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Original Research Article

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

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Agreement on Tariffs and Trade in 1947. ("The European Union: A Critical Assessment", 2020).

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 panoramatic 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 panoramatic 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 finetune 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 adjustmed 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.

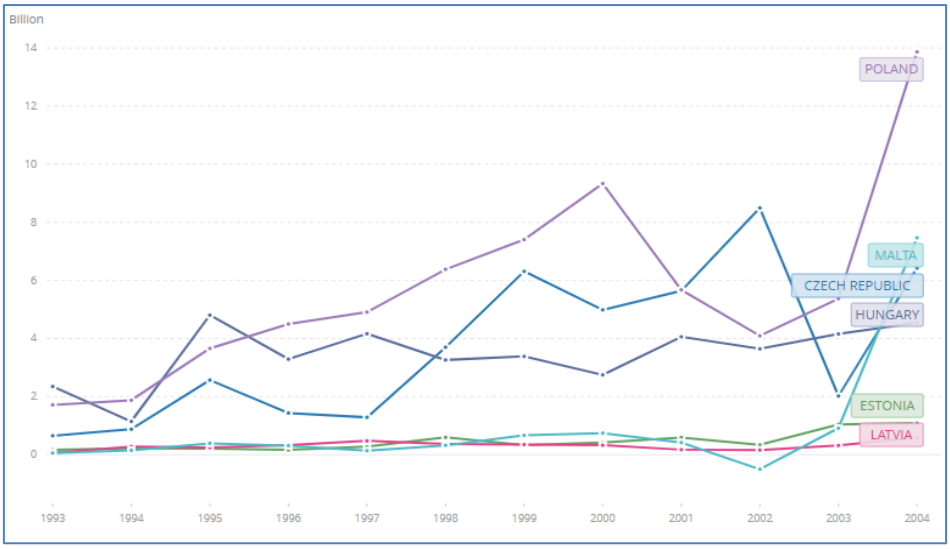
$$REER = 100 \times \prod_{i=1}^{n} \times \left(\frac{S_{it}}{P_{it}} \right)^{w_i}$$

Formula 1. REER[1]

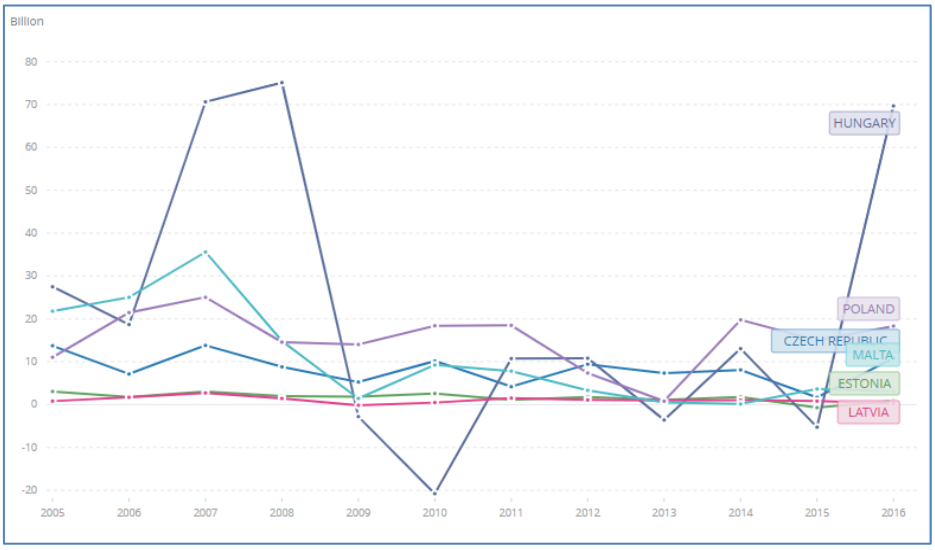
The relevance of REER confirms view of scholars who consider REER as a statically significant predictor of economic crises. According to Rodrik, and his evaluation of the nexus of a database of 188 countries and 11-year periods ranging from 1950 to 2004, the measure of REER adjusted for the Balassa-Samuelson 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 explaination counted with 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?.

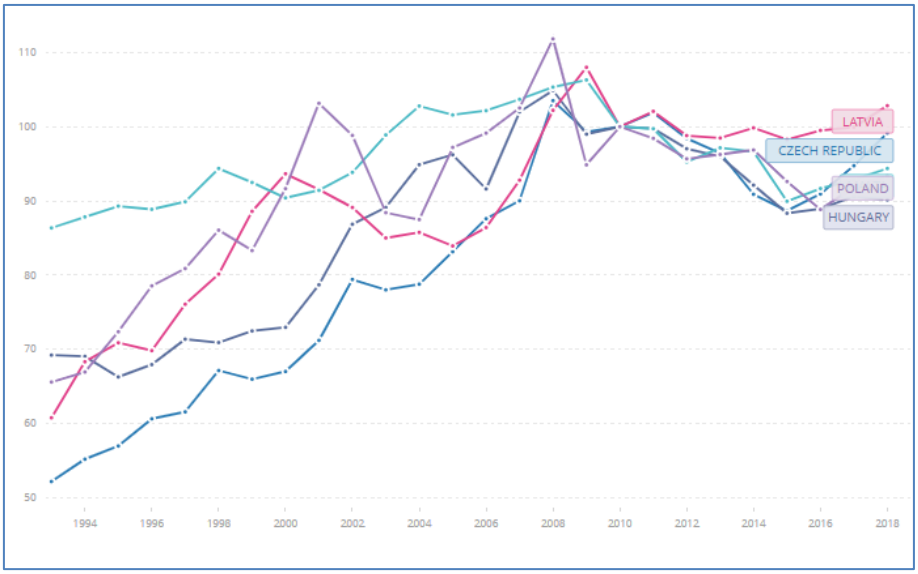
[1] REER corresponds to the Formula nr. 1 below, where: S_{it} corresponds to the basic index of the domestic currency to the currency of the i-th trading partner in the period t, W_t corresponds to normalized currency weights of the i_{th} trading partner, P_{it} corresponds the ratio of the basic price 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).



