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EXCHANGE RATE VOLATILITY AND HOUSE PRICES IN THE EASTERN EUROPEAN COUNTRIES

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ABSTRACT

We analyzed the causal relationship between exchange rate volatility and house prices in 11 Eastern European countries. Exchange rate volatility was modelled using a GARCH framework, while the determinants of house prices were estimated with the GMM method. Based on quarterly data covering the period from 2004 to 2024, we established that exchange rate volatility effects on house prices are quite heterogeneous, with a statistically significant positive effect in 7 countries and a negative effect in 4 countries. However, there is a predominantly dampening effect of exchange rate depreciation on house prices, except Slovenia and Latvia. Among other findings, house prices exhibit inertia, which could be interpreted as the presence of speculative motives among market participants. An inverse relationship between interest rate and house prices is a distinct feature of countries with a floating exchange rate regime. Higher output abroad exerts an upward pressure on house prices in 5 countries, with the opposite effect in 3 countries. The real exchange rate misalignment is significant for house prices in eight countries. Joining the eurozone is likely to increase house prices. Main findings remain robust under different specifications of explanatory variables and the exchange rate volatility determinant.

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1. Introduction

Although theoretical arguments, such as those by Friedman (1953), support the exchange rate disconnect hypothesis, empirical evidence suggests otherwise. Recent studies indicate that exchange rate fluctuations influence not only consumer prices and output - as shown for European countries by Corsetti et al. (2021) - but also housing prices. For the real estate market, exchange rate effects can be transmitted in several ways, such as the value of transactions for foreigners, domestic wealth effect, costs of imported construction materials and equipment, expectations of the future house prices. The importance of exchange rate fluctuations in house price developments is strengthened by an increasing role of international investments in the real estate portfolio management (Thomas & Lee, 2006). In line with the logic of supply-side factors and foreign demand for housing, it is found that exchange rate depreciation is associated with lower house prices in seven OECD countries (Vogiazas & Alexiou, 2017), nine Asian economies (Glindro et al., 2011), Cyprus (Pashardes & Savva, 2009), China (Yang, 2023) and Egypt (Rady et al., 2024). Conversely, a positive relationship between local currency depreciation against the U.S. dollar and house prices characterizes the markets in Argentina (Rosanovich & Di Giovambattista, 2020) and India (Allen et al., 2020).

While the link between exchange rate changes and house prices is studied in many country-specific cases, much less attention has been given to the impact of exchange rate volatility. The findings for Nigeria demonstrate that exchange rate volatility is behind higher real estate investment returns in the low income segment (Diala et al., 2017). Similarly, it is found that exchange rate volatility as a measure of currency risk has a positive impact on the returns of the portfolio of real estate investments in seven Asia Pacific cities (Addae-Dapaah & Tan Yong Hwee, 2009). An earlier study of 12 developed and emerging economies demonstrated that exchange rate volatility was of negative but statistically insignificant effect on

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overseas investments in real estate (Addae-Dapaah & Loh, 2005). For India, it is found that exchange rate effects on house prices become stronger in the presence of higher (real) exchange rate volatility, which is inversely related to house prices (Allen et al., 2020).

Although the relationship between exchange rate and house prices can be viewed as an argument in favor of administrative regulations aimed at supporting exchange rate stability, as found in, for example, Yang (2023), some sort of exchange rate volatility can be productive if housing is considered as one of the investment assets. In such a context, higher exchange rate volatility is associated with higher risk and higher returns on real estate holding, with upward pressure on house prices. Consequently, it is of interest to compare volatility effects under alternative exchange rate regimes - floating and fixed ones. At this point, potential differences between macroeconomic effects of exchange rate changes (realignments) and exchange rate volatility can be instrumental in shaping stabilization policies. If exchange rate changes are helpful in restoring macroeconomic equilibrium, it is an argument in favor of a floating exchange rate regime. Assuming expansionary exchange rate depreciations, as in Romania (Hatmanu et al., 2020) or Poland (Haug et al., 2013), an inverse relationship between currency depreciation and house prices is potentially stabilizing under the condition of a positive link between the value of housing and aggregate demand, a feature which is frequently observed in empirical studies for economically advanced countries (Aizenman et al., 2019; Stockhammer & Novas Otero, 2023). Under a fixed exchange rate regime, both changes in the anchor currency and its volatility could play a significant role. For example, depreciation of the British pound against the euro is associated with a decrease in house prices in Cyprus (Pashardes & Savva, 2009). Regardless of the exchange rate regime, the timely correction of house prices may improve investment efficiency and trigger pro-growth structural reforms (Aizenman et al., 2019). On the eve of the 2008 world financial crisis, there was a warning that loose monetary conditions of the eurozone could be materialized in asset price inflation, notably in the housing market, thus increasing the risk of longer-term disequilibria (Belke & Gross, 2007).

