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## Article

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Risks

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*Suggested Citation:* Ahmad, Bashir; Ciupac-Ulici, Maria; Beju, Daniela-Georgeta (2021) : Economic and non-economic variables affecting fraud in European Countries, Risks, ISSN 2227-9091, MDPI, Basel, Vol. 9, Iss. 6, pp. 1-17,  
<https://doi.org/10.3390/risks9060119>

This Version is available at:

<https://hdl.handle.net/10419/258205>

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## Article

# Economic and Non-Economic Variables Affecting Fraud in European Countries

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**Abstract:** Fraud is one of the most harmful phenomena, because it leads to collapse of organizations, causes economic downfall of countries, and destroys faith in a country's capital markets. The impact of fraud is complex and has varying degrees depending on political and financial institutional structures of a country. In this paper, we investigate the combined effect of economic and non-economic variables on fraud using a sample of 41 developed, in transition, and developing European countries. The data cover the period July 2014–December 2020. Panel data techniques of pooled estimation and the dynamic panel data/generalized method of moments (DPD/GMM) is used, keeping in view the endogeneity perspective. Nevertheless, two-way impacts of fixed effect model estimation—cross-sectional and time-based (panel) effects (alternatively)—are used for analyzing the relationship among the given variables, based on Hausman specification test results. Empirical results of panel data extended REM and FEM approaches with country-specific cross-sectional effects showing that political stability, economic freedom, poverty, and GDP significantly affect fraud proliferation. Political stability is appraised to be the most scoring determinant of fraud incidence in a country.

**Keywords:** fraud; corruption; business operational risk; economic freedom; gross domestic product; political stability; poverty; type of governance; inflation; unemployment



**Citation:** Ahmad, Bashir, Maria Ciupac-Ulici, and Daniela-Georgeta Beju. 2021. Economic and Non-Economic Variables Affecting Fraud in European Countries. *Risks* 9: 119. <https://doi.org/10.3390/risks9060119>

Academic Editor: Montserrat Guillén

Received: 26 April 2021

Accepted: 14 June 2021

Published: 17 June 2021

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## 1. Introduction

Fraud is a worldwide challenge that affects various types of economies and businesses, causing significant negative outcomes for companies, banking systems, and capital markets, as well as for the entire economy. Although during the last two decades an arsenal of instruments has been developed for businesses to fight against fraud, the techniques employed by the fraudsters have been equally sophisticated. Therefore, over the past twenty years, the total amount of fraudulent financial events committed at the international level has been evaluated at GBP 3.89 trillion (USD 5.127 trillion), with related losses rising by 56% since 2009. The global average rate of losses derived from fraud for the last two decades represents 6.05% of gross domestic product (GDP). Losses due to fraud in any company are estimated to account for 3% to 10% (Gee and Button 2019).

Given the fact that fraudulent actions are often unnoticed and seldom publicized, the estimation of the entire scale of overall losses poses serious difficulties. The real costs associated to fraud are potentially larger as there are indirect costs related to the damage to the credibility of investors, creditors, and employees and to the companies' reputation due to subsequent scandals; sometimes fraud can cause bankruptcy (Craja et al. 2020). Fraudulent activities may impact all types of business and sectors of the economy, although smaller companies (with maximum 100 personnel) and nonprofit organizations with fewer

resources to cover the losses caused by fraud and shortage of internal controls are more likely to be victims of fraud (ACFE 2020).

Fraud is considered an act of deception committed intentionally for personal interests or to produce a loss to another party (Directive (EU) 2017). Association of Certified Fraud Examiners (ACFE) reports three major categories of fraud, also called the Fraud Tree namely, asset misappropriation, corruption, and financial statement fraud. Asset misappropriations have the highest frequency but cause the smallest losses. By contrast, financial statement fraud is the least frequent but causes the largest damage. Corruption ranks in between, considering both the frequency and the financial costs (ACFE 2020). Each type of fraud has their own characteristics and there are numerous factors that trigger them. Therefore, detection and identification of the reasons behind fraud are crucial to prevent the financial losses caused to the economies and the welfare of masses.

The aim of this paper is to investigate the combined effect of six economic and two political variables on fraud in Europe using a sample of 41 developed, in transition, and developing countries between July 2014 and December 2020 based on panel data techniques. The paper is structured in six sections, as follows. Section 1 presents the concept of fraud, which is less studied in the financial literature. Section 2 reviews the economic literature regarding the theoretical background of the topic. Section 3 describes the general system model and corresponding assumptions. Section 4 discusses the empirical results including fixed and random effects. Section 5 includes some recommendations regarding the chosen variables from the methodology. The final section outlines the conclusions, limitations, and proposed further research.

## 2. Literature Review

The determinants of fraud are of a various nature, some of them are economic and other, non-economic. Economic literature has identified several economic variables that influence fraud, namely: GDP, consumer price index (CPI), operational risk, economic freedom, and poverty. Fraud has been also linked with some political factors, such as type of governance and political stability. Among socio-economic and demographic determinants of fraud highlighted by scientific research, gender, age, nationality, marital status, occupation, and urbanization are the most significant (Hartmann-Wendels et al. 2009; Xu et al. 2018; Luo et al. 2020). In the current context of the COVID-19 pandemic, technological changes have gained a much more important role in affecting financial fraudulent events (Karpoff 2021).

In a cross-country comparison Ali and Isse (2003) identified several factors that influence fraud and corruption, namely, education, political regime, foreign aid, ethnicity, judicial efficiency, political and economic freedom, and the size of government. Their research provided empirical support for a significant negative relation between corruption and judicial efficiency, economic freedom, and education and a significant positive link between corruption and size of government, and between corruption and foreign aid.

