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Impact of Fiscal Policies on Unemployment in Economic Shock Conditions: Panel Data Analysis

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Abstract

This paper examines the impact of fiscal policy responses on unemployment across EU countries from 2019 to 2024, a period marked by the COVID-19 pandemic as a shock event. A detailed monthly panel data set is used in this study, employing a fixed-effects estimation model with government spending, revenue, and debt as core variables, along with the COVID-19 dummy as a control variable. The findings reveal a strong association between government spending and revenue in reducing unemployment, aligned with countercyclical fiscal policy support. Conversely, increasing government debt is strongly linked to higher unemployment, indicating a risk of excessive borrowing that could hinder future labor market recovery. Moreover, uncertain external economic conditions, such as the COVID-19 pandemic, have further intensified labor market distortions. Finally, the results highlight that fiscal policies can effectively mitigate unemployment in the short term; however, excessive debt may pose challenges to long-term fiscal sustainability. This study underscores the importance of well-structured and timely coordinated fiscal policy frameworks that promote employment stabilization, while ensuring long-term debt sustainability.

Keywords: fiscal policy; government debt-to-GDP; government spending; unemployment; COVID-19

JEL Classification: E62; J64; C33

1. Introduction

An exogenous shock, such as the COVID-19 pandemic, generates synchronized economic disruptions worldwide through labor market upheavals and restricted business activities (Ali et al., 2022; Casquilho-Martins & Belchior-Rocha, 2022). Unlike previous shocks, the outbreak of COVID-19 in early 2020 triggered multidimensional economic consequences, including sustained supply and demand distortions and record-high unemployment in EU member states (Codagnone et al., 2020; De vet et al., 2021; Herod et al., 2022). This unprecedented period saw nearly 255 million full-time jobs lost worldwide, according to the International Labor Organization (De Miquel et al., 2022). As a result, governments were compelled to enact large-scale fiscal responses, such as increased public spending, temporary tax relief, unemployment subsidies, wage support, and various debt-financed recovery plans. Against this backdrop, the primary aim of this study is to investigate how key direct government interventions in fiscal policy, specifically government spending, revenue, and debt, affect labor market dynamics during economic shocks

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like the COVID-19 pandemic (Benmelech & Tzur-Ilan, 2020; Barišić & Kovač, 2022; Hynes et al., 2020). Despite rising interest in the role of post-COVID-19 fiscal interventions in mitigating unemployment, research remains limited. The existing literature often uses lower-frequency data and assesses fiscal measures in isolation or across varied countries, missing the integrated effects of main fiscal indicators within the specific EU context. Since fiscal indicators function jointly within stabilization policy, this gap leaves high-frequency analysis of combined fiscal impacts on unemployment underexplored.

The main purpose of this study is to contribute to ongoing policy debates regarding the government's role in managing extreme economic shocks characterized by uncertainty, following monthly data from 2019 to 2024. Specifically, it explores whether a higher level of debt, spending, or revenue during economic shock conditions and subsequent recovery phases directly influences the unemployment rate or if it has indirect effects when it is hit by an uncertain and extreme economic shock like the COVID-19 pandemic. This study also contributes to seeking the long-term implications of debt accumulation in unemployment mitigation and its implications for unemployment mitigation in the long term under unprecedented economic disruption.

This study makes three main contributions. First, it examines monthly panel data from 26 EU countries (both Eurozone and non-Eurozone) from 2019 to 2024 to track how fiscal tools affect high-frequency changes in labor market dynamics. Second, it analyzes three direct fiscal instruments together: government spending, revenue, and debt-to-GDP, offering a broader view than studies focusing on just one element. Third, it covers the EU-26 in pre-, during-, and post-pandemic periods, linking unemployment mitigation to diverse fiscal capacities and policy objectives. The growing interest in understanding how post-COVID-19 labor market dynamics contribute to unemployment mitigation through government intervention remains largely unexplored. Most of the existing literature relies on annual or quarterly data, which hinders the ability to capture rapid policy alignment. As a result, fiscal measures are often assessed in isolation rather than in an integrated framework. Furthermore, much of the existing literature is designed across heterogeneous country groupings rather than the European Union, where fiscal instruments are diversified according to time, scope, and institutional design. Furthermore, interaction among three major variables, government spending, government revenue, and government debt-to-GDP, is missing, which is important to maintain a comprehensive approach. Since fiscal policy measuring indicators are not isolated, they are an essential part of the combined economic stabilization policy framework. These limitations represent significant research gaps in assessing the combined and high-frequency fiscal impacts on unemployment under economic shock. The remainder of the paper is organized as follows. The first section of this paper will present the findings of the existing literature, incorporating fiscal policy stances and unemployment, mostly emphasizing the COVID-19 pandemic and post-pandemic periods, followed by a theoretical outline explaining the relation of government debt, spending, and revenues as a percentage of the GDP with fluctuations in the unemployment rates across the EU member states. Section 2 of this paper discusses the methodology and data, followed by empirical results, consisting of a detailed explanation of the preliminary test and estimation results in Section 3. Finally, the key contribution of this study, and its association with estimation results, is summarized with key insights for future research in Section 4.

2. Literature Review

Fiscal instruments have a significant impact on unemployment, not only through spending but also revenue-collecting measures, primarily tax cuts. Following the Keynesian framework, tax reduction can increase disposable income and consumption of goods and

services, enhance demand in labor markets, and therefore, create new jobs. Different empirical studies have confirmed that tax cuts can lower unemployment for a short time (Clemens & Veuger, 2020; Țibulcă, 2022). On the other hand, neoclassical and other supply-side frameworks have identified this stance as weakening fiscal sustainability, which, furthermore, erodes business confidence and generates unemployment. In this way, long-term tax cuts may potentially offset short-term benefits (Baines & Hager, 2021; Kose et al., 2023).

Most often, it is found that tax-based consolidation is determined to be less harmful than spending-oriented consolidation. Now, during the COVID-19 pandemic, several EU countries adopted temporary tax deferrals and revenue reliefs (Clemens & Veuger, 2020; Kollias & Paleologou, 2006; Țibulcă, 2022). But unfortunately, their comparative impact is still not in the light. This has enhanced the necessity for integrated analysis, which incorporates spending and revenue, both sides of fiscal policy, in the same framework.

