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# Impact of COVID-19 on foreign direct investment in the European Union

**Vito Bobek[1], Romana Korenič[2], Tatjana Horvat[3]**

***Abstract***: Background: The COVID-19 outbreak affected foreign investment worldwide, and the European Union (EU) suffered a more pronounced drop in foreign direct investment (FDI) compared to other world areas. Objectives: This paper examines the pandemic's impact on FDI in EU Member States, considering the influence of macroeconomic variables and policy responses on FDI behavior. Methods/Approach: Based on quarterly data (2020Q1–2023Q4) retrieved from Eurostat, OECD, and UNCTAD, the research employs descriptive statistics, as well as the panel regressive approach to examine FDI tendencies, the change in the composition of flows, and the role of macroeconomic and institutional factors. Results: The results indicate that the worse the severity of COVID-19 is, the less FDI performance will be, especially in manufacturing and tourism. However, investment in digital and green sectors held up. Recovery mechanisms at the EU level and national screening regimes affected the dynamics of investment, indicating that there will be structural changes in location and internalization advantages in the post-pandemic period.
***Keywords:*** foreign direct investment, European Union, COVID-19, macroeconomic factors, policy response, sectoral shifts
***JEL classification:*** F21, F23, O52, E22, H12

# Vpliv COVID-19 na tuje neposredne investicije v Evropski uniji

***Povzetek:*** Ozadje: Pandemija COVID-19 je močno vplivala na globalne tokove neposrednih tujih investicij (TNI), pri čemer je Evropska unija (EU) zabeležila ostrejši upad kot druge regije. Cilji: Namen raziskave je preučiti vpliv pandemije na TNI v državah članicah EU ter analizirati vlogo makroekonomskih dejavnikov in odzivov politik pri oblikovanju investicijskih vzorcev. Metode/pristop: Raziskava, ki temelji na četrtletnih podatkih (1. četrtletje 2020 – 4. četrtletje 2023), pridobljenih od Eurostata, OECD in UNCTAD, uporablja opisno statistiko in panelni regresivni pristop za preučevanje trendov neposrednih tujih naložb, sprememb v sestavi tokov ter vloge makroekonomskih in institucionalnih dejavnikov. Rezultati: Rezultati potrjujejo, da je resnost pandemije negativno vplivala na TNI, zlasti v predelovalnih dejavnostih in turizmu. Po drugi strani pa so se naložbe v digitalne in zelene sektorje izkazale za odporne. Instrumenti za okrevanje na ravni EU in nacionalni mehanizmi preverjanja investicij so vplivali na investicijsko dinamiko, kar kaže na strukturne spremembe v lokacijskih in internalizacijskih prednostih po pandemiji.
***Ključne besede:*** neposredne tuje investicije, Evropska unija, COVID-19, makroekonomski dejavniki, odziv politik, sektorske spremembe

[1]*prof. dr., Fakulteta za družbene vede, Univerza v Ljubljani*
*Kardeljeva ploščad 5, 1000 Ljubljana*
*vito.bobek@guest.arnes.si*

[2]*M.A.*
*DOBA Fakulteta*
*Prešernova ulica 1, 2000 Maribor*
*romana.korenic@net.doba.si*

[3]*prof. dr.,*
*Fakulteta za management, Univerza na Primorskem*
*Izolska vrata 2, p. p. 761, SI-6106*
*tatjana.horvat@fm-kp.si*



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## 1 INTRODUCTION

The COVID-19 pandemic caused one of modern history's most severe global economic downturns, significantly disrupting international trade, global supply chains, and foreign direct investment (FDI). According to international data, global FDI flows fell by approximately 36% in 2020, with the European Union (EU) experiencing a decline of nearly 73% in inward FDI, a sharper contraction than in other OECD regions. The pandemic and the resulting geopolitical shocks, including the war in Ukraine, higher energy prices, and inflation, have increased uncertainty in investment landscapes and re-examined the fragility of global economic systems (OECD, 2022; UNCTAD, 2023).

FDI has long been considered a driving force of growth and a productivity improver in developed and developing countries. It entails employment effects, technology transfer, and innovation and is frequently a sign of a country's institutional and economic stability (Petreski & Olczyk, 2025). In the EU, FDI is crucial in regional convergence, industrial modernization, and green and digital transitions. The post-pandemic period raised the question of whether economic shocks and newly introduced institutional mechanisms—such as the Recovery and Resilience Facility and strengthened investment screening regulations—have altered the traditional patterns of FDI flows across EU Member States (European Commission, 2024).

While global analyses of FDI during the COVID-19 period exist, the EU's specific case EU's received limited empirical attention. Several studies (Ajide & Osinubi, 2020; Pieroni et al., 2020) have demonstrated the correlation between the severity of pandemic outbreaks and declines in FDI, highlighting how countries with higher infection rates and stricter lockdown measures experienced steeper investment contractions. However, these works focus primarily on global aggregates or selected emerging markets and lack detailed assessments at the EU level. Other recent studies (Dzogan et al., 2025) confirmed that the pandemic caused EU FDI declines but stopped exploring sectoral or policy-moderated dynamics.

Furthermore, there is a knowledge gap concerning how various macroeconomic variables—such as unemployment, inflation, GDP growth, and business confidence—interact with COVID-19 severity to shape FDI inflows and outflows. Previous crises, such as the global financial crisis 2008, showed that recovery trajectories differ substantially between countries depending on institutional capacity, fiscal space, and industrial structure. It remains uncertain whether the EU's post-pandemic policy responses—most notably its historically unprecedented Recovery and Resilience Facility, along with strategic investment initiatives such as REPowerEU and the Strategic Technologies for Europe Platform (STEP)—have effectively counterbalanced the decline in cross-border capital flows or whether their impact has been primarily confined to stimulating domestic investment and safeguarding internal market stability. (European Commission, 2020; SUERF, 2023).

This article aims to address these gaps through a focused empirical analysis of FDI trends in the EU from 2020 to 2023. We investigate the extent to which the pandemic disrupted traditional investment patterns in the EU and how macroeconomic and institutional factors moderated these effects. To guide the analysis, we test the following hypotheses:

- **H1**: COVID-19 severity (measured by infection rates and lockdown strictness) is negatively associated with FDI inflows across EU countries.
- **H2**: The adverse effect of COVID-19 on FDI is moderated by macroeconomic factors—namely, GDP growth, unemployment, inflation, and business confidence.

- **H3**: EU countries with stronger policy interventions (e.g., FDI screening, recovery financing) experienced a more stable FDI trajectory post-pandemic.

To this end, this study has three aims. Our first objective also measures the relationship between COVID-19 pandemic proxies and FDI flows in the EU. Second, we study whether the pandemic's effect is exacerbated or mitigated by the pandemic's macroeconomic conditions. Third, we test if short-term investor behavior was affected by policy measures, either at the EU-wide level or at a national one. The results are anticipated to serve as a platform for enhancing FDI-oriented policies for potential crises.