Ata and Arvas (2011) studied the determinants of corruption and fraud in 25 European markets. The factors considered as influencing corruption and fraud were economic growth, economic freedom, income distribution, and inflation. Economic growth was found to be a statistically insignificant factor of corruption, although in the period of economic boom, the increase in GDP per capita reduces corruption. High economic freedom is associated with a lower level of corruption, while inflation and income distribution are positively associated with corruption.

Performing an analysis on a sample of 56 developing economies, Turedi and Altiner (2016) detected several political and economic factors that affect fraud and corruption. Their investigation showed that economic factors, such as economic growth, trade openness, and economic freedom, are negatively correlated with corruption, whereas corruption is positively linked with inflation. Concerning political factors, namely, political stability and democracy, their study reported a negative relationship.

[Omid et al. \(2017\)](#) examined the joint impact of 6 economic and non-economic factors on fraud based on a sample of 60 developing countries during 1995–2010. Using the method of panel data, their empirical study indicated that some of the variables are positively associated with fraud (i.e., government size, inflation, share of service sector in GDP) and others negatively related to fraud (i.e., GDP, share of industrial sector in GDP). Democracy was found as insignificant in influencing fraud.

Fraud and corruption are strongly interconnected, representing a persistent problem of all countries that impacts financial and economic development. Corruption can be defined as the act of using public power to gain personal benefits ([Aidt 2003](#)). In economic literature, corruption is often associated with bribery for obtaining private advantages that may help businesses to avoid taxation and regulations or to obtain public contracts. Corruption activities frequently occur on a larger scale than direct practices of fraud and bribery. However, corruption is also linked with other forms of economic and financial crime, such as tax evasion, money laundering, and embezzlement ([Achim and Borlea 2020](#)). Corruption harms the development of financial and banking markets and, thus, influences economic growth. For example, [Song et al. \(2021\)](#) have revealed that financial development is negatively affected by corruption in both developed and developing countries. [Asteriou et al. \(2021\)](#) have observed that banking stability and profitability is negatively affected by corruption and transparency and positively influenced by economic freedom and regulation.

Most studies have focused on the impact of corruption and fraud on economic growth, while less research has investigated the impact of economic growth on corruption and fraud. Corruption has been identified to have a negative impact on investment ([Mauro 1995](#); [Ghalwash 2014](#)), company performance ([Blagojevic and Damijan 2013](#); [Sahakyan and Stiegert 2014](#)), firm innovation ([Goedhuys et al. 2016](#); [Bukari and Anaman 2020](#)), and economic development ([Djankov et al. 2002](#); [Aidt 2009](#); [Dreher and Schneider 2010](#); [Blackburn and Powell 2011](#); [Ghalwash 2014](#)). By contrast, a recent study has indicated that corporate corruption increases the profitability of privately held firms ([Ferris et al. 2021](#)). Moreover, several studies have provided empirical support for a positive bidirectional relation between economic growth and corruption in developing economies and a negative unidirectional relation between them in developed countries ([Okoye and Gbegi 2013](#); [Qureshi et al. 2021](#)). Consequently, corruption and fraud can both damage and sustain economic development.

Business operational risks in routine operations, involving internal and external fraud, system failures, and human errors are imminent, affecting the expected profit of the company. Expected losses caused by operational risk can be absorbed as an ongoing fixed cost and managed via internal controls, but unexpected losses should be covered through capital allocation ([Jorion 2003](#)). Therefore, the cost of fraud in banking systems can be assessed in terms of capital allocation needed to cover the unexpected losses ([Urbina and Guillen 2014](#)). The complexity of business in the banking system has increased operational risk, particularly for banks that are subject to strict regulations, and managerial failure of these institutions has offset the gains of strategic risk taking ([Chernobai et al. 2021](#)).

Investment decisions are based on companies' financial statements. To raise more capital by attracting new investors, many companies manipulate their financial statements ([Chen et al. 2019](#)). Fraudulent financial reports have caused significant losses to shareholders in both developed countries ([Cotton 2002](#); [Dibra 2016](#)) and emerging economies ([Li and Wu 2007](#); [Jia et al. 2009](#); [Li and Wu 2010](#)). Analyzing specific elements of corporate governance, several studies have provided empirical support for a positive relationship between the weak corporate governance of firms and financial fraudulent actions ([Beasley 1996](#); [Farber 2005](#); [Chen et al. 2006](#); [Rezaee and Kedia 2012](#); [Yang et al. 2017](#); [Gam et al. 2021](#)).

Economic freedom of a country influences the impact of corruption on economic growth, operating as a mediator between them. Corruption harms economic development in nations with a higher level of economic freedom and supports economic growth

in nations with a lower level of economic freedom (Malanski and Santos Pova 2021). Higher economic freedom reduces the level of corruption and fraud (Ali and Isse 2003; Saha et al. 2009; Ata and Arvas 2011; Saha and Su 2012; Turedi and Altiner 2016).

Economic development of a country has an important impact on fraud, with several studies showing a negative relation between them (Turedi and Altiner 2016; Omid et al. 2017; Achim et al. 2018). Moreover, in an adverse economic environment, fraudulent activities are likely to increase, as in a recession people's income decreases and companies' financial resources for managing and investigating fraud are scarce (Gill 2011). However, some research has provided empirical support for a positive relation between these two indicators, particularly for developing economies (Saha and Gounder 2013; Wang 2016; Ondo 2017). The countries with a higher GDP are less corrupt than those with a lower GDP, but countries with a medium level of GDP are identified to be more corrupt than nations with a lower level of GDP (Saha and Gounder 2013). Nevertheless, the relation between fraud and GDP seems to be reciprocal, with some studies indicating that the eradication of fraud can favor economic growth of developing countries (Magtulis and Park 2017).

