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ESG SPILLOVER AND VOLATILITY

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Abstract. This study investigates the spillover effects of ESG scores from companies operating in the same industry and their impact on stock return volatility. For this purpose, I considered a sample of European listed companies from 2019 to 2022. The results provide evidence of a spillover effect of ESG scores on the ESG ratings of other companies belonging to the same industry. Furthermore, I observed direct spillover effects of the individual Environmental, Social and Governance pillars, with similar magnitudes. I also found that stock return volatility is directly related to ESG scores, including spillover effects.

JEL Classification: G30, M14.

Keywords: ESG, ESG spillover, industry, volatility.

1. Introduction

With the European Union's growing concerns about sustainable development and climate change, European companies have begun to consider environmental, social and governance issues. Moreover, the recent adopting of the European Sustainability Reporting Standards provides transparency, enabling companies to show their making efforts and investors can better evaluate companies' sustainability performance.

The connection between ESG and financial factors has generated a debate in academic literature and it remains uncertain whether the industry to which a company belongs influences the decision of companies on ESG activities. For instance, previous research has mainly examined the impact of ESG scores on the company itself. In this case, several studies investigate whether ESG influences stock return volatility in the context of specific industries (Jo and Na, 2012; Tasnia et al., 2020; Shakil, 2021) or specific countries (Sassen et al., 2016; Meher et al. 2020; Zhou and Zhou, 2022). Despite ESG factors vary by industry due to the specificities of the industries, there is not evident literature on the spillover effects of ESG scores from other companies belonging to the same industry. From this point of view, the companies

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with a competitive advantage due to ESG practices can have a direct influence on other companies (Li et al., 2023).

The aim of this study is to investigate the spillover effects of ESG scores from companies operating in the same industry and their impact on stock return volatility to fill the gaps in literature. For this purpose, I considered a sample of European companies from 2019 to 2022. The study is based on an approach divided into five levels: firstly, I tested if the ESG score of one company is impacted by the average ESG scores of companies belonging to the same industry; Secondly, I investigated the relationship between volatility and ESG scores, including spillovers effects of ESG; Thirdly, I examined whether the spillover effects of ESG impact the volatility through its effect on the ESG scores of a company; Then, the sample was divided according to the ESG scores into better ESG performers and poorer ESG performers; Finally, I explored the relationship between changes in ESG scores and changes in volatility. The results provide evidence of a spillover effect of ESG scores on the ESG ratings of other companies belonging to the same industry. Furthermore, I observed direct spillover effects of the individual Environmental, Social and Governance pillars, with similar magnitudes. I also found that stock return volatility is directly related to ESG scores, including spillover effects.

The remainder of the paper is structured as follows. Section 1 presents the theoretical background. The data and methodology are described in Section 2 and 3. Section 4 discuss the results. Section 5 concludes.

2. Literature review

Previous research has examined the impact of ESG scores on the company itself and suggest that companies benefit from investing in ESG. They report that companies with higher ESG scores have better financial performance (Gao and Zhang, 2015; Cornett et al., 2016; Ferrel et al., 2016; Buallay, 2018; Fatemi et al., 2018; Azmi et al., 2021; Wong et al., 2021) and better stock returns (Hong and Kacperczyk, 2009; Edmans, 2011; Ferrat et al, 2022; Li et al., 2023).

In terms of the topic of this study, several studies investigate whether ESG influences stock return volatility in the context of specific industries (Jo and Na, 2012; Tasnia et al., 2020; Shakil, 2021) or specific countries (Sassen et al., 2016; Meher et al. 2020; Zhou and Zhou, 2022). In this case, existing literature suggests that ESG is linked to lower volatility (Jo and Na, 2012; Sassen et al., 2016; Shakil, 2021; Zhou and Zhou, 2022).

Jo and Na (2012) examined the impact of corporate social responsibility on volatility in controversial industries from US (alcohol, tobacco, gambling, military, firearms, cement, oil, and biotech). The authors report that better social performance leads to lower volatility. Additionally, Sassen et al. (2016) observed that social performance had a significantly and inverse impact on volatility in Europe. Similarly, Shakil (2021) showed a significant inverse effect of ESG performance on volatility of oil and gas companies. Zhou and Zhou (2022) observed that the volatility of companies with good ESG performance is lower than that of companies with poor performance. In contrast, Tasnia et al. (2020) found a direct relationship between ESG score and stock price volatility for US banks. Furthermore, Krüger (2015) found that investors react negatively at negative CSR news, particularly for communities and environment news. Serafeim and Yoon (2022) demonstrated that stock prices react to ESG news classified as financially, and the reaction is larger for positive news.

Regarding the spillover effects of ESG, there is little evidence in the literature about the influence of ESG scores on other companies. Li et al. (2023) found a spillover effect of ESG scores on the ESG scores of other local companies. The authors provide evidence that Chinese companies face peer pressure from other companies' ESG scores in the same location.

Based on the prior literature, the following conclusions may be drawn. Firstly, the results regarding the impact of ESG on volatility are not conclusive. Secondly, the spillover effects of ESG scores are not sufficiently analyzed in the literature.

Data

A total of 10 industries, made up of European listed companies were selected for this study from Thomson Reuters database. After data filtration, the sample has 1094 companies with available ESG scores. The analysis covers the period from 2019 to 2022. As it can be seen from Table 1, the majority of the companies (20.11%) fall under the Industrials, followed by Financials (14.53%) and thereafter Consumer Cyclical (14.44%).

Table 1. Frequency distribution of companies by industry

Industry	Frequency	Percentage (%)
Basic Materials	98	8.96
Consumer Cyclical	158	14.44
Consumer Non-Cyclical	75	6.86
Energy	48	4.39
Financials	159	14.53
Healthcare	103	9.41
Industrials	220	20.11
Real Estate	62	5.67
Technology	127	11.61
Utilities	44	4.02
Total	1094	100

Source: Authors' own research.

Variable selection and definition are shown in Table 2. Following the prior literature, the volatility is measured by the annual standard deviation of daily stock returns (Jo and Na, 2012; Shakil, 2021). The ESG scores and its pillars were provided by Thomson Reuters. The ESG score is an overall company score based on the self-reported information in the environmental, social and governance pillars. The Environmental pillar score measures a company's impact on living and non-living and living natural systems. The Social pillar score measures a company's capacity to generate trust and loyalty with its workforce, customers and society. The Governance pillar score measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long-term shareholders. Additionally, other company-specific variables (dividend yield, return on assets, leverage, size and market to book value of equity) are selected as control variables according to previous studies (Jo and Na, 2012; Sassen et al., 2016; Tasnia et al., 2020; Shakil, 2021).

Table 2. Variable selection

Variable	Code	Definition
Volatility	VOL	Annual standard deviation of daily stock returns
ESG score	ESG	Quantitative score provided by Thomson Reuters
Environmental pillar score	ENV	Quantitative score provided by Thomson Reuters
Social pillar score	SOC	Quantitative score provided by Thomson Reuters
Governance pillar score	GOV	Quantitative score provided by Thomson Reuters
Dividend yield	DY	Dividend per share/price per share
Return on assets	ROA	Income after taxes/total assets
Leverage	LEV	Long-term debt/total assets
Size	SIZE	Natural logarithm of total assets
Market to book value of equity	MTB	Market value of equity/book value of equity

Source: Authors' own research.

The descriptive statistics of the variables are shown in Table 3. The dataset contains 4376 year observations from 1094 companies from 2019 to 2022. Firstly, the average volatility is 33.2%. Secondly, the average ESG score is about 58.6. The average environmental score is 54.6, lower than the average governance score of 57.7, and both are lower than the average social score of 63.8.

Table 3. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
VOL	4376	.332	.171	.069	4.135
ESG	4376	58.611	19.38	1.417	95.422
ENV	4376	54.577	26.205	0	99.169
SOC	4376	63.814	21.309	.432	98.294
GOV	4376	57.738	21.531	2.422	98.733
DY	4376	.023	.041	0	.2
ROA	4376	.031	.122	-2.942	1.718
LEV	4376	.208	.158	0	1.125
SIZE	4376	22.373	1.963	.007	28.743
MTB	4376	3.144	3.883	.001	47.106
AENV	4376	54.577	6.557	38.649	66.825
ASOC	4376	63.814	3.827	54.829	70.49
AGOV	4376	57.738	5.784	46.592	67.513
AESG	4376	58.611	4.516	50.133	66.899

Source: Authors' own research, using Stata.

Table 4 display an overview of the ESG scores by industry. Companies affiliated with Energy, Utilities and Basic Materials have the highest average of ESG scores, while companies from Financials, Healthcare and Real Estate have the lowest average.

Table 4. ESG statistics by industry

Industry	Obs	Mean	Std.Dev.	Min	Max
Basic Materials	392	62.211	19.251	4.870	93.338
Consumer Cyclical	632	59.915	19.362	1.417	93.826
Consumer Non-Cyclical	300	60.153	16.658	15.801	91.384
Energy	192	62.829	17.484	16.184	92.231
Financials	636	56.658	21.392	1.742	95.422
Healthcare	412	56.653	19.779	3.770	95.043
Industrials	880	57.385	19.479	5.845	94.300
Real Estate	248	56.083	18.815	9.964	91.015
Technology	508	57.832	18.065	11.170	94.593
Utilities	176	62.273	18.941	9.009	92.845

Source: Authors' own research, using Stata.

3. Methodology

The purpose of this study is to investigate the spillover effects of ESG scores from companies operating in the same industry and their impact on stock return volatility. The research was divided into five levels:

1. (Spillover effects of ESG) Firstly, I tested if the ESG score of one company is impacted by the average ESG scores of companies belonging to the same industry. To examine the ESG spillover, I calculate the industry averages of the ESG scores and estimate their impact on the ESG score of a specific company using a fixed-effects model (Li et al., 2023). The regression model is given as:

$$(1) \text{ ESG}_{it} = \alpha + \beta_1 \times \text{AESG}_{it} + \beta_2 \times \text{DY}_{it} + \beta_3 \times \text{ROA}_{it} + \beta_4 \times \text{LEV}_{it} + \beta_5 \times \text{SIZE}_{it} + \beta_6 \times \text{MTB}_{it} + \varepsilon_{it}$$

where AESG is the average ESG scores of companies belonging to the same industry.

2. (ESG, Spillover effects of ESG and volatility) Secondly, I investigated the relationship between volatility and ESG scores, including spillovers effects of ESG (Li et al., 2023). The regression models are as follows:

$$(2) \text{ VOL}_{it} = \alpha + \beta_1 \times \text{ESG}_{it} + \beta_2 \times \text{DY}_{it} + \beta_3 \times \text{ROA}_{it} + \beta_4 \times \text{LEV}_{it} + \beta_5 \times \text{SIZE}_{it} + \beta_6 \times \text{MTB}_{it} + \varepsilon_{it}$$

$$(3) \text{ VOL}_{it} = \alpha + \beta_1 \times \text{AESG}_{it} + \beta_2 \times \text{DY}_{it} + \beta_3 \times \text{ROA}_{it} + \beta_4 \times \text{LEV}_{it} + \beta_5 \times \text{SIZE}_{it} + \beta_6 \times \text{MTB}_{it} + \varepsilon_{it}$$

3. (Indirect spillover effects and volatility) Thirdly, I examined whether the spillover effects of ESG impact the volatility through its effect on the ESG scores of a company (Li et al., 2023). The regression model is given as:

$$(4) \text{ VOL}_{it} = \alpha + \beta_1 \times r_ESG_{it} + \beta_2 \times \text{DY}_{it} + \beta_3 \times \text{ROA}_{it} + \beta_4 \times \text{LEV}_{it} + \beta_5 \times \text{SIZE}_{it} + \beta_6 \times \text{MTB}_{it} + \varepsilon_{it}$$

where r_ESG is the predicted residuals of ESG.

4. (Subsample analysis of ESG and volatility) The sample was divided into a group with better ESG performance and a group with poorer ESG performance and it was introduced a dummy variable to distinguish groups. For this purpose, I sorted the ESG scores of all companies from high to low. Then, I extracted the top 25% and the bottom top 25% and I assigned the value 1 to the top and 0 to the bottom. Therefore, I changed the subsample to the top 25% and bottom 75% (Zhou and Zhou, 2022). The regression model is given as:

$$(5) VOL_{it} = \alpha + \beta_1 \times d_ESG_{it} + \beta_2 \times DY_{it} + \beta_3 \times ROA_{it} + \beta_4 \times LEV_{it} + \beta_5 \times SIZE_{it} + \beta_6 \times MTB_{it} + \varepsilon_{it}$$

where d_ESG is the dummy variable equal to 1 for top ESG companies and 0 for bottom ESG companies.

5. (Changes in ESG scores and volatility) Finally, I explored the relationship between changes in ESG scores and changes in volatility (Jo and Na, 2012). The regression model is given as:

$$(6) DVOL_{it} = \alpha + \beta_1 \times DESG_{it} + \beta_2 \times DY_{it} + \beta_3 \times ROA_{it} + \beta_4 \times LEV_{it} + \beta_5 \times SIZE_{it} + \beta_6 \times MTB_{it} + \varepsilon_{it}$$

where $DVOL$ is the current volatility subtracted from that of one year before and $DESG$ is the current ESG score subtracted from that of one year before.

4. Results

The analysis begins with an investigation of the relationships between a company's ESG score and the ESG scores of companies in the same industry. Table 5 reports the findings. Column (1) displays the estimates using ESG scores, while columns (2), (3) and (4) use environmental, social and governance pillars. The results indicate that industry-average ESG score has a direct impact on the ESG score of a specific company. These results may suggest that European companies face peer pressure from other companies in the same industry. The spillover effects of environmental, social and governance pillars are similar to those of ESG scores. These results are similar to Li et al. (2023). The ESG score is also associated with company-specific variables, such as the leverage, size and market to book value of equity.

Table 5. Spillover effects of ESG scores

	(1) ESG	(2) ENV	(3) SOC	(4) GOV
AESG	.975*** (.022)			
AENV		.978*** (.031)		
ASOC			.982*** (.035)	
AGOV				.97*** (.028)

	(1) ESG	(2) ENV	(3) SOC	(4) GOV
DY	-2.329 (2.646)	-3.573 (3.554)	-.752 (3.153)	3.837 (4.261)
ROA	.775 (1.224)	.398 (1.644)	-.06 (1.458)	1.52 (1.971)
LEV	.998 (1.505)	4.274** (2.024)	.465 (1.792)	3.926 (2.43)
SIZE	.489*** (.178)	.021 (.238)	.611*** (.212)	.567** (.286)
MTB	-.198*** (.068)	-.158* (.092)	-.037 (.081)	-.295*** (.11)
_cons	-9.036** (4.233)	.38 (5.664)	-12.468** (5.278)	-10.97 (6.698)
Observations	4376	4376	4376	4376
R-squared	.409	.256	.217	.301
FE	YES	YES	YES	YES

Standard errors are in parentheses

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Authors' own research, using Stata.

