001). This procedure determines whether a long-run relationship among the variables exists. The calculated F-statistic is compared to the lower and upper bound critical values:

- If the F-statistic exceeds the upper bound, it indicates the presence of cointegration.
- If it falls below the lower bound, the null hypothesis of no cointegration cannot be rejected.
- If the value lies between the bounds, the result is inconclusive.

The existence of a long-run relationship is further supported if the coefficient on the lagged dependent variable (along with the error correction term) is negative and statistically significant. This condition is necessary, but not sufficient on its own, to reject the null hypothesis of no cointegration (Morley, 2006). In cases where the F-statistic falls between the bounds, the presence of cointegration can still be examined through the error correction mechanism (Kremers *et al.*, 1992). Finally, the stability of both the short-run and long-run relationships should be tested using stability diagnostics, such as the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMsq) of recursive residuals.

EMPIRICAL RESULTS

The results of the unit root test are presented in Table 2. The original data exhibit unit roots, i.e., they are non-stationary. After the first differencing, the variables representing inflation and the exchange rate become stationary at the 1% significance level, while the money supply becomes stationary at the 5% significance level. These results indicate that the null hypothesis of the presence of a unit root is rejected after the variables are first-differenced. All observed variables are integrated of order one, i.e., I(1). The values of the corresponding test statistics related to the two-step Engle-Granger procedure are shown in Table 3. At the 1% significance level, the results indicate that the series for the consumer price index and the exchange rate are stationary, implying that they are cointegrated (Models 1 and 2). In Model 1, the estimated slope of the cointegration relationship is negative, suggesting that an appreciation of the exchange rate leads to a decrease in the price level, with a corresponding long-term coefficient of -0.66. In Model 2, the relationship is positive, indicating that a depreciation of the exchange rate leads to an increase in prices, with a long-term coefficient of 0.69. The short-term coefficients are -0.14 in Model 1 and 0.14 in Model 2. It is evident that the short-term effect is smaller than the long-term effect when it comes to exchange rate pass-through to inflation.

Table 2. ADF Test Results

Variable	Deterministic components	ADF (number of lags)
lnCPI	Constant & trend	-2.58(1)
lnNER	Constant	-2.06(1)
lnER	Constant	-2.33(1)
lnM1	Constant & trend	-2.82(12)
	First difference	
lnCPI	Constant	-10.04(0)*
lnNER	Constant	-8.74(0)*
lnER	Constant	-9.03(0)*
lnM1	Constant	-2.88(11)**

Source: Author's calculation
Remark: * and ** show significance at 1% and 5% level, respectively

A change in the exchange rate (e.g., currency depreciation) has a limited and smaller impact on inflation in the short term, but this effect becomes more pronounced over time. This suggests the presence of inertia in the economy and a slow transmission mechanism. This is important information for monetary authorities, as it implies that the effects of exchange rate changes on inflation are delayed, thereby making inflation targeting more challenging. In both Models 1 and 2, the estimated adjustment coefficient is -0.04. The negative sign indicates that the dependent variable tends to return to the long-term equilibrium it shares with the independent variable. The coefficient is statistically significant and suggests that approximately 4% of the deviation in the consumer price index from its long-term equilibrium with the exchange rate is corrected each year. This result implies that inflation responds slowly to changes in the exchange rate, and that currency depreciation does not immediately produce its full effect on prices. Potential explanations include the presence of regulations and subsidies that

mitigate the impact of exchange rate fluctuations on inflation, as well as the relatively slow response of monetary policy in addressing inflationary pressures arising from exchange rate movements. The actual and fitted values of the consumer price index are presented in the Appendix.