Political stability is related by economic literature to economic growth. Most studies emphasize that an unstable political regime generates lower rates of economic growth compared with more stable ones. Thus, policy uncertainty should be prevented because it is significantly negatively correlated with economic development (Ali 2001). Various aspects of political stability have been analyzed in connection with corruption and fraud (Nur-tegin and Czap 2012; Schumacher 2013; Turedi and Altiner 2016; Farzane-gan and Witthuhn 2017). It has been observed that political stability and democracy are negatively correlated with corruption (Nur-tegin and Czap 2012; Schumacher 2013; Turedi and Altiner 2016).

Poverty is one of the most important problems that concern developing countries. While there exists vast literature on the relation between poverty and economic growth, most surveys suggest a positive relation between these two variables (Rodriguez 2018), and there are fewer studies focusing on the link between poverty and corruption and fraud. Poorer persons are much more susceptible to be victims of corruption and be pressed to pay bribes to government bureaucrats (Justesen and Bjornskov 2014). The level of income can explain the cross-country differences in the level corruption. As countries become rich, corruption would disappear and there would be a shift from poverty to honesty (Gundlach and Paldam 2009). The risk of poverty and the financial deterioration experienced by the population increases corruption, while strong social conditions may reduce it (Bosco 2016), suggesting the presence of a positive relation between poverty and corruption. The link between them can also be interpreted from the inverse direction, as some studies have highlighted that corruption aggravates poverty (Khan and Pillay 2019).

The type of a country's governance plays an essential role in the magnitude of a country's fraud. Economic growth (Acemoglu et al. 2001) and development of banking and capital markets (La Porta et al. 1997, 2006; Djankov et al. 2007) are positively influenced by the quality of a country's institutions. The quality of public governance is linked with a lower predilection toward committing fraud (Achim et al. 2018). Particularly, a weak institutional framework could help higher-ranking officials to execute bureaucratic-business conniving corruption crime (Liu 2020). More restrictive regulatory reforms are likely to reduce the frequency of fraud (Choi et al. 2020). The regulatory regime implemented in a country can affect the reputational cost suffered by the sanctioned fraudulent companies (Zhu 2020). Moreover, country governance judged in terms of control of corruption, rule of law, quality of regulations, and efficiency of government is positively associated with recovery of losses caused by fraud, while political stability and democracy principles have insignificant effect on this (Curti and Mihov 2018). The ability of government to design and apply sound policies can have a substantial influence on fraud losses, but political stability of a country plays a less significant role in mitigating the losses associated to fraud. The type of the political regime can work as a moderator in the relation between economic growth and corruption, with a positive association existing between them in autocracies;



a relation that is not valid in the case of democracies (Saha and Sen 2021). Democratic economies can adopt some anti-corruption mechanism and elements that reduce corruption (Kubbe and Engelbert 2018).

Inflation is a harmful phenomenon that can destabilize an entire economy, discouraging investments and economic growth and redistributing wealth. Inflation has been analyzed in relationship with corruption and fraudulent activities, with most studies suggesting the existence of a positive relation between inflation and corruption or fraud (Al-Marhubi 2000; Ata and Arvas 2011; Turedi and Altiner 2016; Omid et al. 2017). Other studies have analyzed the impact of corruption on inflation, indicating a positive relationship between them (Blackburn and Powell 2011; Samimi and Abedini 2012; Ayodeji 2020), although there is research that has suggested that fraud and financial crime have no significant impact on inflation (Okoye and Gbegi 2013). Nevertheless, there exists empirical support for a bidirectional positive link between them, since an increase in prices can be motivation for corruption, but corruption can also lead to an increase in the demand for goods, thus pushing prices even higher (Young 1992).

Unemployment and financial criminality are two major social and economic challenges since they can negatively influence welfare and prosperity of all organizations and citizens. Literature on this issue has focused mainly on the influence of corruption and financial criminality on unemployment, emphasizing that the corruption has a statistically significant negative impact on employment (Cooray and Dzhumashev 2018). Corruption and the failure to eradicate it contribute significantly to the amplification of unemployment (Khan and Pillay 2019; Lim 2019). It has also been noticed that there exists a positive relation between corruption practices of paying bribes and the unemployment rate among youth and educated job applicants, who in turn continue to support these illegal practices (Bouazid 2016). The impact of unemployment on corruption and fraudulent activities has received less interest in economic research, yet there are a few studies on this topic. During the periods of economic contraction, unemployment has a significant positive impact on crime, while crime rates decrease in periods of economic expansion (Jawadi et al. 2021).

### 3. Methodology Research and Data

The financial literature is vast regarding the impact of corruption on various economic and non-economic variables, or the impact of different economic and non-economic variables on corruption, which is an important component of fraud. However, there are few papers that analyze fraud as a dependent or independent variable. Thus, this paper analyzes the impact of eight variables on fraud. The originality of our research consists in choosing fraud as a dependent variable and including less studied variables in the empirical model, i.e., political stability, poverty, and unemployment.