Going further, the relationship between volatility and ESG scores, including spillovers effects of ESG is presented in Table 6. Column (1) investigates the impact of company's ESG scores on volatility, while columns (2), (3), (4) and (5) analyze the ESG spillover effects. The results show that the ESG score has a direct impact on volatility. These findings are in line with Tasnia et al. (2021), which explain that investors may not prefer excess concentration on ESG because of the additional costs. Similarly, the average ESG scores have a direct influence on volatility. Regarding the control variables, return on assets, leverage and market to book ratio have an inverse impact on volatility. However, dividend yield and size have a direct effect on stock return volatility.

Table 6. ESG, Spillover effects of ESG and volatility

	(1) VOL	(2) VOL	(3) VOL	(4) VOL	(5) VOL
ESG	.002*** (0)				
AESG		.003*** (0)			
AENV			.002*** (0)		
ASOC				.003*** (.001)	
AGOV					.002*** (0)
DY	.191*** (.056)	.188*** (.056)	.191*** (.056)	.189*** (.056)	.189*** (.056)

	(1) VOL	(2) VOL	(3) VOL	(4) VOL	(5) VOL
ROA	-.174*** (.026)	-.169*** (.026)	-.17*** (.026)	-.17*** (.026)	-.17*** (.026)
LEV	-.219*** (.032)	-.231*** (.032)	-.223*** (.032)	-.225*** (.032)	-.225*** (.032)
SIZE	.008** (.004)	.009** (.004)	.009** (.004)	.009** (.004)	.009** (.004)
MTB	-.002 (.001)	-.002 (.001)	-.002 (.001)	-.002 (.001)	-.002 (.001)
_cons	.113 (.086)	.012 (.089)	.072 (.089)	-.017 (.093)	.093 (.088)
Observations	4376	4376	4376	4376	4376
R-squared	.042	.046	.039	.042	.039
FE	YES	YES	YES	YES	YES

Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Source: Authors' own research, using Stata.

Next, I examined whether the spillover effects of ESG impact the volatility through its effect on the ESG scores of a company by replacing ESG scores with the predicted residuals. The results, presented in Table 7, suggest that the residual ESG is not significantly associated with the volatility. Specifically, the spillovers of ESG ratings at the industry level and the controlled financial variables explain the impact of ESG ratings on volatility.

Table 7. Indirect spillover effects of ESG scores and volatility

	(1) VOL	(2) VOL	(3) VOL	(4) VOL
r_ESG	.001 (0)	.001 (0)	.001 (0)	.001 (0)
AESG	.003*** (0)			
AENV		.002*** (0)		
ASOC			.003*** (.001)	
AGOV				.002*** (0)
DY	.192*** (.056)	.195*** (.056)	.193*** (.056)	.194*** (.056)
ROA	-.169*** (.026)	-.17*** (.026)	-.17*** (.026)	-.17*** (.026)
LEV	-.226*** (.032)	-.219*** (.032)	-.22*** (.032)	-.22*** (.032)
SIZE	.012*** (.004)	.012*** (.004)	.012*** (.004)	.012*** (.004)

	(1)	(2)	(3)	(4)
	VOL	VOL	VOL	VOL
MTB	-.001	-.002	-.001	-.002
	(.001)	(.001)	(.001)	(.001)
_cons	-.056	.007	-.084	.027
	(.099)	(.099)	(.103)	(.098)
Observations	4376	4376	4376	4376
R-squared	.047	.04	.042	.04
FE	YES	YES	YES	YES

Standard errors are in parentheses
*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Authors' own research, using Stata.

The subsample analysis is presented in Table 8. In column (1), the classification of ESG scores is based on the 25% companies with the highest ESG score and the 25% with the lowest. Therefore, in column (2), the subsample was changed to the highest 25% and lowest 75% ESG score companies. The regression result is insignificant for the first subsample. For the second subsample, the dummy variable is significantly positive, indicating that the volatility of companies with excellent ESG performance is greater than that of companies with poor ESG performance. This result is contrary to Zhou and Zhou (2022).

Table 8. Subsample analysis of ESG and volatility

	Subsample 1	Subsample 2
	(1)	(2)
	VOL	VOL
d_ESG	.024	.024***
	(.033)	(.009)
DY	.432***	.185***
	(.132)	(.056)
ROA	-.066**	-.176***
	(.032)	(.026)
LEV	-.171***	-.205***
	(.047)	(.032)
SIZE	.016***	.009**
	(.006)	(.004)
MTB	-.001	-.003**
	(.002)	(.001)
_cons	-.012	.182**
	(.131)	(.085)
Observations	2192	4376
R-squared	.027	.036

Standard errors are in parentheses
*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Authors' own research, using Stata.

To explore the relationship between changes in ESG scores and changes in volatility, I subtracted the current value of each variable from last year's value. The descriptive statistics for changes in variables are presented in Table 9. In this case, the analysis has been reduced to three years, respectively 2020-2022.

Tables 9. Descriptive statistics for changes in variables

Variable	Obs	Mean	Std. Dev.	Min	Max
DVOL	3282	.003	.146	-1.521	3.764
DESG	3282	3.433	6.057	-27.847	45.612
DENV	3282	3.283	8.112	-39.68	63.858
DSOC	3282	2.613	7.382	-34.214	53.45
DGOV	3282	4.32	10.76	-45.015	59.691
DDY	3282	-.001	.046	-.535	1.979
DROA	3282	-.002	.115	-2.91	2.636
DLEV	3282	.007	.081	-.661	.723
DSIZE	3282	.05	.7	-22.296	3.852
DMTB	3282	-.24	1.723	-27.427	23.703
DAENV	3282	3.283	1.128	-.123	5.352
DASOC	3282	2.613	.792	.919	3.958
DAGOV	3282	4.32	1.482	1.117	6.732
DAESG	3282	3.433	.952	.871	5.689

Source: Authors' own research, using Stata.

Table 10 summarizes the change regression results. Columns (1) and (2) show that there is no significant association between ESG changes and volatility changes. Columns (3) and (4) report that an increase in the industry-average ESG score is associated with an increase in volatility.

Table 10. Changes in ESG scores and volatility

	(1) DVOL	(2) DVOL	(3) DVOL	(4) DVOL
DESG	.001 (.001)	.001 (.001)		
DAESG			.028*** (.003)	.029*** (.003)
DY		.167** (.084)		.17** (.082)
ROA		-.133*** (.041)		-.146*** (.04)
LEV		-.127** (.055)		-.129** (.054)
SIZE		.008 (.006)		.007 (.006)
MTB		-.003 (.003)		-.003 (.003)
DDY	.278*** (.069)		.26*** (.068)	

	(1)	(2)	(3)	(4)
	DVOL	DVOL	DVOL	DVOL
DROA	-.019 (.025)		-.027 (.025)	
DLEV	-.213*** (.038)		-.212*** (.038)	
DSIZE	.01* (.005)		.009* (.005)	
DMTB	.003 (.002)		.004* (.002)	
_cons	.002 (.003)	-.148 (.131)	-.091*** (.011)	-.224* (.129)
Observations	3282	3282	3282	3282
R-squared	.025	.012	.059	.049

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Source: Authors' own research, using Stata.

5. Conclusions

This study investigated the spillover effects of ESG scores from companies operating in the same industry and their impact on stock return volatility. For this purpose, I considered a sample of European companies from 2019 to 2022. Research findings indicate that industry-average ESG score has a direct impact on the ESG score of a specific company. The spillover effects of environmental, social and governance pillars are similar to those of ESG scores. Going further, the results show that the ESG score has a direct impact on volatility. Similarly, the industry-average ESG scores have a direct influence on volatility. These results may suggest that European companies face peer pressure from other companies in the same industry. These findings contribute to the literature by adding further evidence about ESG spillover effects, and its relationship with volatility in the European context. Furthermore, the results help investors in the investment decisions making to pay more attention to ESG scores and industry specifics. Future research may consider a longer time horizon to analyze these relationships.

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IMPACT OF IFRS ADOPTION ON FINANCIAL STATEMENTS VALUE RELEVANCE. A STUDY OF EASTERN VS. WESTERN EUROPEAN COUNTRIES

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Abstract. The implementation of IFRS has been a significant milestone in the accounting field, sparking debates among advocates and critics regarding whether the initial objectives were actually achieved in practice. This paper aims to investigate whether the adoption of IFRS has led to an increase in the value relevance of financial statements in both Eastern and Western European countries. The study takes an empirical approach, analyzing companies before and after the adoption of IFRS, and introduces contemporary concepts that can contribute to future research. Policymakers rely on evidence-based policies and often seek impartial and reliable evidence from academic researchers. Given the extensive body of research conducted thus far, this paper seeks to further emphasize the positive impact of IFRS implementation.

JEL Classification: G14, G15

Keywords: IFRS, value relevance, financial reporting

1. Introduction

In the early 2000s, Europe's accounting and financial standards were characterized by a lack of standardization and harmonization, with various policies and accounting methods in place. This situation was exacerbated by high-profile scandals such as the Metallgesellschaft scandal in Germany in 1993, where a major industrial firm reported significant losses in energy futures and swaps. The Enron scandal in 2000 further highlighted the need for transparency and security in financial reporting, leading to the passing of financial security laws in France and Belgium.

Despite these domestic efforts, traditional measures to reform accounting systems were insufficient to meet the demands of financial globalization. As a result, all publicly traded companies in the European Union were required to align their financial reports with the International Financial Reporting Standards (IFRS).

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Since then, numerous studies have been conducted to assess whether the initial objectives of IFRS implementation were achieved. The findings of these studies are not always consistent, as will be discussed in the following section. However, it is clear that the adoption of IFRS has brought about positive changes in the accounting world, with lasting impacts on companies in countries that prioritize reliable investor protection.

The main focus of this paper is to examine whether the implementation of IFRS has increased the value relevance of financial statements. The study compares the financial statements of companies in Eastern and Western European countries before and after the adoption of IFRS.

2. Literature review

To ensure successful capital budgeting, both companies and investors need efficient and practical tools that provide relevant financial documentation and information. These tools allow them to accurately assess multinational financial situations. In June 2003, a set of reporting standards was issued to meet the growing need for companies to compare financial data of global business organizations. This set of standards has been adopted by 167 international jurisdictions and is considered a reliable tool for establishing guidelines for transparent financial statements. (Hwang et al. 2018). However, the ongoing impact of the International Financial Reporting Standards (IFRS) depends on the legal system and relevant institutions of each country.

The adoption of the IFRS resulted in changes in accounting choices and policies, which differed from the previously used domestic standards. The International Accounting Standards Board (IASB) aims to establish a universally accepted accounting language. This significant shift in accounting methodologies aligns with the theory of environmental determinism, as proposed by scholars like Gernon and Wallace (1995) and Rodrigues and Craig (2007).

The concept of isomorphism is used to explain the mechanism behind the mandatory adoption of IFRS in European countries. According to DiMaggio and Powell (1983), there are three forms of isomorphism: coercive, mimetic, and normative. Coercive isomorphism refers to the political pressure for publicly listed firms to prepare their financial statements according to international and IASB standards. Mimetic isomorphism involves companies adopting behaviors from successful organizations. Normative isomorphism revolves around professionalism and funding, with the Big Four accounting firms (Deloitte, EY, KPMG, and PwC) playing a significant role in shaping international standards.

The concept of value relevance, which relates to the ability of accounting information to reflect a firm's market value, is rarely discussed. Only accounting information that accurately represents the financial status of a firm is considered value relevant.

When discussing value relevance literature, it is important to note that the mandatory implementation of IFRS in Europe has shifted the focus from analyzing and comparing the legal origins or accounting systems of different countries to examining the value relevance of accounting information before and after IFRS adoption. This includes comparing the results between countries that voluntarily adopted

IFRS and those where IFRS implementation was imposed, as well as analyzing the differences between countries that based their accounting statements on IFRS and those that relied on domestic standards.

According to a study by Kouki Ahmed and Mundy Julia (2018), the voluntary adoption of IFRS did not improve the value relevance of equity book value and earnings. This was observed in countries like Germany and Greece, where companies listed on the stock exchange experienced a decrease in relevance after mandatory IFRS adoption. Similarly, in countries like Spain and Norway, the mandatory implementation of IFRS had no impact on the value relevance of financial statements. Therefore, it can be concluded that voluntary IFRS adoption did not improve the value relevance of equity book value and earnings.

On the other hand, Barth et al. (2008) found that companies following IFRS standards had more value-relevant financial statements compared to those following domestic standards. This was also observed in Turkey, as reported by Suadiye (2012). Additionally, Iatridis and Rouvolis (2010) found that the transition to IFRS led to an increase in the value relevance of earnings for companies listed on the Athens Stock Exchange.

In their study, Kouki Ahmed and Mundy Julia (2018) conducted a comparative analysis across pre- and post-IFRS adoption timeframes in Germany, France, and Belgium. They concluded that while the value relevance of equity book value and earnings increased after the transition to IFRS, the relevance of earnings and changes in earnings did not show significant improvement prior to adoption. This study adds to the existing body of knowledge on the impact of IFRS adoption.

The 2007-2008 financial crisis signaled the crucial role played by transparency in financial markets, and that the lack of it can compromise the confidence of investors and lead to severe shortages of liquidity and market crashes. Moreover, as individuals utilizing mutual funds or pensions venture into global stock markets or domestic stock markets investments, transparency becomes even more critical. It has become clear that, given the financial environment, the importance of comparable, transparent reporting is not just an element of financial utopia, but a sheer necessity that has urged for universally accepted reporting standards (Devalle, Onali, and Magarini, 2010).

Scholars Alain Devalle, Enrico Onali, and Ricardo Magarini, in their paper published in 2010, titled "Assessing the Value Relevance of Accounting Data After the Introduction of IFRS in Europe", analyzed the correlation (also known as value relevance) between accounting metrics and market information post IFRS adoption, with the focus on companies listed on five relevant European stock exchanges - Frankfurt, Madrid, Paris, Milan, and London. The objective was to determine whether the global harmonization drive really presented benefits and enhancements in cross-border comparability of financial data, and to foresee the implications and consequences of mandatory IFRS implementation in the US in 2014, as hinted by the Securities and Exchange Commission in 2008. The methodology chosen by the scholars employed panel-data models and the Chow test, in order to assess value relevance.

