Determining the Relationship Between Corruption, The Shadow Economy and Tax Evasion: A Comparative Econometric Analysis in Ten European Countries

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Abstract

The aim of this paper is to identify the channels through which institutional and fiscal factors influence the size of the informal economy (IE) and, indirectly, economic development and social equity. Thus, using official data provided by Eurostat, the World Bank Group and the OECD, the structural relationships between corruption, the shadow economy (SE) and tax evasion (TE) are investigated in ten European countries - Austria, Belgium, Denmark, Switzerland, France, Germany, Italy, Luxembourg, Spain and Romania - over the period 2020–2024. The analysis focuses on the impact of key macroeconomic determinants, including GDP per capita, inflation rate and GINI index, highlighting the mechanisms through which corruption and TE spread in national economic structures. The results reveal positive and significant relationship between corruption and the UE, as well as the decisive influence of GDP and the perceived corruption level on TE. The findings provide valuable comparative insights and can inform public policies aimed at reducing fiscal vulnerabilities and strengthening economic governance. The main contribution of the study is the development of an integrated analytical framework for assessing the determinants of the IE in the European context.

Keywords: Corruption; Economic Growth; National Economy; Shadow Economy; Tax System; Tax Administration; Tax Evasion; GDP; Informal Economy; Emerging States.

Introduction

Over the past decade, discussions on the corruption impact on economic performance have become increasingly intense, both in academia and in public policy formulation. A growing number of studies indicate that corruption is associated with high levels of informality and significant fiscal losses. For example, Bermúdez et al. (2024) demonstrate that both corruption and informality have negative effects on economic growth and productivity, both in Latin American countries and in OECD member states. Another recent study (Şentürk et al., 2024) analyses the relationship between corruption and tax revenues in six transition

economies (Estonia, the Czech Republic, Hungary, Poland, Latvia and Slovakia) for the period 1998-2021. The study shows that the relationship between corruption and tax revenues in transition economies is bidirectional: corruption reduces the efficiency of tax collection, while declining budget revenues amplify dependence on informal activities.

The importance of researching these links is highlighted by the structural effects generated by the interaction between corruption, the IE and TE. According to the International Monetary Fund (2016), the estimated IE in Romania represented approximately 28% of GDP, with direct implications for the government's ability to finance public services and implement effective redistributive policies. In addition, comparative studies show that European countries with robust fiscal governance have a significantly lower level of SE (Asllani & Schneider, 2025), and digitalization and increased fiscal transparency contribute to reducing this phenomenon (Bojan & Achim, 2025).

Although the literature has focused extensively on the size and determinants of the IE, certain gaps remain. A considerable proportion of studies treat corruption, informality and TE separately, without integrating these phenomena into a common framework. Furthermore, much research focuses on developing countries, ignoring the particular dynamics of mature European economies and how fiscal policies interact with institutions to shape the size of the IE (Ahmad & Hussain, 2023). In addition, existing studies offer mixed results regarding the effects of fiscal policies - in some cases, they reduce informality, while in others the impact is neutral or even reversed. These methodological and contextual inconsistencies outline an under-explored area of research and justify further investigation of the subject.

In this context, the present study aims to investigate the channels through which institutional and fiscal factors influence the EI size, as well as how this size indirectly affects economic development and social equity in Europe. This integrated approach seeks to provide a solid and comparative empirical perspective, thus addressing the gaps identified in the current literature. The central research question can be formulated as follows: "How and through which institutional and fiscal mechanisms do corruption and fiscal policies influence the size of the IE in European countries?" The answer to this question can inform public policies aimed at reducing fiscal vulnerabilities and strengthening economic governance. In addition, by highlighting the interactions between corruption, TE and the UE, the study provides a relevant analytical framework for formulating more effective economic strategies in the European Union.