This study aims to estimate the impact of exchange rate volatility effects on housing prices across 11 Eastern European countries. Exchange rate volatility is modeled using the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) approach, while its effect on housing prices is assessed through the Generalized Method of Moments (GMM). The analysis also incorporates additional factors, including changes in the exchange rate, interest rates, foreign income, and domestic unemployment. Our main finding is that exchange rate volatility emerges as a significant determinant of housing price dynamics across all countries, although the direction of its impact varies considerably. In contrast, we observe a highly robust inverse relationship between exchange rate depreciation and housing prices.

The rest of the paper is structured as follows. Section 2 presents a brief review of relevant literature. Section 3 outlines research methodology. Empirical results are presented in Section 4, with a discussion on the main findings being provided in Section 5. Finally, Section 6 concludes the work.

2. Review of relevant literature

Initially, analysis of the relation between exchange rate volatility and house markets was focused on the risks and returns of portfolio investments, with an emphasis on the feasibility of hedging instruments for international investments in real estate as predominantly long-term assets (Sirmans & Worzala, 2003). Despite the substantial diversification benefits of adding real estate to a portfolio of financial assets, it was often assumed that accounting for currency risk costs significantly reduces the expected returns on such investments, thereby implying a negative impact of exchange rate volatility on real estate investment performance (Newell & Webb, 1996). Recently, various factors related to the demand and supply of housing are given more attention, including factors related to capital flows, international migration and households' asset management. For example, the housing market of Cyprus is under the influence of residents repatriating from Great Britain and British pensioners (Pashardes & Savva, 2009). Many individuals in the Eastern European countries consider real estate as an attractive form of investments (Okunevičiūtė Neverauskienė et al., 2025).

The effects of exchange rate volatility on house prices can be both positive and negative, depending on the nature and extent of fluctuations. Assuming a currency risk-based adverse relationship between exchange rate volatility and house markets, exchange rate stability should be helpful for both capital inflows and house prices. In this regard, introduction of the euro should diminish importance of the exchange rate risk and thus provide extra incentives for international

real estate investments (Thomas & Lee, 2006). This assumption is supported by evidence from Spain, where the elimination of currency risk premia following eurozone accession contributed to a rise in housing prices (Aspachs-Bracons & Rabanal, 2010). On the other hand, it is likely that capital inflows and higher house prices lead to the real exchange rate (RER) appreciation, which could be a source of future problems due to loss of competitiveness and housing busts (Vogiazas & Alexiou, 2017). If exchange rate volatility helps to limit excessive capital inflows, it may also serve as a mechanism to prevent RER appreciation and overheating of the housing market - both considered leading indicators of slowdown in economic growth.

On the other hand, exchange rate volatility can be associated with higher returns on real estate investments and thus tap foreign investors, which could be attractive for countries with undeveloped housing markets. Addae-Dapaah and Loh (2005) found that emerging economies are more vulnerable to the exchange rate volatility in the long run, but provide higher returns on real estate investments as compared with developed economies. For India, it is argued that the exchange rate volatility, as a side-product of hot money flows, provides incentives for riskier borrowers, with an increase in house prices to follow (Allen et al., 2020). A housing bubble is more likely to occur under conditions of low interest rates and favorable trade balance which sets the ground for expectations of exchange rate appreciation. It is natural to suggest that these are optimistic expectations of the exchange rate path which are instrumental in establishing a positive link between exchange rate volatility and house prices.

As almost all Eastern European countries experience significant labor migration to Western European countries, the house market effects of remittances from workers abroad are of particular interest. Jehan and Hamid (2017) established that exchange rate volatility for developing countries over the 1980-2013 period dampens both FDI and remittance inflows, but the magnitude of this effect becomes smaller in line with the development of financial markets. Although remittances from migrant workers can contribute to rising housing prices without significantly affecting exchange rate volatility (Kwame Adu Jack et al., 2019), it is likely that exchange rate fluctuations play a significant role in domestic consumption and investment decisions. For example, uncertainty related to exchange rate volatility can decrease spending on all kinds of goods and services, including housing. However, exchange rate volatility can intensify the search for safe assets thus increasing demand for housing as a hedge against macroeconomic instability.