Table 4 presents the results of the Johansen cointegration test. Since the choice of lag length significantly influences the results of the cointegration test, the optimal lag length kkk was selected based on the VAR model specification that satisfies key diagnostic criteria - namely, the absence of autocorrelation and heteroskedasticity, as well as residuals that approximate a normal distribution. The results of both the Trace statistic and the Max-Eigenvalue statistic clearly indicate the presence of one cointegration vector among the observed variables at the 5% significance level. As deterministic components, dummy variables were included to capture structural breaks in the time series, primarily resulting from the effects of the Global Financial Crisis, most notably during 2008 and 2012. These dummy variables were incorporated to ensure that the estimated model - particularly the residuals - met the assumptions of normality, homoskedasticity, and no autocorrelation.

Table 3. Exchange Rate Pass-Through Effect (Engle-Granger Procedure)

Model	DFR statistic	Dependent variable	Exchange rate	Long- run	Short- run	Adjustment coefficient
1	-3.84*	lnCPIt	lnNERt	-0.66	-0.14	-0.04
2	-3.99*	lnCPIt	lnERt	0.74	0.14	-0.04

Source: Author's calculation
Remark: * Shows significant at 1% level

Table 4. Johansen Test Results

Model 3: lnCPI lnNER lnM1; Deterministic components: DUM2008_M07 DUM2008_M10 DUM2008_M11 DUM2009_M01 ; VAR(3); Lag (k-1)				
Null hypothesis	**Trace statistics**	**Critical values (5%)**	**Max-Eigen statistic**	**Critical values (5%)**
H_0: r=0	31.092	29.797	22.625	21.132
H_0: r=1	4.38	15.495	3.595	14.265
H_0: r=2	0.004	3.841	0.784	3.841
Model 4: lnCPI lnER lnM1; Deterministic components: DUM2008_M06 DUM2008_M10 DUM2009_M01; VAR(3); Lag (k-1)				
Null hypothesis	**Trace statistics**	**Critical values (5%)**	**Max-Eigen staitstic**	**Critical values (5%)**
H_0: r=0	32.458	29.797	24.181	21.131
H_0: r=1	5.154	15.495	4.453	14.265
H_0: r=2	0.700	3.841	0.700	3.841

Source: Author's calculation

Table 5 displays the results of the VEC (Vector Error Correction) model, where cointegration equations and weakly exogenous variables are reported in Models 3 and 4 (the model specifications are provided in the Appendix). Examining the cointegration equation in Model 3, it can be concluded that in the long run, the exchange rate pass-through is incomplete but substantial, with a coefficient of -0.57. A similar conclusion can be drawn from Model 4, where the corresponding coefficient is 0.84.

Furthermore, the exchange rate and money supply can be characterized as weakly exogenous variables. More precisely, they represent the primary sources of non-stationarity within the system.

Table 5. VEC Model Results

Variable	Co-integration equation	Weakly exogenous variable
Model 3	lnCPI= -0.57*lnNER+ 0.10*lnM1+6.27	D(lnNER); D(lnM1)
Model 4	lnCPI= 0.84*lnER+0.11*lnM1-0.28	D(lnNER); D(lnM1)

Source: Author's calculation

The weak exogenous variables are those whose long-term coefficients of adjustment are not statistically significant.

Table 6. ARDL Test Results

	ARDL			Specification tests			
Estimated model	Optimal lag length	Fixed regressors	F-statistic	X^2 NORMAL	X^2 ARCH	X^2 RAMSEY	X^2 SERIAL
F ($lnCPI_t$/ $lnNER_t$, $lnM1_t$)- Model 5	2,4,1	DUM2012_m11	5.49**	5.15	2.26	0.13	0.58
F($lnCPI_t$/ $lnER_t$, $lnM1_t$)- Model 6	2,4,1	DUM2012_m11	5.40**	2.76	1.98	0.39	0.53
Significance level	Critical values (T=180)						
	Lower bound I(0)	Upper bound I(1)					
1%	5.15	6.36					
5%	3.79	4.85					
10%	3.17	4.14					

Source: Author's calculation

Remark: * Shows significant at 1% level. Critical values are available in the paper Pesaran *et al.* (2001), asymptotic n=1000

Finally, the research also employed the Autoregressive Distributed Lag (ARDL) approach to examine cointegration. Prior to conducting the test, it was necessary to determine the optimal lag length, as the value of the F-statistic is highly sensitive to lag selection. The Akaike Information Criterion (AIC) was used to determine the optimal lag structure for the model, following the methodology proposed by Pesaran *et al.* (2001).

