

# Analysis of the Impact of EU Membership on GDP Growth: An Approach Based on the Differences in Differences Econometric Model

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## Abstract

*This research investigates the economic impacts of European Union (EU) membership using the Difference-in-Differences model. The study systematically analyzes data from multiple countries and time periods to determine how joining the EU influences economic performance, focusing on key metrics such as GDP growth, trade and investment flows, and economic convergence. The findings reveal that EU membership generally results in significant economic benefits, including a notable increase in GDP growth rates, improved trade relations, and higher levels of foreign direct investment. These positive effects are particularly pronounced for countries that joined the EU during major enlargement waves, such as the 2004 accession of ten Central and Eastern European countries. However, the study also identifies variability in the magnitude and persistence of these economic benefits. Factors such as external economic shocks and the initial economic conditions at the time of accession play a crucial role in determining the outcomes. For instance, global financial crises and economic recessions can mitigate the positive effects of EU membership, while less developed economies tend to benefit more in terms of economic convergence. The research highlights the importance of EU structural funds and market access in driving economic growth among new member states. These elements are vital in fostering economic stability and enhancing the overall economic performance of countries within the EU framework. The findings contribute to the broader understanding of economic integration and its role in promoting sustainable economic development, serving as a crucial resource for policymakers and stakeholders in countries considering EU membership.*

*Keywords: difference-in-differences model, European Union, GDP growth, economic integration, economic impact.*

*JEL classification: C23, C55, F15, F36.*

DOI: 10.24818/REJ/2025/90/02

## 1. Introduction

The Republic of Moldova's recent attainment of candidate status for the European Union (EU) represents a pivotal moment in its political and economic evolution, achieved on June 23, 2022. As Republic of Moldova sets out on the path towards EU membership, it becomes crucial to evaluate the potential economic impacts associated with this transition. The European Union, renowned for fostering economic integration and development, has a track record of promoting growth and stability among its member states. This study aims to analyze the effect of EU accession on the GDP of countries that joined the EU between 1960 and 2023,

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utilizing the Difference in Differences (DiD) model. Additionally, we conduct a comprehensive analysis of the trends summary table to provide a detailed examination of heterogeneous treatment effects across different time periods and countries.

The DiD approach is particularly well-suited for this analysis as it allows for the isolation of the causal impact of EU membership by comparing changes in economic outcomes between EU member states (treatment group) and non-member states (control group). This method effectively controls for time-invariant differences between the groups and common trends over time, ensuring that estimated effects can be attributed to EU accession rather than other confounding factors.

Historically, the European Union's enlargement process has been associated with substantial economic benefits for new member states, including increased trade, investment, and institutional reforms. However, the magnitude and nature of these benefits can vary significantly across countries and over time. By examining the experiences of countries that joined the EU over the past three decades, this study aims to provide a comprehensive understanding of how EU membership might influence Republic of Moldova's economic trajectory.

This study comes at an important moment for the Republic of Moldova as it navigates the complexities of joining the EU. Understanding the potential economic impacts of EU membership can inform policymakers and stakeholders about expected benefits and challenges, thereby guiding the formulation of strategies to enhance Republic of Moldova's integration process. Leveraging insights from past EU enlargements and employing rigorous econometric techniques, this study aims to provide a thorough and insightful analysis of the economic implications of EU membership for Republic of Moldova.

## 2. Review of the scientific literature.

**2.1 Historical Context of EU Enlargement.** The European Union has undergone several phases of enlargement since its inception, each contributing to the economic and political landscape of Europe. The EU's origins can be traced back to the 1950s, with the establishment of the European Coal and Steel Community (ECSC) and the European Economic Community (EEC). These early stages of integration aimed to foster economic cooperation and prevent further conflicts among European nations.

The first major enlargement occurred in 1973, with the accession of Denmark, Ireland, and the United Kingdom. This expansion marked a significant shift in the EU's economic dynamics, as it incorporated countries with diverse economic structures and levels of development. The 1980s saw further enlargement with the

accession of Greece (1981), followed by Spain and Portugal (1986). These countries, often referred to as the "Mediterranean enlargement," benefited from EU membership through increased trade, investment, and structural funds aimed at promoting economic convergence.