Other considerations could also play a role. In the presence of a positive relationship between output and house prices (Adams & Füss, 2010; Cevik & Naik, 2022; Cunha & Loureiro, 2024; Maynou et al., 2021), exchange rate volatility can affect the latter indirectly by contractionary effects in the real sector. A negative relationship between exchange rate volatility and economic growth is supported by numerous empirical studies, for example Aizenman et al. (2018) or Morina et al. (2020). If exchange rate volatility is associated with higher interest rates, it creates another channel of the price-damping impact on house prices. Although findings of an inverse relationship between interest rates and house prices are dominant in empirical studies for European countries (Fotopoulos et al., 2024; Cevik & Naik, 2022; Cunha & Loureiro, 2024; Giuliodori, 2005), one recent study reports that interest rate hikes are behind higher house prices in most of Eastern European countries, except Bulgaria (Okunevičiūtė Neverauskienė et al., 2025). Belke and Keil (2018) explain similar findings for German regions by the interaction between interest rates and housing prices over the business cycle. A downward effect of higher interest rate on house prices can be amplified by an increase in unemployment and a decrease in inflation (Jordà et al., 2015). As expected, higher costs of construction have a depressing effect on the house prices in the study involving 18 OECD countries by Fotopoulos et al. (2024), but an opposite positive effect of construction costs is found for 15 industrial countries by Adams and Füss (2010). No impact of construction costs on house prices was found for Portugal (Cunha & Loureiro, 2024). At the same time, a strong effect of lagged housing prices in Portugal at both national and regional levels is interpreted as an argument in favor of speculative behavior, in line with the earlier suggestions by Case and Shiller (1989). Although meeting higher EU standards of energy efficiency can be a house price destabilizing factor, especially in the presence of volatile energy prices and exchange rates, recent empirical studies, for example Linkevičius and Okunevičiūtė Neverauskienė (2026), do not find a strong relationship between energy consumption and house prices for EU countries.

To sum up, causality running from exchange rate volatility to house prices is rather ambiguous. From the

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demand-side perspective, an intuitively appealing inverse relationship between exchange rate volatility and house prices is expected when considering real estate as an investment asset. Indirectly, more volatile exchange rates can depress demand for housing by interest rate hikes and depressing effects on both consumption and investments, especially for countries with significant remittances from abroad which are supposed to be more sensitive to exchange rate fluctuations. A depressing impact of exchange rate and its volatility on house prices is likely to be strengthened by unfavorable supply-side effects in economies dependent on imported factors of production, with EU energy efficiency standards being an extra factor behind house price developments. On the other hand, exchange rate volatility could be a factor behind higher house prices if associated with higher returns in the real estate market when exchange rate appreciation is expected. Similar outcome is likely if housing is considered as a hedge against macroeconomic (exchange rate) instability.

3. Materials and methods

3.1. Data

For the purpose of this study, we use data for 11 Eastern European countries over the period of 2004–2024. Quarterly series of the house prices in real terms (index, 2010 = 100), the short-term interest rate (%) and gross domestic product (index, 2010 = 100) are obtained from the Federal Reserve Bank of St. Louis database (www.fred.org). Other variables of interest, such as nominal and real effective exchange rates (index, 2010 = 100), and consumer prices (index, 2016 = 100), are taken from the IMF's *International Financial Statistics* database (www.data.imf.org). Time series of house prices and GDP are seasonally adjusted. Additionally, the currency misalignment (%) was calculated as a percentage deviation of the current values of the real exchange rate (RER) from the Hodrick–Prescott filtered trend.

Except for Romania, the Augmented Dickey–Fuller (ADF) test indicates that time series of house prices (h_t) are non-stationary in levels but stationary in first differences, i.e. integrated of order one (I(1)) (results are available on request). However, stationarity of house prices for Romania is not supported by the Phillips-Perron (PP) test. Regardless of the exchange rate regime practiced, the nominal effective exchange rate (e_t) is unambiguously I(1), while the RER misalignments ($rerc_t$) are stationary for all countries. The short-term interest rate (r_t) is stationary in most of the countries, except for Bulgaria, Croatia and Lithuania.

3.2. The model of exchange rate volatility

To measure exchange rate volatility, the GARCH model - an extension of the ARCH process - is employed (Engle, 2004). Technically, the GARCH(p, q) model accounts for the lagged term of the conditional variance (parameter p) and the squared error term (parameter q). To capture asymmetries between negative and positive shocks in volatility, the EGARCH model is applied, where the conditional variance is expressed in exponential form (Nelson, 1991).

The quarterly exchange rate volatility is specified with the EGARCH model as follows:

$$\Delta e_t = \mathrm{E}(\Delta e_t|\Omega_{t-1}) + \varepsilon_t, \varepsilon_t/\Omega_{t-1} \approx N(0, \sigma_t), \quad (1)$$

$$\ln(\sigma_t^2) = \omega + \alpha\left|\frac{|\varepsilon_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\sigma_t}}\right| + \gamma\frac{\varepsilon_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \beta\ln(\sigma_{t-1}^2) + \delta_1\Delta cpi_t + \delta_2 CRISIS_t + \delta_3 EURO_t + \xi_t, \quad (2)$$

where e_t and cpi_t stand for the nominal effective exchange rate and consumer price index (in logs), respectively, Ω_{t-1} is the information set available at time $t-1$, ε_t and ξ_t and are stochastic terms, and Δ is the operator of first differences. A country-specific dummy $CRISIS_t$ accounts for crisis developments of 2008–2009 and 2020–2021 periods and $EURO_t$ is the dummy for adopting the euro as a single currency. The expected value of exchange rate $\mathrm{E}(\Delta e_t|\Omega_{t-1})$ is modelled as the ARMA(p, q) process. The exchange rate series are used in logs in order to stabilize variance and reduce outliers.