Nowadays, debt sustainability has added another layer of complexity to the effectiveness of fiscal instruments (Baines & Hager, 2021; Bitner & Sierak, 2022; Briceño & Perote, 2020). While traditional neoclassical economists warned about the vulnerability of excessive government debt, which may impose restrictions on fiscal effectiveness through higher debt risk or institutional constraints in the form of crowding out private investment, hindering long-term growth, and causing labor market distortions (Bai et al., 2024; Kose et al., 2023; Roth et al., 2022). On one side, an increase in borrowing costs gradually weakens credibility; on the other hand, the recent literature shows evidence that fiscal expansion, under some of the significant conditions, can enhance stronger output than burden (Bai et al., 2024; Briceño & Perote, 2020; Roth et al., 2022). These varied and unresolved results create a need to specifically study the relationship between government debt and its contribution to unemployment under different shock conditions across various economic regimes.

An increased amount of research has focused on the impact of fiscal policies on different macroeconomic performances and has reached mixed conclusions in terms of unemployment dynamics. Considering theoretical perspectives, the relationship between fiscal instruments and unemployment dynamics is grounded in both Keynesian and neoclassical viewpoints. Moreover, the impact of fiscal responses in economic shock conditions has been more enriched since the time of the global financial crisis of 2008 and reflects that fiscal stances play a more significant role in recessions (economic shocks), rather than expansions (Jalles et al., 2024; Kohler & Stockhammer, 2022). Further, it was identified that without aggressive fiscal stances, it was quite difficult for advanced economies to deal with their unemployment. Fiscal stances play a buffering role in this regard, where they help to reduce or control unemployment to a certain extent, though they cannot dramatically prevent complete unemployment (Bökemeier & Wolski, 2022).

According to the broader evidence represented in the existing literature, fiscal policies have a significant contribution to unemployment (Akhmad et al., 2022; Haldar & Sethi, 2022; Kalkavan et al., 2021). The consistent findings from these empirical works represent how fiscal consolidation contributes to unemployment mitigation while expansionary measures boost the job market. However, their effects critically depend on the characteristics of different economic regimes, fiscal capacity, debt conditions, and different institutional frameworks (Akhmad et al., 2022; Casado et al., 2020). But still, the interaction between fiscal compositions and labor market dynamics is an issue of debate. This unresolved debate initiates the necessity of the present study on how fiscal initiatives contribute to unemployment mitigation with effective debt sustainability.

During the COVID-19 pandemic, debt-financed interventions have been accepted both politically and economically despite having the probable risk of normalization (where temporary measures may take quite a long time to exit), leading to higher deficits and

long-term unsustainable debt. This approach is a kind of fundamental shift in macroeconomic thought where the immediate necessity of labor market stabilization has been weighed against long-term sustainability (Baines & Hager, 2021; Kose et al., 2023). For example, during the COVID-19 pandemic, demand for unemployment benefits and different wage-supporting subsidies was at its peak at the same time, therefore, generating a probability of excessive debt burden due to not having an effective policy response on time. Moreover, another point of concern was that there is potential heterogeneity in fiscal policy management across the countries. It mainly depends on different structural conditions, like the labor market and institutional flexibility to handle fiscal adjustments based on the situation. For example, Nordic countries have robust welfare funds, which could go through a more reliable and generous fiscal transformation and, ultimately, could represent comparatively better labor market outcomes than the other countries during that period, while, on the other hand, southern European economies under a higher debt burden may result in trade-offs between expansion and fiscal adjustment tools. So, it clearly declares that fiscal effectiveness does not rely only on policy itself; rather, institutional and structural diversity play a vital role in its design (Bökemeier & Wolski, 2022; Bremer et al., 2024; Dougherty & De Biase, 2021).

In this study, the COVID-19 pandemic has been considered as a distinct shock period. During this period, the EU has experienced expansionary fiscal interventions, low interest rates, and disruptions in the labor market mechanisms (Bökemeier & Wolski, 2022; Echebarria Fernández, 2021). With a view to capturing the recent and immediate impacts, this literature review section has emphasized the reviews placed after 2020. This literature captures more recent institutional as well as financial transformations in response to the selected period for this paper.

The contribution of this paper to the existing literature is to fill the gap by incorporating government spending, revenue, and debt-to-GDP, three major indicators explaining government intervention in a single framework, whereas most of the studies assess their involvement separately. Secondly, high-frequency monthly panel data have been used in examining the intensity of the rapid adjustment in fiscal and labor market dynamics, which remains out of scope for quarterly or annual data-oriented studies, especially during an external shock like COVID-19. Thirdly, this study focuses on the joint incorporation of cyclical and structural estimation in a unified benchmark that critically assesses the explanations of beneficial and detrimental impacts of fiscal expansions presented in the prior research.

3. Methodology

This study represents a monthly panel dataset, incorporating 26 European Union (EU) countries from January 2019 to December 2024. This study includes Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, and Sweden, which encompass both Eurozone and non-Eurozone countries.

In this paper, at the primary stage, monthly panel data from January 2019 to December 2024 have been used to capture high-frequency dynamics of the labor market during the COVID-19 shock. Most of the studies comprising the fiscal policy indicators mainly use longer historical periods, but this study has concentrated on the COVID-19 shock and its aftermath effects. When the data frame started in January 2019, it represented a consistent baseline of pre-pandemic periods, with a view to avoiding any kinds of structural breaks caused by the earlier crisis. These periods provide reliable monthly fiscal

and labor market dynamics data across the EU-26 countries, as well as allow for isolation of fiscal-unemployment relations during pre-shocks, shocks, and recovery periods.

However, in this study, Eurozone vs. Non-Eurozone economies are intentionally included to represent a broader EU perspective. Consequently, heterogeneity in diversified government intervention across the Union allows us to capture fiscal responses following a comparative framework. Although the countries here are not differentiated into Eurozone or non-Eurozone groups, their heterogeneity has been addressed econometrically. The country fixed effects model recognizes stable control over different institutional and monetary regimes, and Driscoll–Kraay robust estimation further acknowledges cross-sectional dependencies among Eurozone and non-Eurozone economies. But due to Brexit-oriented rigorous institutional changes that have been implemented since January 2020, this study focuses on the EU-26 countries for the targeted period, excluding the UK. This period conceptualizes the transitional period of the EU from its pre-crisis stability-gaining initiatives in 2019, being hit by the COVID-19 shock from 2020 to 2021, recovery stages, as well as complexities of reshaped fiscal stances from 2022 to 2024. Subsequently, this period has experienced fiscal recovery measures, the energy crisis, inflationary interruptions, and, again, reshaping the fiscal recovery measures.

There are several institutional factors, like labor market mechanisms, welfare facilities, administrative layouts, employment protection systems, and unemployment benefits, that play a significant role in addressing unemployment across the EU member states. But these institutional features are quite stable over the time span, and therefore, it is quite difficult to capture meaningful changes following this short period of 2019–2024.

