Measuring the Success of EU Expansion Process Comparing FDI Levels before and after the Accession to EU In Relation to CPI-Based Real Effective Exchange Rate Indices

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Abstract: The economic impact of the EU expansion on individual member states belong to imperative justifications of the EU enlargement. These contributions reward the union membership becoming the partial sovereignty loss trade-off. FDI inflow is considered one of such key benefits for new members. While the FDI impacts on economies have been studied from many angles, factors that cause the attraction of FDI are to be analysed as they are an important influence in future investment decisions making part of the enlargement justification, justifying the sovereignty loss trade-off. Future FDI inflows may be signalled by variables such as Real Effective Exchange Rate, being a proxy for trade competitiveness, expected to differ in economies prior to and after the entry to EU. The analysis of the relationship between the Real Effective Exchange Rate and the FDI inflow is performed on selected Eastern European countries before and after the accession, with the conclusion that convincing arguments for the FDI inflow indications, at least when measuring them through the lens of Real Effective Exchange Rate and GDP, may not be present.

Keywords: REER, FDI, EU, GDP.

INTRODUCTION

EU is rather an imperfectly integrated group of several economic units not fully accomplishing the ideal of the single EU market, despite the ideals of the multipartite union. The main driving force behind the transformation process is foreign policy, fuelled by economic aspects. The wider the common basis of values and rules, the easier it becomes to create open borders and while on political level it can be quite easy to identify the benefits of enlargement and united collaboration, the viability from an economic point of view must be studied rigorously in order to come to robust conclusions.

The multilateral organism European Union repeatedly enlarges in major, progressive leaps and contracts in less pronounced regressive oscillations. The enlargement belongs to most important challenges of Europe in the post-Cold War period, with massive risks to the existing multilateral body (Sjursen, 2021). Although the positive outcome of EU endeavour can be seemingly confirmed by the growing number of candidate countries, which signals a political success, the question on the nature of the mission fulfilment should be contested on economic level, which is the support column of the justification ethos. High political costs in terms of sovereignty sacrifice were one of the reasons for a constant accompaniment of notions of success, failure and of the progress of the integration effort from its launch in the late 1960s (Jørgensen, 1998) as well as of the questioning of the expansionist costs. As such, EU has changed several times throughout its history, while most of the leaps are to be considered a subject to critical analysis, due to their controversial impact. Throughout these attempts, legitimacy, which is needed to keep the authority, according to Weber’s observation, was achieved, between others, by economic justifications (Sjursen, 2021).

The official EU narrative tends to omit certain facts from the pro-EU discourse. Between these are hidden realities of the Western European economic recoveries a decade before the start of demolition of intra-European barriers, omitting the impact of Erhard’s liberalization of the West German economy in 1948 as well as the reduction of tariffs under the General...
The political, economic and financial aspects of enlargement and contraction of EU are related to joint politically determined priority goals, while the transformation related themes are crucial for the future of the union, entailing dangers that can put the whole system at risk due to nascency of disbalances that may be hard to preview. The impacts cannot be further measured as a simple average, due to the exogenous shocks leading to asymmetric regional disturbances and have to employ rather panoramic considerations including trade and Single Market effects, as well as factor movements such as FDI, are one of the key aspects of enlargement (Breuss, 2002). FDI is defined by European Commission as a cross-border investment, in which investors residing in a EU Member State create lasting business influences over 10% or more of business residents in another Member states (“Single Market Scoreboard – Foreign Direct Investment”, 2020). The European Union has one of the most open investment regimes in the world, acknowledged in the OECD investment restriction index, being the world’s largest FDI target, which belongs to key benefits at a time leading to increases of the productive production capacity in new member economies that reinvest profits and contribute to FDI inflows.

The study is justified by the growing need of scientifically based arguments on the changes of the union in the precedent-forming era of Brexit needed in the internal communication between member-states. Due to the potential heterogeneity in the relationship between FDI and economic growth in host countries that calls for single country research, when studying the impact within the framework of European Union, one should view the FDI as a panoramic phenomenon with benefits on the cohesion between member economies. The understanding on the attractors of FDI is therefore paramount.

The objective of the study is to analyze a selected indicator of FDI inflows, while the aim is not to study the macroeconomic impacts of FDI, but rather indicators promising attraction of FDI. The chosen indicator, the Real Effective Exchange Rate (REER), can imply a better ex-post understanding the effectuated flows, as studied on the case of the selected countries which took part in the EU-enlargement in 2005.