The switch to IFRS consisted in a major change in several European accounting paradigms, in terms of value relevance. The concept of value relevance stands for the ability of financial statements to encapsulate information that affects and influences share values (Hellström, 2006), and the assessment of this concept in the context of accounting measures continues to be a crucial research topic in discerning the efficacy of accounting standards on a global level.

In 2001, Gornik-Tomaszewski and Jermakowicz, pointed out in their study "Accounting-Based Valuation of Polish Listed Companies" that emerging economies such as Poland, display value relevance comparable to developed nations. Lin and Chen (2005), in "Value Relevance of International Accounting Standards Harmonization: Evidence from A- and B-Share Markets in China" found that, in China, the Chinese GAAP exhibits stronger value relevance compared to IFRS. In countries like France, Germany, and the United Kingdom, Joos and Lang (1994), recognized that EU's implementation of the fourth and seventh directive strengthened the value relevance. Furthermore, nations like the Czech Republic, Tunisia, Poland, and Norway have benefited from bolstered value relevance as a result of modifications in their national accounting regulations, as pointed out by Hellström (2006); Naceur and Nachi (2007); Dobija & Klimczak (2007); and Gjerde, Knivsflo, and Sættem (2008).

In assessing the effects IFRS has on value relevance, in countries like the United Kingdom, Germany, or Spain, results have been mixed. The prevailing expectation is that IFRS adoption should amplify value relevance, given its capacity to boost cross-border financial statements comparability, and in due course, refine and enhance the allocative efficiency of stock markets.

When analyzing value relevance, many researchers employ the "measurement perspective," that explores the relationship between accounting and market data. Their studies draw from Ohlson's (1995) "Earnings, Book Values and Dividends in Equity Valuation" linear information model (LIM) which claims that a company's worth is based on its book value of equity and anticipated future abnormal earnings.

By analyzing 3,721 companies spanning five relevant European stock markets, between 2002 and 2007, it was concluded that, although IFRS increased the value relevance of earnings on a general scale, the value relevance of book value equity detected a decline. The effects of the shift were considerably inconsistent across nations. Following the adoption of IFRS, Germany, Spain, and Italy displayed a decline in the explanatory power, translating in a decrease of value relevance as well, whereas, for the United Kingdom and France, registered growth in explanatory power, pointing at enhanced value relevance. Based on Devalle, Onali, and Magarini's findings in the paper titled "Assessing the Value Relevance of Accounting Data After the Introduction of IFRS in Europe", for France, the United Kingdom, and Germany, coefficient estimates indicate a surge in the value relevance on earnings, and, for all mentioned countries except for the United Kingdom, a decline of the value relevance of book value equity. Embracing fair value accounting of the nations aligned with the Continental model might be root cause of the diminished coefficient on book value.

3. Predictions

Accurate and reliable financial information plays a crucial role in aiding stakeholders in their decision-making processes. It allows them to assess the future net cash inflow of a company and evaluate the management's ability to effectively manage the company's financial resources. Any changes in economic assets and liabilities resulting from the entity's financial activities and other events should be accurately reflected in the financial statements.

Based on the prior research discussed earlier, I predict that the value relevance of financial statements for companies in both Eastern and Western European countries has increased following the adoption of IFRS in Eastern European countries. However,

it is important to note that while prior research provides evidence related to this prediction, it does not directly test it, nor can the result of such a test be inferred by combining previous findings.

4. Research design

Value relevance is defined by IASB Conceptual Framework (2018) as “capable of making a difference in decisions made by users. [...] Financial information is capable of making a difference in decisions if it has a predictive value, confirmatory value, or both.”

Starting from this definition, the research is adapted from Barth *et al.*, (2006) model, designed to test the value relevance of the financial statements. The tests used are applied twice – before IFRS adoption and after IFRS adoption, in order to be able to state whether value relevance of financial statements from Western European countries and those from Eastern European countries have increased after IFRS adoption.

In order to eliminate differences other than the financial standards used for the reporting, a matched sample design is used. The same procedure showed reliable results in Gus de Franco *et al.*, (2011). This means that for each Western European company, I choose an Eastern European company from the same industry and with the most similar size in terms of the equity market value. In this way industry specifics and size differences are not permitted to influence the cost of capital.

Each Eastern European company is required to have data in the year it adopts IFRS and at least one year before, in order to be able to establish properly the adoption year. For each identified pair of companies only the years in which both have data are used. Also, the pairs for which the size difference exceeds 60% in absolute value are eliminated.

The economic outcomes used are cash flow, stock price and stock return, while the accounting amounts selected are based on combinations of net income and equity book value. Stock price and stock return were selected as they are reflecting the equity value and the change in equity based on the investors' expectations of corporate earnings or profits. Moreover, cash flow plays an important role in the economic models of equity value, forecasting future cash flow being an extremely important aspect for capital allocation decisions. On the other hand, the accounting amounts used were chosen based on prior research, as they are the two primary measures used from the financial statements.

I construct the metrics based on the explanatory power of regressions of stock price, stock return, and cash flow. Each metric is constructed from the difference between the explanatory power of the full model, that includes the fixed effect in addition to the accounting amounts and the nested model, which includes only the fixed effects. In this way the differences in mean stock prices, stock returns, and future cash flows across countries and industries are not affecting the value relevance metrics. Each metric reflects only the explanatory power for the accounting amounts of the dependent variable.

The explanatory power of stock price is computed based on the difference between the adjusted R^2 from the equation of the full model and the adjusted R^2 from the nested version of it.

The full model of equation 1 is the following:

$$P_{it}^{WE} = \beta_0^{WE} + \beta_1^{WE} BVE_{it}^{WE} + \beta_2^{WE} NI_{it}^{WE} + \varepsilon_{it}^{WE} \quad (\text{Equation 1a})$$

$$P_{it}^{EE} = \beta_0^{EE} + \beta_1^{EE} BVE_{it}^{EE} + \beta_2^{EE} NI_{it}^{EE} + \varepsilon_{it}^{EE} \quad (\text{Equation 1b})$$

The nested version of equation 1 includes only the C_j and I_k , where C_j is country j and I_k is industry k . Both indicators C_j and I_k are designed to equal one for firms domiciled in country j , industry k and zero otherwise. The equation is the following:

$$P_{it}^{WE} = \beta_0^{WE} + \beta_1^{WE} BVE_{it}^{WE} + \beta_2^{WE} NI_{it}^{WE} + \sum_j \beta_{3j} C_j^{WE} + \sum_k \beta_{4k} I_k^{WE} + \varepsilon_{it}^{WE} \quad (\text{Equation 1an})$$

$$P_{it}^{EE} = \beta_0^{EE} + \beta_1^{EE} BVE_{it}^{EE} + \beta_2^{EE} NI_{it}^{EE} + \sum_j \beta_{3j} C_j^{EE} + \sum_k \beta_{4k} I_k^{EE} + \varepsilon_{it}^{EE} \quad (\text{Equation 1bn})$$

The second value relevance metrics, return is computed based on the difference between the adjusted R^2 from the equation of the full model and the adjusted R^2 from the nested version of it.

The full model of equation 2 is the following:

$$\text{RETURN}_{it}^{WE} = \beta_0^{WE} + \beta_1^{WE} (NI_{it} / P_{it-1})^{WE} + \beta_2^{WE} (\Delta NI_{it} / P_{it-1})^{WE} + \beta_3^{WE} \text{LOSS}_{it}^{WE} + \beta_4^{WE} \text{LOSS}_{it}^{WE} \times (NI_{it} / P_{it-1})^{WE} + \beta_5^{WE} \text{LOSS}_{it}^{WE} \times (\Delta NI_{it} / P_{it-1})^{WE} + \varepsilon_{it}^{WE} \quad (\text{Equation 2a})$$

$$\text{RETURN}_{it}^{EE} = \beta_0^{EE} + \beta_1^{EE} (NI_{it} / P_{it-1})^{EE} + \beta_2^{EE} (\Delta NI_{it} / P_{it-1})^{EE} + \beta_3^{EE} \text{LOSS}_{it}^{EE} + \beta_4^{EE} \text{LOSS}_{it}^{EE} \times (NI_{it} / P_{it-1})^{EE} + \beta_5^{EE} \text{LOSS}_{it}^{EE} \times (\Delta NI_{it} / P_{it-1})^{EE} + \varepsilon_{it}^{EE} \quad (\text{Equation 2b})$$

The nested version of equation 2 includes only the C_j and I_k , where C_j is country j and I_k is industry k . Both indicators C_j and I_k are designed to equal one for firms domiciled in country j , industry k and zero otherwise. The equation is the following:

$$\text{RETURN}_{it}^{WE} = \beta_0^{WE} + \beta_1^{WE} (NI_{it} / P_{it-1})^{WE} + \beta_2^{WE} (\Delta NI_{it} / P_{it-1})^{WE} + \beta_3^{WE} \text{LOSS}_{it}^{WE} + \beta_4^{WE} \text{LOSS}_{it}^{WE} \times (NI_{it} / P_{it-1})^{WE} + \beta_5^{WE} \text{LOSS}_{it}^{WE} \times (\Delta NI_{it} / P_{it-1})^{WE} + \sum_j \beta_{6j} C_j^{WE} + \sum_k \beta_{7k} I_k^{WE} + \varepsilon_{it}^{WE} \quad (\text{Equation 2an})$$

$$\text{RETURN}_{it}^{EE} = \beta_0^{EE} + \beta_1^{EE} (NI_{it} / P_{it-1})^{EE} + \beta_2^{EE} (\Delta NI_{it} / P_{it-1})^{EE} + \beta_3^{EE} \text{LOSS}_{it}^{EE} + \beta_4^{EE} \text{LOSS}_{it}^{EE} \times (NI_{it} / P_{it-1})^{EE} + \beta_5^{EE} \text{LOSS}_{it}^{EE} \times (\Delta NI_{it} / P_{it-1})^{EE} + \sum_j \beta_{6j} C_j^{EE} + \sum_k \beta_{7k} I_k^{EE} + \varepsilon_{it}^{EE} \quad (\text{Equation 2bn})$$

The last value relevance metrics, cash flow is computed based on computed based on the difference between the adjusted R^2 from the equation of the full model and the adjusted R^2 from the nested version of it.

The full model of equation 3 is the following:

$$CF_{it+1}^{WE} = \beta_0^{WE} + \beta_1^{WE} (NI_{it} / TA_{it-1})^{WE} + \sum_j \beta_{3j} C_j^{WE} + \sum_k \beta_{4k} I_k^{WE} + \varepsilon_{it}^{WE} \quad (\text{Equation 3an})$$

$$CF_{it+1}^{EE} = \beta_0^{EE} + \beta_1^{EE} (NI_{it} / TA_{it-1})^{EE} + \sum_j \beta_{3j} C_j^{EE} + \sum_k \beta_{4k} I_k^{EE} + \varepsilon_{it}^{EE} \quad (\text{Equation 3bn})$$

The nested version of equation 3 includes only the C_j and I_k , where C_j is country j and I_k is industry k . Both indicators C_j and I_k are designed to equal one for firms domiciled in country j , industry k and zero otherwise. The equation is the following:

$$CF^{WE}_{it+1} = \beta_0^{WE} + \beta_1^{WE} (NI_{it} / TA_{it-1})^{WE} + \sum_j \beta_{3j} C_j^{WE} + \sum_k \beta_{4k} I_k^{WE} + \varepsilon_{it}^{WE} \quad (\text{Equation 3an})$$

$$CF^{EE}_{it+1} = \beta_0^{EE} + \beta_1^{EE} (NI_{it} / TA_{it-1})^{EE} + \sum_j \beta_{3j} C_j^{EE} + \sum_k \beta_{4k} I_k^{EE} + \varepsilon_{it}^{EE} \quad (\text{Equation 3bn})$$

The differences obtained for R^2 should be lower between Western European companies and Eastern European companies after IFRS implementation in order to conclude that the value relevance has increased.

5. Sample and data

The sample is obtained from Eikon and contains companies from Eastern and Western European countries in the timeframe 1998-2022. For the majority of the companies the year of IFRS adoption is 2004. The sample consists of companies from 24 countries. Ten industries are taken into account for the sample, majority of companies belonging to industrials, financials, consumer cyclicals and basic materials.

As mentioned in the research design, all the tests are based on a matched sample, which consists of 141 pairs of companies (Eastern European company matched with a Western European company). I base my matching procedure on three main steps. Step one: for each company from the Eastern European countries, I select several companies from Western European countries from the same industry. Step two: From the Western European companies selected I eliminate all those which have a difference of Equity Market Value higher than 60%. Step three: From the remaining companies I choose the one that has the smallest difference in terms of Equity Market Value and the biggest number of years with data available.

The detailed structure of the sample is presented below:

Table 1: Sample composition by country

Country of Headquarters	Number of companies
Austria	4
Belgium	2
Bosnia and Herzegovina	1
Bulgaria	1
Croatia	4
Czech Republic	4
Estonia	5
France	27
Germany	15

Country of Headquarters	Number of companies
Greece	1
Hungary	8
Ireland Republic of	3
Italy	5
Lithuania	3
Netherlands	11
Poland	73
Portugal	4
Romania	10
Russia	13
Slovenia	6
Spain	1
Switzerland	11
Ukraine	6
United Kingdom	56

Table 2: Sample composition by industry

Economic Sector Name	Number of companies	
	Eastern European companies	Western European companies
Basic Materials	18	18
Consumer Cyclicals	23	23
Consumer Non-Cyclicals	4	4
Energy	12	13
Financials	23	25
Healthcare	3	3
Industrials	26	26
Real Estate	6	6
Technology	12	15
Utilities	7	7

Table 3: Sample composition by year of adoption

Year of IFRS adoption	No. of Eastern European companies	No. of Western European companies
2002-2003	19	7
2004	58	56
2005	5	16
2006	5	13

6. Results

The following tables present value relevance comparability metrics for Eastern European companies and Western European companies based on Equations (1)–(3) when companies applied domestic standards and when they applied IFRS.