Table 7. Exchange Rate Pass through Effect (ARDL procedure)

Model	Dependent variable	Exchange rate	Long-run	Short-run
5	$lnCPI_t$	$lnNER_t$	-0.52	-0.08
6	$lnCPI_t$	$lnER_t$	0.69	0.10

Source: Author's calculation

The empirical results of the applied model are presented in Table 6. The calculated F-statistic values in Models 5 and 6 exceed the upper bound at the 5% significance level, indicating the existence of a long-run relationship among the variables. Specification tests confirm the adequacy and stability of the estimated models. The stability of both the long-run and short-run relationships was tested using the CUSUM and CUSUMSQ tests, with the results presented in the Appendix. The short-run and long-run estimation results are shown in Table 7. Based on the obtained coefficients, it can be concluded that exchange rate pass-through is incomplete in the long run. Specifically, a 1% depreciation of the exchange rate leads to an increase in domestic prices of 0.52% in Model 5, and 0.69% in Model 6. In the short run, the exchange rate pass-through is also incomplete, with a smaller magnitude compared to the long-term effect. A 1% depreciation results in a 0.08% increase in prices in Model 5 and a 0.10% increase in Model 6. To enhance clarity and demonstrate the robustness of the findings, Table 8 provides a summary overview of the key empirical results. The results showed that both the long-term and short-term coefficients are statistically significant in all applied models. The direction of the relationship is also consistent across models; the only difference lies in the values of the individual coefficients. This finding is understandable, given the specific characteristics of the applied techniques. The reliability of the results is further supported by the fact that the estimated coefficients are of similar magnitude.

Table 8. Summary of the Empirical Results

Model	Estimated technique	Long- run coefficient	Short- run coefficient
1	Engle-Granger	-0.66	-0.14
2	Engle-Granger	0.74	0.14
3	VEC	-0.57	/
4	VEC	0.84	/
5	ARDL	-0.52	-0.08
6	ARDL	0.69	0.10

Source: Author's calculation

CONCLUSIONS

At the beginning of the transition period, during the initial phase of the stabilization process, many countries opted to use the exchange rate as a nominal anchor to curb inflation and support disinflation. As a result, a strong relationship between inflation and the exchange rate was evident in the early years of transition in many countries, including Serbia. The fact that exchange rate movements have traditionally served as a signal for corporate behavior, and that during the 1990s the transmission of economic shocks was primarily channeled through the exchange rate, further underscores the importance of analyzing exchange rate pass-through in Serbia. From a macroeconomic perspective, analyzing the exchange rate pass-through to domestic prices has important implications for monetary policy decision-making, particularly when an economy is simultaneously facing inflationary pressures and a current account deficit. Therefore, this type of analysis serves as a valuable tool for selecting appropriate monetary policy measures and instruments, as well as for shaping exchange rate policy. Moreover, it allows for more accurate forecasting of future inflation.

The transmission mechanism operates through several channels. This paper focuses on the channel most relevant to the Serbian economy - the exchange rate channel. Within this context, the pass-through effect of the exchange rate on domestic prices in the Republic of Serbia was analyzed. To ensure more robust and reliable results, several cointegration techniques were applied. The empirical findings clearly confirm the hypothesis that the exchange rate has a significant impact on price dynamics. However, the strength of this effect depends heavily on the econometric method applied, the time horizon of the analysis, and the selected set of variables.