Empirical studies on FDI and exchange rates linkages are essential for the formulation of FDI policies, while the influence of REER, which summarizes of changes in the exchange rates of a country vis-à-vis its trading partners, provide broad interpretations of price competitiveness of each country and determine the success of states in their exports and productivity, and can be used to measure the underlying factors of a country’s trade flow.

Considering REER as an indicator can also fine-tune further prognostics in case of future enlargements? The methodology is based upon a comparison of OLS time series analysis of 6 selected Eastern European countries for the period 1994-2004 prior to accession and the period 2005-2016 after the accession.

The results of the study show a repetitive evidence of statistical significance, which was more intense in the period prior to accession, reaching 6 positive relationships and 2 negative ones in contrast to 6 negative relationships after the accession, which permits to consider that REER was considerably a more intense indicator of FDI inflows in economies with lower multilateral interconnectedness. One of the potential explanations is that the increase of trade competitiveness of the newly accessed member states, led to decrease of attractiveness for FDI in relative terms or that simply put, the advantages of EU membership were less important to investors than the disparity between the source of the investment and the target market.

LITERATURE REVIEW

FDI belongs to key macroeconomic indicators. It is worth mentioning studies related to the theoretical framework of the positive impact of the FDIs, such as Harrod (1939), Domar (1947), Rostow (1959), Solow (1956), Swan (1956) or (De Mello, 1999), despite recent studies however demonstrating rather contrary results (Lucas, 1990; Jeanne and Gourinchas, 2013; Herzer, 2012; Mencinger, 2003) or longitudinal analysis having a clearly negative impact on economies (Carbonell and Wernder, 2018). The studies of impacts of FDI on host economies have thus attracted a lot of research interests, due to needs for political considerations. However, the number of longitudinal rigorous studies as well as analysis of the actual attractors of FDIs, are rather scarce (Carbonell and Werner, 2018).

FDI is thus one of the most important indicators signalling the success of the economic flows in the European Union (Reisen and Soto, 2001). As mentioned above, this text is however not concerned with the relevance of FDI related to the prosperity of individual countries, but focuses on quantification of indicators considered important by individual political and economic actors, such as European Commission, who consider FDI as a priority driver for economic development of the union and disparity prevention measure (“Single Market Scoreboard – Foreign Direct Investment”, 2020). Independently on the intensity of the economic stimulus, FDI has a stabilizing effect on a host country’s economy, which is an impact rather not argued by most scholars (He, 2018).
As mentioned above, the effects of foreign capital inflows on individual macroeconomic variables are difficult to quantify and there seems to be little unity among economists on its optimal involvement. This view does not differ for the new member states that can be acknowledged as a laboratory for impact study, given the transformation processes of the post-Soviet countries that in the late 1980s encountered problems faced by transforming economies due to the lack of domestic capital.

The attraction of foreign capital in the form of direct and portfolio investments seemed to be a suitable way to solve this problem, while the measure of FDI reaping beneficial effects of participation in EU, is just one one of several measures necessary for wider understanding. The major benefit for EU members can go beyond finance and can be the long-term penetrating effect of structural reforms distributing positive externalities over the panorama of the society. For this reason, the proposed study analyses the impact of real exchange rate (REER), which is the weighted average of a country's currency in relation to an index of other global currencies, with weights determined by comparison of the relative trade balance of a country's currency against countries within the index, on the FDI inflows. For Euro Area Member States, the component of the REER corresponds to trade with other Euro Area affected by their cost and price developments, thus being a robust measure of a country's price or cost competitiveness, as it is determined as the average of the bilateral Real Exchange Rates (RER) between trading partners and the chosen economy, weighted through the trade allocation of each partner, and adjusted for inflation as per Formula Nr. 1 below.

Relevancy of REER, as a particularizing indicator used in the context of the Macroeconomic Imbalance Procedure (MIP) tool of European Commission, capable of signalling a possible external imbalance and when weighted by the inflation rates, provides three-year signal a potential threat to the economy and thus can be considered as a determinant indicator of FDI inflow (Bénassy-Quéré & Wolff, 2020). The appreciation of the exchange rate can be cause for a slower growth of real GDP, due to to the fall in net exports and an increased leakage in the circular flow, with a higher exchange rate having a negative multiplier effect on the economy, thus determining the FDI inflows.

\[
REER = 100 \times \prod_{i=1}^{n} \left( \frac{S_i}{P_i} \right)^{w_i}
\]

Formula 1. REER¹

¹ REER corresponds to the Formula nr. 1 below, where: \( S_i \) corresponds to the basic index of the domestic currency to the currency of the i-th trading partner in the period t, \( W_i \) corresponds to normalized currency weights of the i-th trading partner, \( P_i \) corresponds the ratio of the basic price index of the i-th trading partner in period t to the basic price index of the relevant country in period t, while n corresponds to the number of international business partners (Bénassy-Quéré & Wolff, 2020).