The 1995 enlargement, which included Austria, Finland, and Sweden, further deepened economic integration and strengthened the EU's position as a major global economic player. However, the most transformative enlargement occurred in 2004, with the accession of ten countries, primarily from Central and Eastern Europe. This "Eastern enlargement" significantly altered the economic landscape of Europe, as it integrated former socialist economies into the EU's single market. These countries experienced rapid economic growth, increased foreign investment, and improved living standards as a result of EU membership.

Subsequent enlargements in 2007 (Bulgaria and Romania) and 2013 (Croatia) continued to expand the EU's economic and political reach. The EU's enlargement policy has been instrumental in promoting economic growth, stability, and convergence among member states. It has facilitated the free movement of goods, services, capital, and people, creating a highly integrated economic area.

The historical context of EU enlargement is crucial for understanding the economic impact of EU membership on individual countries and the broader European economy. Each enlargement has brought new opportunities and challenges, requiring both new member states and existing members to adapt to changing economic dynamics. The EU's ability to integrate diverse economies and promote economic convergence has been a key factor in its success and attractiveness to aspiring member states.

Republic of Moldova's recent attainment of EU candidate status should be viewed within this historical context. As Republic of Moldova progresses towards EU membership, it can draw valuable lessons from the experiences of previous accession countries. Understanding the economic transformations and challenges faced by these countries can inform Republic of Moldova's own integration strategy and help maximize the benefits of EU membership.

The economic impact of EU membership has been extensively studied, with a focus on its transformative effects on member states' economies. The prevailing literature consistently supports the notion that integration into the EU fosters economic growth, stability, and convergence among member states. Several key studies have examined the economic consequences of EU membership, emphasizing the effectiveness of the DiD methodology in policy evaluation.

**2.2 Economic Impact of EU Membership.** Several studies have documented significant economic benefits associated with EU membership.

Badinger (2005) conducted a counterfactual analysis demonstrating that EU membership significantly contributed to economic growth, estimating that GDP per capita in the EU was approximately 20% higher than it would have been without integration. This study underscores the long-term economic benefits associated with EU membership.

Baldwin and Wyplosz (2015) examined the impact of EU membership on trade flows, noting significant increases in both intra-EU and extra-EU trade, particularly for newer member states. Their research underscores the trade-enhancing effects of EU membership, crucial for understanding the broader economic impact of integration.

Berglof and Bolton (2002) identify key factors behind successful financial transitions and economic growth in EU-integrating countries like Poland. They highlight the importance of fiscal and monetary discipline for macroeconomic stability, and note that the prospect of EU membership provided strong political incentives for economic and legal reforms. These reforms, in turn, attracted substantial foreign direct investment, boosting productivity and technology transfer. Additionally, proximity to Western markets and historical trade ties supported enterprise restructuring and GDP growth. The authors also observe that while strong legal protections aid financial development, the civil-law traditions common in transition economies present unique challenges for institutional reform.

Blanchard, Griffiths, and Gruss (2013) provide a detailed analysis of Latvia's economic evolution surrounding its EU accession, highlighting the profound effects of membership on GDP dynamics. Latvia's entry into the EU in 2004 catalyzed a period of rapid economic expansion, driven by optimism about income convergence and facilitated by access to cheap credit from foreign-owned banks. Between 2000 and 2007, Latvia's GDP surged by nearly 90%, with private consumption and investment rising sharply as a share of GDP. However, the global financial crisis of 2008 exposed underlying vulnerabilities, including high inflation and a large current account deficit, leading to a dramatic 25% contraction in GDP from peak to trough. The subsequent adjustment phase was marked by fiscal consolidation and internal devaluation, which were critical in restoring macroeconomic stability. By 2013, Latvia had entered a recovery phase, with GDP rebounding by 18% from its lowest point, largely due to robust export growth. The Latvian case underscores both the opportunities and risks associated with EU membership for small, open economies: while integration can drive rapid growth, it also heightens exposure to external shocks and necessitates effective policy responses to ensure sustainable recovery.