Depending on the above-mentioned consideration, in this paper, the key independent variables, such as government spending and revenues as a percentage of the GDP and government debt-to-GDP, are examined to analyze their fluctuation impacts on unemployment when the COVID-19 dummy is used as a macroeconomic control variable. Other than the three core fiscal indicators, which explain direct government intervention in unemployment mitigation in response to the shock condition, the other variables are excluded from this study. The operational definition of the selected variables is presented in Table 1.

Table 1. The operational definitions of the variables.

Variable	Operational Definition	Justification of the Variables Following the Existing Literature	Data Source
Unemployment Rate	Labor forces without work, at the same time seeking and available for employment in country i at month t.	(Casado et al., 2020; Kalkavan et al., 2021)	(Trading Economics, 2025d)
Government Spending	The total amount of government expenditure is expressed as a percentage of GDP.	(Abouelfarag & Qutb, 2021; Akhmad et al., 2022; Lord, 2020; Tran Pham, 2025)	(Statista, 2025c; Trading Economics, 2025c)
Government Revenue	Total income that the government receives in terms of taxes, fees, grants, etc., to bear public expenditures.	(Ardiyono, 2022; Clemens & Veuger, 2020; Simak et al., 2020)	(Statista, 2025b; Trading Economics, 2025b)
Government Debt-to-GDP	Comparison between total government debt and Gross Domestic Product (GDP) at annual basis. This ratio has been expressed as a percentage of GDP, indicating the ability of a country to repay its debt.	(Bitner & Sierak, 2022; Briceño & Perote, 2020; Simak et al., 2020)	(Statista, 2025a; Trading Economics, 2025a)

In Table 1, unemployment rate, government spending, revenue, and debt as a percentage of the GDP are denoted as unemployment, spending, revenue, and debt, respectively, while the COVID-19 dummy is symbolized as COVID in the table format.

With a view to having an overview of the selected data before empirical studies, Table 2 represents the descriptive statistics of all the selected variables, including the mean, standard deviation, minimum, and maximum values. This descriptive summary contributes to illustrating their distribution, as well as cross-country heterogeneity.

Table 2. Descriptive statistics (1944 observations).

Statistics	Debt	Unemployment	Revenue	Spending
Mean	0.6824	0.0661	8.3721	3.5043
Standard Error	0.0085	0.0006	0.1980	0.0241
Median	0.5770	0.0610	6.8491	3.5969
Mode	0.6500	0.0500	36.0733	4.1014
Standard Deviation	0.3768	0.0285	8.7280	1.0635
Kurtosis	1.3601	3.3449	4.8694	−0.1475
Skewness	1.1877	1.5486	2.2538	−0.1562
Range	2.0040	0.2030	40.5188	5.3721
Minimum	0.0900	0.0000	0.3990	1.1554
Maximum	2.0940	0.2030	40.9178	6.5275

The descriptive statistics in Table 2 represent an adequate amount of heterogeneity among the selected variables across the EU member states. In this data table, government debt-to-GDP and government revenue have represented substantial and quite wide-ranging dispersion in cross-country fiscal capacities. The values of skewness and kurtosis from Table 2 indicate that government revenue and government debt-to-GDP exhibit a stronger positive asymmetry and leptokurtic nature. These fiscal variables are right-skewed and have heavier tails compared with the normal distribution. In the same way, the unemployment rate is positively skewed but leptokurtic, which maintains consistency with the labor market downfall. On the other hand, government spending is approximately symmetric and somewhat platykurtic (possessing a uniform nature of distribution). Thereby, these distributive statistics declare heterogeneity of the selected fiscal and labor indicators across the EU member states and reflect the eligibility of the panel estimation process, which has control over unobserved country-specific impacts.

Before deciding on empirical estimation, panel unit root tests (Levin–Lin–Chu (LLC), Im–Pesaran–Shin (IPS), Fisher-ADF, and Fisher-PP) were conducted to assess the existence of stationarity properties across the variables. In this context, the presence of a unit root for all the variables can be considered as the null hypothesis, indicating that the series is non-stationary, while the series' stationarity is defined as the alternative hypothesis. This stationarity test is important with a view to avoiding spurious regression results, which, furthermore, contribute to obtaining reliable and valid estimation.

The panel unit root test report of Table 3 acknowledges the rejection of the null hypothesis for all the variables (except for the LLC test, which was expected due to its common unit root handling nature across the countries), following the significant conventional levels. Specifically, the IPS and Fisher tests (ADF and PP) that determine heterogeneity among the cross-sectional units significantly rejected the null hypothesis of non-stationarity, therefore, reducing the probability of spurious estimation results.

Table 3. Panel unit root test.

Variable	LLC	IPS	Fisher-ADF	Fisher-PP
Unemployment	−0.274	−1.875 **	−71.88 *	4.449 ***
	(0.392)	(0.030)	(0.052)	(0.000)
Spending	0.916	−4.522 ***	114.25 ***	4.867 ***
	(0.820)	(0.000)	(0.000)	(0.000)
Revenue	0.660	−6.781 ***	265.96 ***	19.717 ***
	(0.745)	(0.000)	(0.000)	(0.000)
Debt	−5.176 ***	−5.995 ***	137.14 ***	8.000 ***
	(0.000)	(0.000)	(0.000)	(0.000)

The null hypothesis of a unit root at the 10%, 5%, and 1% significance levels is rejected following the symbols *, **, and ***, respectively.

The Hausman test was conducted in this study with a view to determining the appropriate estimation strategy between the fixed effects (FEs) and random effects (REs) models. This test is fundamentally necessary due to its significant impact on the consistency and efficient estimation of the coefficients in an econometric model consisting of panel data analysis. This test contributes to assessing the correlation among the country-specific characteristics like institutional frameworks, labor market dynamics, different welfare systems, and benefits that are temporarily unobserved, and fiscal policy regressors used in this study. Consequently, the existence of inconsistency and bias depends on the existence of the correlation. Otherwise, the fixed effect model is considered valid and consistent, mandating its necessity to eliminate the bias generated from omitted variables, as well as to validate causal inference.

For assuming a fixed term (FE) effect,

$$Unemp_{it} = \alpha_i + \beta_1 GovSpdPct_{it} + \beta_2 GovRevPct_{it} + \beta_3 GovdebtGdpPct_{it} + \beta_4 Covid_{it} + \varepsilon_{it} \quad (1)$$

In this model α_i (playing the role of fixed intercepts for each country) is correlated with the regressors $GovSpdPct_{it}$, $GovRevPct_{it}$, $GovdebtGdpPct_{it}$, and $Covid_{it}$.