Specifically, in the long run, the strength of the exchange rate pass-through effect ranges from 0.52 to 0.66 when the nominal effective exchange rate is used as the independent variable, and from 0.69 to 0.84 when the EUR/RSD exchange rate is used. In the short run, the effect is significantly weaker, ranging from 0.08 to 0.14. These results indicate the presence of a strong but incomplete exchange rate pass-through to domestic prices. The policy implications of these findings underscore the importance of the exchange rate channel in Serbia. While the exchange rate has a dominant influence on price dynamics, it is essential that monetary authorities also closely monitor the key policy rate to ensure the effective implementation of the inflation targeting framework. Moreover, the high degree of unofficial euroization in the Serbian economy significantly diminishes the effectiveness of the exchange rate policy, highlighting the importance of pursuing the dinarization strategy more decisively. The incomplete pass-through allows for a moderately more flexible exchange rate regime, which can serve as a buffer against external shocks. Additionally, emphasis should be placed on maintaining the credibility of the inflation target and anchoring inflation expectations. Active measures to reduce euroization, such as developing the domestic financial market and promoting dinar, denominated savings and credit instruments, are essential to reducing the economy's vulnerability to external disturbances.

APPENDIX

Figure A1. Actual and Fitted Values of Consumer Price Index - Model 1

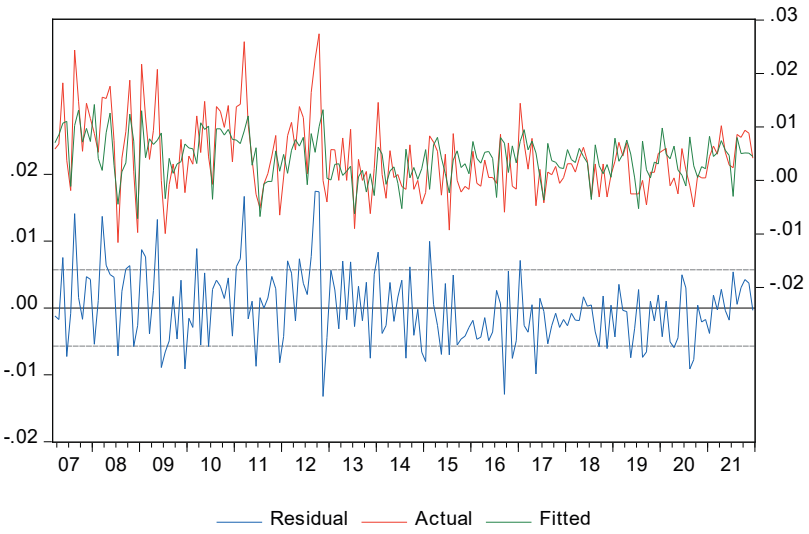


Figure A2. Actual and Fitted Values of Consumer Price Index - Model 2

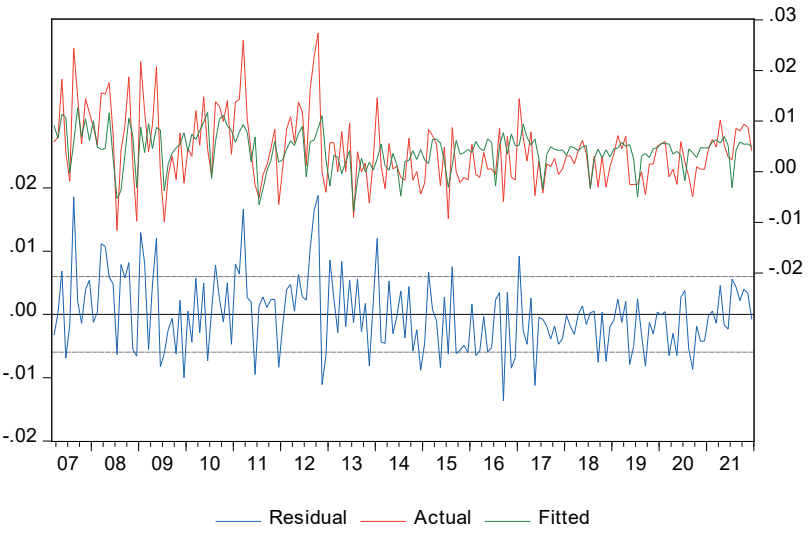


Table A1. Specification Tests - Model 3 and 4

	R^2	F statistic	Autocorrelation	Heteroskedasticity	Normality
Model 3	33.23%	7.46	1.39	1.35	0.13
Model 4	29.02%	6.79	1.35	1.48	0.22