Boltho and Eichengreen (2010) find that EU membership has increased member states' GDP by about 5% compared to non-membership, a gain comparable to major historical innovations like the U.S. railways. This effect is largely driven by enhanced intra-union trade, facilitated by the removal of trade barriers and the creation of a common market. Participation in the Eurozone, in particular, has tripled trade volumes between member countries, with trade gains estimated at 5–15% above expectations, especially from 1999 to 2003. These gains primarily benefited small and medium-sized enterprises by reducing fixed trading costs, but are considered a one-off adjustment rather than a source of ongoing growth.

Breuss (2013), in research published by the Austrian Institute of Economic Research (WIFO), provides a comprehensive assessment of the economic and political effects of Austria's EU membership. Model-based simulations indicate that Austria's integration into the EU has generated a sustained increase in GDP growth, estimated at 0.5 to 1 percentage point annually. This growth dividend is disaggregated as follows: the opening of Eastern Europe contributed approximately 0.2 percentage points per year, EU membership and participation in the Single Market added 0.6 percentage points, involvement in the Economic and Monetary Union (EMU) contributed 0.4 percentage points, and EU enlargement accounted for an additional 0.4 percentage points. Breuss attributes Austria's superior economic performance—particularly its growth advantage over Germany and Switzerland—to these integration effects, arguing that such outcomes are difficult to explain without reference to Austria's active participation in EU integration. Beyond economic gains, the study highlights the broader modernization of Austria's political and societal structures, emphasizing the transformative impact of deeper European integration. Comparative analysis with both EU and non-EU countries further substantiates the conclusion that EU membership has been a decisive factor in Austria's economic and political development.

Bruno, Campos, and Estrin (2021) investigated the impact of EU membership on Foreign Direct Investment (FDI) inflows using a synthetic control method. They found that EU membership increased FDI inflows from outside the EU by approximately 60%, while FDI from within the EU rises by around 50%, emphasizing the role of EU membership in attracting foreign investment.

Campos, Coricelli, and Moretti (2019) utilized synthetic counterfactuals to estimate the economic benefits of EU membership, revealing a notable positive impact on per capita income. Their findings suggest that EU membership resulted in an average increase of 10% in per capita GDP over a decade post-accession, illustrating the profound economic advantages of EU integration.

Crespo Cuaresma, Ritzberger-Grünwald, and Silgoner (2008) focused on the growth effects of EU membership on new member states from Central and Eastern Europe, using a generalized Solow model to find substantial growth effects, particularly for countries with lower initial income levels. This indicates that EU membership can be particularly beneficial for less developed economies seeking to converge economically.

Grassi (2024) rigorously analyzes the economic impact of the 2004 EU enlargement, in which ten countries joined the Union. Using the synthetic control method, the study finds that by 2019, GDP per capita in these new member states was 32% higher—about \$8,433 per person—than it would have been without EU accession. Eight of the ten countries moved from middle- to high-income status, and these gains are primarily attributed to rapid productivity growth and convergence with the EU-15. Importantly, the enlargement had no negative effect on the GDP per capita of existing EU members, confirming the process as a positive-sum game. The study highlights productivity gains as the main driver, though the specific mechanisms—such as technology transfer, competition, and trade—require further research. In summary, the 2004 enlargement led to substantial and sustained improvements in living standards for new members, with no adverse effects on older members, and underscores the transformative potential of EU integration.

According to Mion and Ponattu (2019) individuals in the EU receive an average of 840 euros in per capita welfare gains from the Eu Single Market each year. They find a significant range of advantages: countries and areas in the EU's geographic core receive gains of up to 3,600 euros per capita (a 4.7% rise), while gains in some peripheral regions might be as low as 150 euros (around 2%).

Sondermann and Lehtimäki (2020) provide a rigorous assessment of the economic impact of the European Single Market (ESM) using the Synthetic Control Method (SCM). Their analysis demonstrates that the creation of the ESM resulted in a substantial increase in real GDP per capita for member states, estimated at 12–22% above a counterfactual scenario without the Single Market. This growth effect is consistent with, and in some cases exceeds, earlier projections by Baldwin (1989). The study finds that the benefits of the ESM have been unevenly distributed: smaller EU member states have experienced greater gains, largely due to enhanced market access and reduced dominance of larger producers. Among the larger economies, Spain stands out as a significant beneficiary, whereas Germany, France, and Italy did not realize comparable growth premiums. Methodologically, the authors employ SCM to construct credible counterfactuals, enabling robust estimation of the Single Market's impact. They further validate their findings through a series of robustness checks, including alternative donor pools and covariate specifications. The paper situates these findings within the historical

context of the Single Market's establishment in 1993, following the Single European Act of 1986. While the ESM has delivered notable economic benefits, the authors note that its full potential remains unrealized, particularly in the services sector.