#### 3.1. Defining the Variables

This study focuses only on European economies during the period July 2014–December 2020. The sample includes 41 countries, and all data were collected monthly from Eikon and Eurostat databases. According to the United Nations (2021) classification, which indicates the basic economic country conditions, the countries included in our study are:

- Thirty-one developed countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.
- Nine countries in transition (16): Albania, Armenia, Bosnia and Herzegovina, Moldova, Montenegro, Kosovo, Serbia, Ukraine, Russia.
- One developing country: Turkey.

The research includes fraud, the dependent variable, and eight independent variables, of which five are economic, namely, business operational risk, economic freedom, GDP, inflation, and unemployment, and three are non-economic, namely, poverty, type

of governance, and political stability. The definitions of these variables are taken from [Refinitiv \(2020\)](#) and are as follows.

Fraud represents the total recorded fraud in both financial services and corporate multinationals. It also measures internet fraud.

Business operational risk provides ratings of countries in terms of the probability of business loss occurring from the internal inadequacies of a country or a breakdown in the country's controls, operations, or procedures—in particular, in terms of tax transparency and exchange of information.

Economic freedom analyzes the positive relationship between economic freedom and different economic and social goals. The ideals of this indicator are associated with greater per capita wealth, healthier societies, poverty elimination, human development, cleaner environments, and democracy. Economic freedom is the fundamental right of every human to control his or her own labor and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they choose. In economically free societies, governments allow labor, capital, and goods to move freely, and refrain from coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself.

Gross domestic product represents the sum of value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation output, calculated without making deductions for depreciation of fabricated capital assets or for depletion and degradation of natural resources.

Political stability measures the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism. Furthermore, it evaluates political interferences, political violence, supply chain disruptions, and other related risks that threaten the stability of the jurisdiction's government.

Poverty shows national estimates of the percentage of the population falling below the poverty line based upon surveys of sub-groups.

Type of governance analyzes the development and transformation process towards democracy and market economy in international comparisons, as well as examining associated qualities of democratic and autocratic authorities in governing institutions.

Consumer price index is a measure of the average change over time in the prices of consumer items—goods and services that people buy for day-to-day living. The quantity and quality of these items are kept essentially unchanged between major revisions so that only price changes will be measured. All taxes directly associated with the purchase and use of items are included in the index.

Unemployment rate represents a percent of the civilian labor force.

### 3.2. Methodology Research

The typical regression static panel data of our study can be presented as follows:

$$X_{it} = \alpha + \sum_{j=1}^k \beta_j Y_{jit} + v_{it}, \quad j = 1, \dots, k$$

where  $X_{it}$  is the dependent variable and  $Y_{jit}$  is the matrix set of independent variables/regressors,  $v_{it}$  is the composite error term which constitutes the vector of two-order impacts together—specific effects and the residue of error term. Henceforth, we will refer to 'i' as set of individual observations (regressors) used over time 't' implied to 'j' set of different countries. Further, there are two sets of specific effects—the individual (regressors)-specific effects and time-specific effects. The following equations show the decomposition of  $v_{it}$  into one-way and two-way error components. In one case, one set of specific effects is included in the regression, and is referred to as the one-way error components model. On

the contrary, both sets of specific effects (if included together) are referred to as the two-way error components model.

$$v_{it} = u_i + \delta_{it}$$

$$v_{it} = \theta_t + \delta_{it}$$

$$v_{it} = u_i + \theta_t + \delta_{it}$$

In the decomposed  $v_{it}$ , the term  $u_i$  denotes the unobserved individual effects for each country, while the term  $\theta_t$  denotes time-specific effects.

Panel data analysis was used as the econometric/statistical technique for estimating the effect of different factors on fraud in different European countries. The relationship between regressors and regressed variable is given below as follows:

$$Fra = \alpha + \beta_1 bus + \beta_2 fre + \beta_3 gdp + \beta_4 sta + \beta_5 pov + \beta_6 typ + \beta_7 cpi + \beta_8 une + u_{it}$$

where:

$fra$  = Fraud

$bus$  = Business Operational Risk

$fre$  = Economic Freedom

$gdp$  = Gross Domestic Product

$sta$  = Political Stability

$pov$  = Poverty

$typ$  = Type of Governance

$cpi$  = Consumer Price Index

$une$  = Unemployment Rate

$\alpha$  = Intercept

$\beta_i$  = Coefficients of  $i$  Variables

$u_{it}$  = Error term

#### 4. Results and Discussion

In order to start, the pooled regression was applied, estimating the (given above) specified model of the study using the OLS technique for panel data with no effects (period and cross sectional).

The pooled regression was employed based on the assumption that the model's matrix set of explanatory variables ( $Y_{jit}$ ) carries uniform characteristics across countries and time, treating the unobserved specific effects of  $u_i$  and  $\theta_t$  as redundant and all the observations for all time periods to have a unique (same) intercept for across the countries.

Table 1 shows that even at 1% probability value, there exists a statistically significant relationship between all the explanatory variables (economic freedom, political stability, business operational risks, poverty, type of governance and consumer price index, and gross domestic product) with fraud (as the dependent variable), except unemployment. From the statistically significant relationships, it can be noticed that political stability is negatively linked with fraud, as politically stable countries are less corrupt and therefore experience fewer fraud cases.

These results are promising and in line with theory and general evidence. Nevertheless, as stated above, common effect (PSL) estimates ignore the unobserved specific effects of  $u_i$  and  $\theta_t$ . Ignoring these effects when they are significant yields inefficient estimates and biased standard errors. Thus, the pooled panel data regression results may encounter the problem of correlation of explanatory variables ( $Y_{jit}$ ) with the unobserved specific effects and the shocks from the remainder/residue of the disturbance term. Further, the possibility of endogeneity in case of PSL can result in simultaneity biases. Moreover, in fixed and random effect models, it is not only the intercept and error variance that changes for the units, but also the slopes of coefficients remain constant. The poolability (common effect model estimation) should be checked if the slopes remain homogenous for the coefficients across the countries over time (Baltagi 2001).