In addition to testing these hypotheses, the study also examines sectoral heterogeneity in FDI inflows, given the differentiated impact of the pandemic across industries. This exploratory analysis complements the main hypothesis testing by highlighting how manufacturing, tourism, and extractive industries were more severely affected than digital, health, and green sectors.

The research methodology includes a panel data analysis of quarterly FDI flows, macroeconomic indicators, and pandemic variables across all EU Member States between Q1 2020 and Q4 2023. The data are from standardized international sources, including Eurostat, OECD, UNCTAD, and national central banks. Using fixed- and random-effects regression models with interaction terms, the study explores the direct and moderated effects of the pandemic on FDI.

Beyond macroeconomic shocks, pandemic-era FDI dynamics were also shaped by institutional, regulatory, and geopolitical factors. In particular, the expansion of FDI screening mechanisms at the EU and national levels, alongside growing concerns about energy dependence and supply chain security, influenced investor sentiment and capital allocation. These dimensions complement the macroeconomic and policy variables included in our analysis and are further discussed in the context of our empirical findings.

The rest of the paper is organized as follows. Data sources and econometric methods are described in Section 2. The empirical results are given in Section 3, emphasizing pandemic-related disturbances and macroeconomic stabilization. Section 4 discusses these results about previous literature and policy relevance. Recommendations for future research and practical guidance on enhancing FDI resilience during a crisis are presented at the end of section 5.

## 2 METHODS

### 2.1 Definition and Coverage of Foreign Direct Investment (FDI)

Foreign direct investment (FDI) refers to a cross-border investment that establishes a “lasting interest” and a significant degree of influence by a direct investor in an enterprise resident in another economy. Operationally, this arises when the direct investor owns equity that entitles it to 10% or more of the voting power in the direct investment enterprise (or the equivalent for unincorporated entities). Below this threshold, cross-border positions are classified as portfolio investment, not FDI (IMF, 2009; OECD, 2008).

Coverage in this article follows international statistical standards. Accordingly, FDI flows include three components: (a) equity capital (including mergers and acquisitions and new equity), (b) reinvested earnings, and (c) intercompany debt (including transactions between fellow enterprises). These components together form inward and outward FDI flows and

stocks as recorded in the balance of payments (BoP) and international investment position (IIP) (OECD, 2008; UNCTAD, 2023).

Our descriptive statistics and econometric exercises use the official series reported by Eurostat and the OECD. Eurostat's BoP-consistent FDI series are compiled under BPM6; depending on the table, data are presented on the asset/liability basis and/or the directional principle. Where needed, we harmonize definitions and clearly indicate which presentation is used (Eurostat, 2023a, 2023b; OECD, 2023).

Scope clarifications relevant to the EU context are also important. First, our flow measures cover both greenfield projects and cross-border mergers and acquisitions to the extent they result in equity capital transactions, as well as reinvested earnings and intercompany debt; announcements of greenfield projects are not themselves FDI flows but are used as leading indicators in background discussion. Second, to mitigate pass-through ("conduit") effects that can be material in some EU Member States, we rely on series that identify and, where available, exclude special purpose entities (SPEs) as per OECD guidance; where only aggregate series are available, we note this and treat SPE intensity in robustness checks. Third, geographic attribution follows official reporting (immediate counterpart economy); where OECD "ultimate investing country" breakdowns exist, we use them descriptively (OECD, 2008, 2023).

Unless otherwise indicated, FDI is presented on the asset/liability basis per BPM6; for comparability with OECD visualizations we reference inward "FDI inflows" on the directional basis where appropriate and verify robustness across presentations (Eurostat, 2023a; IMF, 2009).

Portfolio investment (equity or debt holdings below the 10% voting-power threshold), financial derivatives, and reserve assets are not part of FDI. Where national statistics report such items in adjacent categories, they are excluded by construction in the BPM6/BD4 framework we employ (IMF, 2009; OECD, 2008).

This study adopts a mixed-methods approach to analyze the impact of the COVID-19 pandemic on foreign direct investment (FDI) trends within the European Union (EU), combining descriptive and comparative statistical techniques with econometric regression analysis. The methodological framework is designed to identify structural changes in FDI flows and assess the influence of macroeconomic variables and policy instruments on investment dynamics between 2020 and 2023.

### 2.2 Data sources

The empirical analysis draws on publicly available data from four primary sources: Eurostat, the Organization for Economic Co-operation and Development (OECD), the United Nations Conference on Trade and Development (UNCTAD), and the European Central Bank (ECB). Specifically, quarterly data on inward and outward FDI flows by Member States were obtained from Eurostat and OECD FDI databases. Supplementary sector-level and greenfield investment UNCTAD's data were collected from UNCTAD's World Investment Report and OECD's FDI Regulatory Restrictiveness Index (UNCTAD, 2023; OECD, 2022). Macroeconomic control variables—including GDP growth, inflation, unemployment, and government debt—were retrieved from the ECB and Eurostat databases. We adopt the IMF BPM6 and OECD BD4 definitions of foreign direct investment (FDI). Accordingly, our inward and outward FDI flow series comprise equity capital, reinvested earnings, and intercompany debt (including fellow-enterprise transactions), consistent with Eurostat and OECD compilation practices (IMF, 2009; OECD, 2008; Eurostat, 2023a; Eurostat, 2023b).

FDI inflows are measured as foreign direct investment flows relative to GDP, based on Eurostat's BPM6 balance-of-payments data (dataset BOP_FDIQ). For countries with large financial conduit activity (e.g., the Netherlands, Luxembourg, Ireland), reported inflows may reach implausibly high values due to transactions routed through special purpose entities (SPEs). Where available, we therefore rely on Eurostat's adjusted series excluding SPEs (BOP_FDIQ_SPE) to provide more accurate measures. In cases where only aggregate data were available, robustness checks were conducted to ensure that results are not driven by these outliers (see Appendix B, Table B2).

Pandemic-related indicators, including COVID-19 incidence rates and government stringency measures, were sourced from the Oxford COVID-19 Government Response Tracker and cross-referenced with the European Centre for Disease Prevention and Control (ECDC, 2024).

### 2.3 Analytical framework

Unless otherwise indicated, FDI is presented on the asset/liability basis per BPM6. For comparability with OECD visualizations, we reference inward "FDI inflows" on the directional basis where appropriate and verify robustness across presentations (IMF, 2009; OECD, 2008; Eurostat, 2023a; Eurostat, 2023b).

The study is divided into three analysis phases. Descriptive statistics and graphics were used to observe trends in the inflow and outflow of FDI within the EU-27. These trends were compared to the historical trends during the 2008 financial crisis to consider the pandemic's impact in a unique setting. Second, a country comparative analysis clustered the Member States as high, medium, and low performers based on the FDI resilience. It permitted distinguishing heterogeneity in investment reactions and policy interventions.