Literature review

Macroeconomic determinants of the shadow economy in the European Union

The SE is often seen as a direct consequence of structural and institutional imbalances, being closely linked to fiscal dynamics and macroeconomic performance. Recent studies show that persistent inflation, systemic corruption and poor governance amplify the tendency of economic agents to evade taxes (Asllani & Schneider, 2025). Research on the post-pandemic period reveals that, in Central and Eastern European countries, the SE has grown slightly as a result of fiscal pressures and declining trust in institutions.

There is strong empirical evidence that fiscal expansion reduces the size of the SE, while restrictive fiscal policies amplify it. According to Ahmad & Hussain (2023), increased government spending has a deterrent effect on informal activities, while increased tax burdens stimulate migration to the SE. These results are relevant for EU countries, where post-crisis fiscal adjustment policies may influence taxpayers' fiscal behavior. In addition, the dynamics of the economic cycle play a significant role in determining the size of the IE. The results obtained by Owolabi et al. (2022) show that the SE behaves counter cyclically, growing during periods of economic recession. Thus, real GDP becomes not only an indicator of macroeconomic performance, but also an indirect determinant of economic informality. These results are relevant for the analysis of the ten EU Member States in the current sample.

Inflation is another key structural determinant. Tran (2023) demonstrates that high inflation amplifies the effects of the IE on macroeconomic stability. This interaction effect is particularly valid in economies with weak institutions, where economic agents prefer to operate outside the formal framework to avoid the costs of adjusting to volatile prices. Finally, digital convergence and the development of technological infrastructure play an increasingly important role in controlling the SE. Bojan & Achim (2025) show that investments in digitization and IT services significantly reduce the size of the IE. Countries in northern and Western Europe, with high levels of digitization, have seen more pronounced declines in the IE compared to those in the south-east.

Bermúdez et al. (2024) show that corruption and informality negatively affect economic growth and productivity in the countries analyzed, and that human capital can reduce these negative effects. In another perspective, Mohamed et al. (2024) highlight the difficulties faced by small and medium-sized enterprises in Egypt's informal tourism sector, emphasizing the need for financial inclusion to integrate activities into the formal sector. In addition, Javed et al. (2024) confirm that corruption in Pakistan favors the expansion of the SE by reducing the efficiency of tax collection and increasing systematic TE.

The relationship between corruption, tax evasion and the shadow economy

Recent studies highlight a strong correlation between corruption, TE and the SE, especially in transition economies and countries with weak tax institutions. Şentürk et al. (2024) provide evidence that high perceptions of corruption reduce the efficient collection of tax revenues, creating space for informal activities. Thus, corruption is not only a consequence of institutional weaknesses, but also a catalyst for the SE.

TE often acts as a bridge between the formal and informal spheres of the economy. Amoh et al. (2023) confirm that TE has a direct effect on GDP per capita, but at the same time undermines indicators of economic freedom and governance quality. This paradox is also relevant for EU economies; TE can temporarily support aggregate demand but negatively affects the tax base in the long term. In another view, Oanh et al. (2024) demonstrate, using a PVAR approach that the link between corruption, taxes and the SE differs depending on the level of financial development of states. In developed economies, tax increases have a more pronounced effect on reducing the IE, while in emerging economies, corruption mitigates this effect. These results provide a solid analytical framework for the comparative analysis of the ten EU countries examined.

The quality of regulations also influences the intensity of corruption and the degree of tax compliance. According to Barra & Papaccio (2024), regions with higher institutional standards have a lower share of the IE and a lower degree of TE. Thus, institutional quality not only discourages informal behavior, but also contributes to strengthening the tax base. In addition, comparative studies of EU economies show that the intensity of corruption also influences the effectiveness of tax digitization policies. For example, Mara (2025) shows that digitization has significantly stronger effects in countries with low corruption levels. Where corruption is endemic, the benefits of digitization are partially offset by informal mechanisms to avoid controls.