**Table 1.** Common effect (PLS)—pooled panel data estimation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BUS	0.093152	0.029274	3.182046	0.0015 *
FRE	0.277912	0.033473	8.302649	0.0000 *
GDP	0.124823	0.033303	3.748104	0.0002 *
STA	−0.909445	0.033118	−27.46056	0.0000 *
POV	0.277904	0.022726	12.22844	0.0000 *
TYP	0.695711	0.039355	17.67786	0.0000 *
CPI	0.207582	0.055159	3.763366	0.0002 *
UNE	0.007352	0.006632	1.108533	0.2677

Note: \*  $p < 0.01$ .

To overcome these problems, the contrary fixed effect model may be used to transform the model in order to eliminate the unobserved effect, resulting in efficient and unbiased estimates. Nevertheless, in fixed effects panel data models, the number of parameters is excessively high and may result in loss of degrees of freedom. In addition, the given panel model assumes the error term  $v_{it}$  to be random, independent, and identically distributed with 0 mean and  $\sigma_v$  standard deviation ( $v_{it} \sim 0, \sigma_v$ ), and  $\delta_{it}$  is also identically distributed with 0 mean and  $\sigma_\delta$  standard deviation ( $\delta_{it} \sim 0, \sigma_\delta$ ) and independent of the random term  $v_{it}$ . In such a scenario, applying the random effect model, as per theory and literature, seems to produce more accurate estimated results.

#### 4.1. Lagrange Multiplier Test (LM)

In the first instance, the Lagrange multiplier test (LM) was used to determine whether the random effect model was better than the pooled technique of the common effect (PLS) method to be used.

The LM test, under all its five criteria, namely, Breusch–Pagan, Honda, King–Wu, Standardized Honda, and Standardized King–Wu, rejects the null hypothesis for cross-section effects, time test hypotheses, and combined cross section and times series.

According to Table 2, the  $p$ -value was 0.000 ( $p < 0.05$ ), we accepted the alternative hypothesis that REM be used for capturing the time variant and cross-section variant changes in slopes of the coefficients of regressors. The random effect model eliminates the problem of unobserved heterogeneity bias by assuming the set of explanatory variables ( $Y_{jit}$ ) as exogenous and independent of  $\delta_{it}$  and the specific effects of  $u_i$  and  $\theta_t$ . Further, the random effect model (REM) can calculate the individual intercept specified for each country exclusively and solve the problem of one intercept across all the countries.

**Table 2.** LM test—RE (together).

	Cross-Section	Time	Both
Breusch–Pagan	33,683.32 (0.0000) *	86.40822 (0.0000) *	33,769.73 (0.0000) *
Honda	183.5302 (0.0000) *	9.295602 (0.0000) *	136.3484 (0.0000) *
King–Wu	183.5302 (0.0000) *	9.295602 (0.0000) *	154.3233 (0.0000) *
Standardized Honda	198.4818 (0.0000) *	9.463482 (0.0000) *	135.5343 (0.0000) *
Standardized King–Wu	198.4818 (0.0000) *	9.463482 (0.0000) *	156.3934 (0.0000) *
Gourieroux et al.	—	—	33,769.73 (0.0000) *

Note: \*  $p < 0.10$ .

#### 4.2. Random Effect Model

All LM test criteria—Breusch–Pagan, King–Wu, Honda, Standardized Honda, and Standardized King–Wu—suggest statistical significance of coefficient variability for both cross section and period (time). Thus, applying the REM procedure, two-way random effects—both cross-sectional and period effects—on the intercept were calculated. Cross-sectional effects (CS) were taken as random, in case of random effects for cross-sectional (CS) specification, keeping the period (time) format impactive (no effect) and vice-versa.

##### i. Random effect model—with CS impact

Calculating the random effect of cross-sectional (CS) effect, the random effect model (REM) was initially estimated for cross-sectional (CS) specification, where CS was taken as random, keeping the period (time) format impactive (no effect).

Transformation was applied based on this nonrandom part of error—error GLS (EGLS). The intercept from Table 3 shows the mean of the intercept of all 41 countries for 78 observations.

**Table 3.** Random effect model—panel EGLS (CS random).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.613364	0.795728	8.311091	0.0000 *
BUS	0.039366	0.033634	1.170430	0.2419
FRE	0.394230	0.070708	5.575491	0.0000 *
GDP	−0.297979	0.086400	−3.448833	0.0006 *
STA	−0.441504	0.049525	−8.914798	0.0000 *
POV	0.081837	0.049899	1.640057	0.1011 *
TYP	−0.011967	0.053867	−0.222165	0.8242
CPI	0.056765	0.038214	1.485452	0.1375
UNE	0.008353	0.004429	1.885723	0.0594 **
Effect Specification			S.D.	Rho
Cross-section random			1.290022	0.4436
Idiosyncratic random			1.444666	0.5564

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ .

##### ii. Random effect model—with period impact

Next, calculations were performed for random effect of period (time) in REM, applying the period effect to be random and keeping the cross-section effect to be impactive (no-effect).