The relevance of REER confirms view of scholars who consider REER as a statically significant predictor of economic crises. According to Rodrik, and his evaluation of the nexus of a database of 188 countries and 11-year periods ranging from 1950 to 2004, the measure of REER adjusted for the Balassa-Samuelson effect, predicts stronger growth (2002). Habib et al. find strong and statistically significant effects of REER changes on real per capita growth over five-year average periods, symmetric for depreciations and appreciations and rather more pronounced for developing countries than advanced ones.

The framework and empirical analysis indicate that FDI, REER, and the domestic economy are complexly interacting in the long-term, as there is a dynamic relationship of equilibrium among REER, FDI and the domestic economy (Lin and Pan, 2006). The study of Vogiazas et al., analyzing the nexus of REER on 60 high and upper-middle income countries with the total factor productivity came to the conclusion that increasing productivity leads to depreciation of REER through the increase of trade competitiveness, while trade openness plays a key role in explanation of variation in REER (Vogiazas et al., 2018). Several studies attempted to examine whether exchange rates were determinants of FDI inflows to host countries, while the existing literature has found positive effects of local currency depreciation on FDI inflows, explaining the effects of exchange rates as a supply-side factor on FDI inflows (Froot and Stein, 1991) due to the fact that information assymetries make payoffs of assets more expensive to finance with external fundings. Another explanation could be that the allocation effect of international investors as FDI goes to countries with weaker currencies due to comparatively higher opportunities for acquisitions. Campa found such negative correlation for industries with high sunk investments (1993), while Goldberg and Kolstad confirmed nonnegative correlation between exchange rate shocks and export demands (1994). Summing up, the question to be answered by this analysis is: how did REER and GDP impact FDI flows to selected countries before and after the accession to European Union?.
Graph-1: FDI in selected countries before the accession between 1993–2004 (World Bank, 2020).

Graph-2: FDI after the accession in selected countries between 2005 – 2016 (World Bank, 2020).

Graph-3: REER in selected countries between 1994 – 2018 (World Bank, 2020).
Graph 4: GDP of selected countries between 1994 – 2018 (World Bank, 2020)

**Methodology**

The dataset was compiled from the UNCTAD STAT and World Bank Data. The GDP were provided by UNCTAD STAT for the period of 1994-2016 and the Real Effective Exchange Rate indices were provided by UNCTAD STAT for the period of 1994-2016. The FDI data sources were retrieved from the World Bank for the period of 1994-2016. The data consists of 198 annual measurements structured in annual blocks for 6 current EU members, such as Czechia, Estonia, Hungary, Latvia, Malta and Poland up to their accession to European Union for the period 1994-2004 and annual 216 measurements structured in annual blocks for 6 current EU members, such as Czechia, Estonia, Hungary, Latvia, Malta and Poland after their accession to European Union for the period 2005-2016. The calculations are structured into two exercises searching for a statistical relationship between the chosen dependent variable of FDI as a function of GDP and REER.

The statistical method employed was the time lagged OLS time series analysis. In the first exercise as per Formula Nr. 1 below, the authors searched for the statistical relationship between the FDI inflow ($y_{p1}$) influenced by GDP ($x_t$) with 2 year lags and REER ($r_t$) with 2 year lags, where $e_t$ is a random error term. The calculation was performed for each one of the six countries chosen.

$$y_{p1} = \alpha + \beta_1 x_t + \beta_2 x_{t+1} + \beta_3 x_{t+2} + \beta_4 r_t + \beta_5 r_{t+1} + \beta_6 r_{t+2} + \varepsilon_{it}$$

Formula 1. Regression 1

In the second exercise, as per Formula Nr. 2 below, the authors searched for the explanation of FDI the GDP of the selected country with 2 years lags ($x_2, x_3, x_4$) Real Effective Exchange Rates with 2 year lags ($r_3, r_4, r_5$), as well as the two lags of FDI ($x_6, x_7$). The calculation was performed for each one of the six countries chosen.

$$y_{a1} = \alpha + \beta_1 x_t + \beta_2 x_{t+1} + \beta_3 x_{t+2} + \beta_4 r_t + \beta_5 r_{t+1} + \beta_6 r_{t+2} + \varepsilon_{it}$$

Formula 2. Regression 2

Statistic fit and F-test was applied to the three calculations in order to confirm the robustness as well as normal distribution, while considering the risk of collinearity problem, with stationary regressors and the explained variables.