The shadow economy and its implications for inequality and welfare

The SE has not only fiscal and macroeconomic implications, but also profound social consequences, including on income inequality and the well-being of the population. Masca & Chis (2023), Jakubek P. (2023) highlight that the effects of the IE on inequality are mixed: while domestic activities may temporarily reduce inequality, international TE amplifies social polarization. The study by Karazijienė et al. (2025) offers an innovative perspective on the relationship between the IE and welfare indicators. The results show that countries with a high happiness economy index have, on average, a smaller SE. Investments in social capital and welfare-oriented public policies can reduce the size of the informal sector by

increasing trust in state institutions.

In terms of income inequality measured by the GINI index, it proves to be a structural determinant of the IE. In this regard, Ha & Huyen (2022) show that countries integrated into global value chains and with a high level of human capital tend to have a smaller IE. In contrast, economies characterized by high inequality show a greater predisposition towards unregistered activities. At the same time, the effects of the SE on sustainable development and climate resilience are becoming increasingly relevant. Furthermore, Lobont et al. (2025) show that the size of the IE has indirect effects on climate vulnerability by undermining reporting mechanisms and environmental taxation. Integrating the IE dimension into environmental governance policies is therefore a necessary condition for the green transition in the European Union.

Last but not least, cultural and institutional factors can amplify or mitigate the link between inequality and the IE. EU countries with high levels of social trust, fiscal transparency and participatory governance tend to have smaller shadow economies. This relationship confirms the hypothesis that reducing inequalities and strengthening institutions can be effective indirect strategies for combating the IE.

Based on these findings, the following working hypotheses have been formulated:

Hypothesis 1 (H1): The effect of corruption on the size of the SE is conditioned by the level of economic development – being significantly stronger in economies with lower GDP per capita.

Hypothesis 2 (H2): The relationship between TE and the SE is significantly amplified in periods of high inflation, indicating the existence of an interaction effect between fiscal behavior and macroeconomic instability.

Hypothesis 3 (H3): The effect of inequality on the SE size is mediated by the trust level in public institutions – in economies with low trust, the relationship is positive and significant.

Methodology

Formulation of working hypotheses

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Research design and variables analyzed

This research is based on a quantitative panel approach, integrating elements of comparative econometric analysis to investigate the relationships between corruption, the SE and TE in ten European countries. In this regard, the analysis aims to examine the structural interdependencies between the main variables of the research (level of corruption, size of the SE and degree of TE), along with macroeconomic control variables, including gross domestic product per capita, inflation rate and GINI index. The central methodological objective is to identify the direction and intensity of the relationships between these factors, thus providing empirical support for the hypotheses developed in the previous section.

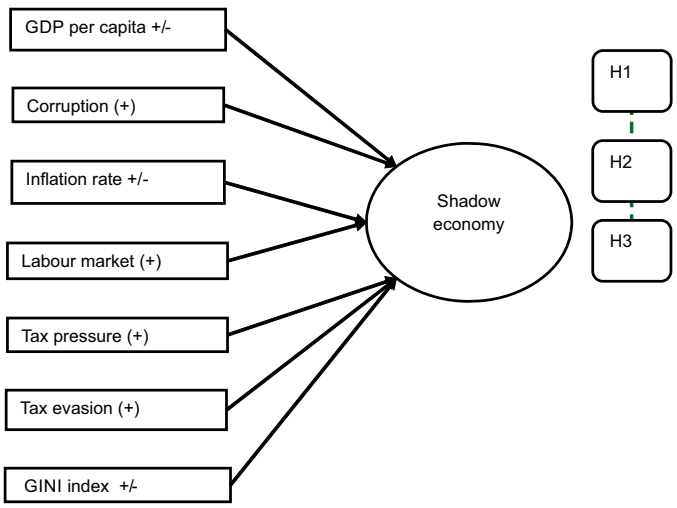
The study was conducted on a sample of ten representative European countries, selected based on their level of economic development, fiscal structure and institutional diversity: Austria, Belgium, Denmark, Switzerland, France, Germany, Italy, Luxembourg, Spain and Romania. This selection was designed to include both developed economies (with consolidated fiscal infrastructures) and emerging economies, allowing for differentiated testing of the relationships between variables. The analysis period was 2020–2024, corresponding to an economic context

marked by post-pandemic effects and accelerated fiscal reforms at the European level. The data was taken from various European websites. Sources with numerical statistics on the economies of these countries are available from World Meters, the World Bank, Eurostat, Visual Capitalist, the Tax Foundation, the World Bank and Country Economy.