Table 4: R² for the equations based on regions and standards

R ²	NON-IFRS					
	EASTERN EUROPEAN COMPANIES			WESTERN EUROPEAN COMPANIES		
	Price	Return	CashFlow	Price	Return	CashFlow
a - Full version of the equation	0,724	0,025	0,011	0,909	0,011	- 0,006
b - Nested version of the equation	0,810	0,074	0,118	0,887	0,002	- 0,001
Difference a-b	-0,086	- 0,049	-0,107	0,022	0,009	- 0,005
R ²	IFRS					
	EASTERN EUROPEAN COMPANIES			WESTERN EUROPEAN COMPANIES		
	Price	Return	CashFlow	Price	Return	CashFlow
a - Full version of the equation	0,802	0,051	0,173	0,407	0,135	-
b - Nested version of the equation	0,838	0,049	0,174	0,466	0,156	0,066
Difference a-b	-0,036	0,002	- 0,001	-0,059	-0,021	-0,066

Table 5: Difference in R² Eastern vs. Western European companies

Difference a-b	NON-IFRS			IFRS		
	Price	Return	CashFlow	Price	Return	CashFlow
Eastern - Western values	-0,108	-0,058	-0,102	0,023	0,023	0,065

Table 6: Difference in R² IFRS vs. NON-IFRS

	Price	Return	CashFlow
IFRS - NON-IFRS	0,131	0,081	0,167

The table 6 findings support the prediction that value relevance comparability increased after companies adopt IFRS as comparability increased significantly based on all three metrics.

In particular, results from table 5, indicate that the difference in value relevance decreased significantly from when Eastern European companies applied domestic standards to when they applied IFRS. For Price, Return, and Cash Flow, the difference in value relevance decreased by 0.131, 0.081, and 0.167.

The findings in table 4 are showing that value relevance is higher for Western European Companies than for Eastern European ones before they adopt IFRS in that each of the three value relevance metrics is significantly higher for Western European Companies (0.022 vs. -0.086 for Price, 0.009 vs. -0.049 for Return, and -0.005 vs. -0.107 for Cash Flow). However, the findings also indicate that after IFRS adoption, value relevance is higher for Eastern European companies, significantly so for Return (0.002 vs. -0.021), Cash Flow (-0.001 vs. -0.066) and for Price (-0.036 vs. -0.059).

7. Discussion

The results of this study are confirming the proposed hypothesis which states that the implementation of IFRS standards has improved the value relevance of financial statements. Moreover, it shows that it had a greater effect on the Eastern European companies, managing to reduce the discrepancy between the Eastern and Western European Countries in terms of the confidence of investors in the financial statements data quality.

Given the structure of the sample several topics are worth considering such as:

Some might argue that as the sample is mainly composed of companies from Poland and United Kingdom the conclusions are hard to extrapolate for all Eastern and Western European Countries. However, Poland is a representative country from the political regulations point of view for the Eastern Europe, facing similar conditions with the rest of the countries over time. On the other hand, UK was always recognized as a particular environment, so further analysis might be needed to isolate other political effects that might interfere with the results, such as pre-Brexit period and all the regulations that changed during the transition period.

Another consideration worth mentioning is that the sample used contains also the Economic Crisis period from 2008. Being a nonspecific period, with lots of measures taken in order to reduce the effects of the crisis and to secure as much as possible the economy of the countries, it might lead to results that cannot be attributed directly to the IFRS implementation, or in a worse case influencing them in a negative direction.

Moreover, the European Union expansion after 2005 and all the regulations that were changed in the countries as a pre-condition of accession, might also have an impact on the financial statements of the companies, which is almost impossible to separate.

However, disregarding the limitations of the current research, it is worth mentioning that it still has some further theoretical and practical implications. From a theoretical perspective, it shows that the initial objectives of IFRS implementation are achieved in practice and are bringing economic benefits on long term. The results obtained on the current sample are demonstrating a value relevance increase for the

Eastern European companies higher than the one for the Western European companies, meaning that the reporting of accounting figures that have a prediction with respect to the equity market values has a better quality after IFRS implementation. The impact of the results could be extended to stating that after implementation the difference between Eastern and Western European countries from an economical perspective have decreased.

A practical implication that is important to be considered is the reaction of the investors to a higher value relevance of the financial statements. Knowing that investors are keen to make informed decisions, a potential result of this paper, that can be further analyzed, is how the changes in the accounting figures explain the changes in stock prices. Going further, a higher increase of value relevance for the Eastern European companies is translated into more confidence of investors placing their resources into these companies.

8. Concluding remarks

Previous research on the benefits of mandatory IFRS adoption has yielded inconclusive results, although some improvements have been observed. It is also evident from the research that these benefits were not evenly distributed among firms and countries.

This study aligns with previous research by demonstrating that the value relevance of financial reporting for Eastern and Western European companies increased after the implementation of IFRS. The statistical results obtained from the study suggest that the database used is relevant for investigating the research question, in relation to cash flows, prices and returns. However, it is important to note that there are factors influencing these economic outcomes that are not covered by the accounting standard. Therefore, further analysis may be necessary to fully determine the relevance of the database in these areas.

It is worth acknowledging that isolating the effects of IFRS implementation from other events during a specific time period, such as different government regulations or financial/health crises, is extremely challenging. Therefore, additional research may be required to draw a definitive conclusion.

A possible extension of the current research is testing also some relevant sub-samples such as:

- To test whether the comparability has increased more in some industries than in others after IFRS adoption, the same procedure for each industry sector can be applied.
- To test whether the value relevance has increased after 10 years of mandatory IFRS adoption, the observations can be grouped as before 2015 and after 2015, and apply the same tests. The Economic Crisis years should be taken out for this analysis, so that its effects are isolated.
- To test whether the comparability has increased more for mandatory IFRS adoption than for voluntary adoption, the observations can be grouped into earlier adopters and 2005 adopters.

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EXPLORING DETERMINANTS OF TRANSFER PRICING PRACTICES AMONG ROMANIAN PUBLICLY TRADED COMPANIES

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Abstract. This paper explores the effect of determinants shaping the landscape of transfer pricing practices within intra-group transactions among publicly traded companies in Romania over the period 2022. The research hypothesis focuses on identifying the variables that have a significant impact on transfer pricing in the Romanian business environment. Data collection was conducted manually from various sources, including explanatory notes from annual reports and databases such as Thomson Reuters and Bloomberg. The results reveal that the size of companies, sales, capitalization, foreign ownership, sales growth, and operational profit collectively contribute to the influence on transfer pricing practices. However, individual analysis shows that only sales significantly affect the transfer pricing practice.

JEL classification: M4, H25, F23, H87

Keywords: transfer pricing; related party transactions; multiple linear regression

1. Introduction

In recent years, transfer pricing (TP) has become increasingly significant in the realm of international business, with the rise of globalization and the expansion of multinational companies (MNC) operating across borders. MNCs strategically utilize TP mechanism among affiliated entities to optimize revenues in the context of varying tax rates across jurisdictions (Cristea & Nguyen, 2016). A common approach observed in these companies is to maintain dual objectives: one for internal management accounting and another for tax reporting. This illustrates the complexity and importance of TP strategies in MNCs (Robu & Căpățină-Verdeș, 2017). With a significant portion of world trade transactions occurring between entities within the same corporate group, TP has rightfully claimed its place as a top priority on the fiscal agenda. The practice of TP remains within legal bounds as long as it complies with prevailing tax regulations. However, it has evolved into an international concern as numerous companies engage in TP practices that contravene tax laws, leading to state revenue losses (Supriyati et al.,

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2021). In Romania, TP became an official part of fiscal regulations in 2016 with the release of Order no. 442/2016, signifying a crucial development in the country's handling of intra-group transactions. Since then, understanding how publicly traded companies navigate and implement TP practices has become imperative.

Our study is motivated by the need to investigate the factors influencing TP practices. TP is evaluated through related party transactions (RPT), commonly observed when companies conduct transactions with affiliated entities, serving as the dependent variable in our analysis. We aim to explore the impact of various independent variables, including company size, sales volume, market capitalization, foreign ownership, sales growth, and net operating income, on TP practices. This analysis contributes to the existing literature, which is currently underexplored in this area. Our research aims to reveal the fundamental factors driving intra-group decisions. Understanding these factors can empower companies to optimize their financial structure and devise tax strategies more efficiently.

2. Literature review

Numerous studies have explored the factors influencing TP decisions within companies over the past decades. Since the 1970s, empirical research has investigated how companies select the optimal TP method for their environments, analyzing a multitude of factors including TP objectives, tax regulations, organizational characteristics, environmental variables, and host country constraints.

Borkowski (1992) investigated the factors shaping companies' decision-making processes in selecting TP methods, highlighting tax legislation, operational complexity, and considerations of tax risk and transparency. Wu & Sharp (1979) and Benke & Edwards (1980) categorized significant factors affecting TP method choice into organizational, environmental, and international factors. Al-Eryani et al. (1990) analyzed determinants of TP strategies among US MNCs, identifying factors such as company size, host country tax rates, and product differentiation's influence on TP. In exploring the impact of company size, Nurwati et al. (2021) found that larger companies tend to engage in more aggressive TP practices, possibly driven by their greater resources and market presence. Oyelere et al. (1999) examined the influence of environmental factors on TP decisions among UK-based MNCs, emphasizing the significant impact of tax laws, regulations, enforcement, political stability, exchange rates, and market competition. Moving beyond traditional factors, researchers have investigated the relationship between related party transactions (RPTs) and various determinants such as market capitalization, foreign ownership, and profitability. Refgia et al. (2017) explored the determinants of RPTs, including company size, in the Indonesian context, revealing a positive correlation between company size and RPT. Similarly, studies by Kiswanto (2014) and Melmusi (2016) examined the influence of foreign ownership on TP decisions, suggesting that higher levels of foreign ownership led to increased influence from foreign parties in determining TP decisions.

While tax regulations have been a consistent theme in prior studies, our focus lies on the specific context of Romanian public companies. Given the potential variations in tax regulations across countries, our study focuses on other influential factors such as company size, sales, market capitalization, foreign ownership, and operating income, which are more pertinent to the Romanian business landscape.

3. Methodology

The research method adopted is causal research selected to investigate the hypotheses regarding the influence of one or more independent variables on other dependent variables. This approach facilitates the examination of cause-and-effect relationships within the study. Utilizing quantitative data, expressed in measurable numerical form, enables analysis using statistical techniques. Data for the research is gathered from diverse sources, including databases such as Thomson Reuters and Bloomberg, as well as from the annual reports and financial statements of public companies.

To assess our hypotheses, we aimed to identify the factors influencing transactions with related parties by constructing a database for multiple linear regression, considering it the most appropriate method. Drawing from scientific literature, we evaluated various variables and selected those we believed to significantly influence the phenomenon under study. Given our focus on a sample of Romanian companies, we omitted certain indicators deemed less relevant to the local context. This analysis was conducted using the SPSS Statistics 25 software. The initial step involved testing the correlation between variables, explored, and visualized through Scatterplot diagrams. These diagrams serve to identify patterns, trends, or relationships between variables. Clustering of points in a specific manner or following a trend line may suggest a correlation between variables (Nguyen et al., 2020).

Thus, our investigation led us to the variables presented in Table 1, along with the associated calculation methods, providing a structured approach to analyze the determinants of transactions with related parties.

Table 1. List of variables. Own processing

Abbreviation	Description	Unit of Measurement
Dependent		
RPT it	Related party transactions	Value of total related party transactions (Sales and purchases)
Independent		
SIZE it	Company size	Value of total asset
SALES it	Sales	Value of total sales
MC it	Market capitalization	Market value of equity
FO it	Foregin ownership	Shares held by foreign entities / Total number of shares * 100
SG it	Sales growth	Sales growth Current period sales – Previous period sales
NOI it	Net operating income	Operating profit Revenue – Operating expenses

The hypothesis aligns with previous research findings from scholars such as Borkowski (1992), who maintained that certain independent variables play a significant role in shaping TP dynamics. Therefore, we propose the following hypotheses:

- H0: There is no significant influence of the independent variable on transactions with affiliates.
- H1: There is a significant influence of the independent variable on transactions with affiliates.

The proposed research model is a multiple regression that explores the relationship between the dependent variable, TP it and a set of independent variables. The model is expressed by the equation:

$$TPit = \alpha it + \beta 1SIZEit + \beta 2SALESit + \beta 3MCit + \beta 4FOit + \beta 5SGit + \beta 6NOIit + \epsilon it.$$

where:

α it - represents the model intercept.

$\beta 1, \beta 2, \dots, \beta 10$ - are the coefficients associated with each independent variable

ϵ it - is the error term.

4. Descriptive Analysis

In this research, several independent variables are used: company size, sales, market capitalization, foreign ownership, sales growth, operating profit. Company size can be observed based on the size of the assets held by it and is replaced with Ln Total assets. The use of natural logarithms (ln) aims to reduce excessive data instability without changing the proportion of the original real value (Leksono et al., 2019).

The sample in this research includes companies listed on the Bucharest Stock Exchange in the year 2022. The initial sample consisted of 63 companies, however, in cases where transactions with affiliates were not published, we excluded those companies from the sample, resulting in a final number of 50 companies.

Table 2. Descriptive Analysis Results. Own processing

N Statistic		Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Devia- tion Statistic	Skewness		Kurtosis	
						Statis- tic	Std. Error	Statis- tic	Std. Error
RPT it (DV)	50	3.24077	22.29561	14.78515	3.68586	-.566	.337	1.507	0.662
SALES it (IV)	50	13.8243	23.24236	18.20774	2.08522	.152	.337	-.109	0.662
SIZE it (IV)	50	15.8365	23.17802	18.63699	1.78133	.589	.337	-.319	0.662
MC it (IV)	50	14.6073	22.70974	18.12601	2.01914	.190	.337	-.706	0.662
FO it (IV)	50	.000000	24.25792	8.961964	9.22932	.122	.337	-1.884	0.662
SG it (IV)	50	-32.687	117.1537	18.14855	31.3392	1.314	.337	2.169	0.662
NOI it (IV)	50	.000000	21.61399	13.98406	6.09511	-1.601	.337	1.477	0.662
Valid N (listwise)	50								

In this study, descriptive statistical analysis was used to highlight the data's picture by revealing the minimum value, maximum value, mean value, and standard deviation of the data. It is presumed that both parties involved may derive significant benefits from such TP practices Refgia et. al (2017). The variables analyzed in this research included related party transactions (RPT), company size (SIZE), sales size (SALES), market capitalization (MC it), Foreign ownership (FO it), Sales growth (SG it), and Operating profit (NOI it). Thus, a final number of 50 companies were included in the analysis. RPT was identified as the dependent variable, with a minimum value of 3.24 and a maximum value of 22.29. A minimum value of 3.24 for RPT indicates that there are companies with relatively low levels of RPT, while a maximum value of 22.29 suggests that there are also companies with larger transactions in this area. The mean of 14.79 indicates a central value of the RPT variable. The standard deviation of 3.69 shows some variability around this mean. The negative skewness (-0.566) suggests a slight longer tail on the left side of the distribution, and the Kurtosis of 1.507 indicates heavier tails than those of a normal distribution. Distributions with heavier tails than a normal distribution are characterized by higher probabilities for extreme or rare events (Nurul, 2023). The normality test was conducted using the Kolmogorov-Smirnov statistical test using the results from SPSS. The data is considered normally distributed if the Kolmogorov-Smirnov test shows a significant value above 0.05.