In the case of the random effect (RE), α_i is considered uncorrelated with the regressors ($GovSpdPct_{it}$, $GovRevPct_{it}$, $GovdebtGdpPct_{it}$, and $Covid_{it}$) and therefore, α_i reflects a composite error term

$$\varepsilon_{it} = \mu_i + \nu_{it} \quad (2)$$

where μ_i interprets random individual effects and ν_{it} denotes errors.

So, in this study, the random effect (RE) model is as follows:

$$Unemp_{it} = \beta_1 GovSpdPct_{it} + \beta_2 GovRevPct_{it} + \beta_3 GovdebtGdpPct_{it} + \beta_4 Covid_{it} + \mu_i + \nu_{it} \quad (3)$$

The Hausman test equations are as follows

$$H = (\beta_{FE} - \beta_{RE})' \left[\mathrm{Var}(\beta_{FE}) - \mathrm{Var}(\beta_{RE})\right]^{-1} (\beta_{FE} - \beta_{RE}) \quad (4)$$

where β_{FE} is the vector of the coefficients retrieved from the fixed effect model, β_{RE} is the vector of the coefficients retrieved from the random effect model, and $H \sim \chi^2(k)$ represents the number of regressors.

Here, $Unemp_{it}$ represents the unemployment rate in country i at time t, α_i represents a country-specific fixed effect, $GovRevPct_{it}$ stands for government revenue % of GDP, and $GovdebtGdpPct_{it}$ represents the ratio of government debt-to-GDP. Finally, $Covid_{it}$ represents the dummy variables, where 1 is used for 2020–2021 and 0 for others, to model structural breaks. ε_{it} is considered as an error term.

Multicollinearity assessment that was conducted through VIF in this study is mandatory for panel regressions where multiple fiscal variables are used. It ensures the indepen-

dent contributions of the estimated coefficients (not identical for overlapping interference among the correlated regressors) (Daoud, 2017; Tay, 2017).

$$Vif_j = \frac{1}{1 - r_j^2} \tag{5}$$

where R_j^2 represents the unadjusted coefficient of determination obtained by regressing the j^{th} independent variable on all remaining explanatory variables. Generally, VIF coefficients exceeding 4 acknowledge the potential existence of multicollinearity and signs for further correction. However, in certain cases, higher VIF values can be tolerated without serious concern, particularly when variables are theoretically justified, data are limited, or model stability remains unaffected.

In this study, the monthly panel data were used, spanning 26 EU countries comprised of diversified economic and institutional structures, which, therefore, inherently exhibit heteroskedasticity. For this type of data, it is common for the existence of diversified error variance across diversified cross-sectional units and time periods. In response to this context, the Huber–White robust standard errors test corrects this inconsistency in the variance without changing coefficient estimations, validates statistical inference, and prevents I errors (generated from underestimated standard errors in ordinary least squares (OLSs) estimation). This test is highly essential while working with the panel data of monthly frequency and different sizes of economies associated with vastly diversified fiscal capacities and labor market volatilities (Stock & Watson, 2008).

$$Var\ (\hat{\beta}) = \left(X'x\right)^{-1} X'\hat{\Omega}x\left(x'x\right)^{-1} \tag{6}$$

$\hat{\beta}$ denotes vectors of the estimated coefficients of the variables ($GovSpdPct_{it}$, $GovRevPct_{it}$, $GovDebtGdpPct_{it}$ and $Covid_{it}$) from the model, $Var(\hat{\beta})$ represents the robust variance–covariance matrix of the estimated coefficients of the variables, X is the matrix of the explanatory variables, X' contribute to aligning the dimensions of the matrices for estimation, and $\hat{\Omega}$ is the variance–covariance matrix of the residuals ($\hat{u}_{it}$) that holds a heteroskedasticity pattern of the observations.

The Wooldridge test checks the existence of first-order autocorrelation in the residuals of the panel data, which declares the inconsistent existence of standard fixed effects errors, and, therefore, the probability of misleading towards narrow confidence intervals (Born & Breitung, 2016; Silvapulle & Evans, 1998).

$$\begin{aligned} \widehat{\Delta Unemp}_{it} &= \beta_1\left(GovSpdPct_{it} - GovSpdPct_{i,t-1}\right) + \beta_2(GovRevPct_{it} - GovRevPct_{i,t-1}) \\ &+\beta_3\left(GovDebtGdpPct_{it} - GovDebtGdpPct_{i,t-1}\right) + \beta_4(Covid_{it} - Covid_{i,t-1}) \\ &+(\varepsilon_{it} - \varepsilon_{i,t-1}) \end{aligned} \tag{7}$$

$\Delta Unemp_{it}$ represents the residual difference of actual and predicted unemployment, while $\Delta \hat{Unemp}_{it}$ denotes the estimated residual of the model at time t.

The Pesaran CD test examines cross-sectional dependence across the EU member states, where unemployment in one country represents the domino effect on the other countries. It mainly occurs due to common monetary policy in the Eurozone area, mobility of labor forces, trade linkage, harmonized business cycles, and coordinated fiscal policy frameworks across the EU area; therefore, it is crucial for assessing the impact of fiscal policies on unemployment. Otherwise, this spatial correlation may produce downward-

biased standard errors and generate overestimation of the statistical significance (Dogan & Seker, 2016; Jensen & Schmidt, 2011). The baseline for the studies is Equation (1), as follows:

$$\varepsilon_{it} = Unemp_{it} - (\alpha_i + \beta_1 GovSpdPct_{it} + \beta_2 GovRevPct_{it} + \beta_3 GovdebtGdpPct_{it} + \beta_4 Covid_{it}) \quad (8)$$

If we consider i and j as the two states in this study, then

$$\hat{\rho}_{ij} = \frac{\sum_{t=1}^{T} \hat{\varepsilon}_{it} \hat{\varepsilon}_{jt}}{\sqrt{(\sum_{t=1}^{T} \hat{\varepsilon}_{it}^2)(\sum_{t=1}^{T} \hat{\varepsilon}_{jt}^2)}} \quad (9)$$

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \quad (10)$$

If the existence of serial correlation, heteroskedasticity, and cross-sectional dependence is detected, it necessitates re-estimation of all the regressions using Driscoll–Kraay standard errors. This estimator validates inference asymptotically under the critical existence of temporal and spatial dependence frameworks without posing any kinds of restrictive assumptions. That is why this DK standard error estimation has become a preferable method for multi-country panel studies (Albassam et al., 2025; Mamba, 2021).