Additionally, a conceptual diagram of the interdependencies between macro- and microeconomic factors that promote the growth of the subterranean economy is shown in Figure 1.

As can be observed, that it provides a concise overview of the intricate interplay between internal and external elements that support the development and continuation of the SE. From an analytical perspective, it can be observed that internal dimensions – e.g., the taxation level, administrative efficiency or the degree of voluntary compliance – are interdependent with external variables, including the macroeconomic context, institutional pressures and the governance climate. This interconnection generates a cumulative effect, in which internal institutional dysfunctions can be amplified by unfavorable external factors, leading to the expansion of areas of informal activity.

Figure 1. Interaction of internal and external factors



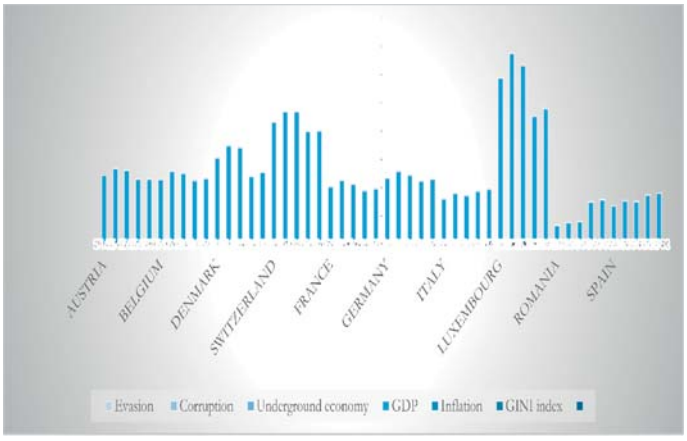
It also highlights the importance of adopting a systemic approach in analyzing the phenomenon, as isolating one of the determining factors would lead to a partial understanding of the mechanisms of the SE.

Results and Discussions

To highlight the structural differences between European economies in terms of macroeconomic performance and fiscal risks, a comparison was made between a set of relevant indicators: gross domestic product (GDP), inflation rate, GINI index, the SE level, corruption degree and TE extent. These indicators reflect not only the economic health of the countries analyzed, but also the quality of governance, institutional efficiency and the degree of tax compliance.

It can be seen that among these indicators, GDP stands out in particular, showing significant differences between countries. For example, Luxembourg has the highest GDP, exceeding 130,000 units, reflecting a high-performance economy based on financial services and high productivity. Switzerland, Germany and France follow with high GDP values, supported by diversified economies and macroeconomic stability. Romania and Spain are at the opposite end of the spectrum, with considerably lower GDP values, which can be correlated with higher levels of shadow and corrupt economies.

Figure 2. Structural differences between 10 European economies



Source: own processing based on data published in Transparency International; Trading Economics World Bank Group

Furthermore, the results obtained from data processing allowed the design of an econometric model to establish a pattern and compare the following variables: corruption, TE, SE, GDP, inflation and the GINI index.

Table 1. Modelling Correlations

		Corruption	Tax evasion	Underground economy	GDP	Inflation	GINI index
Pearson Correlation	Corruption	1.000	-.278	-.693	.624	-.242	-.035
	Tax evasion	-.278	1,000	.162	.181	.044	.018
	Underground economy	-.693	.162	1,000	-.596	.078	.104
	GDP	.624	.181	-.596	1,000	-.198	-.073
	Inflation	-.242	.044	.078	-.198	1.000	-.183
	GINI index	-.035	.018	.104	-.073	-.183	1
Sig. (1-tailed)	Corruption	.	.025	.	.	.045	.404
	Tax evasion	.025	.	.131	.104	.381	.450
	Underground economy	.000	.131	.	.	.294	.236
	GDP	.000	.104	.000	.	.084	.308
	Inflation	.045	.381	.294	.084	.	.102
	GINI index	.404	.450	.236	.308	.102	.