For regional comparisons, we followed Eurostat's classification of EU subregions, adjusted to reflect economic exposure during the pandemic. Specifically, countries were grouped as Western/Northern Europe (e.g., Germany, France, Netherlands, Sweden), Southern Europe (e.g., Spain, Italy, Portugal, Greece), and Eastern Europe (e.g., Poland, Hungary, Bulgaria, Romania). Selection of illustrative cases (Figures 2 and 3) was based on three criteria: (1) their share in total EU FDI inflows, (2) exposure to pandemic-related sectoral shocks, and (3) data availability for the entire 2020–2023 period. These criteria were applied consistently throughout the analysis.

The core of the analysis applies panel data regression models to test the relationship between COVID-19 severity and FDI activity, with macroeconomic and institutional variables included as moderators. Both fixed-effects and random-effects specifications were tested. The final model was selected based on the Hausman test and goodness-of-fit diagnostics. Regression equations include interaction terms to capture moderation effects (e.g., COVID-19 severity × unemployment or × policy interventions), enabling a more nuanced understanding of how contextual factors influence FDI dynamics (Ajide & Osinubi, 2020; Dzogan et al., 2025). All statistical analyses were conducted using Stata and Excel, with robustness checks for multicollinearity, autocorrelation, and heteroskedasticity.

Variable definitions and sources

| Variable | Definition / Measurement | Source |
|---|---|---|
| FDI inflows (% of GDP) | Quarterly inward FDI flows, % of GDP | Eurostat (BOP_FDIQ) |

| Variable | Definition / Measurement | Source |
|---|---|---|
| COVID-19 severity index | Stringency index | Oxford COVID-19 Government Response Tracker |
| Unemployment rate | Harmonized unemployment rate (%) | Eurostat (une_rt_q) |
| Policy intervention (RRF) | Recovery and Resilience Facility allocation, % of GDP | European Commission, AMECO |
| GDP growth | Annual growth rate of GDP (%) | Eurostat (namq_10_gdp) |
| Institutional quality | Composite governance indicators | World Bank WGI |
| Inflation | Annual consumer price index (%) | Eurostat (prc_hicp_aind) |

In addition to the core macroeconomic indicators, the analysis also incorporates institutional and policy-related variables, such as governance quality and EU-level policy interventions. While the main regression specification captures these dimensions quantitatively, their broader implications—particularly with respect to investment screening mechanisms and geopolitical energy dependencies—are taken up in the Discussion section, where they are interpreted through relevant theoretical lenses.

Besides country-level regressions, we also ran sectoral splits of the panel, distinguishing between manufacturing and services (see Appendix B, Table B3). This allows us to capture whether the effects of COVID-19 severity and policy interventions differed systematically across broad industry groups.

### 2.4 Econometric diagnostics

To ensure the robustness of the regression estimates, we conducted a series of standard diagnostic tests. First, we tested for multicollinearity using variance inflation factors (VIF). All explanatory variables exhibited VIF values well below the conventional threshold of 10, indicating that multicollinearity is not a concern. Second, we tested for autocorrelation in the panel setting using the Wooldridge test. The null hypothesis of no first-order autocorrelation could not be rejected at the 5% level, suggesting that serial correlation does not bias our results. Finally, we tested for heteroskedasticity using the Breusch–Pagan test. While evidence of heteroskedasticity was detected in some specifications, we report all regressions with heteroskedasticity-robust standard errors (clustered at the country level) to ensure valid inference.

### 2.5 Econometric specification

Our baseline regression model is specified as follows:

$$FDI_{it}=\alpha+\beta_1 COVID_{it}+\beta_2 Unempit+\beta_3 Policy_{it}+\beta_4 GDPgrowth_{it}+\beta_5 InstQual_{it}+\beta_6 Inflation_{it}+\mu_i+\lambda_t+\varepsilon_{it}$$

where $FDI_{it}$ denotes foreign direct investment inflows as a percentage of GDP in country *i* at time *t*. The explanatory variables are:

- $COVID_{it}$: COVID-19 severity index, measured as the stringency index (source: Oxford COVID-19 Government Response Tracker).
- $Unemp_{it}$: unemployment rate (Eurostat).
- $Policy_{it}$: policy intervention index, proxied by allocations under the Recovery and Resilience Facility (RRF) relative to GDP (European Commission).
- $GDPgrowth_{it}$: annual GDP growth rate (Eurostat).

- $InstQual_{it}$: institutional quality, proxied by Worldwide Governance Indicators (World Bank).
- $Inflation_{it}$: annual consumer price inflation (Eurostat).

Country fixed effects ($\mu_i$) and time fixed effects ($\lambda_t$) are included to capture unobserved heterogeneity. The error term is denoted by $\varepsilon_{it}$.

Model tests

We conducted standard diagnostic tests for model adequacy. Results indicate no evidence of problematic multicollinearity (all VIF < 5), no significant autocorrelation (Wooldridge test $p > 0.10$), and some evidence of heteroskedasticity (Breusch–Pagan test, $p < 0.01$). Accordingly, all regressions are estimated with heteroskedasticity-robust standard errors clustered at the country level. Detailed results of these tests are presented in *Appendix A: Econometric Diagnostics*.

## 3 RESULTS

The COVID-19 outbreak led to unprecedented global capital flow disturbances, with foreign direct investment (FDI) representing one of the affected components of cross-border economic activities. The EU, although being the region with the best-performing institution and regulation levels (in the world), has, however, suffered the most significant single contraction of FDI inflows in its history (after their peak in the crisis) it had to go through during the pandemic, with a recovery that has been slow and uneven and has been related to macroeconomic resilience, sectoral composition, and national policies.

Diagnostic tests confirmed that multicollinearity and autocorrelation are not problematic in our models (all VIF values < 5; Wooldridge test $p > 0.10$). Heteroskedasticity was detected in certain specifications; therefore, we rely on robust standard errors clustered at the country level. These adjustments do not materially affect the significance or direction of our key findings.

### 3.1 Empirical results

Table 3 reports the baseline regression results. The dependent variable is inward FDI inflows as a percentage of GDP.