Table 3. Normality test results in SPSS. Own processing

Test of Normality						
	Kolmogorov-Smirnov ^a			Shapiro- Wilk		
	Statistic	df	Sig.	Statistic	df.	Sig.
RPT it (DV)	.116	50	.089	.960	50	.089
SALES it (IV)	.057	50	.200*	.993	50	.992
SIZE it (IV)	.111	50	.172	.952	50	.042
MC it (IV)	.100	50	.200*	.971	50	.246
FO it (IV)	.334	50	.000	.747	50	.000
SG it (IV)	.139	50	.017	.897	50	.000
NOI it (IV)	.261	50	.000	.743	50	.000

The results of the analysis suggest that the FO, SG, and NOI variables exhibit significant deviations from a normal distribution. On the other hand, other variables such as RPT, SALES, and SIZE seem to follow a normal distribution, with a usual significance level of 0.05. This discrepancy may be attributed to the fact that the FO, SG, and NOI variables contain values of 0, indicating either the absence of foreign ownership, decreases in sales, or the absence of net operating income in the year 2022. These exceptions affect the normal distribution of these variables.

5. The Scatterplot and multicollinearity test

The preliminary data analysis involves several steps to assess the relationships between the independent variables and the dependent variable. Firstly, multicollinearity tests and Scatterplot analyses are conducted. The purpose of these analyses is to determine the relevance of each independent variable in relation to the dependent variable. By examining scatterplots, we will look for correlations or trends between variables. Identifying significant patterns or relationships will provide us with a better understanding of the impact of each independent variable on the dependent variable. Each of these variables will be analyzed separately in relation to the dependent variable to evaluate their impact on the research outcomes.

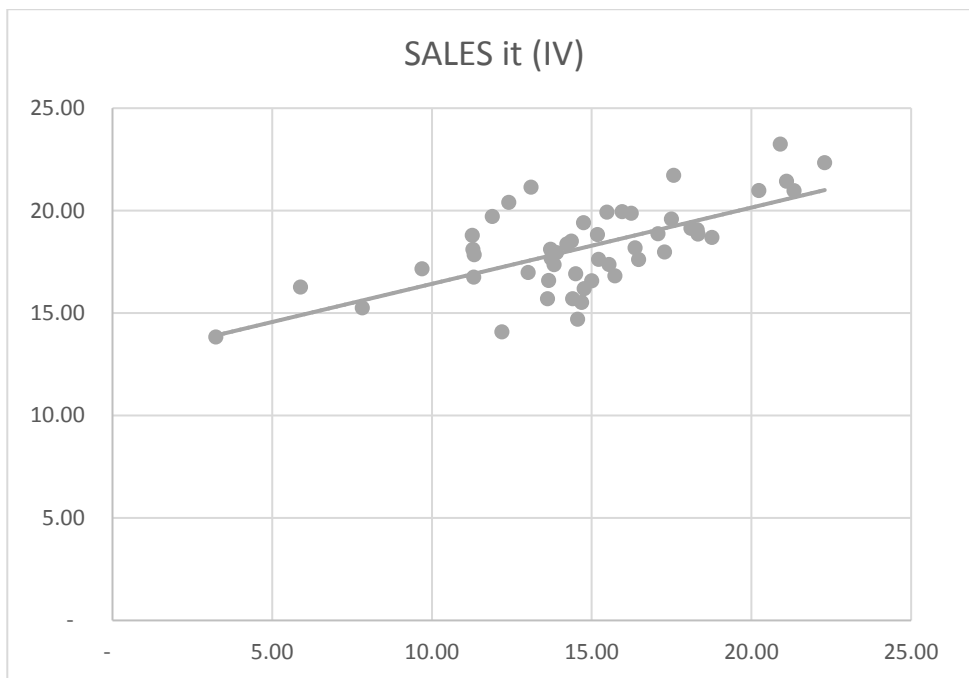


Figure 1. Own processing

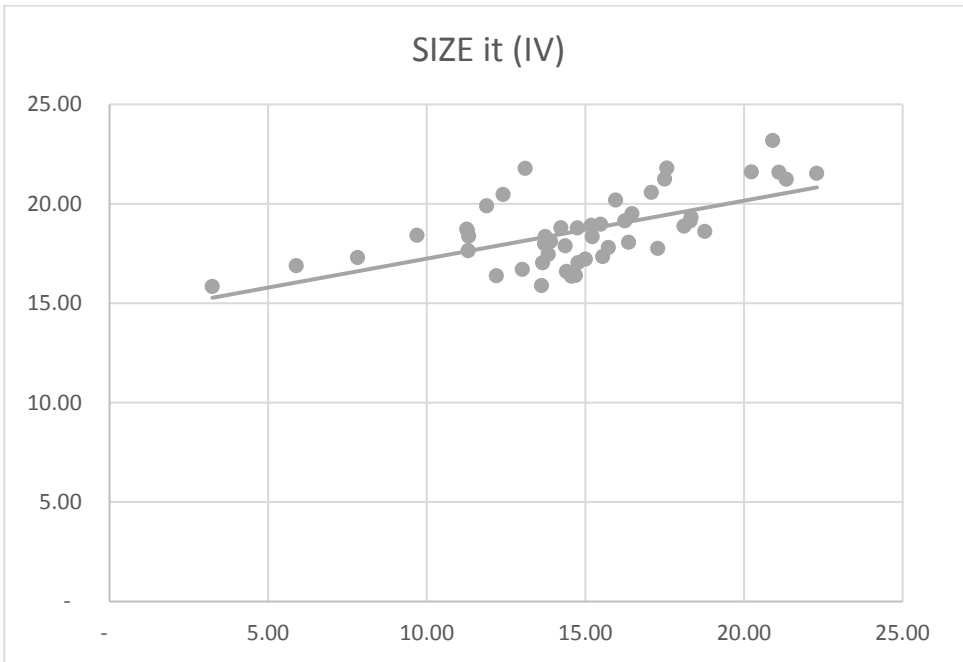


Figure 2. Own processing

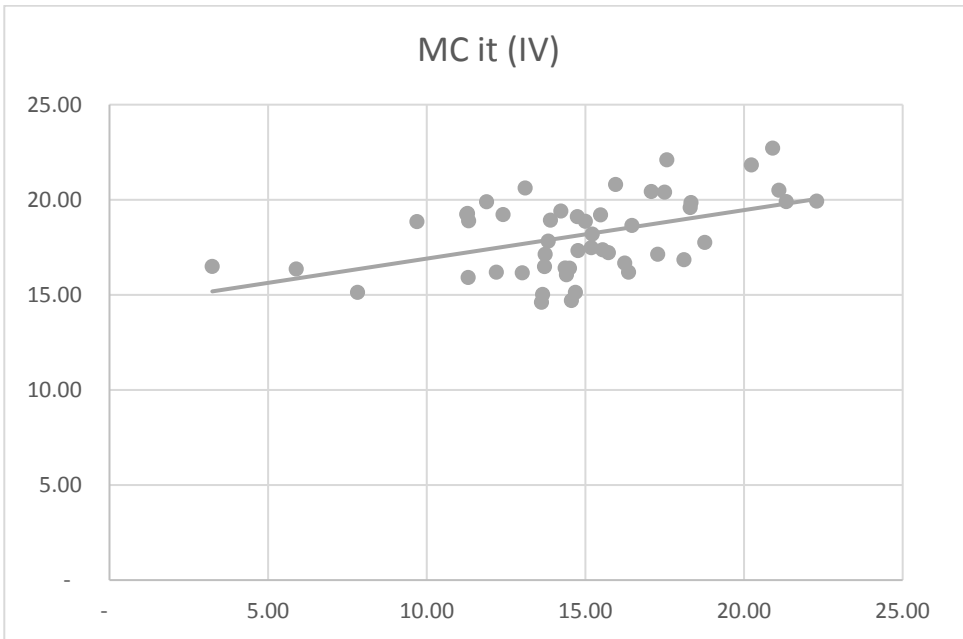


Figure 3. Own processing

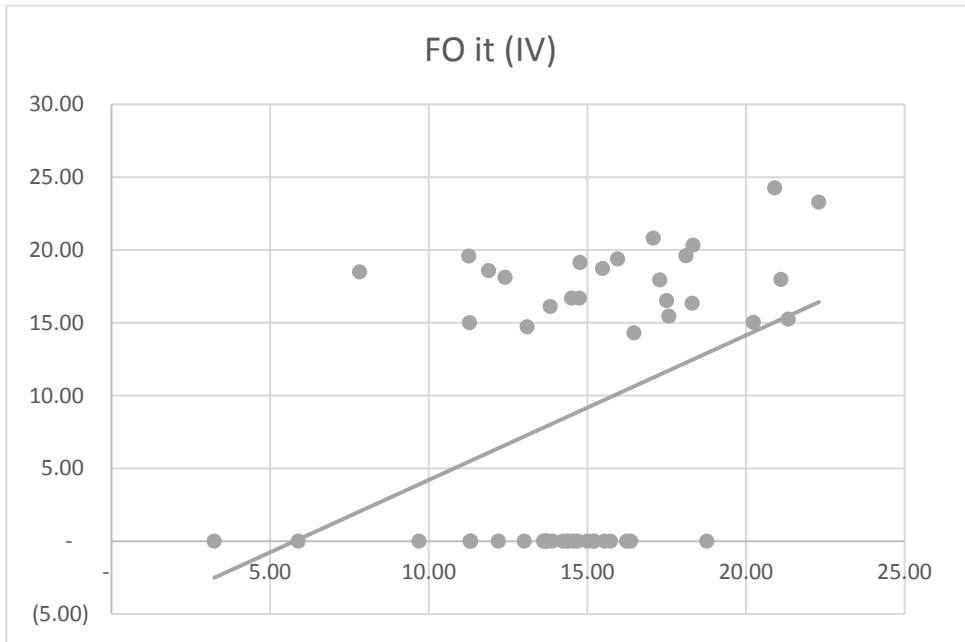


Figure 4. Own processing

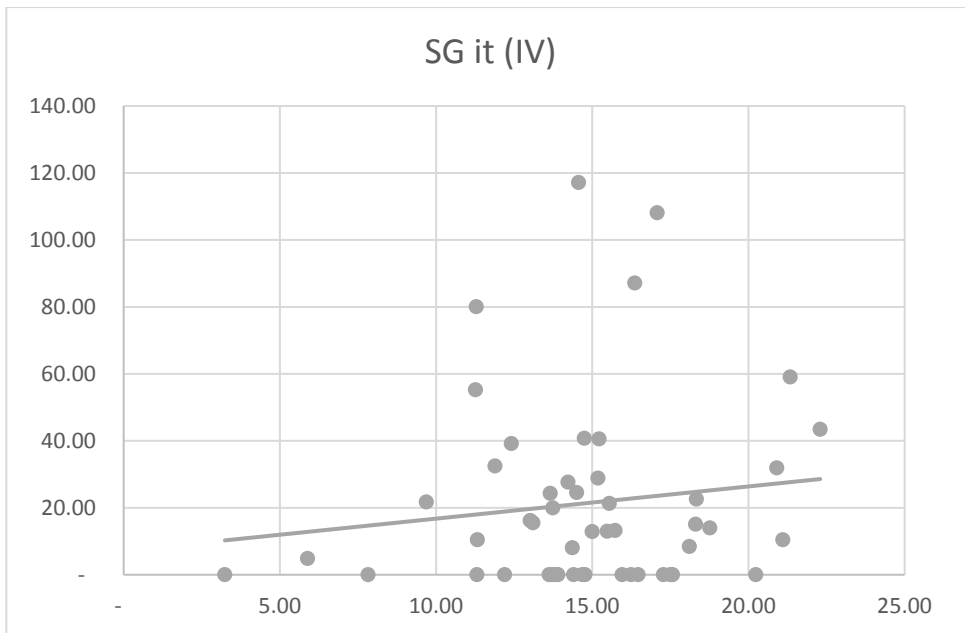


Figure 5. Own processing

Visualizing all variables on Scatterplot graphs, with the dependent ones (on the X-axis) in relation to the independent variable (on the Y-axis), we can conclude that all points on the graphs are close to the regression line. This observation indicates a good fit of the regression model to the data. In cases where there are points that do not follow a linear pattern, this could indicate either a lack of available data for those variables or that they are equal to zero.

We used the Pearson correlation coefficient method to examine the relationships between the dependent variable and the independent variables.

Table 4. Own processing

Correlations								
		RPT it (DV)	SIZE it (IV)	SALES It (IV)	MC it (IV)	FO it (IV)	SG it (IV)	NOI it (IV)
Pearson Correlation	RPT it (DV)	1.000	.603	.658	.0466	.397	.161	.298
	SIZE it (IV)	.603	1.000	.933	.879	.622	.186	.615
	SALES It (IV)	.658	.933	1.000	.809	.594	.189	.599
	MC it (IV)	.466	.879	.809	1.000	.614	.151	.642
	FO it (IV)	.397	.622	.594	.614	1.000	.146	.467
	SG it (IV)	.161	.186	.189	.151	.146	1.000	.104
	NOI it (IV)	.298	.615	.599	.642	.467	.104	1.000
Sig. (1- tailed)	RPT it (DV)	.	.000	.000	.000	.002	.132	.018
	SIZE it (IV)	.000	.	.000	.000	.000	.098	.000
	SALES It (IV)	.000	.000	.	.000	.000	.094	.000
	MC it (IV)	.000	.000	.000	.	.000	.147	.000
	FO it (IV)	.002	.000	.000	.000	.	.156	.000
	SG it (IV)	.132	.098	.094	.147	.156	.	.237
	NOI it (IV)	.018	.000	.000	.000	.000	.237	.
N	RPT it (DV)	50	50	50	50	50	50	50
	SIZE it (IV)	50	50	50	50	50	50	50
	SALES It (IV)	50	50	50	50	50	50	50
	MC it (IV)	50	50	50	50	50	50	50
	FO it (IV)	50	50	50	50	50	50	50
	SG it (IV)	50	50	50	50	50	50	50
	NOI it (IV)	50	50	50	50	50	50	50

The obtained correlation coefficients, ranging from 0 to 1, indicate the presence of a positive correlation, suggesting that, generally, an increase in one variable is associated with a proportional increase in the other.