Individual time effect for the time specific intercept in REM can be inferred from the above results. As it is known, in case of no random effect, the variance of the random term is zero ( $\sigma_v^2 = 0$ ) and the term  $\beta$  is also equal to zero, reducing the main panel data model to:

$$\sum_{j=1}^k \beta_j (Y_{jit} - \beta \bar{Y}_{ji.}) = (X_{it} - \beta \bar{X}_{i.}) - (\delta_{it} - \beta \bar{\delta}_{i.})$$

where

$$\beta = 1 - (\sigma_\delta^2) / (T\sigma_v^2 + \sigma_\delta^2)$$

In such situations, the procedure of pool estimation can be adopted for analysis, or the fixed effect model can be used for regression of panel data.

The suitability of the fixed effect panel data model for estimation can be determined by using the F-test and Hausman test to establish that the time (panel)-based effects and cross-sectional-based common effects are random in nature and not correlated with the set of the explanatory variables  $Y_{jit}$ . The rejection of the null hypothesis advocates for the application of the fixed effect model for estimation and supports that the specific effects (linked) are taken by the fixed effect model in a better manner. The outcomes are offered in Table 4.

**Table 4.** Random effect model—panel EGLS (period random).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.717051	0.245321	35.53326	0.0000 *
BUS	−0.006068	0.024357	−0.249131	0.8033
FRE	−0.153632	0.030171	−5.092018	0.0000 *
GDP	−0.006222	0.027773	−0.224027	0.8228
STA	−0.387612	0.031062	−12.47847	0.0000 *
POV	−0.125868	0.021952	−5.733894	0.0000 *
TYP	0.126208	0.036275	3.479169	0.0005 *
CPI	0.006774	0.046145	0.146799	0.8833
UNE	0.006886	0.005516	1.248375	0.2120
Effect Specification			S.D.	Rho
Period random			0.085847	0.0023
Idiosyncratic random			1.802889	0.9977

Note: \*  $p < 0.10$ .

#### 4.3. Random Effect vs. Fixed Effect

The Hausman test was applied to decide between the two obvious choices of estimation in panel data—the fixed effect model and the random effect model estimation—as ascendancy of the random effect model to the pooled common effect (PLS) estimation was already established and intact in the preceding analysis, through all criteria of the LM test at the 5%  $p$ -value.

In other words, the LM test decided that the random effect model estimation is preferred over the pooled common effect procedure. Nevertheless, the Hausman test was applied to choose between the FEM and REM as the preferred estimation technique.

The null hypothesis based on our random effect outcome was that REM was comparatively a more appropriate estimation technique in comparison to FEM. If the  $p$ -value was higher than 0.05, the null hypothesis was accepted; otherwise, it was rejected, and FEM was considered to be more appropriate.

##### i. Correlated RE Hausman test—CS measures

The results from Table 5 show that the  $p$  value was 0.0388 ( $p < 0.05$ ), so the null hypothesis was rejected, and the random effect model was disapproved. Again, when the same Hausman test was repeated by considering the cross period (time) random effect, the following results were obtained. Table 6 presents the obtained results.

**Table 5.** Correlated—cross section RE Hausman test.

Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
CS random	16.262270		8	0.0388 **
Cross Section RE Test Comparisons				
Variable	Fixed	Random	Var (Diff.)	Prob.
BUS	0.035789	0.039366	0.000052	0.6192
FRE	0.481293	0.394230	0.000809	0.0022
GDP	−0.377600	−0.297979	0.004023	0.2093
STA	−0.444217	−0.441504	0.000257	0.8656
POV	0.109066	0.081837	0.000363	0.1529
TYP	−0.017354	−0.011967	0.000250	0.7332
CPI	0.059816	0.056765	0.000004	0.1422
UNE	0.008419	0.008353	0.000000	0.5714

Note: \*\*  $p < 0.05$ .

**Table 6.** Correlated—cross period (time) RE Hausman test.

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	
Period random	206.797424	8	0.0000 *	
Cross Section RE Test Comparisons				
Variable	Fixed	Random	Var (Diff.)	Prob.
BUS	−0.004798	−0.006068	0.000007	0.6395
FRE	−0.208242	−0.153632	0.000017	0.0000
GDP	0.008580	−0.006222	0.000007	0.0000
STA	−0.384546	−0.387612	0.000009	0.3188
POV	−0.122761	−0.125868	0.000000	0.0000
TYP	0.139573	0.126208	0.000010	0.0000
CPI	−0.020009	0.006774	0.000276	0.1068
UNE	0.003010	0.006886	0.000005	0.0936

Note: \*  $p < 0.10$ .

#### ii. Correlated RE Hausman test—period (time) measures

Again, the  $p$  value was 0.0000 ( $p < 0.05$ ) and we rejected the null hypothesis, and the random effect model suitability was disapproved by both criteria.

#### 4.4. Fixed Effect Model

##### i. Fixed effect model—CS fixed dummy variables

The fixed effect model was applied for the cross-section effect to be fixed, initially keeping the cross-section effect to be impassive (no effect), and the following results were concluded in Table 7.

**Table 7.** Fixed effect model (FEM)—CS fixed (dummy variables).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.455888	1.016059	6.353851	0.0000 *
BUS	0.035789	0.034395	1.040519	0.2982
FRE	0.481293	0.076213	6.315124	0.0000 *
GDP	−0.377600	0.107181	−3.523023	0.0004 *
STA	−0.444217	0.052053	−8.534017	0.0000 *
POV	0.109066	0.053412	2.041970	0.0412 **
TYP	−0.017354	0.056136	−0.309135	0.7572
CPI	0.059816	0.038270	1.562974	0.1182
UNE	0.008419	0.004431	1.900024	0.0575 **

Note: \*  $p < 0.01$ , \*\*  $p < 0.05$ .