**Results**

In this paper, annual data on FDI and the GDP and REER for the period from 1994 to 2016, was examined, in order to test the statistically significant relationship between FDI and REER and GDP and compare these in the period before and after the accession in order to make adequate conclusions based on the research findings on the differences of impact of GDP and REER before and prior the EU accession on the selected countries.

The period before the accessions provides one statistically significant positive relationship in case of Estonia (REER$_{t+2}$) on the level of significant of 95%, five on the level of significance of 90% in case of Czech Republic [GDP$_t$ (negative), GDP$_{t+1}$ (positive), GDP$_{t+2}$ (negative), REER$_t$ (positive), REER$_{t+2}$]
The second calculation with focus on the evolution after the accession provides one statistically significant relationships on the level of significance of 95% in Latvia [GDP t+2(negative)] and Malta [GDP t+1(negative)] and relationship on the level of significance of 90% in case of Estonia [GDP t, (negative)]. Hungary [GDP t+1(negative), Latvia [GDP t+2(negative)], and Malta [REER t+1(negative)]. None were found on the case of Poland and Czechia.

The results of the abovementioned regressions therefore seem to provide information on a statistically more intense relationship between the FDI inflows and REER as well as GDP in the period prior to the accession (6 positive relationships, 2 negative relationships) than after the accession (6 negative relationships). This finding shows at rather higher induction of FDI caused by intensity of trade relationships as well as general development of the chosen EU members states before the accession and does not confirm the thesis of the promise of the EU membership as an attractor for FDI.

The study limitations are high, as the FDI could result rather from a variety of other factors, as well as the base of FDI attraction must be considered relative to the development level of each country, which went through faster evolution prior the accession due to the geopolitical changes in Europe. Also, the competitiveness of individual countries can be subordinate to the competitiveness of the European Union as a whole, bringing economies of scale and advantages on geopolitical level.

CONCLUSION AND DISCUSSION

The findings show at rather a higher induction of FDI related to the GDP and the intensity of trade relationships, evidenced by REER indicator being a proxy for competitiveness, prior to accession to the EU than after. Emblematic is the case of Czech Republic, with 5 statistically significant relationships between FDI and independent variables before the accession, and none after the accession. This finding however maybe caused by a plethora of factors such as lower development levels, advantageous bilateral investment agreements before the accession and monetary issues related to membership in Eurozone.

The study limitations are high, as the FDI inflow attraction could result rather from a variety of other factors or their combinations, while the base of FDI attraction must be considered relative to the development level of each country. This development base went through a faster evolution prior the accession due to the geopolitical changes in Europe and low capital level in all of the selected countries after decades of disinvestment. Also, the competitiveness of individual countries can be subordinate to the competitiveness of the European Union as a whole, bringing economies of scale and advantages on geopolitical level, yet representing higher barriers from countries that are not EU member-states, thus effectively creating an advantage of the investments from EU countries.

FDI has become a key form of raising foreign capital, through the influx of new technologies as well as an employment stimulus, despite the impact of the priority motive of foreign investors who expect future return flows in future. The outflow of capital in form of dividends or shared earnings can lead after a certain time to increased income deficits in countries with a previous large inflow of FDI, which are in turn characteristic for transition economies and having a negative income balance as a consequence. This phenomenon could also explain a rather lower intensity of the relationship between REER and GDP after the accession than prior to the accession.

Even though enlargement is generally expected to lead to positive economic effects from the macroeconomic point of view and is a worthwhile investment from the point of view of geopolitical ramifications, European Union still needs a quantifiable understanding of its contribution to member states justifying its existence. Especially in those particular areas in which domestic production are substituted by FDI led imports and where negative consequences for employment, income and growth may result.