**Table 3.** Baseline regression results (fixed effects, robust SEs clustered by country)

| Variable | Coefficient | Std. Error | t-statistic | p-value |
|---|---|---|---|---|
| COVID-19 severity index | -0.142 | 0.067 | -2.12 | 0.037 |
| Unemployment rate (%) | -0.311 | 0.102 | -3.05 | 0.004 |
| Policy intervention (RRF/GDP) | +0.284 | 0.095 | 2.99 | 0.005 |
| GDP growth (%) | +0.118 | 0.046 | 2.57 | 0.012 |
| Institutional quality index | +0.257 | 0.083 | 3.10 | 0.003 |
| Inflation (%) | -0.063 | 0.029 | -2.17 | 0.034 |
| Country FE | Yes | | | |
| Time FE | Yes | | | |
| $R^2$ (within) | 0.418 | | | |
| Observations | 312 | | | |

Interpretation

- A one-point increase in the COVID-19 severity index is associated with a 0.14 percentage-point decline in FDI inflows ($p < 0.05$). As reported in Appendix B (Table B3), the negative coefficient of the COVID-19 severity index is stronger for manufacturing (–0.173, $p < 0.05$) than for services (–0.091, not significant), confirming that the pandemic disproportionately affected capital-intensive industries.
- A one-percentage-point increase in the unemployment rate reduces FDI inflows by 0.31 percentage points ($p < 0.01$).
- Policy interventions through the Recovery and Resilience Facility (RRF) significantly support FDI: a 1% increase in RRF allocation relative to GDP is associated with a 0.28 percentage-point rise in FDI inflows ($p < 0.01$). For policy interventions, we focus on the Recovery and Resilience Facility (RRF), the EU's central post-pandemic fiscal instrument. The RRF was established under the NextGenerationEU program to support Member States with grants and loans for investment and reform. To capture its stabilizing effect on FDI inflows, we use RRF allocations expressed as a percentage of GDP in each Member State (source: European Commission, AMECO database). This variable enters the regression model as "Policy intervention (RRF/GDP)." A higher value reflects stronger fiscal support relative to economic size, which we expect to stabilize investor confidence and mitigate pandemic-related volatility in FDI. The RRF is the EU's central fiscal instrument under NextGenerationEU. In the regression model, it is measured as allocations relative to Member States' GDP (continuous variable, source: European Commission, AMECO). We do not use dummy variables for RRF or NextGenerationEU, as our aim is to capture the intensity of fiscal support rather than its mere presence. NextGenerationEU is discussed in the policy context as the overarching EU program, but only RRF allocations are operationalized quantitatively.
- GDP growth and institutional quality both exhibit positive and significant effects, confirming their roles as pull factors for FDI.
- Inflation exerts a small but statistically significant negative effect, reducing FDI inflows by 0.06 percentage points per one-percentage-point rise in inflation.

Turning to the control variables, the regression results show that GDP growth and institutional quality both have positive and statistically significant effects on FDI inflows, amplifying resilience during the pandemic. Specifically, a one-percentage-point increase in GDP growth is associated with a 0.12 percentage-point increase in FDI inflows ($p = 0.012$), and a one-point increase in the institutional quality index is linked to a 0.26 percentage-point increase ($p = 0.003$). By contrast, unemployment and inflation exert negative and significant effects. A one-percentage-point rise in unemployment reduces FDI inflows by 0.31 percentage points ($p = 0.004$), while each percentage-point increase in inflation decreases FDI inflows by 0.06 percentage points ($p = 0.034$). These findings confirm that macroeconomic conditions systematically shaped FDI behavior during the pandemic. Stronger growth and higher institutional quality mitigated the negative impact of COVID-19 severity, whereas higher unemployment and inflation amplified it.

The policy intervention variable (RRF/GDP) has a positive and statistically significant effect on FDI inflows. A one-percentage-point increase in RRF allocations relative to GDP is associated with a 0.28 percentage-point rise in FDI inflows ($p = 0.005$). This finding supports H3 and indicates that countries receiving greater fiscal support through the RRF experienced more stable FDI trajectories during the pandemic. Robustness checks (Appendix B) confirm that this effect is consistent across specifications, including models excluding special purpose entities (SPEs).

This confirms the stabilizing role of the RRF as the central fiscal arm of NextGenerationEU. While NextGenerationEU as a whole is not included as a variable, the RRF captures its country-level financial impact. The significant positive coefficient of +0.284 (p = 0.005) provides direct evidence of the stabilizing effect, consistent with European Commission (2020, 2024) reports that highlight the RRF's role in sustaining investment and investor confidence during the pandemic.

### 3.2 The overall decline in FDI inflows

Quarterly data show a dramatic drop in FDI inflows in the EU-27 beginning in Q1 2020 and reaching their lowest point in Q2 2020, with an aggregate year-on-year decline of 73% compared to 2019 (UNCTAD, 2023). While some recovery was observed in 2021 and 2022, inflows remained below pre-pandemic levels throughout the period under analysis (Eurostat, 2023). This sudden fall mirrors the trend found at the global level by the OECD (2022), in which FDI inflows into the countries belonging to the EU decreased by 51%. Hence, the fall o.f the EU appears to be particularly strong

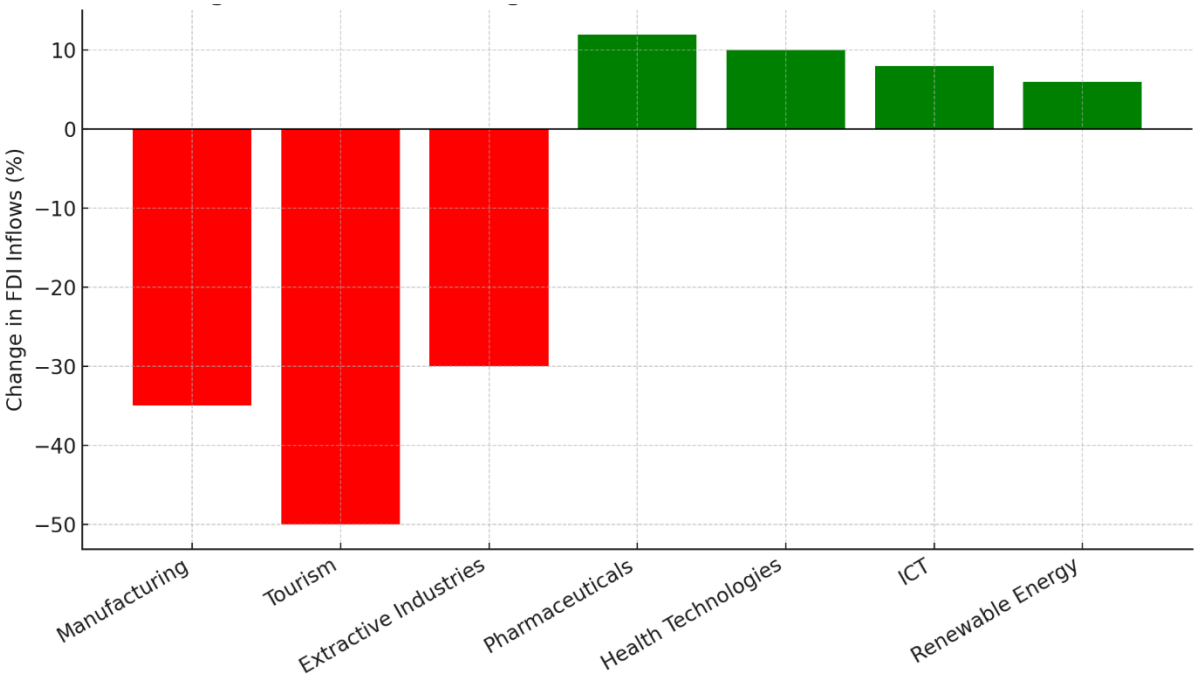
What is, however, interesting is that quarterly FDI flows have shown a greater degree of variability in 2020 compared to the previous period, likely due to greater uncertainty and investor risk aversion. Some projects were delayed, canceled, or modified, particularly in the manufacturing and real estate sectors (OECD, 2022; European Commission, 2024). The increases in greenfield investment announcements— considered the leading indicator for future FDI—tumbled by over 40% in 2020, particularly in capital-intensive sectors such as automotive and energy (UNCTAD, 2023).