The intercept of each country can be calculated separately by dividing the overall intercept in the table (when the cross-section effect was applied to be fixed and the cross-section effect was made to be placebo).

##### ii. Fixed effect model—period fixed dummy variables

Following the cross-sectional effects fixed model of fixed effects, the FEM model was repeated for estimation of the intercept and coefficients for regressors while applying period (time) effects as fixed, keeping the period (time) to be impassive (none) as follows in Table 8.

**Table 8.** Fixed effect model (FEM)—period fixed (dummy variables).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.858327	0.245864	36.02941	0.0000 *
BUS	−0.004798	0.024507	−0.195787	0.8448
FRE	−0.208242	0.030454	−6.837994	0.0000 *
GDP	0.008580	0.027903	0.307499	0.7585
STA	−0.384546	0.031214	−12.31952	0.0000 *
POV	−0.122761	0.021962	−5.589749	0.0000 *
TYP	0.139573	0.036411	3.833278	0.0001 *
CPI	−0.020009	0.049043	−0.407988	0.6833
UNE	0.003010	0.005980	0.503272	0.6148

Note: \*  $p < 0.01$ .

### iii. Fixed effect model—both, CS fixed, and period fixed (dummy variables)

Finally, the exercise was repeated to calculate FEM estimated, applying both the cross-sectional effects and period (time) fixed effects. The results are shown in Table 9.

**Table 9.** Fixed effect model (FEM)—CS fixed + period fixed (dummy variables).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.526431	1.001116	9.515811	0.0000 *
BUS	0.058808	0.033243	1.769014	0.0770 ***
FRE	−0.149224	0.081578	−1.829231	0.0675 ***
GDP	−0.240126	0.109615	−2.190626	0.0286 **
STA	−0.409813	0.050309	−8.145848	0.0000 *
POV	0.169327	0.050752	3.336373	0.0009 *
TYP	−0.043821	0.053501	−0.819071	0.4128
CPI	0.039922	0.038930	1.025458	0.3052
UNE	0.003614	0.004581	0.788950	0.4302

Note: \*  $p < 0.01$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.10$

To summarize, the analysis of the panel data for the given variables and random effect estimation procedure, both for cross-sectional and time-based effects, were implied in the light of the LM test, which prefers the random effect model to the common effect (PLS) estimation as the technique of estimation. Nevertheless, when comparison between the fixed effect and the random effect model were made, the Hausman test prefers the fixed effect model to be more suitable for data under study.

To elaborate, there must be a clear understanding of the model effects in the countries and between the countries for the given set of explanatory variables ( $Y_{jit}$ ) so that the omitted bias of variables generated by the correlation between higher residuals and a lower (level) covariant can be elucidated. In this context, many articles challenged the default implications of fixed effects (FE) modeling even if the Hausman test suggests its appropriateness for time series/cross-sectional data and panel data analysis.

Thus, literature on the subject advocates that random effect models are more flexible, have better generalization ability, and prove to be a better choice. Given this formulation of Mundlak's (1978) technique, the random effect model becomes a superior choice as it can estimate all the variables that the fixed effect model can evaluate. On the face of the above discussion, we used both the fixed and random effect models along with the common effect pool data analysis to avoid unnecessary controversy.

The results were tested for heterogeneity and autocorrelation (Durbin–Watson test value was higher than 2) and found to have no statistical problem. Most of the results are in line with the literature and provide enough new insight on the subject for a focused policy direction to rectify many financial and non-financial disparities in the contemporary world.

The study uses the common effect pooled technique along with the fixed effect and random effect models for cross-sectional effects and period (time) effects. Keeping the



cross-sectional and panel effect off, and assuming the same intercept for all the countries, the pooled common effect estimation results show that economic freedom, political stability, poverty, business operational risk, type of governance, gross domestic product, and inflation have a significant impact on fraud at a  $p$ -value of less than the 5% level.

In response to one unit improvement in economic freedom, there is a statistically significant impact of 27% on fraud, again 27% in the case of an increase in poverty (Bosco 2016 found also a positive relation), a negative 90% in response to political stability (most studies identified a negative relationship, such as Nur-tegin and Czap 2012; Schumacher 2013; Turedi and Altiner 2016), 69% in the case of type of government (Achim et al. 2018), a huge 20% in the case of inflation (positive relation between inflation and corruption or fraud was also found by Al-Marhubi 2000; Ata and Arvas 2011; Turedi and Altiner 2016; Omid et al. 2017), 20% in the case of gross domestic product, and 9% in the case of business operational risk (this relation was also obtained by Saha and Gounder 2013; Wang 2016; Ondo 2017).

In the case of the random effect model (for cross-sectional effects), where the Durbin–Watson model ensures no auto-correlation problem and the F statistic is equal to 0.0000, the same regressors were obtained (as in the case of the common effect model estimation) to be significant at the 5% level, except for the business operational risk, type of the governance, inflation, and unemployment. Poverty was insignificant at 5% but almost significant at a  $p$ -value of 10%. Again, at the  $p$ -value of 5%, political stability had a huge 44% impact to decline fraud, scams, and corruption and indicates interesting policy recommendations. The same random effect model (REM), when repeated for panel random effects, proved all those variables to be significant when REM was computed with cross-sectional random effects, except for GDP and type of the governance. This finding is in line with the results of Ata and Arvas (2011).