Rapacki and Prochniak (2019) present compelling empirical evidence that EU accession significantly accelerated economic growth in Central and Eastern European (CEE) countries. Their analysis demonstrates that, between 1995 and 2015, the EU11 outpaced the older EU15 member states in average GDP growth, with the gap widening after the 2004 enlargement. The study documents marked income-level convergence, as the CEE countries' real GDP per capita grew substantially faster than that of Western Europe. Econometric estimates reveal that the speed of convergence ( $\beta$  coefficient) increased from 1.93% in the pre-accession period (1995–2004) to 2.27% post-accession (2004–2015), implying a halving of the income gap in approximately 35 years. While the 2008–2009 global crisis temporarily slowed this process, the overall trend remained robust. The authors conclude that EU membership served as a powerful external anchor, fostering structural reforms and sustained economic catch-up in the CEE region.

Vojinović and Oplotnik (2008) provide robust empirical evidence that EU membership significantly accelerated GDP growth and economic convergence among the ten countries that joined the Union in 2004. Their analysis demonstrates that, particularly in the late 1990s and 2000s, poorer new member states experienced higher growth rates—averaging 2.87% to 3.23%—largely due to trade liberalization, increased foreign direct investment, and structural reforms driven by EU integration. The study suggests that, without EU membership, these countries would likely have faced slower growth, reduced FDI inflows, and less impetus for reform, resulting in greater economic challenges and a wider income gap with older EU members. Thus, EU accession played a crucial role in supporting the economic recovery and convergence of the new member states, though continued policy efforts are needed to further reduce persistent disparities.

**2.3 Difference in Differences.** The DiD methodology, central to this study, has proven effective in evaluating policy impacts by comparing changes in outcomes before and after treatment between treatment and control groups. The seminal work of Card and Krueger (1994), notably their study on the minimum wage in New Jersey, illustrates the power of DiD in economics. This study, considered one of the most famous DiD applications, demonstrated how differences in minimum wage policies across neighboring states could be leveraged to estimate the impact on employment and wages. Card's contributions to DiD methodology were instrumental in advancing econometric techniques for policy evaluation, culminating in his recognition with the 2021 Nobel Memorial Prize in Economic Sciences.

**2.4 Applications to Republic of Moldova.** Building on this literature, this study aims to provide a comprehensive assessment of the potential economic impacts of EU membership on Republic of Moldova. By employing rigorous econometric techniques of the DiD model, we aim to offer empirical evidence and methodological rigor to inform strategic decisions aimed at maximizing the benefits of Republic of Moldova's integration into the European Union.

### 3. Research methodology

**3.1 Materials.** The dataset covers annual observations from 1960 to 2023 for a comprehensive set of countries, including both EU member states and non-member states. The outcome variable current GDP is sourced from the World Bank's World Development Indicators. The treatment variable is EU membership and is coded as 0 for non-EU members and 1 for the year in which a country became a member.

**3.2 Methods.** The analysis employs a robust econometric approach, specifically the DiD model, to evaluate the impact of EU accession on economic outcomes. The model assumes parallel trends for the control and treatment groups before the treatment occurs. The DiD model is represented as:

$$Y_{it} = \alpha + \delta Tt + \gamma Di + \beta(TtDi) + \epsilon_{it} \quad (1)$$

where:

$Y_{it}$ : Outcome variable (GDP) for country  $i$  at time  $t$ .

$Tt$ : Time dummy variable that equals 1 for the post-treatment period and 0 otherwise.

$Di$ : Group dummy variable that equals 1 for the treatment group (EU members) and 0 for the control group (non-EU members).

$Tt \times Di$ : Interaction term that captures the DiD estimator.

$\beta$ : Coefficient of interest representing the average treatment effect of EU membership.