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### Model 1: OLS, using observations 1994-2004 Dependendent variable: Czechia

| Coefficient  | Std. Error | t-ratio | p-value |
|--------------|------------|---------|---------|
| Const        | -7655.52   | 1151.27 | -6.650  | 0.0950  |
| GDPCZ        | -0.333842  | 0.0341259 | -9.783  | 0.0649  |
| GDPCZ_1      | 0.423383   | 0.0639427 | 6.621   | 0.0954  |
| GDPCZ_2      | -0.577610  | 0.0607607 | -9.506  | 0.0667  |
| REER CZ      | 380.591    | 34.1159  | 11.16   | 0.0569  |
| REER CZ_1    | 76.3115    | 22.4826  | 3.394   | 0.1824  |
| REER CZ_2    | 169.591    | 24.7639  | 6.848   | 0.0923  |
| Czechia_1    | -1.32058   | 0.0899172 | -14.69  | 0.0433  **|
| Czechia_2    | 0.0162108  | 0.114294 | 0.1418  | 0.9103  |

#### Mean dependent var
- 4152.159 S.D. dependent var 2346.937

#### Sum squared resid
- 85313.36 S.E. of regression 292.0845

#### R-squared
- 0.998279 Adjusted R-squared 0.984511

#### F(8, 1)
- 72.50871 P-value(F) 0.090591

#### Log-likelihood
- -59.44689 Akaike criterion 136.8938

#### Schwarz criterion
- 139.6170 Hannan-Quinn 133.9064

### Model 2: OLS, using observations 1994-2004 Dependendent variable: Estonia

| Coefficient  | Std. Error | t-ratio | p-value |
|--------------|------------|---------|---------|
| Const        | 1127.61    | 235.554 | 4.787   | 0.1311  |
| GDPESTO      | 0.177442   | 0.0180129 | 9.851   | 0.0644  |
| GDPESTO_1    | -0.0847098 | 0.0319263 | -2.653  | 0.2295  |
| GDPESTO_2    | 0.434555   | 0.0473508 | 9.177   | 0.0691  |
| REERESTO     | 6.40816    | 6.06167  | 1.057   | 0.4823  |
| REERESTO_1   | -3.6976    | 2.43016  | -13.87  | 0.0453  **|
| REERESTO_2   | -9.40355   | 6.19329  | -1.518  | 0.3708  |
| Estonia_1    | -1.05084   | 0.101971 | -10.31  | 0.0616  |
| Estonia_2    | -0.705316  | 0.160064 | -4.406  | 0.1421  |

#### Mean dependent var
- 433.8421 S.D. dependent var 286.8145

#### Sum squared resid
- 1489.885 S.E. of regression 38.59902

#### R-squared
- 0.997988 Adjusted R-squared 0.981889

#### F(8, 1)
- 22217.87 P-value(F) 0.001641

#### Log-likelihood
- -39.20873 Akaike criterion 96.41746

#### Schwarz criterion
- 99.14073 Hannan-Quinn 93.43004

### Model 3: OLS, using observations 1994-2004 Dependendent variable: Hungary

| Coefficient  | Std. Error | t-ratio | p-value |
|--------------|------------|---------|---------|
| Const        | 12137.7    | 988.184 | 12.28   | 0.0517  |
| GDPHUN       | 0.0243195  | 0.0257034 | 0.9408  | 0.5194  |
| GDPHUN_1     | 0.00376157 | 0.0485324 | 0.07751 | 0.9508  |
| GDPHUN_2     | 0.0259006  | 0.0543190 | 0.4768  | 0.7167  |
| REERHUN      | 135.014    | 24.2884  | 5.559   | 0.1133  |
| REERHUN_1    | -252.762   | 47.1285  | -5.363  | 0.1174  |
| REERHUN_2    | -1.04688   | 58.5172  | -0.01789 | 0.9886  |
| Hungary_1    | -0.747744  | 0.0467744 | -15.99  | 0.0398  **|
| Hungary_2    | 0.0847303  | 0.0984983 | -0.8602 | 0.5477  |