Table 5. Own processing

Model Summary ^b									
						Change Statistics			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df 1	df 2	Sig. F Change
1	.677 ^a	.458	.383	2.8957529	.458	6.065	6	43	.000

Based on Table 5, we observe that the adjusted R-squared value is 0.383 or 38.3%. This indicates that 38.3% of the variability in TP can be explained by company size, sales, capitalization, foreign ownership, sales growth, and operational profit.

The R-squared value (R²) indicates the proportion of variation in the dependent variable explained by the independent variables included in the model. In this case, 0.458 suggests that approximately 45.8% of the variation in RPT is explained by the independent variables, and the Sig F value is the p-value associated with the F Change statistic. According to Nurwati et al. (2021), a low p-value (close to zero) indicates that adding the independent variables is significant.

Table 6. Own processing

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	305.122	6	50.854	6.065	.000 ^b
	Residual	360.572	43	8.385		
	Total	665.693	49			

- a. Dependent Variable: RPT it (DV)
b. Predictors: (Constant), NOI (IV), SG it (IV), FO it (IV), SALES it (IV), MC it (IV), SIZE it (IV)

The results of the ANOVA tests, as shown in Table 6, conducted to assess the influence of company size, sales, capitalization, foreign ownership, sales growth, and operational profit on affiliate transactions, obtained a significance value (Sig.) of 0.000, where this value is less than 0.05, thus accepting H1. This means that company size, sales, capitalization, foreign ownership, sales growth, and operational profit collectively have a significant influence on TP.

Table 7. Own processing

Coefficients ^a											
Unstandardized Coefficients							Correlations			Collinearity Statistics	
Standardized Coefficients		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-6.363	5.670		-1.122	.268					
	SIZE it (IV)	.285	.800	.138	.356	.724	.603	.054	.040	.084	11.881
	SALES it (IV)	1.291	.555	.730	2.324	.025	.658	.334	.261	.128	7.839
	MC it (IV)	-.382	.454	-.209	-.842	.405	.466	-.127	-.094	.203	4.916

Coefficients ^a											
		Unstandardized Coefficients				Correlations				Collinearity Statistics	
		Standardized Coefficients									
	FO it (IV)	.023	.059	.057	.390	.699	.397	.059	.044	.586	1.707
	SG it (IV)	.004	.013	.033	.288	.775	.161	.044	.032	.961	1.040
	NOI it (IV)	-.072	.090	-.119	-.799	.429	.298	-.121	-.090	.565	1.769

6. Findings

The coefficient value for the variable SIZE is 0.285, with a corresponding t-test value of 0.356 and a significance value of 0.724, exceeding the threshold of 0.05. Consequently, we accept the null hypothesis (H0) and reject the alternative hypothesis (H1), indicating that company size does not significantly affect TP practices. While these results diverge from the findings of Melarosa, C. (2018), who reported a positive influence of company size on TP practices, they align with the conclusions drawn by Nurwati et al. (2021), which similarly found no significant impact of company size on TP practices.

For the variable SALES, the coefficient value is 1.291, accompanied by a t-test value of 2.32 and a significance value of 0.025, below the predetermined threshold of 0.05. Thus, we reject the null hypothesis (H0) and accept the alternative hypothesis (H1), indicating a significant relationship between the SALES variable and TP practices. This finding is supported by the research of Johnson et al. (2020), who also observed a positive influence of sales on TP practices. Conversely, Chen and Li (2017) found no significant relationship between sales and TP practices in their study.

The variable MC has a coefficient value of -0.382, accompanied by a calculated t-test of -0.842 and a significance value of 0.405. His negative coefficient suggests an inverse relationship between the MC variable and TP practices. However, the significance value of 0.405 exceeds the conventional threshold of 0.05, indicating insufficient evidence to reject the null hypothesis (H0) that the regression coefficient for "MC" is zero. Therefore, we cannot assert a significant relationship between capitalization and TP practices. Brown and Jones (2016) similarly found no significant effects of market capitalization on TP practices, consistent with our findings. Garcia et al. (2018) reported a significant negative association between market capitalization and TP practices in their analysis, contrasting with our results.

The variable FO (foreign ownership) is associated with a coefficient value of 0.23, along with a calculated t-test of 0.390 and a significance value of 0.699. Given that the significance value exceeds the conventional threshold of 0.05, foreign ownership appears to lack a significant effect on TP practices. This finding is consistent with the conclusions drawn by Wang and Wu (2019), who similarly found no significant effect of foreign ownership on transfer pricing practices. However, Li et al. (2015) reported a significant positive impact of foreign ownership on transfer pricing practices, contrasting with our results.

Regarding the variable SG (sales growth), it exhibits a coefficient value of 0.04, accompanied by a calculated t-test of 0.288 and a significance value of 0.775. As the significance value surpasses the conventional threshold of 0.05, it indicates that sales growth does not significantly affect TP practices. This finding is consistent with the results reported by Patel and Shah (2020), who similarly found non-significant

effects of sales growth on transfer pricing practices, aligning with our observations. However, Kim and Park (2018) observed a significant positive relationship between sales growth and TP practices in their study, which contrasts with our findings.

Lastly, the variable NOI (operational profit) presents a coefficient value of -0.072, with a calculated t-test of -0.799 and a significance value of 0.429. Since the significance value exceeds the conventional threshold of 0.05, it suggests that operational profit does not significantly impact TP practices. This finding aligns with the results reported by Zhang and Wang (2016), who similarly found a non-significant association between net operating income and TP practices.

7. Conclusion and study limitations

In conclusion, our study examined the impact of various independent variables on transfer pricing (TP) practices in Romania. While some variables demonstrated significant relationships with TP practices, others did not yield significant results. Specifically, company size was found to have no significant effect on TP practices, aligning with previous research by Nurwati et al. (2021) but differing from findings by Melarosa, C. (2018). Sales volume was identified as a significant factor influencing TP practices, consistent with Johnson et al. (2020), while market capitalization, foreign ownership, sales growth, and operational profit showed non-significant associations with TP practices, which is in line with prior research by Brown and Jones (2016), Wang and Wu (2019), Patel and Shah (2020), and Zhang and Wang (2016).

However, it's crucial to acknowledge several limitations that may impact the generalizability of our findings. Firstly, the constraints posed by our sample size limited the depth of our analysis. Additionally, challenges related to data quality and transparency regarding affiliated parties compelled us to reduce the number of included companies. Moreover, given that transfer pricing is a relatively novel concept in Romania, there is a scarcity of research in this area, which may have influenced our study outcomes.

Moving forward, addressing these limitations is imperative for future research endeavors. Expanding our database and considering additional factors, such as the tax rates of host countries, could enhance the comprehensiveness of our analysis. However, this expansion would necessitate broadening our scope to include not only Romania but also other European countries or even a global perspective. Furthermore, mitigating the challenges associated with data collection, particularly regarding the volume of transactions with affiliated parties, is paramount. Implementing strategies to overcome these limitations will contribute to a more robust understanding of transfer pricing dynamics in Romania and beyond.

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EUROPEAN MACROECONOMIC DYNAMICS ON FINANCIAL MARKETS AND ECONOMIC POLICY: A CROSS COUNTRY STUDY FOR SPILLOVER EFFECTS

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Abstract. What is the direction and extent of the spillover effects of sovereign bond yields in the European Union and which countries are transmitters and receivers of these effects? The motivation for this research is related to the need to better understand the interconnectedness of European Union sovereign bond markets in the context of rising budget deficits and public debt, as well as recent financial and sovereign debt crises, which have highlighted the importance of bond market interdependencies. The main objective of the paper is to investigate the direction and magnitude of the spillover effects of sovereign bond yields in the European Union and to identify the states that act as transmitters and receivers of these effects. The data used in the analysis include the evolution of the bond markets of the euro area member states and non-monetary union states, to allow comparison and assessment of their interconnectivity. To analyse the interconnectedness of bond markets, methods which provide a suitable analysis framework to assess volatility propagation between countries were used. The research results highlight that most of the contagion effects are concentrated in the peripheral countries, such as Romania, Portugal, Lithuania and Ireland, and the central countries act as transmitters of these effects.

Keywords: interconnectivity, bond markets, European Union, spillover effects, contagion.

JEL codes: C01, C51, C52, C53, C54, C58, C61, C63

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1. Introduction

The current context characterized by increasing budget deficits and public debt provides an opportunity to explore the existing bond market linkages between CEE countries and eurozone member states. The recent financial crisis that erupted in December 2007, as well as the recent sovereign debt crisis, highlighted the importance of bond market interdependencies. The analysis of these interdependencies between European countries leads to obtaining additional information about the evolution of financial crises and their specificity.

Even though more attention needs to be paid to equity market contagion, following the Greek crisis, research has increasingly focused on exploring the bond market. The lesson of the Greek crisis was simple for both investors and policymakers: a potential crisis in one European country can influence the volatility of many others. In this chronological context, this paper aims to explore financial inter-connectivity through the spillover effects of sovereign bond yields. Furthermore, the paper is motivated by the relatively limited research on the integration of the CEE bond market into the euro area.

The main objective of this paper is to identify the direction and magnitude of the spillover effects of sovereign bond yields in the European Union. The results provide a framework for future research investigating the degree of volatility and integration of bond markets.

As there is not universally accepted theoretical or empirical definition of inter-connectivity, we define the concept as inter-dependence or contagion (Chen, 2020; Acemoglu and Tahbaz-Salehi, 2015; Davidson, 2020). However, at the conceptual level the terms inter-connectivity and inter-dependence imply a long-term temporal element and do not necessarily imply contagion. Rather, contagion is defined as the short-term intensification of market linkages resulting from a shock within a market or within a group of markets (Karkowska and Urjasz, 2020).

The literature has used different methodologies and methods to assess either interdependence or contagion in bond markets. For example, numerous studies have used the copula methodology (Silvapulle *et al.*, 2016), Bayesian regressions (Caporin *et al.*, 2018), vector error correction approach (Ters & Urban, 2018), network methodology (Chen *et al.*, 2020). Empirically, this paper uses the Diebold and Yilmaz (2012, 2014, 2015) framework to explore cross-country volatility propagation. A similar approach is taken by Karkowska & Urjasz (2020). This paper is in fact an attempt to replicate the Karkowska & Urjasz (2020) study, including all relevant EU countries for the sample. The choice of methodology is motivated by the high degree of simplicity for measuring spillover effects in a generalized vector autoregressive framework. The benefits of using this methodology are presented in section 4.

The results of this research attempt to highlight the transmitting states of the spillover effects, as well as the receiving states in the European network, providing insights on future research directions. Only one general and common conclusion can be drawn from the results: peripheral countries are receivers of spillover effects, while central countries transmit spillover effects.

This paper is organized as follows: Section 2 reviews the literature attempting to explore the policy applicability of the direction and magnitude of spillover effects. Section 3 describes the data and attempts to explore the differences between euro area and non-EU countries. Section 4 presents the inter-connectivity estimation methodology. Section 5 presents the results. Section 6 concludes by formulating future research directions.

2. Literature review

The academic literature on bond market contagion explores the determinants of contagion as well as the effects of this phenomenon. Regarding the determinants, studies have shown that government bond spreads are driven by fundamental macroeconomic and fiscal indicators, specific news, exchange rate movements, rating changes or stock market returns (Silvapulle *et al.*, 2016; Gomez-Puig *et al.*, 2014; Haugh & Turner, 2009; Afonso *et al.*, 2012; Reboredo & Ugolini, 2015; Favero, 2013; Beetsma *et al.*, 2013). Regarding contagion effects in bond markets, studies have focused on bank and sovereign default risk (De Bruyckere *et al.*, 2013; Angeloni and Wolff, 2012; Arezki *et al.*, 2011; Brown and Dinc, 2011) or on the impact of sovereign yield margins on stock returns (Bhanot, K., *et al.*, 2014).

Looking at the inter-connectivity of sovereign bond markets as measured by volatility spillovers, the literature is limited. Market interdependence or inter-connectivity is addressed, as described above, in cause-and-effect studies. It can be mentioned that inter-connectivity is a concept that remains undefined completely and can be measured by several tools.

At the European level, most studies on the inter-connectivity of sovereign bond markets focus on countries within the European Monetary Union (Fernández-Rodríguez *et al.*, 2015; Caporin *et al.*, 2018; Frijns and Zwickels, 2020; Gomez-Puig and Sosvilla-Rivero, 2014; Martin and Zhang, 2017). For example, using the Diebold and Yilmaz (2012, 2014, 2015) framework, Fernández-Rodríguez *et al.* (2015) show that in the pre-crisis period, most of the triggers of spillover effects came from core countries, while during the crisis, peripheral countries became the dominant transmitters. Similar results were also identified by Gomez-Puig and Sosvilla-Rivero (2014) who demonstrate that causal relationships originating from EMU peripheral countries show an important increase during the crisis period. In contrast, Caporin *et al.* (2018) show that the propagation of euro bond shocks shows almost no change implying that contagion has so far remained low.

The study of CEE sovereign bond markets is even more limited as this market is relatively new. Moreover, the study of this region presents some disadvantages because not all states are part of the Monetary Union, which makes it difficult to control some of the factors that influence yield spreads, including exchange rate movements, exchange rate risk, inflation, or credit risk premiums. However, the studies related to this field focus on the dynamics of the financial integration of the CEE in the euro area. For example, Christiansen (2014) shows that the integration of government bond markets is stronger for UM than for non-UM member states and stronger for old UM member states than new UM member states. The article by Yang and Hamori (2015) discusses the interdependence between the bond markets of the CEC-3 (Poland, the Czech Republic and Hungary) and Germany, finding that there was contagion in these markets during the global financial crisis and the sovereign debt crisis at different degrees and directions. Even though the focus should be on CEE bond markets, this study considers roughly all EU markets. Since the general interest is market convergence, future research should analyse specific markets and the use of econometric models of convergence is necessary. Furthermore, exploring the dynamics of convergence will provide insights into what type of policy instruments are needed for financial markets and what type of policy instruments are best suited for convergence. For example, some studies demonstrate the divergence of bond

yields and support the static criterion of the Maastricht Treaty for long-term bond yields that does not favor financial stability for euro candidate countries (Gabrisch and Orłowski, 2009).