As suggested by the monetary model of exchange rate determination, the information set Ω_t in the baseline EGARCH model includes the difference between domestic and foreign output, $y_t - y_t^*$. In line with Corsetti et al. (2017), the lagged terms of trade, $p_t - p_t^*$, are included, where domestic prices p_t are proxied with the producer price level, while the consumer price index in Germany is used as the foreign price level p_t^*.

In the specification of the conditional variance (Eq. 2), the one-period-ahead forecast variance, σ_t, is a function of the mean (ω), the ARCH term (α), the EGARCH term (β), and two explanatory variables. A high value of α indicates a stronger impact of stochastic shocks, with a high value of β being an indicator of persistence in exchange rate volatility. Asymmetry in the standardized shocks to $\ln(\sigma_t^2)$ exists if $\gamma \neq 0$. Similar to Schnabl (2009), consumer price

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inflation is used as an indicator of macroeconomic stability, in addition to a dummy for crisis developments. It is expected that exchange rate becomes more volatile in cases of both higher inflation and economic crises, with the latter having usually been characterized by downward pressure on consumer and producer prices. Joining the eurozone is supposed to diminish exchange rate volatility.

3.3. The model of house prices

A general representation for the determinants of real house price dynamics (in first differences) is represented as follows:

$$\Delta h_t = a_1 \Delta h_{t-1} + a_2 \Delta e_t + a_3 evar_t + a_4 r_t + a_5 rerc_t + a_6 \Delta y_t^* + a_7 EURO_t + a_8 CRISIS_t + \upsilon_t, \quad (3)$$

where $evar_t$ is exchange rate volatility, e_t is the nominal effective exchange rate, r_t is the domestic short-term interest rate, $rerc_t$ is the RER misalignment, y_t^* is the foreign output, and υ_t is the stochastic factor.

It is assumed that house prices are inertial ($a_1 > 0$) and negatively related to higher interest rates ($a_4 < 0$). As suggested by the above-mentioned empirical studies, the effects of both exchange rate changes and its volatility on house prices are rather ambiguous ($a_2, a_3 <> 0$). Undervaluation of the RER is expected to have a dampening effect on house prices ($a_5 < 0$). Income is proxied with output abroad which is likely to be positively correlated with domestic output and house prices ($a_6 > 0$), with an extra boost to house prices due to both investments from non-residents and remittances from workers abroad. Joining the eurozone is likely to contribute to higher housing prices ($a_7 > 0$). It is reasonable to expect that the world financial crisis of 2008–2009 and the COVID-19 pandemic of 2020–2021 contributed to a decline in house prices ($a_8 < 0$).

4. Results

4.1. Determinants of exchange rate volatility

As suggested by the Akaike info criterion, an ARMA (2.2) model is used for estimation of determinants of the mean exchange rate for most of countries. For Estonia and Poland, an ARMA (3.3) model is used. Estimates for Bulgaria are provided with an ARMA(1,1) model instead. In all cases, variance of the nominal effective exchange rate is estimated using Gaussian distribution assumptions. Estimates of the baseline EGARCH (1,1) model are presented in Tables 1 and 2. For all countries, the ARCH LM test indicates that there is no volatility clustering in the residuals, while the Jarque-Bera test suggests normal distribution of the residuals. The Ljung-Box Q test provides strong evidence in favor of the absence of serial correlations of residuals for most of countries. However, the results of the Ljung-Box Q test are at a 10% significance level for Hungary and Slovenia.

Among the determinants of the mean exchange rate (Table 1), stronger output growth in comparison to the eurozone ($y_t - y_t^*$) is associated with exchange rate appreciation in Slovenia and Latvia (Table 2), an outcome in line with the monetary model of exchange rate determination. An opposite positive relation between Δe_t and $y_t - y_t^*$ is observed in six countries, with neutrality in three countries. Contrary to predictions by Corsetti et al. (2017), higher domestic producer prices in comparison to consumer prices in Germany ($p_t - p_t^*$) lead to exchange rate appreciation in most of the analyzed countries.

Table 1

Univariate EGARCH results (mean equation)

Country	$y_t - y_t^*$	$p_t - p_t^*$	AR(1)	AR(2)	MA(1)	MA(2)	R^2	AIC	ARCH LM	Jarque-Bera
Countries with a floating exchange rate regime										
Czechia	0.028	−0.008***	0.068	−0.025	0.394	0.360***	0.25	−5.30	0.64	0.79
Hungary	0.140***	−0.039***	1.001***	−0.482	−1.081**	0.378	0.31	−4.39	0.18	0.38
Poland	0.039***	−0.114**	−0.107	0.119	0.078	−0.036	0.38	−4.25	0.27	0.18
Romania	0.069***	−0.035***	0.049	0.535***	−0.028	−0.674***	0.31	−5.05	0.17	0.35
Countries with a fixed exchange rate regime										
Bulgaria	0.010	−0.006	−0.495**	—	0.717***	—	0.09	−6.02	0.60	0.30
Croatia	0.035*	0.023	−0.234**	−0.852***	0.501***	0.746***	0.26	−6.39	0.27	0.76
Slovakia	0.008	−0.032**	0.894***	−0.719***	−0.922***	0.832***	0.14	−5.73	0.61	0.16
Slovenia	−0.016	−0.047**	0.270**	0.574***	−0.172	−0.734***	0.32	−6.68	0.87	0.20
Estonia	0.019	−0.006***	−0.682***	0.002	0.732*	−0.070	0.22	−6.13	0.74	0.21
Latvia	−0.021***	0.002	−0.598***	−0.472***	0.861***	0.892****	0.19	−5.94	0.62	0.30
Lithuania	0.007	0.008	−1.146***	−0.598***	1.284***	0.628***	0.24	−5.92	0.78	0.51