Source: SPSS

According to Table 1, there is a strong correlation between Corruption and GDP (0.624), which indicates a high level of corruption, meaning that the existing GDP will be higher in these cases. There is a moderate correlation between corruption and the shadow economy (0.693), which may indicate a link between the two indicators, such as high levels of contributions and taxes, or that some corruption is intended to protect informal activities. There are weak links between corruption and TE (0.278), In this case, the conclusion is that corruption is not only concentrated in taxation, but also in other sectors. The correlation between Corruption and Inflation is minimal (0.242), which indicates an insignificant finding in this case, as inflation is very little influenced by corruption. In addition, the link between Corruption and the GINI Index is the weakest connection (0.035), demonstrating an almost non-existent and insignificant relationship between the two indicators.

Furthermore, based on the multiple linear regression function, the following variables were introduced into an econometric model (Eq.1)

$$Sw\_Econ = \alpha + \beta_1 * EVS_i + -\beta_2 * GDP_i + \cdot \beta_3 * IF_i + +\beta_4 * I\_GINI_i + \beta_5 * CRP + \varepsilon_i \quad (1)$$

Where: Sw_Econ – The SE is the dependent variable; Independent variables: EVSi– Tax evasion; GDPi– Gross domestic product; IFi– Inflation; CRPi– Corruption; I_GINI(i) – GINI index, which is a statistical measure of inequality in the distribution of income or wealth in a country.

Table 2 shows how the dependent variable is determined in relation to correlation for the Summary model .

Table 2. Summary Model, N =50

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.737[a]	.543	.491	.713	1,632
a. Predictors: (Constant), CRP, I_GINI, EVS, IF, GDP					
b. Dependent Variable: Sw_Econ					

Source: SPSS

According to Table 2, R represents the correlation coefficient of 0.737, which indicates a positive and strong relationship between the predictors and the dependent variable (Sw_Econ). R squared indicates approximately 54.3% of the variation in Sw_Econ. The adjusted R-squared specifies the adjustment for predictors, with a high value of 0.491. Key factors include GDP, IF, I_GINI, EVS and CRP.

The data model is represented by the R-value, which ranges from 0 to 1. In Table 2, the R-value is 0.737. The R2value shows another measure of the overall fit of the data model. It is calculated by squaring the R-value and ranges from 0 to 1, with 1 indicating a perfect fit, having a value of 0.543. The adjusted R(2)-value is a version of the R(2)-value that assigns the number of predictor variables in the model. It is generally considered a more reliable measure of model fit than the R(2)value,with a value of 0.491.

Using the ANOVA test, the multiple linear model, with the SE as the dependent variable, is validated econometrically.

Table 3. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	26.614	5	5,323	10,462	.000[b]
	Residual	22,386	44	.509		
	Total	49,000	49			
a. Dependent Variable: Sw_Econ						
b. Predictors: (Constant), CRP, I_GINI, EVS, IF, GDP						

Source: SPSS

According to the data in Table 3, the values of the components of variation are as follows: the approximate explained variation is 26,614, the estimated residual variation is 22,386, and the estimated total variation is 49,000. The Fisher coefficient has a significant value of F = 10.462, and the Sig. value for the F test is below 0.05. Therefore, the model illustrates a significant dependence and a strong effect between Sw_Econ and I_GINI, I_GINI, CRP, CRP, and IF through multiple correlation. From a statistical perspective, if the significant value is below 0.05, the multiple linear regression model is confirmed with a 95% probability. The following table illustrates the model coefficients, with as the dependent variable.

Using the coefficients in Table 3, the following econometric equation is obtained:

The analysis of the results indicates the following order of influence on Sw_Econ: a 1% increase in corruption, keeping the other variables constant, causes an average increase of 0.490% in the UE, highlighting a positive relationship.