$$\hat{Var}\left(\beta \hat{d}_K\right) = (X'x)^{-1} \sum_{T=1}^{t} \hat{u}_T \hat{U}_T' (X'x)^{-1} \quad (11)$$

$$\widehat{Unemp}_{it} = \sum_{i=1}^{N} X_{it} \hat{\varepsilon}_{it}$$

$$X_{it} = \left[GovSpdPct_{it}, GovRevPct_{it}, GovDebtGdpPct_{it}, Covid_{it}\right]$$

Fiscal indicators like government spending (% of GDP), government revenue (% of GDP), and government debt-to-GDP, on one hand, may jointly determine unemployment, while on the other hand, potentially generating reverse causality, as well as omitted variable bias in the fixed effect model. With a view to eroding endogeneity concerns between unemployment and fiscal variables, the instrumental variable (IV) approach was conducted through the two-stage least squares (2SLSs) method, instrumenting with their first and second lags, and a COVID-19 dummy as a control variable. The usage of these lagged instruments contributes to exploiting fiscal policy persistence, and, alongside it, it reduces correlation with simultaneous shocks generated through unemployment. The first-stage equations of the least squares method are represented as follows:

$$GovSpdPct_{it} = \pi_{10} + \pi_{11} GovSpdPct_{i,t-1} + \pi_{12} GovSpdPct_{i,t-2} + \pi_{13} Covid_{it} + v_{1it} \quad (12)$$

$$GovRevPct_{it} = \pi_{20} + \pi_{21} GovRevPct_{i,t-1} + \pi_{22} GovRevPct_{i,t-2} + \pi_{23} Covid_{it} + v_{2it} \quad (13)$$

$$GovdebtGdpPct_{it} = \pi_{30} + \pi_{31} GovdebtGdpPct_{i,t-1} + \pi_{32} GovdebtGdpPct_{i,t-2} + \pi_{33} Covid_{it} + v_{3it} \quad (14)$$

The fitted values obtained from the first stage of the least squares method were used in the second stage of the unemployment equation.

$$Unemp_{it} = \alpha_i + \beta_1 \widehat{GovSpdPct}_{it} + \beta_2 \widehat{GovRevPct}_{it} + \beta_3 \widehat{GovDebtGdpPct}_{it} + \beta_4 Covid_{it} + \varepsilon_{it} \quad (15)$$

$\widehat{GovSpdPct}_{it}$, $\beta_2 \widehat{GovRevPct}_{it}$, $\beta_3 \widehat{GovDebtGdpPct}_{it}$ represents instrumented values received from the first stage, while v_{it} denotes the second stage error term.

Although data interpolation produces temporal resolution, there remains a greater probability of the existence of measurement inaccuracy. In response to this situation, this

study used additional model estimation using a non-interpolated quarterly data set. These dual-frequency data analyses, furthermore, contribute to assessing whether core findings fluctuate with interpolation assumptions or remain robust and consistent in terms of signs, significance, and magnitudes for both specifications.

For sensitivity analysis, considering interpolated monthly data,

$$Unemp_{it}{}^{(M)} = \alpha_i{}^{(M)} + \beta_1{}^{(M)}\, GovSpdPct_{it}{}^{(M)} + \beta_2{}^{(M)} GovRevPct_{it}{}^{(M)} + \beta_3{}^{(M)} GovdebtGdpPct_{it}{}^{(M)} + \beta_4{}^{(M)} Covid_{it}{}^{(M)} + \varepsilon_{it}{}^{(M)}\ for\ i = 1, \ldots, N;\ t = 1, \ldots, T \quad (16)$$

And non-interpolated quarterly data,

$$Unemp_{it}{}^{(Q)} = \alpha_i{}^{(Q)} + \beta_1{}^{(Q)}\, GovSpdPct_{it}{}^{(Q)} + \beta_2{}^{(Q)} GovRevPct_{it}{}^{(Q)} + \beta_3{}^{(Q)} GovdebtGdpPct_{it}{}^{(Q)} + \beta_4{}^{(Q)} Covid_{it}{}^{(Q)} + \varepsilon_{it}{}^{(Q)}\ for\ i = 1, \ldots, N;\ t = 1, \ldots, T \quad (17)$$

where (M) and (Q), respectively, represent monthly and quarterly specifications.

This methodology provides a stronger and empirically robust framework that assesses the impact of fiscal policies on unemployment across the EU member states. This approach redefines labor market fluctuations in both cyclical and structural dimensions by incorporating factors such as COVID-19, dummy variables, and fiscal heterogeneity.

Empirical data analysis was conducted using monthly panel data (Giesselmann & Schmidt-Catran, 2022) extracted from Trading Economics, Statista, and Eurostat, based on their availability. In this study, data interpolation was conducted with Eviews, while the rest of the test used RStudio version 4.3.2.

Based on the outlined econometric framework, this study has produced the following group of hypotheses with a view to assessing the impact of fiscal policies on labor market dynamics in the EU countries. These hypotheses were constructed following established macroeconomic theory (Keynesian perspective on government spending, crowding out effect of revenue, and Neoclassical perspective on excessive debt) in the context of an external economic shock (COVID-19 pandemic). For each hypothesis, the null hypothesis $H_0 : \beta = 0$; represents no statistically significant effects on the dependent variable. On the other hand, the alternative hypotheses are as follows:

H1: *Increased amount of government spending is associated with a reduction in unemployment* $(\beta_{spending} < 0)$.

H2: *An increased amount of government revenue (therefore creating fiscal space) is associated with lower unemployment* $(\beta_{revenue} < 0)$.

H3: *An increase in government debt is associated with higher unemployment* $(\beta_{debt} > 0)$.

H4: *The COVID-19 shock period (2020–2021), following uncertainty and lockdown-induced distortions, is linked with fiscal–labor market dynamics* $(\beta_{covid} > 0)$.

H5: *Counter-cyclical fiscal stances effectively contribute to mitigating unemployment for a short term, but excessive debt may impose challenges to further long-term fiscal and labor market sustainability (kind of composite and interpretive hypothesis).*

These hypotheses, in this study, represent complex and, at the same time, contradictory fiscal stances on influencing labor market dynamics. The subsequent section of this study focuses on the empirical results generated from the econometric estimation, following the statistical significance, magnitude, and direction of the above-mentioned hypothesized relationships at a conventional level. Therefore, it will contribute to bridging the gaps between theoretical perspectives and empirical realities in the EU labor market context.