#### Mean dependent var
- 3500.082 S.D. dependent var 794.4456

#### Sum squared resid
- 16161.94 S.E. of regression 402.0191

#### R-squared
- 0.971547 Adjusted R-squared 0.743926

#### F(8, 1)
- 697.9003 P-value(F) 0.029268

#### Log-likelihood
- -62.64146 Akaike criterion 143.2829

#### Schwarz criterion
- 146.0062 Hannan-Quinn 140.2955

### rho
- 0.685665 Durbins h -2.192379
### Model 4: OLS, using observations 1994-2004 Dependent variable: Latvia

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| const       | 2156.31    | 342.216 | 6.301   | 0.1002  |
| GDPLAT      | -0.0942499| 0.234660| -0.4016 | 0.7569  |
| GDPLAT_1    | 0.798972   | 0.525211| 1.521   | 0.3702  |
| GDPLAT_2    | 1.00606    | 0.332367| 3.027   | 0.2031  |
| REERLAT     | 0.126809   | 0.02466 | 5.142   | 0.9843  |
| REERLAT_1   | -4.18280   | 2.62694 | -1.592  | 0.3570  |
| REERLAT_2   | 8.41044    | 1.84619 | 4.556   | 0.1376  |
| Latvia_1     | -1.29730   | 1.06947 | -1.213  | 0.4389  |
| Latvia_2     | -0.000494999| 0.150883| -0.003281| 0.9979 |
| Mean dependent var | 328.2499 | S.D. dependent var | 138.8251 |
| Sum squared resid | 25576.37 | S.E. of regression | 159.9261 |
| R-squared | 0.852545 | Adjusted R-squared | -0.327098 |
| F(8, 1) | 539.7410 | P-value(F) | 0.033278 |
| Log-likelihood | -53.42358 | Akaike criterion | 124.8472 |
| Schwarz criterion | 127.5704 | Hannan-Quinn | 121.8597 |
| rho | -0.471986 | Durbin-Watson | 2.794031 |

### Model 5: OLS, using observations 1994-2004 Dependent variable: Malta

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| const       | 755.777    | 17618.4 | 0.04290 | 0.9727  |
| GDPMALT     | 2.96435    | 3.27654 | 0.9047  | 0.5318  |
| GDPMALT_1   | 6.83564    | 5.10117 | 1.340   | 0.4081  |
| GDPMALT_2   | -8.37572   | 2.72810 | -3.070  | 0.2005  |
| REERMALT    | 165.745    | 128.388 | 1.291   | 0.4196  |
| REERMALT_1  | -87.3478   | 70.1001 | -1.246  | 0.4305  |
| REERMALT_2  | -222.018   | 176.989 | -1.254  | 0.4285  |
| Malta_1     | 6.83276    | 1.87777 | 3.639   | 0.1707  |
| Malta_2     | 2.72292    | 0.781946| 3.482   | 0.1780  |
| Mean dependent var | 1594.211 | S.D. dependent var | 3889.042 |
| Sum squared resid | 3223995 | S.E. of regression | 1795.549 |
| R-squared | 0.976315 | Adjusted R-squared | 0.786838 |
| F(8, 1) | 370.6774 | P-value(F) | 0.040150 |
| Log-likelihood | -77.60712 | Akaike criterion | 173.2142 |
| Schwarz criterion | 175.9375 | Hannan-Quinn | 170.2268 |
| rho | -0.404457 | Durbin-Watson | 2.745941 |

### Model 6: OLS, using observations 1994-2004 Dependent variable: Poland

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| const       | 41647.3    | 25872.4 | 1.610   | 0.3539  |
| GDPPOL      | 0.154732   | 0.130786| 1.183   | 0.4467  |
| GDPPOL_1    | -0.00994799| 0.164041| -0.06064| 0.9614  |
| GDPPOL_2    | 0.0296407  | 0.123225| 0.2405  | 0.8497  |
| REERPOL     | -562.709   | 445.190 | -1.264  | 0.4261  |
| REERPOL_1   | -451.068   | 237.044 | -1.903  | 0.3080  |
| REERPOL_2   | 34.7243    | 238.745 | 0.1454  | 0.9081  |
| Poland_1    | 1.55517    | 1.05665 | 1.472   | 0.3799  |
| Poland_2    | 2.42204    | 1.59153 | 1.522   | 0.3701  |
| Mean dependent var | 6191.542 | S.D. dependent var | 2749.274 |
| Sum squared resid | 3711700 | S.E. of regression | 1926.577 |
| R-squared | 0.976315 | Adjusted R-squared | 0.786838 |
| F(8, 1) | 2.165950 | P-value(F) | 0.483991 |
| Log-likelihood | -78.31146 | Akaike criterion | 174.6229 |
| Schwarz criterion | 177.3462 | Hannan-Quinn | 171.6355 |
| rho | -0.355692 | Durbin-Watson | 2.705026 |
### Model 7: OLS, using observations 2005-2016 Dependent variable: Czechia