$\alpha, \delta, \gamma$ : Coefficients for the intercept, time effect, and group effect, respectively.

$\epsilon_{it}$ : Error term

The DiD methodology allows for the isolation of the causal impact of EU membership by comparing changes in economic outcomes between EU member states and non-member states over time. This approach controls for time-invariant differences between groups and common trends over time, ensuring that any estimated effects are attributable to EU accession rather than other factors.

The DiD model in Eviews used  $\text{gdp} = \text{dlog}(\text{GDP current US \$}) * 100$  for variable, and EU for the treatment (where EU is membership of the European Union, with 0 for nonmember and 1 for year in which a country became a member. Always Members: Belgium, France, Germany, Italy, Luxembourg, Netherlands. Treatment dates are: Ireland (1973), Denmark (1973), United Kingdom (1973, not a member since 2020), Greece (1981), Spain (1986), Portugal (1986), Austria (1995), Finland (1995), Sweden (1995), Cyprus (2004), Czechia (2004), Estonia (2004), Latvia (2004), Lithuania (2004), Hungary (2004), Malta (2004), Poland (2004), Slovak Republic (2004), Slovenia (2004), Bulgaria (2007), Romania (2007), Croatia (2013). Never Members: Switzerland, Norway, Turkiye (Turkey), Republic of Moldova, Albania, Belarus, Bosnia and Herzegovina, Georgia, Iceland, Kosovo, Montenegro, North Macedonia, Ukraine, Serbia.

#### 4. The model results and discussions.

In this analysis, we employed a DiD model to evaluate the impact of European Union membership on GDP. We analyzed 63 periods across 42 countries, resulting in a total of 1994 observations (unbalanced panel).

Figure 1. DiD model estimation

Dependent Variable: GDP

Method: Difference-in-Difference

Periods included: 63

Cross-sections included: 42

Total panel (unbalanced) observations: 1994

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EU	6.926718...	1.4739084...	4.6995580...	0

Source: elaborate by author in Eviews 13

For DiD models, the most critical aspects are: the Treatment Effect Coefficient - in a DiD model, the coefficient of the treatment interaction term (EU in this case) is the main parameter of interest; statistical Significance - assessing the significance of the treatment effect using the t-statistic and p-value; assumptions of the model - ensuring that the parallel trends assumption holds are crucial for the validity of the DiD estimates.

The coefficient for the EU variable is 6.926, this coefficient is statistically significant at the 1% level, as indicated by the t-statistic of 4.699 and a p-value of 0. This indicates that the coefficient is statistically significant, meaning we can reject the null hypothesis that EU membership has no effect on GDP growth.

On average, EU membership is associated with a 6.93 percentage points increase in GDP. This result suggests that, holding other factors constant, countries that joined the EU experienced a notable boost in their economic output compared to non-members. In this case, the coefficient 6.926 suggests that, on average, EU member countries experienced a 6.93 percentage point higher growth rate in GDP compared to non-member countries, after controlling for any pre-existing differences between the two groups. The average GDP growth rate of countries that joined the EU is 6.93 percentage points higher, on average, compared to the GDP growth rate of countries that did not join the EU. A 6.93 percentage point increase in GDP growth rate is quite substantial. For example, if a non-EU country was growing at 2% per year, this suggests that joining the EU would boost its growth rate to about 8.93% per year, on average. This effect is the difference between the treated (EU member) and control (non-EU member) countries after the treatment period (EU membership), relative to the trends observed before the treatment.

The parallel trend statistic is 0.93 with a p-value of 0.35, which indicates that the parallel trends assumption for the DiD model holds. This implies that, in the absence of EU membership, the GDP trends of treated and control countries would have been similar over time.

**4.1 A Difference-in-Differences Perspective on Historical GDP Growth Trends from the Summary Table.** The Trends Summary table provides a thorough assessment of GDP patterns from 1961 to 2023, separated by treatment status to show how different groups have fared over time. This table is an important tool for studying GDP dynamics over different time periods and treatment circumstances, especially in the context of a DiD analysis.

The table divides GDP statistics into three main categories:

- treatment date: The time during which the treatment was administered;
- Never: Periods when treatment was not provided.
- Always: Groups that received constant treatment throughout the research period.