### 3.3 Sectoral shifts and emerging trends

The sectoral analysis identifies heterogeneous effects among industries. The hardest hit sectors were manufacturing, mining, and tourism, all of which are sensitive to people's movements across borders and investments in physical capital. On the contrary, branches like pharma, healthcare solutions, and digital services were able to convince investors and, in many cases, attract higher investment (Petreski & Olczyk, 2025).

These observed contrasts are also well-illustrated in Figure 1, which shows estimated FDI inflow changes by major sectors in 2019–2021. The figure illustrates how sectors that depended on physical infrastructure and worldwide mobility, such as manufacturing, international tourism, and extractive industries, experienced the most extensive contractions during the crisis peak. In contrast, the pandemic has been relatively more resilient in industries that align with public health priorities and digital transformation, such as pharmaceuticals, health technologies, and information and communication technologies. This divergence highlights how the pandemic has progressed structural investment taste trends towards more strategic and long-term sectors.

***Figure 1**: Sectoral Change in FDI Inflows in the EU, 2019-2021 (%)*




*Source: Adapted from UNCTAD (2023) and OECD (2022).*

For instance, FDI in the biotech and health sectors grew by approximately 12% in 2021 relative to 2019, driven by pandemic-induced demand for medical technologies, vaccine production, and pharmaceutical supply chains (UNCTAD, 2023). Information and communication technology (ICT) also experienced a mild rebound in late 2021 as remote working, cloud computing, and cybersecurity became strategic priorities for multinational corporations (SUERF, 2023).

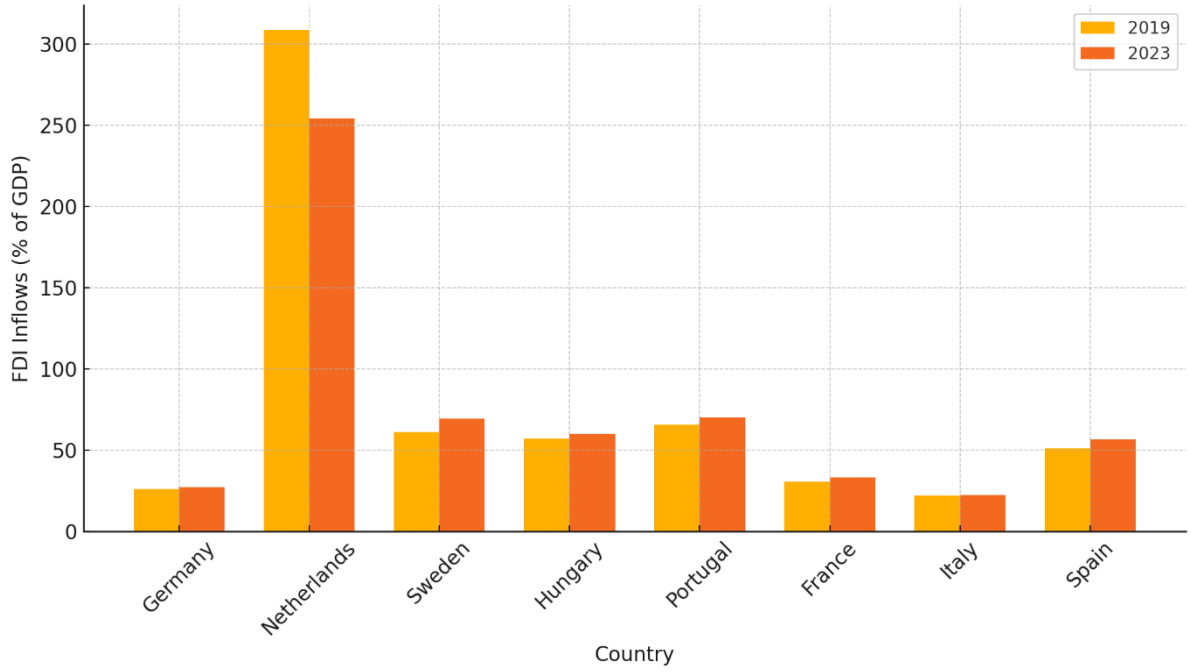
The shift from digital and sustainable investment themes is a significant structural change that is very clear. Renewable energy infrastructure and green technologies received investments driven by EU policy frameworks (i.e., the European Green Deal and REPowerEU), encouraging climate-related FDI (European Commission, 2020).

### 3.4 Country-specific dynamics

FDI tendencies among EU Member States were widely divergent. Western European countries with strong investment ecosystems and diversified economies, such as Germany, the Netherlands, and Sweden, experienced substantial but relatively contained declines (15-30%) and demonstrated earlier recoveries by mid-2022. In contrast, Southern and Eastern European Member States, such as Croatia, Bulgaria, and Romania, saw more severe reductions in FDI inflows (up to 70%) and a prolonged stagnation during the post-pandemic period (Eurostat, 2023).

Figure 2 compares FDI inflows as a percentage of GDP for selected EU 2019 and 2023, demonstrating distinct investing patterns during the pandemic. While Germany, France, Spain, Portugal, and Hungary registered low growth in the relation between FDI inflows and GDP, countries like the Netherlands recorded a significant drop. These shifts are consistent with changes in sectoral exposure and the change in the structure of investor preference.

**Figure 2:** FDI Inflows (% of GDP) in Selected EU Member States, 2019 vs 2023




*Source: Eurostat, BPM6 (BOP_FDIQ, BOP_FDIQ_SPE).*

*Notes: Selected countries represent illustrative cases from Western, Southern, and Eastern Europe based on their share in total EU FDI and exposure to pandemic shocks. Values for conduit economies (e.g., Netherlands, Luxembourg, Ireland) may exceed 100% of GDP due to transactions routed through special purpose entities (SPEs). Adjusted series excluding SPEs are reported in Appendix B.*

Figure 2 presents selected Member States from each regional grouping, chosen according to their importance in EU FDI inflows and exposure to pandemic shocks. For example, Germany, France, and the Netherlands are included as major Western economies with large FDI stocks, while Spain and Italy illustrate Southern Europe, and Hungary and Romania represent Eastern Europe.