4. Results

This section represents the empirical study results, starting with the correlation matrix. Afterwards, fiscal policy impacts on unemployment are estimated with fixed and random effect models, followed by the Hausman test as a guiding tool for model selection. Several diagnostic tests were conducted, including VIF, heteroskedasticity-robust standard errors, the Wooldridge test, and Pesaran's CD test, with a view to checking the reliability of the model. The Driscoll–Kraay standard errors test, in this study, represents the existence of the cross-sectional dependency along with serial correlation. Finally, sensitivity analysis between interpolated monthly and non-interpolated quarterly data was conducted to ensure further robustness of the findings.

The correlation matrix in Table 4 demonstrates an initial idea about the correlation (linear relationship) of the variables. Here, the dependent variable unemployment rate reflects a moderate and positive correlation (0.596) with government debt-to-GDP, while the rest other indicators represent their limited impact. The COVID-19 dummy, the macroeconomic control variable of this study, shows a smaller positive correlation (0.231) with the unemployment rate. However, the correlation matrix obtained from the selected data frame initiates the requirement of multivariate analysis with a view to obtaining more accurate results.

Table 4. Correlation matrix.

Variables	Debt	Unemployment	Revenue	COVID	Spending
Debt	1				
Unemployment	0.595927989	1			
Revenue	0.020298712	0.1898758	1		
COVID-19	0.080431607	0.2308527	−0.05822593	1	
Spending	0.120472167	0.1722776	0.07319885	−0.04054	1

4.1. Main Results

This section denotes the main empirical findings of this study generated from panel data estimation through fixed effects (FEs) and random effects (REs) models; therefore, the Hausman test was conducted to determine a specific estimation strategy for more consistent and efficient results.

Government revenue and government spending both denote negative coefficients, explaining that higher government spending and stronger revenue capacity contribute to lowering the unemployment rate. While analyzing with magnitude, a 1 percent increase in government spending decreases unemployment by 0.0055 percent, while an equivalent rise in government revenue reduces unemployment by 0.0007 percent. This is quite moderate and stabilizes the implications of these variables in unemployment mitigation. On the other hand, government debt reflects a positive correlation with unemployment. A 1 percentage increase in government debt-to-GDP results in a 0.0305 percent rise in unemployment; consequently, it has become econometrically significant among the variables used in this study. The COVID-19 dummy (control variable) in this study acknowledges a positive association of labor market distortions with the pandemic period, following the coefficient of 0.0101.

The random effects model explains similar signs and magnitudes for the selected variables, but the Hausman test used in this study for model specification further rejected the null hypothesis (where random effects are preferred). The value of $\chi^2 = 38.49$ ($p < 0.001$) strongly confirms the appropriateness of the fixed effects model. Robustness checking, afterwards, supports this model specification when results generated from the FEs model are stable for both cross-sectional dependence and serial correlation. So, according to the

results presented in Table 5, it is acknowledged that government spending and revenue contribute to unemployment mitigation, while, on the other hand, higher government debt depressed the overall labor market dynamics during 2019–2024.

Table 5. Panel regression estimation model.

Variable	Fixed Effects	Random Effects
Spending	−0.0055 ***	−0.0052 ***
Revenue	−0.0007 ***	−0.0007 ***
Debt	0.0305 ***	0.0304 ***
COVID-19	0.0101 ***	0.0102 ***
Constant	—	0.0660 ***
Hausman χ^2 (df = 4)	38.49	
Hausman p-value	<0.001	
Preferred Model	Fixed Effects	

The fixed effects model represented in Table 5 declares the significance of all the fiscal variables used in this study. Significance levels *** $p < 0.01$; ** $p < 0.05$; and * $p < 0.10$.

The selected fixed effects (FEs) model has contributed to this study in assessing time-invariant differences among EU countries and maintains control for unobserved, diverse factors, and ensures that the estimated relationship between unemployment and other fiscal variables (government debt-to-GDP, spending, and revenues) during economic shocks (such as the COVID-19 pandemic) is free from country-specific biases. Therefore, this model provides a more accurate assessment of how variations in government spending, revenue, and debt affect unemployment, and it determines whether the role of fiscal policies is truly stabilizing or destabilizing under shock conditions.

4.2. Diagnostic Test

With a view to ensuring the validity of the results generated from the panel regression, several diagnostic tests were conducted in this study, including the VIF test for multicollinearity, heteroskedasticity-robust standard errors, the Wooldridge test for serial correlation, and Pesaran's CD test for cross-sectional dependency.

The analysis represented in Table 6 accepts government debt as the most significant indicator and plays a central role in explaining unemployment variations, while government spending and revenue are comparatively weaker in reflecting their direct effects on unemployment. Multicollinearity tests using the variance inflation factor (VIF) evaluate all the variables having a minimal correlation with one another (between 1.009 and 1.023). This result indicates that the estimated coefficients produce reliable and distinct information.

Table 6. Multicollinearity tests through variance inflation factor (VIF).

Variable	VIF
Spending	1.022
Revenue	1.009
Debt	1.023
COVID	1.012

The model has been re-estimated using heteroskedasticity-robust standard errors, following Table 7. Significance codes: *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

The test result here is consistently aligned with baseline findings in Table 5. In Table 7, government debt-to-GDP is found as one of the positively significant indicators addressing unemployment ($\beta = 0.0305$ *), while government spending ($\beta = -0.0055$ *) and government revenue ($\beta = -0.0007$ *) both have reflected negatively significant bonds with unemployment. Now, while explaining the COVID-19 dummy ($\beta = 0.0101$ ***), it acknowledges the

significant positive contribution to unemployment. Overall, this heteroskedasticity-robust standard errors test identified selected data used in this study are not controlled by non-constant variance among the observations, acknowledging the reliability of the datasets and their estimation methods.

Table 7. Heteroskedasticity-robust standard errors.

Variable	Coefficient (β)
Spending	−0.0055 *
	(0.0024)
Revenue	−0.0007 *
	(0.0003)
Debt	0.0305 *
	(0.0153)
COVID	0.0101 ***
	(0.0017)

Significance codes: *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

Since, in this study, high-frequency monthly panel data were used, there is a significant probability of the existence of temporally correlated residuals in the panel regression. In response to this issue, the Wooldridge test was conducted to check serial correlation, following the test result, represented in Table 8, where $\chi^2 = 1303.3$, df = 72, $p < 0.001$, and it rejects the null hypothesis. This result confirms the presence of serial correlation within the panel data frame. Although it does not declare the model invalid, it signals for the correction of the standard fixed effects standard errors with a view to avoiding bias and inconsistency through appropriate correction methods (Driscoll–Kraay standard errors adjustment).