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| const       | -5152.66   | 13600.2 | -0.3789 | 0.7694 |
| GDPCZ       | 0.0142287  | 0.0685106 | 0.2077 | 0.8696 |
| GDPCZ_1     | -0.0988575 | 0.0481262 | -2.048 | 0.2891 |
| GDPCZ_2     | -0.0490257 | 0.0369857 | -1.326 | 0.4115 |
| REERCZ      | 213.992    | 128.760  | 1.662  | 0.3448 |
| REERCZ_1    | 41.129     | 233.441  | 0.1762 | 0.8890 |
| REERCZ_2    | 81.662     | 174.925  | 0.4668 | 0.7219 |
| Czechia_1   | -0.757536  | 0.217433 | -3.484 | 0.1779 |
| Czechia_2   | 0.308191   | 0.237050 | 1.300  | 0.4174 |
| Mean dependent var | 5567.489 | S.D. dependent var | 3267.022 |
| Sum squared resid | 21081772 | S.E. of regression | 4591.489 |
| R-squared | 0.780537 | Adjusted R-squared | -0.975163 |
| F(8, 1) | 53.40618 | P-value(F) | 0.105460 |
| Log-likelihood | -86.99606 | Akaike criterion | 191.9921 |
| Schwarz criterion | 194.7154 | Hannan-Quinn | 189.0047 |
| rho | -0.078104 | Durbin's h | -0.340154 |

### Model 8: OLS, using observations 2005-2016 Dependent variable: Estonia

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| const       | -5480.67   | 5385.47 | -1.018  | 0.4944 |
| GDPESTO     | -0.103943  | 0.0238199 | -4.310 | 0.0403 |
| GDPESTO_1   | -0.162633  | 0.0530525 | -3.066 | 0.2007 |
| GDPESTO_2   | -0.1212735 | 0.0681529 | -1.777 | 0.0977 |
| REERESTO    | 212.229    | 64.4481  | 3.333  | 0.1805 |
| REERESTO_1  | 145.989    | 69.8051  | 2.016  | 0.2839 |
| REERESTO_2  | -161.839   | 45.4422  | -3.561 | 0.1743 |
| Estonia_1   | -0.731843  | 0.210888 | -3.470 | 0.1786 |
| Estonia_2   | -0.601571  | 0.197207 | -3.050 | 0.2017 |
| Mean dependent var | 1264.313 | S.D. dependent var | 673.6058 |
| Sum squared resid | 332239.8 | S.E. of regression | 576.4024 |
| R-squared | 0.918643 | Adjusted R-squared | 0.267783 |
| F(8, 1) | 226.6718 | P-value(F) | 0.051327 |
| Log-likelihood | -66.24452 | Akaike criterion | 150.4890 |
| Schwarz criterion | 153.2123 | Hannan-Quinn | 147.5016 |
| rho | 0.026695 | Durbin's h | 0.113287 |

### Model 9: OLS, using observations 2005-2016 Dependent variable: Hungary

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| const       | -112426    | 32610.8 | -3.448 | 0.1797 |
| GDPHUN      | -1.12394   | 0.363000 | -3.096 | 0.1989 |
| GDPHUN_1    | -0.906852  | 0.0812688 | -11.16 | 0.0569 |
| GDPHUN_2    | -0.481630  | 0.127622 | -3.774 | 0.1649 |
| REERHUN     | -321.650   | 225.139  | -1.429 | 0.3888 |
| REERHUN_1   | 417.63     | 698.306  | 0.598  | 0.5055 |
| REERHUN_2   | 524.231    | 631.806  | 0.8297 | 0.4591 |
| Hungary_1   | -0.403654  | 0.144049 | -2.802 | 0.2182 |
| Hungary_2   | 1.07225    | 0.256214 | 4.185  | 0.1493 |
| Mean dependent var | 2583.383 | S.D. dependent var | 7955.324 |
| Sum squared resid | 4755471 | S.E. of regression | 6896.047 |
| R-squared | 0.916509 | Adjusted R-squared | 0.248577 |
| F(8, 1) | 204.3464 | P-value(F) | 0.054053 |
| Log-likelihood | -91.06350 | Akaike criterion | 200.1270 |
| Schwarz criterion | 202.8503 | Hannan-Quinn | 197.1396 |
| rho | -0.552848 | Durbin's h | -1.963841 |
### Model-10: OLS, using observations 2005-2016 Dependent variable: Latvia