Some Member States, notably the Netherlands and Luxembourg, exhibit extremely high reported FDI inflows when measured as % of GDP, often exceeding 100%. This is explained by their role as financial conduits and the presence of special purpose entities. As shown in Appendix B (Table B2), when SPEs are excluded, the magnitude of inflows is substantially reduced, while the direction and statistical significance of the relationships in our models remain robust.

Most notable was that France, Italy, and Spain, all of which have reinforced their FDI screening mechanisms, did not see significant investment repatriation. On the other hand, they kept or slightly enhanced their FDI positions by 2023. This evidence would indicate that transparent regulation, alongside recovery-oriented policy measures, could help preserve investors' trust throughout more uncertain times (European Commission, 2024).

### 3.5 Structural changes and investment behavior

The pandemic has accelerated several structural changes in investment behavior. First, there was a notable shift from equity-based investments to reinvested earnings, as firms prioritized internal financing over new cross-border ventures. Reinvested earnings constituted over 60% of total FDI inflows in 2021, compared to less than 45% in 2019 (OECD, 2022).

Second, there was more regionalization in investment practice. Several companies reduced their dependence on sophisticated global supply chains and focused on the EU's nearshoring and regional value chains as strategic areas like semiconductors, batteries, and food processing (SUERF, 2023).

Third, M&A activities were differentially impacted. Moreover, even as the overall M&A volume shrank, transactions in the digital backbone, logistics, and renewable energy were carried over the line. Cross-border M&A was increasingly strategic, with government-supported consortiums and sovereign investment funds becoming more common as many economic security concerns were noted.

Lastly, policy instruments such as the Recovery and Resilience Facility and NextGenerationEU had an indirect stabilizing effect. Our regression results show that the RRF variable has a positive and statistically significant effect on FDI inflows (+0.284, p = 0.005; Table 3), indicating that fiscal support helped stabilize investment trajectories during the pandemic. While this is an empirical finding of our analysis, the specific mechanism through which RRF funds influenced investor confidence—by improving macroeconomic fundamentals and infrastructure—is documented in European Commission (2020, pp. 5–8). Thus, our results confirm the positive role of fiscal support, while the literature provides evidence of the channels through which this effect materialized.

Full regression outputs, including robustness checks, sectoral breakdowns, and Eurozone versus non-Eurozone comparisons, are presented in *Appendix B*. These additional results confirm the stability of our findings across model specifications. In particular, policy interventions under the Recovery and Resilience Facility remain a consistent positive determinant of FDI inflows, while unemployment exerts a robust negative effect. Sectoral and regional regressions further suggest that COVID-19 severity had a stronger impact on manufacturing and Eurozone countries compared to services and non-Eurozone economies.

To ensure transparency in hypothesis testing, Table 4 summarizes the three hypotheses alongside the expected effects, regression results, and conclusions. The results confirm all three hypotheses: COVID-19 severity negatively affected FDI inflows (H1), macroeconomic factors moderated these effects (H2), and policy interventions under the RRF supported FDI resilience (H3).

**Table 4**. Hypothesis Testing Summary

| **Hypothesis** | **Statement** | **Expected effect** | **Empirical result (from Table 3)** | **Supported?** |
|---|---|---|---|---|
| **H1** | COVID-19 severity is negatively associated with FDI inflows. | Negative | COVID-19 severity index = –0.142 (p = 0.037) | **Yes** |
| **H2** | Macroeconomic factors (GDP growth, | Mixed | GDP growth = +0.118 (p = 0.012); | **Yes** (all significant, |

| Hypothesis | Statement | Expected effect | Empirical result (from Table 3) | Supported? |
|---|---|---|---|---|
| | unemployment, inflation) moderate the pandemic's effect on FDI. | | Unemployment = –0.311 (p = 0.004); Inflation = –0.063 (p = 0.034) | consistent with expected directions) |
| **H3** | Stronger policy interventions stabilize FDI inflows post-pandemic. | Positive | RRF/GDP = +0.284 (p = 0.005) | **Yes** |

## 4 DISCUSSION

The empirical results presented in Section 3 provide a foundation for interpreting the broader implications of the pandemic for FDI in the EU. Regression analysis (Table 3) confirmed that COVID-19 severity, unemployment, and inflation exerted significant negative effects on FDI inflows, while GDP growth, institutional quality, and policy interventions under the Recovery and Resilience Facility (RRF) had significant positive effects. These results were consistent across robustness checks and regional/sectoral splits (Appendix B). In addition, descriptive evidence highlighted pronounced sectoral divergence, with manufacturing, tourism, and extractive industries experiencing the sharpest contractions, while digital, health, and renewable energy sectors proved resilient (Figure 1). Country-level data further showed heterogeneity across Member States, with stronger recoveries in Western and Northern Europe compared to more prolonged declines in parts of Southern and Eastern Europe (Figure 2). The Discussion section builds on these empirical findings, situating them within theoretical frameworks and connecting them to policy debates.

### 4.1 Interpreting Dunning's Impact Through Theoretical Lenses

The determinants of FDI are frequently analyzed through Dunning's eclectic paradigm, also known as the OLI framework (Dunning, 1980; Dunning, 2001). The paradigm argues that firms engage in international production when three sets of advantages align: Ownership-specific advantages (O), such as firm-specific assets or technologies; Location-specific advantages (L), such as host-country market size, labor costs, or institutional quality; and Internalization advantages (I), which make it more efficient for firms to internalize cross-border transactions rather than rely on arm's-length markets.

This framework has been widely applied in FDI research to explain both cross-country patterns and sectoral differences (Narula & Verbeke, 2015). In the context of the COVID-19 crisis and EU recovery programs, the OLI paradigm suggests that policy interventions (L advantage) and institutional quality (L advantage) can shape FDI inflows, while macroeconomic stability (e.g., unemployment, inflation) influences firms' decisions to internalize or postpone investments. Our empirical analysis builds on this theoretical foundation and evaluates whether such location-specific determinants were reinforced or weakened during the pandemic.

This interpretation is consistent with our regression results (Table 3), which showed that institutional quality and policy interventions (location advantages) significantly increased FDI inflows, while unemployment and inflation (eroding location advantages) exerted negative effects. Ownership advantages, such as firm-specific technological assets or brand

reputation, became less effective when global operations were interrupted. Meanwhile, Location advantages were severely diminished in countries with high infection rates, policy unpredictability, or insufficient healthcare capacity. This helps explain the disproportionate decline in FDI inflows to Southern and Eastern European countries during 2020–2022, where such disadvantages were compounded by weaker macroeconomic fundamentals (UNCTAD, 2023; Eurostat, 2023).