Table 8. Wooldridge test for serial correlation.

Test Statistic (chi-sq)	1303.3
Degrees of Freedom (df)	72
p-value	$<2.2 \times 10^{-16}$
Alternative Hypothesis	Serial correlation in idiosyncratic errors
Decision	Reject $h_0 \rightarrow$ serial correlation exists.

The CD test result, following Table 9, directly rejects the null hypothesis and confirms the interdependence of the countries following the residuals. It strongly suggests the impact of fiscal variables in one country is not just isolated, but rather interconnected with one another. Even during the COVID-19 pandemic, the EU labor market represented its spillover nature across the EU labor markets. This type of interconnectedness justifies the need to conduct the Driscoll–Kraay test more strongly, which further contributes to providing more consistency in the standard errors under the existence of cross-sectional correlation, serial correlation, and heteroskedasticity.

Table 9. Pesaran's cross-sectional dependence (CD) test.

Parameters	Value/Comments
Test Statistic (CD)	24.201
p-value	$<2.2 \times 10^{-16}$
Alternative Hypothesis	Cross-sectional dependence exists.
Decision	Fail to reject h_0 considering *p*-value.

4.3. Robustness Check and Alternative Estimation

With a view to investigating whether the main findings of this study are valid and reliable, this study has incorporated a series of robustness checks and additional estimation frameworks, which have been represented as follows.

Table 10 presents a comparison of fixed effects estimations with Driscoll–Kraay standard errors, representing a robust inference with the existence of heteroskedasticity, serial correlation, and cross-sectional dependence.

Table 10. Comparison of the fixed effects model with Driscoll–Kraay robust inference.

Variable	Coefficient (β)	FEs Std. Error	DK Std. Error
Spending	−0.0055 ***	(0.00085)	(0.00199)
Revenue	−0.0007 ***	(0.00008)	(0.00025)
Debt	0.0305 ***	(0.00350)	(0.00435)
COVID-10	0.0101 ***	(0.00050)	(0.00195)

Significance codes: *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

Considering spending and revenue, both have exhibited significantly negative coefficients, which explains that expansionary government spending and a higher amount of government revenue contribute to lowering the unemployment rate. Quantitatively, it can be assumed that a 1 percent increase in government spending may reduce unemployment by 0.0055 percent approximately; on the other hand, the same equivalent expansion in government revenue lowers unemployment by almost 0.0007 percent, therefore, representing their moderate impact on contemporary labor market dynamics. On the other hand, government debt represents its significant positive association with unemployment. A 1 percent increase in debt, therefore, leads 0.0305 percent rise in unemployment. In this context, a higher debt burden lowers investors' confidence and imposes a contractionary impact on overall job markets. While studying the COVID-19 dummy, it presents a significantly positive coefficient for the labor market outcomes during the COVID-19 pandemic. In this table, Driscoll–Kraay standard errors represent higher values than conventional fixed effect standard errors, where all the estimated coefficients reflect both statistically significant and expected signs. These values confirm the robustness and reliability of the baseline fixed effects model.

The 2SLS specification instruments reported in Table 11 have been developed using their first and second lags. The OLSs and 2SLSs estimation results in Table 11 represent positive and statistically significant coefficients across fiscal regressors and unemployment (for spending 0.02656 *** and 0.02623 ***, revenue 0.000597 *** and 0.000614 ***, debt 0.04270 *** and 0.04195 ***, and COVID 0.01222 *** and 0.01274 *** respectively). All of the regressors have represented statistical significance and closer alignment with one another. Consequently, comparison between these OLSs and 2SLSs estimators confirms robustness as well as contributes to mitigating endogeneity concerns.

Table 11. Comparison between OLSs and two-stage least squares (2SLSs) estimation.

Variable	OLS Coef.	2SLS Coef.
Spending	0.02656 ***	0.02623 ***
Revenue	0.000597 ***	0.000614 ***
Debt	0.04270 ***	0.04195 ***
COVID	0.01222 ***	0.01274 ***
Constant	0.01876 ***	0.01877 ***

Significance codes: *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

Therefore, another significant concern raised from Table 11 is its diversified characteristics, focusing on structural fiscal conditions exploited through lagged instruments in contrast with the contribution of discretionary fiscal expansions in unemployment mitigation in the short run, represented in the fixed effects (Table 5) and Driscoll–Kraay results (Table 10).

These diversities across the nature of fiscal policy clearly indicate the effectiveness of the temporary fiscal stimulus during economic distortions, which is counter-cyclical in nature, while, on the other hand, expansionary public spending and debt, furthermore, necessitate expansionary revenue collection following structural cross-country diversities in tax-to-GDP ratios (tax wedges). These entire labor market mechanisms discourage labor force participation, increase employer costs, and lower investors' confidence, therefore, resulting in a drastic level of labor market distortions (generating a higher unemployment equilibrium). While considering the COVID-19 dummy, it represents a significantly positive coefficient across both specifications, which furthermore confirms the independent adverse impact of external shock conditions on labor market dynamics.

Following both the interpolated monthly panel data and non-interpolated quarterly data, their consistency has been presented with signs, magnitude, and significance levels, which strongly acknowledge the reliability of the findings of this paper.

Government spending maintains a negatively significant coefficient with unemployment (see Table 12), −0.00402 with monthly panel data, and −0.00497 with quarterly non-interpolated panel data. Although values are slightly different, their signs and directions are identical. Government revenue also represented significantly negative coefficients for both specifications (−0.00439 and −0.00432, respectively) and affirms its mild impact on unemployment mitigation for both data frequencies. Government debt-to-GDP (0.07778 and 0.07993) has shown a strong and positive impact on unemployment for both datasets, providing stronger evidence of not being sensitive to the temporary selection of the frequency. The COVID-19 dummy has provided identical positive coefficients (0.00786 and 0.00785, respectively) in both frequencies and declared the consistent impact of the COVID-19 pandemic on unemployment.

Table 12. Sensitivity analysis (monthly interpolated vs quarterly non-interpolated).

Variable	Monthly β	Quarterly β
Spending	−0.00402 *	−0.00497 *
Revenue	−0.00439 **	−0.00432 **
Debt	0.07778 ***	0.07993 ***
COVID	0.00786 ***	0.00785 ***

The sensitivity analysis results in Table 12 declare the robustness of the core result for both frequencies. Significance codes: *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$.