The GDP growth trends can be divided into four main periods. Before 1973, there was generally stable and robust growth, with significant peaks in 1964 (11.66%) and 1969 (11.80%). Post-1973, there was a marked downturn due to the oil crisis and subsequent volatility. The period from 1986 to 2000 saw a significant growth spike in 1986 (28.23%) and relative stability thereafter, with some economic setbacks in the early 1990s. The 2001-2023 period was characterized by major economic disruptions, including the 2008 financial crisis and the 2020 COVID-19 pandemic, followed by a recovery phase in 2021-2023.

The pre-1973 period, for instance, was characterized by relatively stable growth across many European countries, with notable high-growth years in 1964 and 1969 driven by post-war reconstruction efforts and industrialization. However, the early 1970s exhibited a boom period, with exceptionally high growth rates in 1972-1973 across various countries before the onset of the 1973 oil crisis.

The 1973 oil crisis had a profound impact on growth rates, leading to a significant downturn in 1974-1975, followed by a period of high volatility with sharp fluctuations between positive and negative growth rates. This volatility was exacerbated by the economic shocks of the time, including the collapse of the Bretton Woods system and the transition to floating exchange rates. Countries that joined the EU in 1973, like the UK, Ireland, and Denmark, experienced a period of volatility due to the oil crisis and other economic shocks. However, over the long term, EU membership contributed to increased trade and investment opportunities, which became more apparent in the following decades, as seen in their average growth rates and recovery trajectories.

The era from 1986 to 2000 began with a substantial growth surge in 1986 in many nations, which was most likely impacted by the Single European Act and the foundation of the single market. This was followed by generally consistent development patterns in the late 1980s and 1990s, with only sporadic economic setbacks, such as the 1993 European Exchange Rate Mechanism crisis. Countries that joined the EU in 1986, such as Spain and Portugal, saw particularly high economic growth during this time, thanks to EU membership benefits such as greater investment and technology transfer.

Between 2001 and 2023, important events occurred, including the 2008 financial crisis, which produced a worldwide economic slowdown, and the COVID-19 pandemic, which resulted in a steep economic collapse in 2020. However, the years 2021-2023 experienced a rebound period, with significant growth in 2021 followed by more moderate growth. This recovery was most certainly aided by the implementation of vaccinations, the reopening of economies, and different fiscal and monetary measures targeted at promoting growth.

The study also indicates various EU accession effects that differ depending on the time and conditions of the membership. Countries that joined the EU in 1973 saw an average growth rate of 7.19%, somewhat lower than the "Never" group but higher than the "Always" group. These nations saw more consistent growth during the tumultuous 1970s than non-EU countries, which might be ascribed to the long-term benefits of EU membership. Countries that joined the EU in 1986, such as Spain and Portugal, had a large increase in growth to an average of 7.38% in the following years, owing to the benefits of the Single European Act. In contrast, the

1981 group encountered economic hardships, as seen by their negative average growth rate.

A comparative analysis of EU and non-EU countries reveals that the “Never” group showed the highest average growth rate, suggesting that while EU membership offers significant benefits, it is not the sole determinant of economic growth. EU members generally exhibited more stable growth patterns, especially during economic crises, due to the benefits of EU coordination and cooperation. Founding members demonstrated more moderate but stable growth compared to later joiners, who often experienced higher growth rates in the years following accession, indicating a potential “catch-up” effect.

Regional patterns also emerged, with Southern European countries experiencing strong growth in the 1990s due to EU membership and increased investment and tourism. Eastern European countries showed rapid growth in the pre-accession and early post-accession years, driven by EU membership benefits including increased investment and technology transfer. The analysis also highlights the impact of economic shocks and resilience, with EU members generally showing better recovery rates compared to non-EU countries.

For example, the 1973 oil crisis affected all groups, but EU members demonstrated somewhat better recovery, likely due to increased coordination and cooperation. The global financial crisis of 2008-2009 had a universally negative impact, but newer EU members showed stronger rebounds, likely due to EU membership benefits and effective fiscal and monetary policies. The COVID-19 pandemic caused widespread negative growth, followed by a strong recovery in 2021, supported by vaccination efforts, economic reopening, and growth-stimulating policies.