In general, the interconnection between bond markets in the European Union is important. Inter-connections indicate a high or low degree of market integration. As government bonds are influenced by interest rate movements in other economies and are integrated into EU bond markets, understanding these links leads to further implications for monetary policy actions. Monetary policy instruments could be limited to some extent by spillover effects. Furthermore, for investors, understanding these inter-connections could lead to different investment diversification strategies, especially during a crisis.

3. Data

The data used in this study were taken from Thomson Reuters Eikon and represent daily closing values of 10-year government bond yields, denominated in Euro to ensure comparability. The geographic area of the data includes 19 European countries (all members of the European Union), except for Slovakia, Croatia, and Slovenia, which were removed due to the lack of data available for the periods leading up to the EU accession negotiations. The data set comprises 4137 observations for each time series between April 1, 2005, and January 29, 2020.

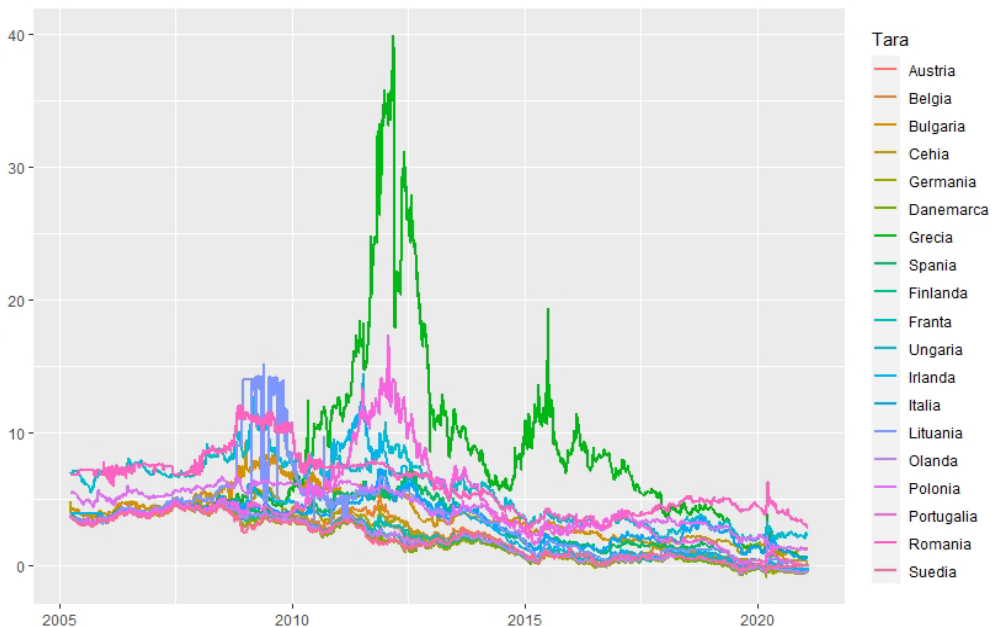


Figure 1. Daily 10-year government bond yields (% per year)

Figure 1 shows the evolution of sovereign bond yields from 2005 to 2020 in each country. The figure depicts a similar trend indicating a decline in all 19 bond markets. Significant changes are observed over three sub-periods corresponding to major crisis events: the 2007-2009 Global Financial Crisis (GFC), the peak of the 2012 sovereign debt crisis, and the 2020 Covid-19 pandemic.

For clarity, figure 2 shows the evolution of the bond markets for the euro area and for the non-member states of the UM, the states geographically located in Eastern Europe (Bulgaria, the Czech Republic, Hungary, Poland, and Romania). The figure shows the same trend over time, but the degree of volatility is much lower outside the UM.

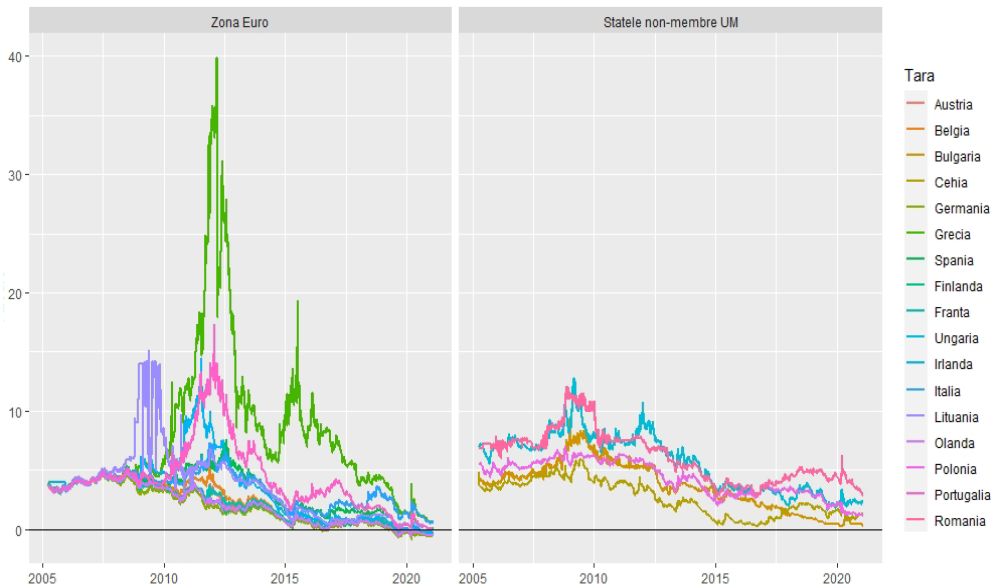


Figure 2. Daily 10-year government bond yields (% per annum) - comparison between the Eurozone and non-member states of the Monetary Union

Table 1 presents preliminary statistics for 10-year government bond yields, as well as the results of the Jarque-Bera test for normality. Series of mean returns are either positive or negative. France, Denmark, Austria, the Czech Republic, and Greece have the highest average returns, while Germany, Portugal, Sweden, Belgium, and the Netherlands have the lowest average returns. France is characterized by the highest degree of volatility, resulting from the standard deviation. It is followed by Ireland, Sweden, and Germany. The least volatile countries in our sample are Poland, Hungary, Romania, and Italy.

The results of the skewness, kurtosis and Jaque-Berra tests indicate that the return series do not follow the normal distribution. Thus, based on these results, we justify our decision to apply a different measurement of profitability, but also the application of the Diebold and Yilmaz (2012, 2014) framework.

4. Methodology

The first step to construct measures of connectivity (spillover effects of contagion), consisted of measuring daily returns by calculating the changes that occur from the previous day to the current day, as follows:

$$Return = \frac{Bond\ yield_t - Bond\ yield_{t-1}}{Bond\ yield_{t-1}} \quad 1$$

Based on the descriptive statistics of the data set, our choice of measurement of the spillover effect, a measure of contagion, was driven by its simplicity. For future research, other methods of calculating volatility could be applied: the ADDC-GARCH model that estimates a measure of volatility based on the performance of daily returns or the Garman & Klass (1980) model that estimates weekly return volatilities using the highest daily prices, lowest prices, closing prices and opening prices.

The second step of our analysis is to apply the Diebold Yilmaz (2012, 2014, 2015) framework that uses a generalized VAR (GVAR) and a generalized variance decomposition that allows us to explore the connectedness in bond markets. This methodology allows us to examine the relative importance of information both within a market and across markets in explaining contagion movements. First, it allows us to examine net directional spillover effects that provide information about how much one market contributes to contagion to other markets. Second, it allows us to assess the total volatility losses in the markets. In addition, we use a network mapping approach to graph volatility dynamics.

The methodology of the Diebold-Yilmaz Connectedness Index (DYCI) relies on generalized variance decompositions within a vector autoregressive (VAR) model framework. By incorporating network graphical display, DYCI effectively visualizes spillover effects across countries, bridging forecast error variance decompositions matrices with network edge weights to provide a robust representation of interconnectedness. The measure reveals how much SCDS i's variable future uncertainty results from shocks in variable j. DYCI methodology starts with the implementation of a covariance-stationary VAR model with N variables is defined as follows:

$$Y_t = \sum_{i=1}^p \phi_i x_{t-i} + \varepsilon_t$$

with $\varepsilon_t \sim (0, \Sigma)$. The moving average representation of VAR takes the following form:

$$Y_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i}$$

where $N \times N$ is a coefficient matrix. A_i follows recursive pattern as $A_i = \phi_1 A_{i-1} + \phi_2 A_{i-2} + \dots + \phi_p A_{i-p}$. A_0 is an identity matrix and $A_j = 0$ for $i < 0$. We calculate the decomposition of the variance of the forecast error at h steps ahead:

$$\varphi_{ij}(H) = \frac{\gamma_{jj}^{-1} \sum_{h=0}^{H-1} (e_i' A_h \Sigma e_j)^2}{\sum_{h=0}^{H-1} (e_i' A_h \Sigma A_h' e_i)}$$

The decomposition records how much variance of the forecast error of SCDS idiosyncratic or returns measures at h steps ahead is due to the shocks in another variable included in the VAR model. Each matrix element is normalized by summing the row so that the decomposition including shocks in each market equals the total decomposition of all variables sums to N :

$$\tilde{\varphi}_{ij}(H) = \frac{\varphi_{ij}(H)}{\sum_{j=1}^N \varphi_{ij}(H)}$$

These measures denote the spillover level received or transmitted by variable i within the system. Finally, the total spillover index is calculated as:

$$S(H) = \frac{\sum_{i,j=1, i \neq j}^N \tilde{\varphi}_{ij}(H)}{N} \times 100$$

denoting the overall spillover significance that originates in other countries on the determination of SCDS measures. This measure is called “system-wide connectedness” or “dynamic connectedness index”.

5. Results and discussion

As depicted in Table 2, the degree of total inter-connectivity among states in our sample is 14.73%. On the one hand, the markets that transmit most of the contagion are Italy, Lithuania, Portugal, Spain, and the Netherlands. Italy has the most significant result in measuring contagion (1.89%), followed by Lithuania (1.64%). Thus, the bond markets of Italy and Lithuania are the two most connected markets in terms of contagion.

On the other hand, the receiving bond markets are: Lithuania (1.77%), Portugal (1.67%), Italy (1.66%), Denmark (1.12%) and Spain (1.12%). The states that receive the least contagion effects are Germany (0.11%), Bulgaria (0.26%), Romania (0.29%), Austria (0.33%) and Belgium (0.39 %).

As mentioned, within the European Union, Italy is the strongest transmitter of volatility. However, the bond markets of Germany, Bulgaria, France, and Romania are the least affected by the Italian bond market, while the bond markets of Lithuania, Poland, Spain, and the Netherlands are the most influenced.

Overall, the analysis shows that, to some extent, these countries exhibit a high degree of two-way spillovers, suggesting financial market integration. As expected, this degree of integration is more persistent among the member states of the Monetary Union.

Table 1. Descriptive statistics

	Austria	Belgium	Germany	Denmark	Greece	Spain	Finland	France	Ireland	Italy	Lithuania	Netherlands	Portugal	Sweden
	ds													
Mean	0.0036	-0.0061	-0.0138	0.0071	0.0001	-0.0009	-0.0015	0.0329	-0.0038	-0.0001	-0.0005	-0.0044	-0.0119	-0.0110
Standard deviation	0.6440	0.4430	0.9405	0.2940	0.0300	0.0979	0.3653	2.0394	1.3662	0.0276	0.2044	0.6420	0.9015	1.0998
Min	-32	-12.5	-54.3333	-5	-0.5110	-3.8	-9.1429	-15.7692	-62	-0.2709	-8	-27.5	-56	-37
Max	18	14.5	10	13.5	0.4109	1.1818	10	125.6667	44	0.5978	5.4	23	7	26.5
Kurtosis	-22.5564	-2.5672	-47.2225	25.6530	-0.5949	-19.5782	-0.7614	56.7853	-15.0707	2.9656	-11.9636	-10.0400	-58.0660	-7.4279
Skewness	1647.9843	566.5107	2705.4884	1163.1911	65.4522	754.2191	318.0210	3483.1638	1331.7200	65.3469	805.2604	1252.6298	3586.1867	508.1455
Jarque-Bera test	368.6308*	418.4935*	346.0478*	344.3913*	8701.5955*	213.6975*	361.5985*	359.6592*	512.9511*	141.6182*	2972.3985*	357.1527	1826.1305	337.9856

	Bulgaria	Czechia	Hungary	Poland	Romania
Mean	-0.00000004	0.0001	-0.0001	-0.0003	4.76E-05
Standard deviation	0.0382	0.0301	0.0196	0.0165	0.0224
Min	-0.4375	-0.2846	-0.1741	-0.1990	-0.224
Max	1.2286	0.26	0.2613	0.1636	0.1903
Kurtosis	7.9196	0.9923	0.8210	-0.0137	0.2117
Skewness	274.1038	18.5700	18.3356	19.5680	14.8856
Jarque-Bera test	113.0774*	276.2342*	207.7915*	283.6493*	241.5051*

*** Notes: The Jarque-Bera test measures whether the sample data have a skewness index and a flattening index that fit a normal distribution.