Note: the null hypothesis is the existence of a unit root in the series; Δ stands for first differences; here and hereafter *, **, and *** denote

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significance at the 10%, 5%, and 1% level, respectively.
Source: own study.

In the estimates of conditional variance (Table 2), the ARCH term (α) indicates that the impact of "surprises" from previous periods is rather weak in Bulgaria and Croatia. As indicated by the value of the EGARCH term (β), exchange rate volatility is persistent in Romania. Based on the sum of α and β, the speed of convergence of the conditional volatility to a steady state is very slow in Czechia, Bulgaria and Croatia. Asymmetry in the errors of $\ln(\sigma_t^2)$ is detected in four countries, where the value of γ is statistically significant, indicating a leverage effect in Croatia and an inverse leverage effect in Slovenia. Among the control variables, inflation contributes to exchange rate volatility only in Romania. Crisis developments add to higher exchange rate volatility in seven countries. As expected, joining the eurozone is associated with lower exchange rate volatility in Latvia and Lithuania, but not in Croatia and Estonia.

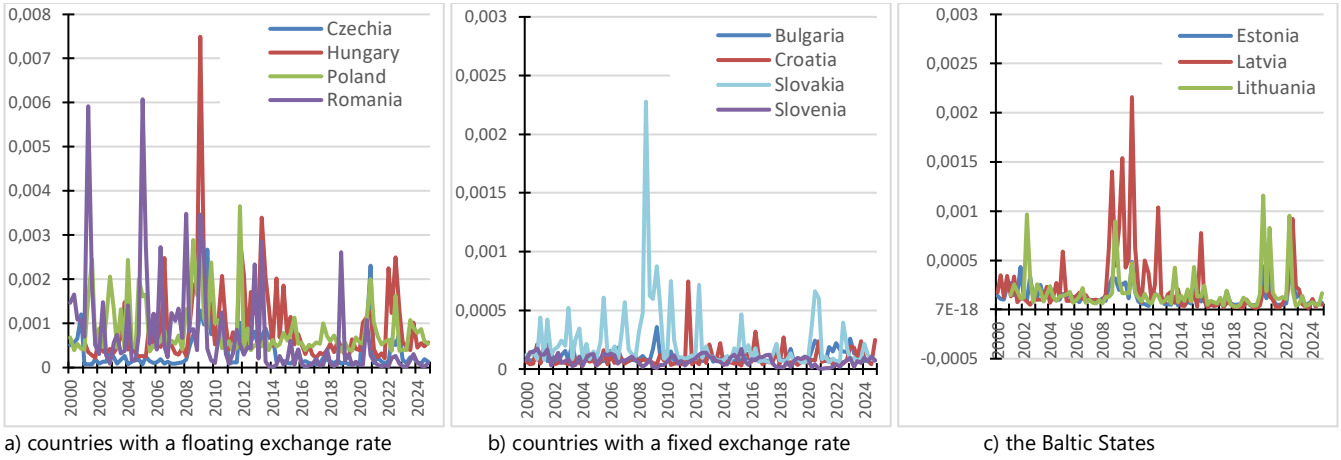
Figure 1 plots the evolution of quarterly exchange rate volatility for three groups of countries, with the Baltic states presented in a separate panel for better visualization. As expected, volatility is much higher in countries which practice a floating exchange rate regime. There are periods of higher exchange rate volatility around 2008–2009, 2012–2013 and 2020–2022. Among countries with a fixed exchange rate regime, Slovakia and Latvia are characterized by the highest exchange rate volatility.