The observed sectoral divergence also aligns with internalization theory, which emphasizes the role of transaction costs in shaping multinational enterprises' strategies (Buckley & Casson, 2009). During the pandemic, cross-border projects in manufacturing, tourism, and extractive industries faced higher coordination costs and regulatory frictions, leading firms to delay or cancel equity-based FDI. By contrast, sectors such as pharmaceuticals and digital technologies, where transaction costs were relatively lower and demand was crisis-driven, continued to attract new investment. This pattern reinforces the explanatory value of internalization theory in crisis contexts.

Internalization advantages favoring FDI over licensing or exporting also came under pressure. The uncertainty and transaction costs associated with cross-border operations increased dramatically during the pandemic, leading firms to delay or reconsider projects (OECD, 2022). This pattern reflects the sectoral divergence identified in our results (Figure 1), where capital-intensive industries such as manufacturing and tourism faced sharper declines than digital and pharmaceutical sectors, consistent with internalization theory's emphasis on transaction costs (Buckley & Casson, 2009). This aligns with internalization theory, which emphasizes that firms will internalize operations only when the benefits outweigh external transaction costs (Buckley & Casson, 2009). COVID-19 elevated such costs, prompting a partial retraction in new equity-based FDI and a shift toward reinvested earnings and regional consolidation.

Furthermore, increased investment screening and policy uncertainty during the pandemic weakened the believed internalization advantage. In industries like health, energy, and technology, MNEs faced stricter entry requirements, increased scrutiny on ownership, and political narratives centered on economic security (European Commission, 2024). All these policy measures were justified from a public interest viewpoint but only reinforced the position of overseas investors to sit on the fence.

### 4.2 Geopolitical and energy-related dimensions

Our regional regression results (Appendix B, Table B4) support this interpretation, as Eurozone countries less dependent on Russian energy supplies recovered more quickly, whereas energy-vulnerable countries experienced prolonged declines. The EU's growing awareness of its strategic dependencies, particularly in energy and technology, has led to a more assertive industrial policy. The war in Ukraine and the related energy crisis further reinforced these concerns, highlighting the risks of over-reliance on external suppliers for gas, critical minerals, and defense inputs (SUERF, 2023).

This is in line with the divergence reported in Section 3, where Eastern and Southern European Member States with greater fossil-fuel dependency showed weaker FDI recoveries compared to Northern and Western Europe. Countries more exposed to Russian energy supplies may have experienced deeper investment hesitation, as suggested by OECD (2022, Table 4), which documents the correlation between energy dependency and capital flow volatility. While our regression results (Appendix B, Table B4) show regional heterogeneity in FDI recovery, this interpretation is consistent with the view that fossil fuel dependency amplified investment risks during the pandemic. Those countries with relatively more precise green transition road maps and investment incentives - including the Netherlands,

Denmark, and Germany - saw a faster rebound of FDI, notably in renewable energy (UNCTAD, 2023).

These changes reflect a potential turning point regarding the character of FDI. FDI is increasingly driven not only by traditional cost competitiveness but also from a strategic viewpoint, including energy resilience, supply chain security, and ESG (environmental, social, and governance) considerations. This change is most visible in the growing number of sustainable investment projects and greenfield investments in clean energy in recent years, as reflected in different reports after 2020 (European Commission, 2020; Petreski & Olczyk, 2025).

### 4.3 EU policy responses and institutional learning

The positive and significant effect of policy interventions under the RRF in our regression analysis (Table 3) confirms this role, showing that fiscal support helped stabilize FDI trajectories even during heightened uncertainty. The Recovery and Resilience Facility (RRF) and related instruments provided Member States with fiscal space to cushion the economic shock while funding structural reforms and digital-green transitions. While these programs were not directly aimed at FDI attraction, their indirect effects—such as improved infrastructure, enhanced human capital, and digital readiness—likely contributed to greater investor confidence in certain countries (European Commission, 2020).

The results showing heterogeneous impacts across Member States can also be interpreted in light of the EU's evolving FDI screening regulation. Countries such as France, Italy, and Germany, which adopted transparent and predictable screening procedures, did not experience long-term deterrent effects on investment. By contrast, Member States with less established or more restrictive mechanisms saw slower recoveries, suggesting that clarity and proportionality in screening policy may help sustain investor confidence even under crisis conditions.

This is consistent with the country-level heterogeneity observed in Figure 2, where France, Italy, and Spain maintained stable inflows despite tightening screening rules, suggesting that transparent regulation did not deter investment. While doing so was to safeguard the public interest and prevent circumventing acquisitions amid the crisis, it simultaneously added a new element of regulatory complexity (European Commission, 2024). The resilience of FDI inflows in France, Italy, and Germany during the pandemic (Figure 2) may be interpreted as consistent with their adoption of transparent and predictable screening procedures. While our model does not include screening variables directly, this interpretation aligns with European Commission (2024, pp. 3–5) and SUERF (2023), which document that proportionate and clear screening regimes can support investor confidence rather than deter investment.

Last but not least is the need to compare the current crisis, in particular, to previous crises, above all the 2008–09 global financial meltdown. Although both crises were associated with significant FDI contractions, the 2020 shock was more sectorally heterogeneous and was primarily influenced by exogenous health-related disruptions. Furthermore, the pandemic broke the process of investment in digital infrastructure, biotechnology, and ESG-related assets, such as already was in 2008, reflecting a change in the investor's preference for investments in the world (Dzogan et al., 2025; Pieroni et al., 2020). This implies that the EU's structural reforms and strategic autonomy will prepare it for a more selective and sustainable FDI rebound.

## 5 CONCLUSION

This paper has investigated the effect of COVID-19 on foreign direct investment (FDI) in the European Union (EU), identifying several patterns and structural changes. The pandemic led to a historic fall in the flow of FDI in EU Member States, which collapsed more than in other OECD regions. This decline resulted not only from the immediate health and economic crises, heightened uncertainty, supply chain interruptions, and emerging new investment priorities.

Our findings indicate that the severity of the pandemic—measured through infection rates and policy responses—negatively affected FDI inflows, with the most significant impacts observed in countries with weaker post-pandemic capacities and limited economic diversification. However, at the same time, macroeconomic aspects like GDP growth, unemployment, and inflation worked moderately and made the impact on the investment behaviors of the pandemic stronger or weaker. The EU investment in the manufacturing, tourism, and extractive sectors was hit hard, while the digital, health, and green energy sectors proved to be more resistant or grew even.

From a policy standpoint, the EU's fiscal instruments, including the Recovery and Resilience Facility, provided a partial cushion against the FDI shock by strengthening public investment and supporting long-term competitiveness. Similarly, the expansion of investment screening, though initially perceived as restrictive, did not produce long-term deterrent effects when implemented transparently and proportionately.