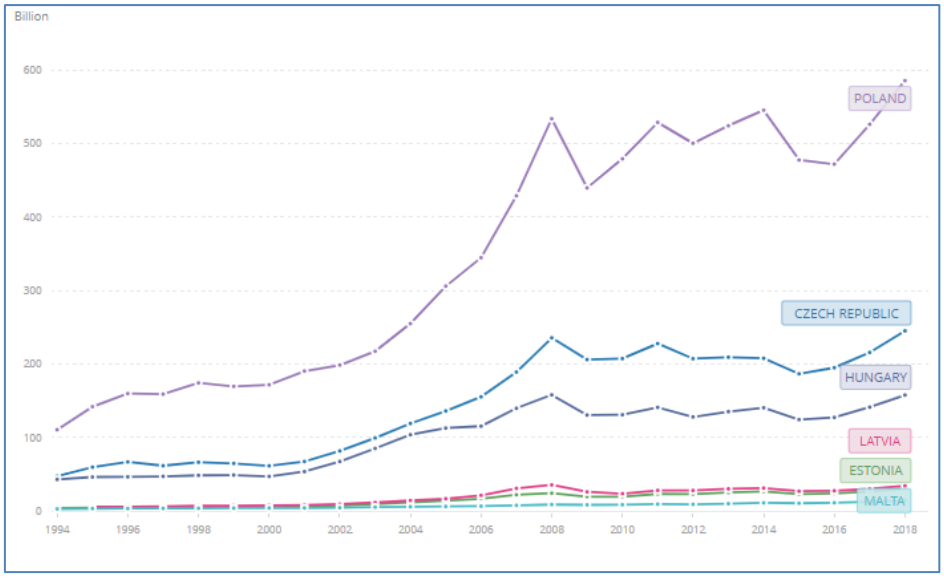
Graph-1: FDI in selected countries before the accession between 1993–2004 (World Bank, 2020)



Graph-2: FDI Graph. 1 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 [[2]]. The FDI data sources were retrieved from the World Bank Data sources 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_{it}) with 2 year lags and REER (r_{it}) 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 (x_5, x_6, x_7), as well as the two lags of FDI (x_8, x_9). 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), $REER_{t+2}$

[2]UNCTAD employed fixed export weights for each period, 1998-2003, for 91 partner countries and for data after 2003 for 99 partner countries, while the group aggregation for both periods was done in separate way using the countries mentioned above.

(positive)] and two positive relationships on the level of significance of 90% in case of Estonia (GDP, GDP $_{t+2}$). In case of Malta, Poland and Latvia no relationships were found.

The second calculation with focus on the evolution after the accession provides one statistically significant relationships on the level of significant of 95% in Latvia [GDP $_{t+2}$(negative)] and Malta [GDP $_{t+2}$(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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Anex 1

Model-1: OLS, using observations 1994-2004 Dependent 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	*
REERCZ	380.591	34.1159	11.16	0.0569	*
REERCZ_1	76.3115	22.4826	3.394	0.1824	
REERCZ_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		
Rho	−0.579840	Durbin's h	−1.912561		

Model-2: OLS, using observations 1994-2004 Dependent 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	−33.6976	2.43016	−13.87	0.0458	**
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)	222178.7		P-value(F)	0.001641	
Log-likelihood	−39.20873		Akaike criterion	96.41746	
Schwarz criterion	99.14073		Hannan-Quinn	93.43004	
rho	−0.627086		Durbin's h	−2.094927	

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

	Coefficient	Std. Error	t-ratio	p-value	
const	12137.7	988.184	12.28	0.0517	*
GDPHUN	0.0241805	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	161619.4		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		Durbin's 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	5.14251	0.02466	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	−0.000494991	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	0.945437		Adjusted R-squared	0.508937	
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	

Annex. 2

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	−0.0985750	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	41.1296	233.441	0.1762	0.8890	
REERCZ_2	81.6622	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	−0.197931	0.0238199	−8.310	0.0762	*
GDPESTO_1	−0.297403	0.0780572	−3.810	0.1634	
GDPESTO_2	−0.162633	0.0530525	−3.066	0.2007	
REERESTO	221.229	64.4481	3.433	0.1805	
REERESTO_1	145.989	69.8051	2.091	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	4175.63	698.306	5.980	0.1055	
REERHUN_2	524.231	631.806	0.8297	0.5591	
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	47555471		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	0.6384	
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	327.2276	
R-squared	0.973267		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	0.6599	
GDPMALT_1	−2.71613	1.41755	−1.916	0.3062	
GDPMALT_2	−13.5304	0.787859	−17.17	0.0370	**
REERMALT	−1483.14	452.269	−3.279	0.1884	
REERMALT_1	−1690.03	237.109	−7.128	0.0887	*
REERMALT_2	424.316	436.343	0.9724	0.5089	
Malta_1	−0.577963	0.0815458	−7.088	0.0892	*
Malta_2	−0.112801	0.134529	−0.8385	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)	11029.99		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	0.0992702	0.0533119	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	

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