Table 2

Univariate EGARCH results (variance equation)

Country	ω	α	γ	β	Δcpi_t	$CRISIS_t$	$EURO_t$
Countries with a floating exchange rate regime							
Czechia	−7.320***	0.724**	0.026	0.225	−18.846	1.163**	—
Hungary	−4.520**	0.709***	0.285*	0.470*	−9.572	0.757*	—
Poland	−7.446***	0.948***	0.146	0.081	−1.472	0.508*	—
Romania	−5.863***	2.064***	−0.126	0.545***	17.437***	0.246	—
Countries with a fixed exchange rate regime							
Bulgaria	−10.114**	0.355*	−0.190	−0.077	−0.858	0.456	—
Croatia	−10.157***	0.371	−0.584***	−0.045	−16.877	0.252	—
Slovakia	−8.517***	0.967***	0.229	0.134	—	1.635***	—
Slovenia	−5.438**	0.515**	0.684****	0.395*	0.136	−0.275	—
Estonia	−8.522***	0.628**	−0.191	0.124	—	0.889*	−0.468
Latvia	−8.395***	1.063***	0.196	0.152	5.471	1.514***	−1.028**
Lithuania	−8.001***	1.038***	−0.265*	0.184	—	1.176***	−0.584***

Source: own study.



a) countries with a floating exchange rate b) countries with a fixed exchange rate c) the Baltic States

Fig. 1. Conditional variance from EGARCH(p, q) Model. *Source*: own study.

4.2. Determinants of house prices

For the purpose of our study, the GMM estimator with the Newey-West covariance matrix is used. The lagged values of exogenous variables plus dummies for the COVID-19 pandemic and the period of zero lower-bound (ZLB) interest rates were used as internal instruments to address potential endogeneity issues. Estimates for a baseline model of house prices are

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presented in Table 4. The Sargan J test for over-identifying indicates the instruments are exogenous in all country-specific regression models. Based on the results of Ljung-Box Q test on residuals, there is no evidence of residual autocorrelation in the estimates, suggesting that all country-specific regression models are adequately specified. Most countries have significant estimates with the coefficient of determination R^2 greater than 0.35, indicating a strong relationship between the predictors and house prices. Explanatory power is lower in the estimates for Slovakia and Latvia.

Exchange rate volatility contributes significantly to house prices in all countries (four positive, seven negative). Similar to studies by Vogiazas and Alexiou (2017) or Pashardes and Savva (2009), a weaker currency is associated with a dampening effect on house prices in 9 out of 11 countries, except Slovenia and Latvia.

In all countries, there is a statistically significant lagged effect of house prices, indicating persistence in house prices. This finding could also be interpreted as the presence of the so-called *momentum effect*, meaning the importance of speculative motives among market participants, as argued by Case and Shiller (1989). Interest rate is highly significant in the determination of house prices in all countries with a floating exchange rate regime, with a counterintuitive positive effect in Bulgaria. The RER undervaluation has a positive impact on house prices in 5 countries, whereas its effect in Romania and Slovenia is found to be negative. Higher output abroad is predominantly of an upward pressure on house prices, with the exception of Bulgaria, Poland and Romania. House prices decline during crisis times in 7 of the analyzed countries. Finally, joining the eurozone contributed to higher house prices in Croatia, Estonia and Lithuania.

Table 4

Determinants of house prices (baseline model–I)

Country	Independent variables											
	Δh_{t-1}	Δe_t	$evar_t^1$	r_t	$rerc_t$	Δy_t^*	$CRISIS_t$	$EURO_t$	R^2	DW	J-stat	Jarque-Bera
Countries with a floating exchange rate regime												
Czechia	0.382***	–0.086**	9.847***	–0.001**	0.002***	0.036**	–0.020***	—	0.72	1.94	0.24	0.40
Hungary	0.563***	–0.146***	5.960***	–0.002***	–0.001	0.198***	–0.015***	—	0.67	1.76	0.36	0.10
Poland	0.302***	–0.142***	–6.457***	–0.002***	0.001	–0.085***	—	—	0.49	2.18	0.31	0.33
Romania	0.398***	–0.215***	–14.011**	–0.002***	–0.002***	–0.070***	–0.013***	—	0.27	1.83	0.08	0.83
Countries with a fixed exchange rate regime												
Bulgaria	0.751***	–0.364***	17.433**	0.001*	0.001*	–0.063***	–0.062***	—	0.78	2.26	0.72	0.38
Croatia	0.324***	–0.585***	–32.171***	–0.002	0.015***	0.114***	–0.012***	0.016***	0.35	2.26	0.06	0.30
Slovakia	0.608***	–0.521***	–13.597***	0.003	0.003	–0.001	–0.008**	—	0.18	2.18	0.20	0.06
Slovenia	0.410***	0.365	93.266**	–0.003	–0.007*	0.151*^	–0.014	—	0.30	1.73	0.21	0.87
Estonia	0.326***	–0.345*	–63.508**	–0.001	0.007**	0.558***	–0.012	0.013**	0.55	1.88	0.26	0.06
Latvia	0.284**	0.213	–9.724***	—	0.004	0.022	–0.030**	0.001	0.17	1.95	0.68	0.73
Lithuania	0.163***	–0.499***	–21.825***	–0.003	0.005***	0.151***	0.002	0.010***	0.81	1.80	0.55	0.71

Source: own study.

4.3. Robustness check

Our robustness analysis proceeds in three steps. First, we use an alternative measure of exchange rate volatility, as obtained by the EGARCH model with the output gap $y_t - y_t^*$ substituted by the interest rate differential $r_t - r_t^*$, where r_t^* is a 3-month interbank rate for the eurozone. Second, the unemployment rate is added as an explanatory variable to the baseline model of Eq. (3). Third, we use the RER instead of the nominal exchange rate in the estimates of house price determinants.