Table 4. Model coefficients, Dependent variable – Sw_Econ

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	-1.431E-16	.101		.000	1
	EVS	.088	.120	.088	.729	.470
	GDP	-.323	.149	-.323	-2,169	.036
	IF	.100	.107	.100	.932	.356
	I_GINI	.043	.104	.043	.414	.681
	CRP	.490	.153	.490	3,207	.003
a. Dependent Variable: Sw_Econ						

Source: SPSS

In contrast, a 1% increase in GDP generates an average decrease of 0.323% in Sw_Econ, indicating a negative correlation. The IF and EVS rates have positive effects on the dependent variable, with average increases of 0.100% and 0.088% respectively, while a 1% increase in I_GINI leads to a 0.490% increase in Sw_Econ.

The model also highlights the significant impact of the SE on macroeconomic indicators such as the GINI index, EVS, GDP, CRP and IF. The IE influences these variables through weak institutions, high tax pressure, lack of effective sanctions against tax fraud, high taxes and limited digitalization.

Table 5 provides data on significantly high residual values related to the SE. The lowest residual value recorded is -1.58192027 (Austria), and the maximum residual value is 1.16858268 (Romania). While Romania ranks last in terms of corruption, unfortunately, it ranks among the top countries analyzed in terms of the UE.

This high value of the IE in the first two years (2020-2022) is due to the pandemic and the crisis in Ukraine, followed by the main causes of increased fiscal pressure through high taxes and contributions, unstable unemployment, unjustified government spending and bureaucracy. These values vary in each country in terms of the SE system.

The diagram verifies the normality assumption of the regression model. It compares the observed cumulative distribution function of the uniform residual with the expected cumulative distribution function of the normal distribution. The P-P Plot diagram displays deviations from the predefined theoretical distribution, illustrating Henry's line (Figure 3).

Table 5. Residual Statistics, Dependent Variable: Sw_Econ

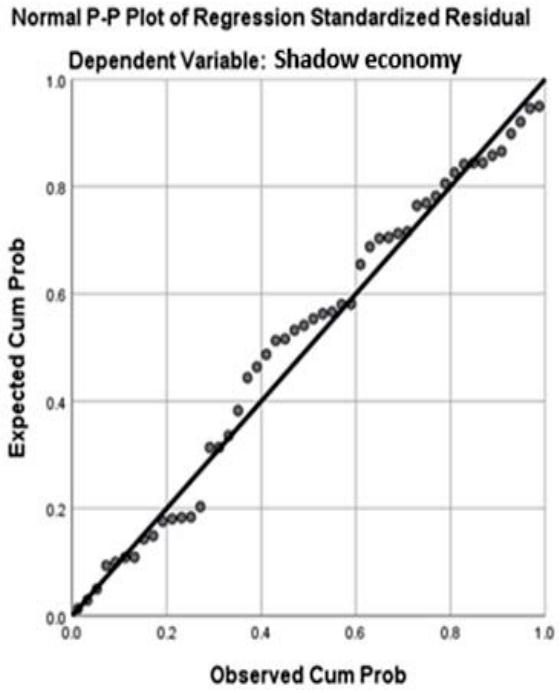
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-1.3230129	1.6646525	.000000	.73697977	5
Std. Predicted Value	-1.795	2.259	.	1	5
Standard Error of Predicted Value	.154	.390	.240	.059	50
Adjusted Predicted Value	-1.5400667	1.3528100	-.0202524	.73667457	5
Residual	-1.58192027	1.16858268	.000000	.67591480	5
Std. Residual	-2.218	1.638	.000	.948	50
Residual study	-2,412	1,860	.013	1,019	5
Deleted Residual	-1,871,334.43	1.50611508	.02025244	.78305216	5
Stud. Deleted Residual	-2.560	1,916	.009	1,036	50
Mahal. Distance	1,317	13,671	4,900	2,995	50
Cook's Distance	.000	.177	.028	.041	50
Centred Leverage Value	.027	.279	.100	.061	50

Source: SPSS

The histogram suggests that the SE is below expectations due to a decline in activity in the early years of 2020-2022, followed by a sharp increase in the period 2022-2024, with war and migration as the main factors.