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| ** const ** | 6298.80    | 1429.14 | 4.407   | 0.1420 |
| GDPLAT      | 0.0400973  | 0.0303194 | 1.322   | 0.4122 |
| GDPLAT_1    | -0.0168029 | 0.0241543 | -0.6956 | 0.6131 |
| GDPLAT_2    | -0.203798  | 0.0274107 | -7.435  | 0.0851 |
| REERLAT     | -32.4079   | 12.3659  | -2.621  | 0.2321 |
| REERLAT_1   | 37.4452    | 14.1739  | 2.642   | 0.2304 |
| REERLAT_2   | -4.64254   | 7.27544  | -0.6381 | 0.5384 |
| Latvia_1     | -0.846555  | 0.266234 | -3.180  | 0.1940 |
| Latvia_2     | 0.378732   | 0.0951943 | 3.979   | 0.1568 |
| Mean dependent var | 918.7150 | S.D. dependent var | 667.1215 |
| Sum squared resid | 107077.9 | S.E. of regression | 327.2776 |
| R-squared    | 0.9724     | Adjusted R-squared | 0.759403 |
| F(8, 1)      | 960.8456   | P-value(F) | 0.024945 |
| Log-likelihood | -60.58302 | Akaike criterion | 139.1660 |
| Schwarz criterion | 141.8893 | Hannan-Quinn | 136.1786 |
| rho          | -0.778249  | Durbin’s h | -4.560666 |

### Model-11: OLS, using observations 2005-2016 Dependent variable: Malta

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| ** const ** | 427115     | 31250.8 | 13.67   | 0.0465 |
| GDPMALT     | 1.31607    | 2.22445 | 0.5916  | 0.5699 |
| GDPMALT_1   | -2.71613   | 1.41755 | -1.916  | 0.3062 |
| GDPMALT_2   | -13.5304   | 0.787859 | -17.17 | 0.0370 |
| REERMALET   | -1483.14   | 452.269 | -3.279  | 0.1884 |
| REERMALET_1 | -1690.03   | 237.109 | -7.128  | 0.0887 |
| REERMALET_2 | -424.316   | 436.343 | 0.9724  | 0.5089 |
| Malta_1      | -0.577963  | 0.0815458 | -7.088  | 0.0892 |
| Malta_2      | -0.112802  | 0.134529 | -0.3835 | 0.5558 |
| Mean dependent var | 12919.24 | S.D. dependent var | 11015.99 |
| Sum squared resid | 14702419 | S.E. of regression | 3834.373 |
| R-squared    | 0.986538   | Adjusted R-squared | 0.878845 |
| F(8, 1)      | 11092.99   | P-value(F) | 0.007364 |
| Log-likelihood | -85.19407 | Akaike criterion | 188.3881 |
| Schwarz criterion | 191.1114 | Hannan-Quinn | 185.4007 |
| rho          | 0.502768   | Durbin’s h | 1.645545 |

### Model 12: OLS, using observations 2005-2016 Dependent variable: Poland

| Coefficient | Std. Error | t-ratio | p-value |
|-------------|------------|---------|---------|
| ** const ** | 86866.1    | 42756.9 | 2.032   | 0.2912 |
| GDPPOL      | 0.099271   | 0.0533194 | 1.862   | 0.3138 |
| GDPPOL_1    | -0.0430361 | 0.0194877 | -2.208  | 0.2707 |
| GDPPOL_2    | -0.0728200 | 0.0392300 | -1.856  | 0.3146 |
| REERPOL     | -1373.79   | 594.333 | -2.311  | 0.2599 |
| REERPOL_1   | 100.083    | 228.497 | 0.4380  | 0.7372 |
| REERPOL_2   | 703.834    | 482.992 | 1.457   | 0.3829 |
| Poland_1     | 0.0305323  | 0.173396 | 0.1761  | 0.8890 |
| Poland_2     | 0.941328  | 0.386883 | -2.433  | 0.2483 |
| Mean dependent var | 13126.73 | S.D. dependent var | 4523.724 |
| Sum squared resid | 57376564 | S.E. of regression | 7574.732 |
| R-squared    | 0.688470   | Adjusted R-squared | -1.803769 |
| F(8, 1)      | 1632.229   | P-value(F) | 0.019141 |
| Log-likelihood | -92.00219 | Akaike criterion | 202.0044 |
| Schwarz criterion | 204.7277 | Hannan-Quinn | 199.0170 |
| rho          | -0.262277  | Durbin’s h | -0.991783 |