An alternative measure of exchange rate volatility does not change our main results (Table 5). If the unemployment rate is added as an explanatory variable, exchange rate volatility effects stay intact in all countries as well (Table 6). It is confirmed that house prices are inertial and adversely influenced by the exchange rate depreciation in 9 countries, while a positive effect on house prices emerges in Slovenia. The results suggest that the higher unemployment is associated with a decline in housing prices in Hungary, Romania and Slovakia. Regardless of the exchange rate volatility measure, its effects on house prices stay intact in the specification with the RER (results are available on request). However, the effect of RER changes on house prices is lost for Czechia, Romania, Slovenia and Estonia. Also, a positive effect of the RER changes on house prices emerges for Slovenia, as well as for Latvia and Romania (to a lesser extent). The RER undervaluation is positively related to house prices across alternative specifications in Czechia, Estonia and Lithuania, with Slovenia representing a robust case of an opposite

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negative effect. Robust interest rate effects on house prices are observed in countries with a floating exchange rate. A dampening effect of crisis developments is not confirmed for Slovakia. Findings of a positive relationship between joining the eurozone and house prices are very robust for Croatia, Lithuania and Estonia (to a lesser extent).

5. Discussion

Our results support international evidence that exchange rate volatility is a significant factor behind housing market developments. In line with Newell and Webb (1996), an inverse relation between exchange rate volatility and house prices can be explained by currency risk considerations. On the other hand, a positive exchange rate volatility effect on house prices can be related to higher returns on real estate investments. No evidence indicates that exchange rate volatility effects on house prices are different under alternative exchange rate regimes. In contrast to volatility effects, changes in the nominal exchange rate have a rather uniform impact on house prices. Regardless of the exchange rate regime, a currency depreciation has a predominantly dampening effect on house prices, similar to other empirical studies by Vogiazas and Alexiou (2017), Pashardes and Savva (2009), Yang (2023) or Rady et al. (2024). Indirectly, our results support arguments against the exchange rate disconnect, as exchange rate and its volatility are related to the value of housing, which in turn is very likely to affect output in an expansionary way.

Table 5

Determinants of house prices (baseline model–II)

Country	Independent variables											
	Δh_{t-1}	Δe_t	$evar_t^2$	r_t	$rerc_t$	Δy_t^*	$CRISIS_t$	$EURO_t$	R^2	DW	J-stat	Jarque-Bera
Countries with a floating exchange rate regime												
Czechia	0.381***	–0.287***	57.468***	–0.001***	0.002**	0.033	–0.019***	—	0.70	1.92	0.24	0.68
Hungary	0.207***	–0.141**	3.736***	–0.003***	—	0.207***	–0.016***	—	0.58	1.39	0.56	0.02
Poland	0.568***	–0.134***	–6.091***	–0.002***	0.001**	–0.071***	0.001	—	0.49	1.92	0.25	0.02
Romania	0.409***	–0.337***	–20.248***	–0.006**	–0.001	–0.163***	–0.014***	—	0.19	1.46	0.49	0.32
Countries with a fixed exchange rate regime												
Bulgaria	0.793***	–0.351**	20.645**	—	–0.001	–0.062***	–0.057***	—	0.78	2.31	0.48	0.06
Croatia	0.309***	–0.336***	–33.799***	—	0.016***	0.103***	–0.010***	0.012***	0.37	2.26	0.06	0.44
Slovakia	0.253**	–0.603***	–12.504***	0.002*	0.003**	0.014	–0.005	—	0.22	2.16	0.15	0.04
Slovenia	0.554**	0.115	99.018***	–0.001	–0.008***	0.132***	–0.014*	—	0.30	1.76	0.29	0.39
Estonia	0.271***	–0.119	–171.10**	–0.003**	0.004**	0.464***	–0.015***	0.024***	0.53	2.06	0.68	0.01
Latvia	0.325**	1.677	–13.975**	—	0.001	–0.278*	–0.032***	—	0.30	2.07	0.63	0.25
Lithuania	0.146***	–0.575***	–33.714*	–0.001	0.007***	0.217**	–0.011	0.020**	0.55	1.85	0.62	0.01

Source: own study.