The sensitivity analysis results in Table 12 declare the robustness of the core results for both frequencies. Following both the interpolated monthly panel data and non-interpolated quarterly data, their consistency has been presented with signs, magnitude, and significance levels, which strongly acknowledge the reliability of the findings of this paper.

5. Discussion

This study has highlighted several examples of the existing literature based on fiscal policy implications on labor market dynamics. It contributes to the growing literature with empirical evidence for assessing unemployment by using a group of fiscal policy indicators, consisting of government spending, revenue, and debt (initiates direct government interventions), under external shocks (impact of the COVID-19 pandemic on the EU labor market). Monthly panel data for EU countries has been developed, and fixed-effects,

Driscoll–Kraay, and 2SLS (instrumental variable estimation) models were conducted, followed by several model estimations, validations, and robustness checking mechanisms. This empirical analysis affirms the diversified and asymmetric fiscal policy implications that depend on the nature of interpretation, such as either short-run counter-cyclical measures or long-run structural factors.

Maintaining consistency with the Keynesian stabilization literature (Akhmad et al., 2022; Auerbach & Gorodnichenko, 2012; Haldar & Sethi, 2022), the result of the fixed-effects model (Table 5) and the comparison between the FEs model and Driscoll–Kraay estimation (Table 10) affirms the negative significance and discretionary nature of government spending and revenue, therefore, affirms the existence of positive and statistically significant coefficients for debt in terms of mitigating unemployment (following H1, H2, and H3) in the short run. These findings have been developed based on within-country consideration, reflecting the contribution of fiscal stimulus in mitigating labor market deterioration in response to shock conditions. However, the modest magnitude generated from these variables maintains alignment with recent evidence from the existing literature indicating fiscal policy initiatives as a stabilizing buffer rather than a complete offset for unemployment mitigation under shock conditions.

While considering the COVID-19 dummy, it represents a significantly positive coefficient across both specifications (following H4), which, furthermore, confirms the independent adverse impact of external shock conditions on labor market dynamics (Benmelech & Tzur-Ilan, 2020). It clearly identified that the pandemic-induced unemployment is a significant outcome of both demand shortfalls and distortion in the supply chain (due to lockdowns, sectoral closures, and labor reallocation), which conventional fiscal instruments fail to offset completely (Forsythe et al., 2020).

Expansionary public spending and debt, furthermore, necessitate expansionary revenue collection following structural cross-country diversities in tax-to-GDP ratios (tax wedges), consequently, discouraging labor force participation, increase employer costs, and lower investors' confidence, therefore, resulting in a drastic level of labor market distortions (generate higher unemployment equilibrium), which is consistent with the neoclassical perspectives on crowding-out effects following a reduction in fiscal space (supports composite hypothesis H5).

On the other hand, the instrumental variables (t2SLSs) results, at the finishing point, highlight one of the significant structural dimensions which is most often out of consideration in the context of short-run analysis. The positive contributions of the fiscal regressors (spending, revenue, and debt) used in this study are adequately consistent while studying across countries and represent a higher unemployment equilibrium in the national economies under expansionary public spending and debt accumulation (Briceño & Perote, 2020; Checherita-Westphal & Rother, 2012).

This type of divergency does not indicate contradictions across the selected estimation strategy; rather, they accumulate two different strands of the literature with different parameters under the same context. When within-country fiscal expansions contribute to lowering unemployment cyclically, on the other hand, highly structured fiscal intervention imposes an adverse outcome for the labor market in the long run.

The main contribution of this study to the existing literature is that the critical assessment of the fiscal policy effectiveness distinctly depends on temporary stabilization measures and persistent structures of the fiscal instruments. In this study, the joint incorporation of cyclical and structural estimation in a unified benchmark, furthermore, reconciles the explanations of beneficial and detrimental impacts of fiscal expansions in the prior research (Ramey, 2016; Romer & Romer, 2010).

Despite representing the strength of the empirical findings, there are several limitations that must be acknowledged. Firstly, data interpolation from different quarterly or annual data may impose the risk of measurement uncertainty. Although sensitivity analysis comparing interpolated monthly panel data and non-interpolated official quarterly data (less interpolated) declares data consistency regardless of time frequencies. Secondly, this study aims to capture the short-term COVID-19 shock dynamics. The absence of several macroeconomic indicators (inflation, interest rates, or technological progress), as well as control variables, may result in some residual endogeneity.

Finally, while analyzing the policy perspectives, this study reaches a concluding remark that suggests the necessity of temporary and well-organized (along with predetermined targets) fiscal interventions, which will be credible to ensure long-term sustainability. Otherwise, this distinction, in the case of being overlooked, may put the performance assessments of the labor market through long-term employment benefits, as well as debt sustainability, in question.

6. Conclusions

This study investigates a comprehensive framework on fiscal policy–unemployment dynamics across the EU countries under economic shock conditions. Three key variables (government spending, revenue, and debt) play their roles quite asymmetrically in terms of influencing labor market outcomes under shock conditions. The fixed effect model, followed by Driscoll–Kraay and instrumental variable (2SLS) estimations, was conducted in this paper, being further validated through sensitivity analysis based on frequency. This study represents a robust analysis of how different fiscal channels interact across short-run and structural horizons.

The findings highlight the non-monolithic nature of fiscal policy in terms of interacting with labor-market dynamics. Temporary fiscal stances influence labor market outcomes differently than structurally persistent conditions, which underscores the necessity of distinguishing them with a view to assessing how similar expansionary fiscal measures impose diversified outcomes on the labor market based on their level of persistence, as well as financing structure.

Methodologically, the fiscal–unemployment relationships presented in this paper demonstrate their robustness to alternative estimators, along with investigating their cross-sectional dependency and data frequency. The results generated from monthly interpolated and quarterly non-interpolated data are closely aligned and strengthen confidence for the adopted empirical strategy used in this study, and therefore, mitigate endogeneity concerns, error terms, and bias.

Considering the policy perspective, this study proposes suggestions for more comprehensive unemployment mitigation measures under economic shock conditions. A crucial balance between short-term and long-term fiscal sustainability is highly required, since counter-cyclical fiscal measures contribute as a stabilizer under economic shock but impose a high risk of undermining labor-market performance over time. In response, a well-targeted temporary policy initiative, having credibility to maintain limited distortions to labor market dynamics.

Overall, this study incorporates fiscal–labor market grounded empirical insights with methodological robustness and policy relevance, which can further be extended through analyzing heterogeneous impacts across the countries, thereby enriching the existing policy debate on fiscal–unemployment resilience.

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