R^2 represent determination coefficient, F value is statistically significant, autocorrelation refers to Breusch-Godfrey test, heteroskedasticity refers to Breusch-Pagan-Godfrey test, and normality refers to Jarque-Bera test

Figure 3A. CUSUM i CUSUMsq Test - Model 5

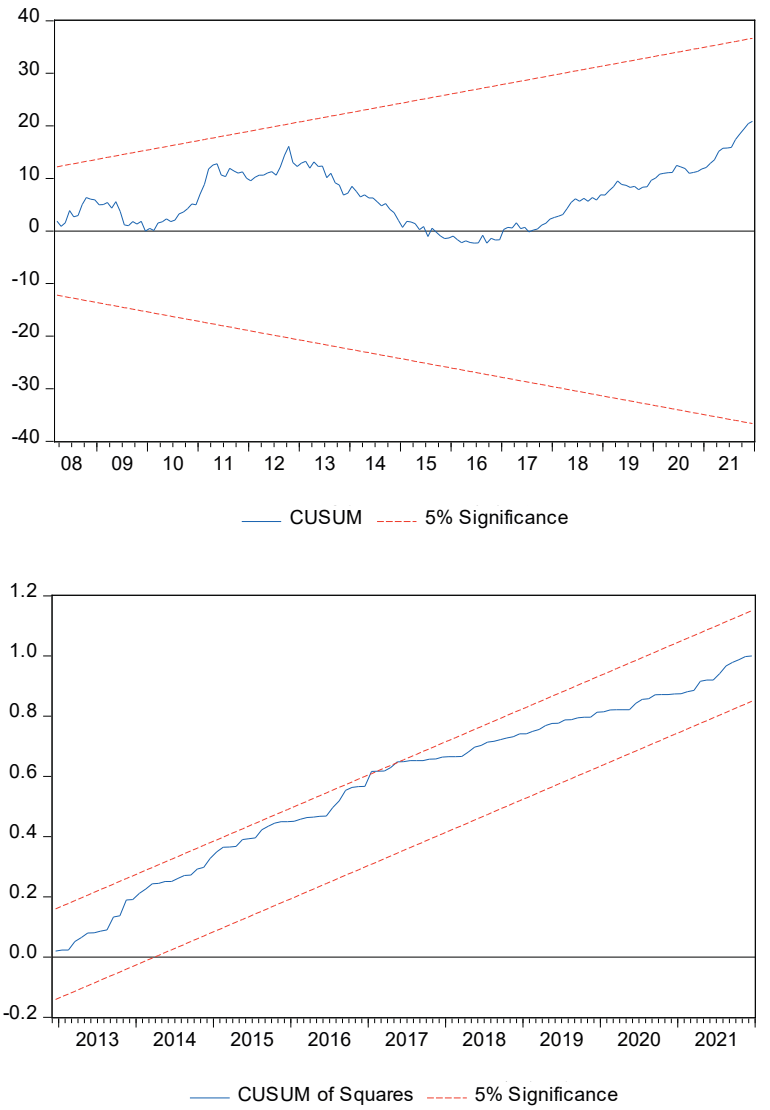
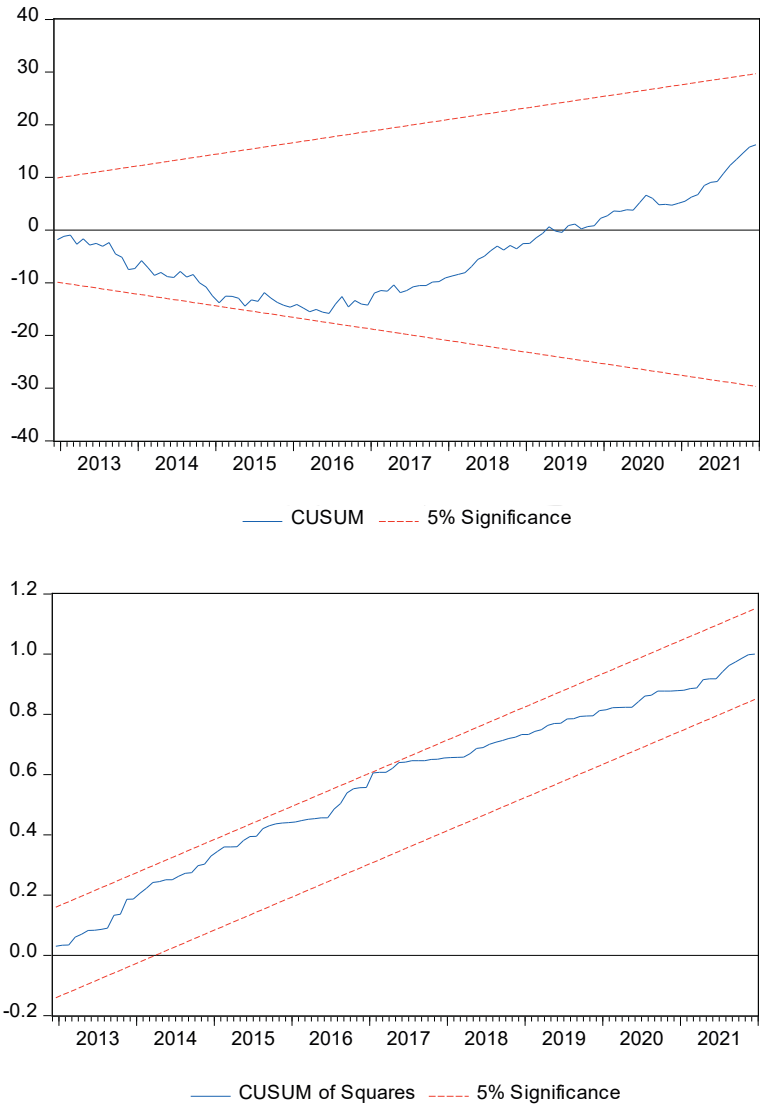


Figure 4A. CUSUM i CUSUMsq Test - Model 6



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DA LI JE EFEKAT PRENOSA DEVIZNOG KURSA VALIDAN U SRBIJI? EMPIRIJSKO TESTIRANJE PRIMENOM TEHNIKA KOINTEGRACIJE

Rezime:

Cilj ovog rada je da ispita prisustvo efekta prenosa deviznog kursa na cene u Srbiji. U maloj i otvorenoj ekonomiji sa režimom rukovođeno plivajućeg deviznog kursa, uticaj promena kursa na inflaciju je posebno značajan. S obzirom na to da je ova tema široko proučavana, doprinos ovog rada ogleda se u primeni nekoliko tehnika kointegracije i analizi specifičnog vremenskog perioda za slučaj Srbije. Izabrani vremenski okvir obuhvata period od 2007. do 2021. godine, uz korišćenje mesečnih podataka. Rezultati istraživanja pokazuju da je efekat prenosa deviznog kursa na cene nepotpun. Takođe je utvrđeno da je efekat izraženiji na duži rok i da jačina uticaja zavisi od primenjene tehnike kointegracije.

Ključne reči:

devizni kurs;
inflacija;
ARDL;
studija slučaja.

JEL klasifikacija:

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