Furthermore, the statistics reveal indications of economic convergence, with newer EU members frequently displaying greater growth rates after admission, albeit there were also periods of divergence, particularly during global economic crises. This convergence is being pushed by the advantages of EU membership, such as greater investment, technology transfer, and EU policies aiming at economic convergence. The research emphasizes the need of taking into account a variety of factors and long-term trends when evaluating the economic impact of EU membership. While EU membership is typically associated with positive growth impacts, the impact varies by accession group and time period, depending on global economic conditions, pre-existing economic structures, and timing of accession.

**4.2 Investigating EU Accession’s Effects on Economic Growth: A Difference-in-Differences Examination of Historical Data.** The analysis of growth trends across various EU accession periods reveals intricate dynamics that underscore the complexities of estimating the treatment effect of EU membership

through the Difference-in-Differences (DiD) methodology. Initially, the pre-1973 era - encompassing the 1960s and early 1970s—presents a period of relatively stable and comparable growth rates among the “Always” EU members (founding EU countries) and their non-member counterparts, thus validating the parallel trends assumption fundamental to the DiD approach. This historical backdrop supports the methodological premise that pre-treatment trends were consistent across the treated (EU members) and control (non-EU) groups, a crucial factor for isolating the causal impact of EU membership.

The 1973 accession of Ireland, Denmark, and the UK marks a pivotal shift, with a marked increase in growth rates from 18.29% in 1972 to 19.11% in 1973, followed by a sustained growth rate of 7.60% in 1974 amidst a broader economic slowdown in non-member countries. This significant upturn in growth immediately post-accession aligns well with the DiD model’s expectation of a positive treatment effect, demonstrating that the EU’s structural and economic integration mechanisms were likely effective in stimulating growth in the newly admitted member states. This initial positive effect contrasts with the experience of Greece, which in 1981 experienced a decline in growth to -8.22%, a phenomenon that appears to be driven more by external economic shocks, such as global inflation and recession, rather than the EU accession itself. Nevertheless, Greece’s subsequent recovery from 1984 to 1986 underscores a more nuanced, delayed positive effect of EU membership, highlighting that while initial impacts may be muted or adverse, longer-term growth benefits can materialize as countries stabilize and adapt to EU economic policies.

The 1986 accession of Spain and Portugal offers a compelling illustration of the treatment effect’s immediate and substantial impact, with growth rates surging to 34.31% in 1986 and remaining high through 1987 and 1988. This dramatic increase reflects a significant positive treatment effect, likely driven by the implementation of EU structural funds, increased market access, and economic reforms incentivized by EU membership. The high growth rates observed during this period corroborate the DiD model’s findings and reflect the potential for EU membership to serve as a catalyst for economic expansion.

The 1995 accession wave, which admitted Austria, Finland, and Sweden to the EU, paints a more complicated picture. The growth rate climbed from 9.54% in 1994 to 19.51% in 1995, after which growth slowed in the following years. This trend illustrates that, while EU membership can bring a short-term economic boost, the long-term consequences may be influenced by a variety of other variables, such as the absorption of early gains and the changing economic landscape.

The 2004 accession, which saw ten new member states join the EU, further underscores the positive treatment effect with a significant rise in growth from 13.53% in 2003 to 17.74% in 2004, and continued strong performance through 2005 and 2006. This period exemplifies the DiD model's assertion that EU membership fosters robust economic growth, as evidenced by the sustained positive growth rates of the new entrants, suggesting that the benefits of EU accession are both significant and durable over time.

Conversely, the 2007 accession of Bulgaria and Romania, characterized by an extraordinary growth spike to 30.74% in 2007 and 20.44% in 2008, presents a case where the positive effects of EU membership are overshadowed by the subsequent global financial crisis of 2008-2009. This instance illustrates the vulnerability of newly acceded member states to external economic shocks, while also reflecting that the EU's stabilizing influence can be overshadowed by broader global financial turbulence.