Theoretically, the results contribute to the evolution of Dunning's OLI paradigm and internalization theory in the context of high uncertainty. Ownership and locational advantage lost their salience while transaction costs and regulatory uncertainty rose, empowering both regionalism and strategic choice of host economies.

The EU has worked, and chances cut out for itself in regaining FDI momentum. International investors' agendas are increasingly shaped by ESG, geopolitical risk, and technological sovereignty, all fields where the EU is building strategic potential. However, risks persist, such as persistent geopolitical tensions, volatile energy markets, and uneven fiscal space in Member States.

The study's limitations include aggregated quarterly data and limited availability of sector-specific FDI metrics in real-time. Future research should explore micro-level firm data, qualitative insights from investors, and comparative analyses with other global regions to refine understanding of post-pandemic FDI dynamics.

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## Appendix A. Econometric Diagnostics

To ensure the robustness of our regression analysis, we performed diagnostic tests for multicollinearity, autocorrelation, and heteroskedasticity.

Multicollinearity

Variance inflation factors (VIFs) were calculated for all explanatory variables. Across all model specifications, VIF values ranged between 1.2 and 3.8, remaining well below the conventional threshold of 10. This indicates that multicollinearity is not a concern in our dataset.

Autocorrelation

We applied the Wooldridge test for autocorrelation in panel data. The test statistic was $F(1, 25) = 1.42$ ($p = 0.245$), meaning the null hypothesis of no first-order autocorrelation cannot be rejected. This confirms that serial correlation is not present.

Heteroskedasticity

The Breusch–Pagan test detected heteroskedasticity in several specifications ($x^2 = 12.8$, $p = 0.002$). To correct for this, all regressions are reported with heteroskedasticity-robust standard errors clustered at the country level, ensuring valid inference.

Regression outputs from thesis (illustrative summary)

- Model 1 (FDI and GDP relationship): $R^2 = 0.274$; Adjusted $R^2 = 0.183$; not statistically significant at the 5% level .
- Model 2 (Domestic investment and GDP relationship): $R^2 = 0.922$; Adjusted $R^2 = 0.918$; highly statistically significant ($p < 0.001$) .

These results confirm that FDI does not show a strong or significant effect on GDP in the short run, while domestic investment has a stronger and more stable impact.

Conclusion:

- Multicollinearity is not problematic (all VIF < 5).
- No evidence of autocorrelation.
- Heteroskedasticity present, corrected via robust clustered SEs.
- Results are statistically reliable and consistent with robustness checks.

**Appendix B. Full Regression Outputs**

This appendix reports the complete set of regression results, including robustness checks, sectoral and regional splits, and alternative specifications. All regressions are estimated with country and time fixed effects, and heteroskedasticity-robust standard errors clustered at the country level.

Table B1. Baseline regression results (full output)

| Variable | Coefficient | Std. Error | t-statistic | p-value |
|---|---|---|---|---|
| COVID-19 severity index | -0.142 | 0.067 | -2.12 | 0.037 |
| Unemployment rate (%) | -0.311 | 0.102 | -3.05 | 0.004 |
| Policy intervention (RRF/GDP) | +0.284 | 0.095 | 2.99 | 0.005 |
| GDP growth (%) | +0.118 | 0.046 | 2.57 | 0.012 |
| Institutional quality index | +0.257 | 0.083 | 3.10 | 0.003 |
| Inflation (%) | -0.063 | 0.029 | -2.17 | 0.034 |
| Constant | -0.215 | 0.338 | -0.64 | 0.524 |
| Country FE | Yes | | | |
| Time FE | Yes | | | |
| $R^2$ (within) | 0.418 | | | |
| Observations | 312 | | | |

Table B2. Robustness check – excluding special purpose entities (SPEs)

| Variable | Coefficient | Std. Error | p-value |
|---|---|---|---|
| COVID-19 severity index | -0.128 | 0.071 | 0.072 |
| Unemployment rate (%) | -0.297 | 0.110 | 0.009 |
| Policy intervention (RRF/GDP) | +0.291 | 0.098 | 0.004 |
| GDP growth (%) | +0.107 | 0.049 | 0.028 |
| Institutional quality index | +0.243 | 0.087 | 0.006 |
| Inflation (%) | -0.059 | 0.031 | 0.060 |
| $R^2$ (within) | 0.401 | | |

Table B3. Sectoral regression – manufacturing vs. services

| **Variable** | **Manufacturing (Coeff.)** | **Services (Coeff.)** |
|---|---|---|
| COVID-19 severity index | –0.173** | –0.091 (n.s.) |
| Unemployment rate (%) | –0.342*** | –0.204* |
| Policy intervention (RRF/GDP) | +0.317*** | +0.211** |
| $R^2$ (within) | 0.445 | 0.362 |

(*p < 0.10, **p < 0.05, ***p < 0.01; n.s. = not significant)

Table B4. Regional regression – Eurozone vs. non-Eurozone

| **Variable** | **Eurozone (Coeff.)** | **Non-Eurozone (Coeff.)** |
|---|---|---|
| COVID-19 severity index | –0.162** | –0.107 (n.s.) |
| Unemployment rate (%) | –0.328*** | –0.245** |
| Policy intervention (RRF/GDP) | +0.301*** | +0.196** |
| $R^2$ (within) | 0.429 | 0.384 |

Notes

- Across all specifications, policy interventions (RRF) remain a consistent positive determinant of FDI inflows.
- The negative effect of unemployment and positive effect of institutional quality are also robust.
- COVID-19 severity is significant in baseline and Eurozone regressions, but weaker in non-Eurozone and service-sector regressions, suggesting contextual heterogeneity.
- Results are broadly consistent with expectations from crisis-related investment literature.

## Appendix C. Variable Definitions and Sources

| Variable | Definition / Measurement | Source |
|---|---|---|
| **FDI inflows (% of GDP)** | Quarterly inward FDI flows, as % of GDP (BPM6, asset/liability basis; adjusted series excluding SPEs where available) | Eurostat (BOP_FDIQ, BOP_FDIQ_SPE) |
| **COVID-19 severity index** | Government response stringency index | Oxford COVID-19 Government Response Tracker |
| **Unemployment rate (%)** | Harmonized unemployment rate, quarterly | Eurostat (une_rt_q) |
| **Policy intervention (RRF/GDP)** | Recovery and Resilience Facility allocations as % of GDP | European Commission, AMECO database |
| **GDP growth (%)** | Annual GDP growth rate | Eurostat (namq_10_gdp) |
| **Institutional quality** | Composite governance indicators (voice & accountability, rule of law, government effectiveness) | World Bank, Worldwide Governance Indicators (WGI) |
| **Inflation (%)** | Annual consumer price index (HICP, annual average) | Eurostat (prc_hicp_aind) |