Finally, the fixed effects model, when repeated for cross-section fixed (dummy variables), period fixed (dummy variables), and both for cross-sectional fixed and period fixed effects (simultaneously) results in more or less identical values and is consistent with the outcomes of PSL and REM. Unemployment rate (Une) has two regressors which remained statistically insignificant at the 5%  $p$ -value in the case of all the panel data estimated techniques, including common effects (PSL), fixed effect model (FEM), and REM. This indicates that most of the fraud and corruption incidents are constant when there is engagement of malefactors in government and private offices. Our results indicate a positive, but insignificant impact, while Jawadi et al. (2021) obtain a significant impact at the 1% level on corruption. One explanation may be that our research analyzes fraud, while corruption represents an important component of fraud.

## 5. Conclusions

The concept of fraud is not new in financial and nonfinancial circles. However, recently the issue has become increasingly important as incidence of fraud has led to financial crises and corruption in certain countries, causing notable damage to their economies and business organization.

In this paper, we investigated the combined effect of eight variables on fraud in 41 developed, in transition, and developing countries from Europe between July 2014 and December 2020. Our empirical results of panel data extended REM and FEM approaches with country-specific cross-sectional effects, showing that political stability, economic freedom, poverty, and GDP significantly affect the level of fraud.

Among the factors this article has scrutinized, political stability was analyzed to be the most significant element in explaining the large number of fraud incidences in a country.

In response to one unit enhancement in political stability, 90% reduction in fraud prevalence was observed in pooled PLS (common factor) estimates, while 44% decline in fraud was witnessed in both REM and FEM models when cross-sectional effects were studied. Political instability is a condition that demoralizes public in general, and investors in particular; it results in stock market crashes and impedes every convention of positive

change, affecting the country's prosperity. Invention and innovation play a less significant role, brain drains become the norm, and capital spills out of the country. Political instability does not only affect businesses negatively but also compromises its cultural and institutional heritage. Political institutions and law and order become volatile, rendering an improved future and better opportunities a distant reality.

The second most important factor influencing the fraud in our analysis is economic freedom. An improvement of one unit in economic freedom leads to an increase of 27% in fraud frequency, as it is noticed in pooled PLS (common factor) estimates, whereas a 39% increase in fraud is seen in both REM and FEM models when cross-sectional effects were considered. Economic freedom opens new horizons and opportunities for organizations and people and ameliorates economic welfare in a globalized world, where capital and goods movements are becoming easy and available at low cost.

Further, the analysis illustrates a direct correlation between fraud and incidence of poverty, as in line with the research of [Kelly \(2000\)](#) and [Block and Heineke \(1975\)](#), which investigated the link between criminality and poverty. An essential aspect judged in this context, as explained by [Becker \(1968\)](#) in his economic theory of crime, is that crime is committed only when the gains from it exceeds its costs. Our study has indicated that a rise of one unit in poverty causes an increase of 27% in the level of fraud, such as it was revealed by the pooled PLS (common factor) estimates, while an 11% growth in fraud was shown in both REM and FEM models when cross-sectional effects were introduced.

Finally, GDP was the last major factor affecting fraud in our empirical investigation. In response to one unit increase in GDP, 12% expansion in fraud occurrences was detected in pooled PLS (common factor) estimates, whereas a 37% decline in fraud is reported in both REM and FEM models when cross-sectional effects were examined. Fragile economic growth generates low income for people and low financial resources for entities. Financial difficulties increase the probability and the number of fraudulent activities committed by entities to achieve their goals and by the population to satisfy their personal economic needs. Measures are needed to combat fraud by ensuring equal distribution of wealth and making huge penalties for persons convicted of fraud practices. As [Rose-Ackerman \(1999\)](#) quoted, it is not only important for the criminal law to search for fraudulent actions but also assurance of integrity in punishing high officials.

The range of risks is not only limited to corruption and money laundering, but new type of fraud can threaten organizations' survival. Thus, the leading organizations around the world should respond to fraud occurrences through amplified supervisory mechanisms to avoid financial damage. In this context, a mechanism in the code of conduct should be formed, where proper reporting of suspected fraudulent cases would have a well-timed procedure to be communicated. Further, the government representatives, executives, and legislators, at a national level, and senior management and board of directors, at an organizational level, should promote ethical standards and formulate national strategies and policies pertinent to prevent fraud in operational procedures. This may reduce companies' additional costs of fraud and ensure economic prosperity, increasing welfare of people around the globe.

The findings obtained in this paper must be seen in light of some limitations. One limitation is that the sample includes only European countries. In our forthcoming research, we intend to extend the model to (groups of) countries from other regions of the world. The second limitation consists of not dividing the sample into groups of developed, in transition, and developing countries, since the economic literature indicates different impacts of analyzed variables on fraud in different types of countries; it is known that fraud has a higher level in in transition and developing countries than in developed countries. Another limitation refers to the fact that the selected variables are economic and non-economic; therefore, we plan to include socio-economic and demographic variables in the upcoming studies.

**Author Contributions:** Conceptualization, B.A., M.C.-U. and D.-G.B.; methodology, B.A.; software, B.A.; validation, B.A., M.C.-U. and D.-G.B.; formal analysis, B.A. and M.C.-U.; investigation, M.C.-U. and D.-G.B.; resources, M.C.-U. and D.-G.B.; data curation, M.C.-U. and D.-G.B.; writing—original draft preparation, B.A., M.C.-U. and D.-G.B.; project administration, D.-G.B.; funding acquisition, B.A., M.C.-U. and D.-G.B. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not Applicable.

**Informed Consent Statement:** Not Applicable.

**Data Availability Statement:** Available upon request.

**Conflicts of Interest:** The authors declare no conflict of interest.

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