Finally, the 2013 accession of Croatia saw a modest growth increase to 3.72% following a period of negative growth, indicative of a more gradual and less pronounced treatment effect in the immediate aftermath of accession. This scenario points to the variability in the efficacy of EU membership's impact, suggesting that while EU accession tends to yield positive economic outcomes, these effects can be contingent upon the specific economic conditions at the time of accession.

In summary, the empirical evidence from the various accession periods supports the DiD model's hypothesis of a generally positive treatment effect of EU membership on economic growth. However, this effect is neither uniform nor immediate, as demonstrated by the variability across different accession waves and the influence of external economic shocks. The observed trends reveal that while EU membership provides a significant and often beneficial stimulus to economic growth, the magnitude and persistence of these effects are influenced by a complex interplay of domestic economic conditions, external shocks, and the timing of EU accession. This analysis underscores the importance of considering both short-term and long-term effects, as well as the broader economic context, in evaluating the causal impacts of EU membership on economic performance.

##### **5. Limitations of the study and future direction.**

While the Difference-in-Differences (DiD) model, supported by a non-significant parallel trends test ( $p=0.35$ ), suggests a positive impact of EU membership on GDP growth, certain limitations inherent to the methodology warrant consideration. Potential unobserved country-specific heterogeneity that evolves over time, or endogeneity in the decision and timing of a country's accession to the EU, could still influence the estimated 6.93 percentage point increase in GDP. Although the

DiD framework accounts for time-invariant differences and common trends, factors not captured by the model might correlate with both EU membership likelihood and economic performance. Therefore, future research could build upon these findings by employing a synthetic control model. This approach would be particularly insightful for this analysis, as it could construct a more tailored counterfactual for each acceding country by optimally weighting non-member countries based on pre-accession economic characteristics and GDP trajectories. This could provide a more robust examination of the EU membership effect, especially given the staggered nature of accession and the diverse economic profiles of the countries involved.

## 6. Conclusion

The research paper provides a comprehensive analysis of the economic impacts of European Union membership, utilizing the Difference-in-Differences model to estimate the causal effects of EU accession on GDP growth. The findings indicate that EU membership is generally associated with significant and positive economic benefits, including increased GDP growth of 6.93 percentage points per year, enhanced trade and investment flows, and economic convergence.

The DiD analysis reveals that countries joining the EU often experience a substantial boost in economic performance compared to non-member states. This positive treatment effect is evidenced by statistically significant increases in GDP growth rates, particularly in the years immediately following accession. The study demonstrates that the benefits of EU membership are multifaceted, encompassing improved market access, increased foreign direct investment, and access to EU structural funds, which collectively drive economic expansion.

However, the research also highlights the heterogeneity in the magnitude and persistence of these benefits across different countries and time periods. The impact of EU membership is influenced by several factors, including external economic shocks, such as the 1973 oil crisis, the 2008 financial crisis, and the COVID-19 pandemic. These events underscore the importance of considering the broader economic context when assessing the effects of EU accession. Additionally, the initial economic conditions of the countries at the time of accession play a crucial role in shaping the outcomes, with less developed economies often experiencing higher post-accession growth rates as they converge towards the economic standards of more developed EU member states.

The study's findings underscore the importance of EU structural policies in promoting economic stability and growth among new member states. The positive effects of EU membership on trade and investment flows are particularly pronounced for countries that joined during the major enlargement waves, such as

the 2004 accession of ten Central and Eastern European countries. These nations benefited significantly from the integration into the EU's single market, leading to substantial economic gains.

The research offers valuable insights for policymakers and stakeholders in countries like Republic of Moldova, which are currently navigating the path towards EU membership. By drawing lessons from past EU enlargements and employing rigorous econometric techniques, the study provides a nuanced understanding of the potential economic implications of EU membership. This knowledge can inform strategic decisions aimed at maximizing the benefits of integration into the European Union, ensuring that countries are well-prepared to leverage the opportunities presented by EU accession.

Through the results obtained the paper contributes to the existing literature by providing robust empirical evidence of the positive economic impacts of EU membership. It emphasizes the importance of considering both short-term and long-term effects, as well as the broader economic context, in evaluating the causal impacts of EU accession on economic performance. The research highlights the transformative potential of EU membership, particularly for less developed economies, and offers a comprehensive framework for understanding the economic trajectory of countries aspiring to join the European Union.

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