Table 6

Determinants of house prices (extended model-I)

Country	Independent variables											
	Δh_{t-1}	Δe_t	$evar_t^1$	r_t	$rerc_t$	Δy_t^*	un_t	$CRISIS_t$	$EURO_t$	R^2	DW	J-stat	Jarque-Bera
Countries with a floating exchange rate regime													
Czechia	0.419***	–0.099**	13.217***	–0.001	0.002***	0.063**	–0.003	–0.021****	—	0.70	1.91	0.29	0.17
Hungary	0.592***	–0.131***	5.422***	–0.001***	–0.001	0.233***	–0.009**	–0.014***	—	0.68	1.77	0.67	0.22
Poland	0.532***	–0.128**	–3.152**	–0.001**	0.001	–0.066***	–0.004	—	—	0.51	1.84	0.50	0.01
Romania	0.364***	–0.158**	–9.334**	–0.003***	–0.001	–0.294***	–0.026***	–0.002	—	0.33	1.79	0.10	0.76
Countries with a fixed exchange rate regime													
Bulgaria	0.721***	–0.361***	19.575***	0.001	–0.001	–0.049***	–0.001	–0.063***	—	0.78	2.22	0.78	0.24
Croatia	0.314***	–0.541***	–26.796**	–0.002	–0.001	0.109***	–0.003	–0.011***	0.016***	0.35	2.22	0.18	0.24
Slovakia	0.523**	–0.628***	–7.374***	0.002*	0.006***	–0.010	–0.008***	–0.006	—	0.21	2.08	0.40	0.04
Slovenia	0.586**	0.552**	95.847***	–0.003	–0.007**	0.136***	–0.004	–0.013	—	0.31	1.86	0.23	0.97
Estonia	0.347***	–0.447**	–82.211***	–0.003	0.006*	0.443***	0.003	–0.011	–0.003	0.55	2.01	0.58	0.01
Latvia	0.365**	–0.201	–8.130***	—	0.002	0.029	–0.006	–0.023**	0.002	0.07	2.11	0.22	0.31
Lithuania	0.274***	–0.625***	–20.668***	–0.001	0.002**	0.162***	–0.002	0.008***	0.009***	0.81	1.95	0.20	0.17

Source: own study.

A positive causality from income to housing prices, consistent with findings from previous studies on industrial countries (Adams & Füss, 2010; Cevik & Naik, 2022; Cunha & Loureiro, 2024; Maynou et al., 2021), is

found in 5 countries, with a robust negative effect in 3 countries. For countries with a floating exchange rate, our results are in full accordance with standard findings for European countries (Cevik & Naik, 2022; Fotopoulos et al., 2024; Giuliodori, 2005; Cunha & Loureiro, 2024). However, the case of Slovakia provides support for a positive link between interest rate hikes and house prices, similar to results obtained by Okunevičiūtė Neverauskienė et al. (2025) or Belke and Keil (2018). A robust negative relation between the unemployment rate and house prices in Hungary, Romania and Slovakia confirm earlier findings by Maynou et al. (2021) and Fotopoulos et al. (2024).

From policy perspectives, it is established that exchange rate depreciation could be helpful for containing excessive house price growth in all Eastern European countries, except Slovenia. Assuming that a weaker currency is expansionary (Hatmanu et al., 2020; Haug et al., 2013), its downward pressure on house prices could be instrumental in avoiding overheating of the economy via the wealth effect (Aizenman et al., 2019; Stockhammer & Novas Otero, 2023). For countries with a floating exchange rate regime, curbing exchange rate volatility along a depreciating path can be a policy tool aimed at dampening house prices. As other countries in our study are dependent on the euro fluctuations, a more stable European single currency can also lower house prices in many (not all) countries. Higher interest rate can be viewed as an important regulator of the housing market under the floating exchange rate regime.

6. Conclusions

For 11 Eastern European countries, it is found that exchange rate volatility effects on house prices are quite heterogeneous, with a statistically significant positive effect in four countries and a negative effect in seven countries. As a positive exchange rate volatility effect on house prices can be related to higher returns on real estate investments and hedging against macroeconomic instability, an inverse causality running from the former to the latter can be explained by currency risk considerations and unfavorable supply-side effects. There is no evidence that exchange rate volatility effects on house prices are different under alternative exchange rate regimes. However, there is a uniform dampening effect of exchange rate depreciation on house prices across all countries, except Slovenia. Moreover, the effect of RER depreciation is considerably weaker. Indirectly, our results support arguments against the exchange rate disconnect, as exchange rate and its volatility are likely to have real output effects via changes in the value of housing. Among other findings, house prices are inertial, especially in Bulgaria. An inverse relationship between interest rate and house prices is a distinct feature of countries with a floating exchange rate regime. The RER undervaluation is not significantly related to house prices in most of the countries under study. The results suggest that the higher unemployment is associated with a decline in housing prices in Hungary, Romania and Slovakia. It is quite natural that house prices declined during a crisis in six countries. Finally, joining the eurozone contributed to higher house prices in Croatia, Estonia and Lithuania. Main findings remain robust under different specifications of explanatory variables and the exchange rate volatility determinant.

There are several promising directions for future studies on house markets in Eastern European countries. First of all, future research may be able to find a better proxy for exchange rate volatility. Second, it is likely that exchange rate effects are time-varying. Third, it would be useful to distinguish between the short- and long-term effects of exchange rate and its volatility on house prices. It cannot be ruled out that a long-term cointegration relationship exists between house prices, income and exchange rate. In this respect, both country-specific and panel data estimates using VAR models can be employed to clarify important causal links.

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