The econometric results obtained confirm the existence of a significant link between corruption, the SE and the macroeconomic performance of the countries analyzed. The regression coefficient for corruption ($\beta = 0.490$, $p < 0.01$) indicates a positive and robust relationship between the perceived level of corruption and the size of the IE. This result validates Hypothesis 1 (H1) and is consistent with the conclusions of studies conducted by Bermúdez et al. (2024) and Mohamed et al. (2024), according to which corruption is a major structural determinant of informality. However, the impact is more pronounced in countries with low GDP per capita, such as Romania and Spain, which confirms the conditional nature of the relationship depending on the level of economic development.

Figure 3. P-P Plot Chart



Source: SPSS

Furthermore, the negative coefficient of GDP ($\beta = -0.323$, $p < 0.05$) suggests that economic growth has a discouraging effect on the expansion of the SE, partially validating Hypothesis 2 (H2). This result indicates that as formal economic activity intensifies and income levels rise, the motivation to participate in informal activities decreases. However, the IF effect, although positive ($\beta = 0.100$), is not statistically significant ($p = 0.356$), suggesting that price instability only marginally influences the SE in the current European context. This can be explained by the fact that the countries analyzed have well-established anti-inflationary mechanisms, and the behavioral effect of uncertainty is mitigated by fiscal and monetary policies.

With regard to Hypothesis 3 (H3), the positive but insignificant coefficient of I_GINI ($\beta = 0.043$, $p = 0.681$) suggests a weak relationship between inequality and the SE, only partially confirming the hypothesis regarding the role of institutional trust as a mediating factor. Indeed, countries with higher levels of trust in institutions, such as Denmark and Switzerland, exhibit low levels of the IE, but the direct effect of inequality on informality is marginal. This indicates an indirect influence of social equity, manifested through institutional mechanisms rather than income distribution itself, in line with the results obtained by Ha & Huyen (2022).

Residual analysis confirms the robustness of the econometric model and the absence of significant autocorrelation (Durbin–Watson = 1.632). The extreme values observed for Romania and Austria highlight the contrast between emerging and consolidated economies, emphasizing the role of governance quality and administrative capacity in controlling informality. From this perspective, the results support the approach that institutional reforms and fiscal digitalization (Mara, 2025; Bojan & Achim, 2025) are essential channels for reducing the SE in European states.

Overall, the model confirms the robustness of the proposed theoretical relationships: corruption remains the main determinant of the IE, while GDP and institutional quality act as moderating factors. Thus, hypotheses H1 and H2 are confirmed, and H3 is partially supported, requiring further investigation through the introduction of additional institutional variables (e.g., the level of fiscal digitization or government transparency indicators).

Conclusions

The study demonstrated, through a comparative econometric analysis applied to ten European countries between 2020 and 2024, the existence of significant interdependencies between corruption, the SE and TE. The results confirm that high levels of corruption stimulate the expansion of the IE, affecting macroeconomic performance and reducing the efficiency of public revenue collection. At the same time, GDP growth and strengthened fiscal governance are associated with a decline in the IE, highlighting the importance of policies geared towards sustainable growth and institutional transparency.

In practical terms, the study highlights the need to implement integrated strategies to combat corruption and TE by digitizing administrative processes, reducing bureaucracy and encouraging voluntary compliance. At the same time, increasing trust in institutions and strengthening social equity can have indirect positive effects on reducing the IE.

The main theoretical contribution of the research is the development of an integrated analytical framework that simultaneously captures the links between corruption, TE and the SE, providing an empirical basis for the development of public policies tailored to the specificities of each European economy. In the long term, future research directions may include expanding the sample to the European Union level, integrating tax digitization variables, and testing nonlinear models to capture threshold effects between the institutional and economic dimensions of informality.

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