Table 2. Total connectivity of volatilities, Diebold & Yilmaz method (2012), 10-year sovereign bond markets

	Austria	Belgium	Bulgaria	Czechia	Germany	Denmark	Greece	Spain	Finland	France	Hungary	Ireland	Italy	Lithuania	Netherlands	Poland	Portugal	Romania	Sweden	FROM
Austria	93.55	0.91	0.63	0.68	0.01	0.09	0.23	0.19	1.72	0.51	0.58	0.05	0.06	0.02	0.09	0.30	0.01	0.02	0.36	0.34
Belgium	0.36	92.47	0.14	0.09	0.01	0.11	0.20	0.33	1.80	1.93	0.81	0.22	0.48	0.05	0.43	0.26	0.01	0.05	0.24	0.40
Bulgaria	1.14	0.09	95.04	0.01	0.07	0.04	0.09	0.01	2.99	0.01	0.01	0.01	0.01	0.01	0.08	0.14	0.00	0.09	0.15	0.26
Czechia	0.33	0.23	0.01	90.23	0.07	0.74	0.03	0.42	0.22	0.05	2.33	0.24	1.16	0.03	0.94	2.48	0.02	0.37	0.11	0.51
Germany	0.02	0.02	0.07	0.53	97.83	0.58	0.08	0.03	0.04	0.00	0.06	0.01	0.17	0.01	0.25	0.24	0.00	0.07	0.00	0.11
Denmark	0.09	0.11	0.03	0.51	0.60	78.56	0.26	0.09	2.04	0.03	0.09	0.04	0.12	0.02	17.17	0.03	0.01	0.12	0.07	1.13
Greece	0.25	0.36	0.08	0.03	0.05	0.15	81.19	2.03	0.19	0.23	1.12	0.30	12.11	0.05	0.08	0.06	0.08	1.33	0.33	0.99
Spain	0.11	0.13	0.01	0.27	0.02	0.03	1.82	78.59	0.13	0.14	1.36	0.49	12.36	1.28	0.04	1.41	1.43	0.14	0.22	1.13
Finland	2.02	2.23	2.29	0.26	0.11	0.91	0.09	0.15	86.84	0.59	0.17	0.58	0.16	0.04	2.29	0.16	0.01	0.19	0.93	0.69
France	2.01	0.52	0.06	0.03	0.00	0.05	0.12	0.34	3.24	91.62	0.29	0.81	0.55	0.04	0.09	0.10	0.02	0.04	0.05	0.44
Hungary	0.41	0.79	0.01	2.07	0.05	0.03	1.10	1.40	0.26	0.08	80.20	0.55	2.77	0.03	0.04	8.80	0.04	0.98	0.38	1.04
Ireland	0.02	5.96	0.01	0.35	0.00	0.01	0.25	0.82	0.14	0.11	0.09	91.30	0.60	0.05	0.03	0.14	0.03	0.04	0.05	0.46
Italy	0.15	0.46	0.01	0.87	0.17	0.29	10.19	11.13	0.18	0.21	2.36	1.03	68.45	0.23	0.24	2.33	0.86	0.75	0.12	1.66
Lithuania	0.01	0.02	0.01	0.03	0.01	0.00	0.07	5.54	0.01	0.02	0.09	0.07	0.12	66.32	0.00	0.10	26.20	0.00	1.39	1.77
Netherlands	0.04	0.07	0.12	1.67	1.68	1.92	0.20	0.04	1.38	0.04	0.29	0.03	0.41	0.01	91.56	0.24	0.00	0.27	0.03	0.44
Poland	0.44	0.68	0.12	2.23	0.19	0.03	0.05	1.48	0.40	0.07	8.89	0.32	2.78	0.06	0.16	81.68	0.08	0.21	0.12	0.96
Portugal	0.00	0.02	0.00	0.01	0.00	0.00	0.31	1.46	0.00	0.00	0.07	0.01	0.67	28.62	0.00	0.04	68.23	0.01	0.54	1.67
Romania	0.02	0.11	0.12	0.39	0.05	0.11	1.52	0.19	0.10	0.07	1.14	0.09	1.00	0.02	0.44	0.24	0.04	94.31	0.05	0.30
Sweden	0.12	0.70	0.18	0.12	0.01	0.09	0.31	2.69	0.29	0.04	0.83	0.23	0.46	0.66	0.06	0.71	0.12	0.31	92.06	0.42
TO	0.40	0.71	0.21	0.53	0.16	0.27	0.89	1.49	0.80	0.22	1.08	0.27	1.89	1.64	1.18	0.94	1.52	0.26	0.27	14.73

Furthermore, from Table 2 measures of net connectivity can be calculated. Directional connection in network pairs can take the form of a positive (sender) or negative (receiver) value. As can be seen, the number of states transmitting contagion effects is slightly higher than the number of recipient states. The Dutch bond market is the largest transmitter of spillovers, followed by Spain, Belgium, and Italy. On the other hand, Denmark, France, Ireland, and Portugal are characterized as recipient states.

Table 3. Transmission/reception of volatility propagation effects

Country	Net Sender/ Net Receiver	Net Degree of Connectivity – Diebold & Yilmaz (2012)
Austria	Net transmitter	0.057
Belgium	Net transmitter	0.309
Bulgaria	Net receiver	-0.055
Czech Republic	Net transmitter	0.021
Germany	Net transmitter	0.050
Denmark	Net receiver	-0.856
Greece	Net receiver	-0.100
Spain	Net transmitter	0.364
Finland	Net transmitter	0.103
France	Net receiver	-0.223
Hungary	Net transmitter	0.041
Ireland	Net receiver	-0.191
Italy	Net transmitter	0.233
Lithuania	Net receiver	-0.128
Netherlands	Net transmitter	0.736
Poland	Net receiver	-0.028
Portugal	Net receiver	-0.148
Romania	Net receiver	-0.037
Sweden	Net receiver	-0.148

Table 3 graphically presents the pair-wise directional connection between the analysed bond markets. Also, Figure 3 represents the graphical confirmation of the results presented in table 3. A general conclusion is related to the geographical distribution of the countries receiving spillover effects: most of them are peripheral countries (Romania, Portugal, Lithuania, Ireland). However, Germany does not follow the same pattern.

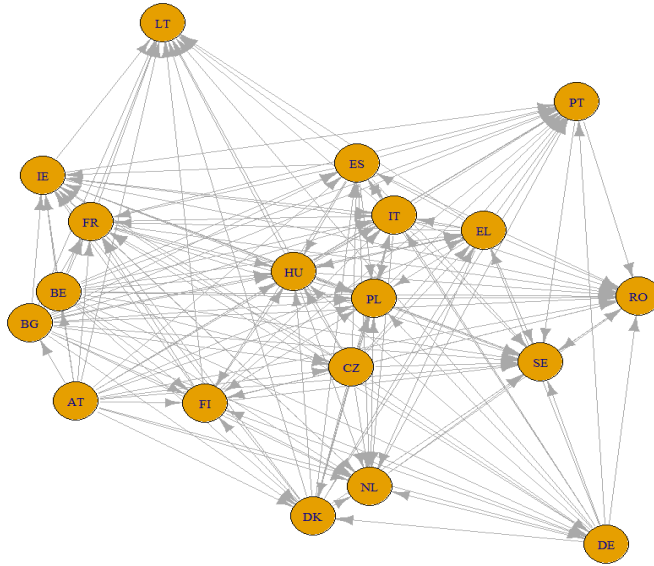


Figure 3. The degree of directional net connectivity by country pairs over the entire period studied

Figure 4 shows the global propagation effects of the contagion for the entire analysed period. Three periods of contagion can be identified. The first period between 2007-2008 corresponding to the GFC, the transmission of spillover effects reached its highest point in early 2009. Between 2009-2012, the intensity dropped considerably from 70% to about 40%. However, in early 2013, we identify a second period of uncertainty culminating in the highest value between 2016-2017.

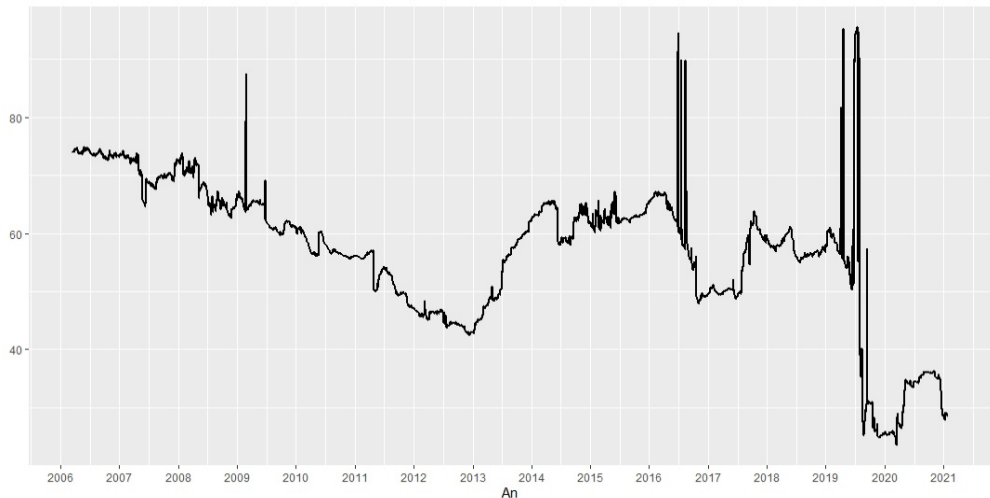


Figure 4. Global spillover effects of contagion

Furthermore, the third and most interesting period starts with a sharp increase in 2017 with a level of spillover effects that fluctuates for the next two years until it reaches the first highest point in 2019. After a sharp decline, 2019 characterized by a second peak and a sudden drop from 90% to about 30%. The Covid-19 crisis has also raised the level of contagion effects, but the increase is not significantly higher compared to the immediate previous level (from less than 30% to 40%).

However, describing contagion interconnectivity only based on the Diebold & Yilmaz framework, which only considers the static connectivity index, requires the application of a new method that considers price jumps and volatility caused by global events such as the Referendum Brexit. For example, Karkowska & Urjasz (2021) tried to apply the methodology of Bai & Perron (1998, 2003) to discover the data of structural changes caused by political events or international market conditions. However, their analysis did not distinguish a single event, with each market affected by multiple structural changes. To solve this problem, they applied a rolling window analysis for each market and described the developments in the CEE market.

6. Conclusions, implications for economic policy and future research

In the current context described by the increase in public budget deficits and public debt, the results of this study indicate some aspects of interest for economic governance such as tax policy, as the Netherlands, Spain, Italy, and Belgium send the highest degree of contagion to other EU countries, it is worth paying attention to the potential implications of the determinants of sovereign risk. Fiscal performance, as well as other macroeconomic fundamentals, are key determinants of sovereign bond yield movements (Gómez-Puig *et al.*, 2014; Haugh *et al.*, 2009; Bae, K.H., 2012; Caporin *et al.*, 2018). The GIIPS countries, including Italy and Spain, are of particular interest as their public deficits and debts are expected to rise above the limits set by the Maastricht Treaty. As described by Afonso *et al.* (2012) in the run-up to the GFC crisis, fiscal performance was not significant in explaining spreads, but during the crisis, fiscal performance began to explain these movements, with financial markets setting the size, liquidity, and maturity of debt issuance. Moreover, the increase in investors' risk aversion driven by sovereign ratings has significant effects, especially for EMU peripheral countries (Gómez-Puig *et al.*, 2014). In addition, more attention should be paid to the interconnection between private and public debt. During the GFC, studies have observed that an increase in sovereign risk is driven by an increase in the level of bank debt as well as foreign bank claims on the public sector. Mitigating sovereign risk through appropriate policy must consider specific national contexts. Governments are under pressure to decide whether to implement contractionary fiscal policy or expansionary fiscal policy. Which type of expansionary policies (additional spending or tax cuts) are appropriate remains to be decided given particular national contexts.

Another aspect of interest is the prudential policy. Regarding the possibility of avoiding contagion effects, governments must evaluate effective measures to reduce their intensity. Banks with a weak funding structure, weak capital depreciation and less traditional banking activities are vulnerable to contagion effects (Arezki *et al.* 2011). Appropriate policy measures aimed at reducing the intensity of contagion should consider the temporal dimension, as direct capital injections are the most effective instruments. For this reason, future research should look at time periods. Studies have

found that when governments face high budget deficits, they are less likely to close or take over a failing bank, especially if the banking system is weak. This effect, referred to in the literature as “too many to fail” leaves governments with limited options, but specific contexts determine whether capital, credit or liquidity are the appropriate tools.

Future research should explore, in turn, specific time periods and specific events that differentiate between pre-crisis and early crisis periods. Similar studies have been carried out by (Fernández-Rodríguez *et al.*, 2015; Gomez-Puig and Sosvilla-Rivero, 2014) which argue that, in the pre-crisis period, most of the contagion triggers came from the core countries. However, during a crisis, peripheral countries have become dominant transmitters. Furthermore, Antonakakis and Vergos (2013) highlight that during the debt crisis, destabilizing shocks mainly come from peripheral euro area countries and in a smaller measure of the eurozone core. Another research direction is suggested by the increasing importance of sovereign ratings, which are perceived as one of the key determinants of bond yield volatility (Silvapulle *et al.*, 2016; Afonso *et al.*, 2012; Frijns and Zwinkels, 2020). In addition, the paper does not influence the US bond market in European markets. Other studies have quantified this influence (Davidson, 2020; Karkowska and Urjasz, 2021). The methodological steps required for future research were described in section 5.

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Appendix A: Abbreviations and explanatory notions

CEE	Member States of the European Union in Eastern Europe
CEC-3	Member States of the European Union in Central Europe (Poland, Czech Republic and Hungary)
GFC	Global Financial Crisis
UE	European Union
UM	Monetary Union
VAR	Vector Autoregression Model
EMU	European Monetary Union

Term/Notion	Explanation/ definition
Net connectivity	<p>Table 3. Transmission/reception of volatility propagation effects shows the degree of net connectivity. This degree is calculated as the difference between the total connectivity transmitted / country and the total connectivity received from Table 2. This difference can be negative (case in which the state is a net receiver of spillover effects) or positive (case in which the state is a transmitter of spillover effects propagation). The values in table 3 are not approximate.</p>
VAR Model (Vector Autoregression Model)	<p>Vector autoregression model is a statistical model used to highlight the relationship between multiple quantities as they change over time. Models of this type generalize the univariate autoregressive model using multivariate time series. Generally, a VAR model includes lags for previous time periods. For example, for a variable y_t (e.g. bond yield, bond yield) with only one previous time period, the model is:</p> $y_t = a_1 y_{t-1} + \epsilon_t$ <p>where y_t, a_1, ϵ_t are matrices.</p>

Appendix B: Conclusions drawn from specialized literature

Reference	Items researched	Conclusions
Bond market contagion units articles		
Silvapulle P., Fenech, J.P., Thomas, A., Brooks, R. (2016) "Determinants of sovereign bond yield spreads and contagion in the peripheral EU countries", <i>Economic Modelling</i> , vol. 58, 83-92.	<ul style="list-style-type: none"> • Significant determinants of daily bond yield spreads and their volatilities. • The presence of financial contagion effects among the peripheral countries of the EMU. 	The German stock index return, the Euro interbank offer rate, stock index returns in these countries, S&P 500 returns, VIX and sovereign debt ratings have had a significant impact on bond yields and/or volatilities, particularly in the post-crisis period.
Gómez-Puig, M., Sosvilla-Rivero, S., & Ramos-Herrera, M.d.C. (2014) "An update on EMU sovereign yield spread drivers in times of crisis: a panel data analysis", <i>The North American Journal of Economics and Finance</i> , vol. 30, 133-153. Gonzalo, J., & Olmo, J., (2005).	<ul style="list-style-type: none"> • Potential drivers of EMU sovereign bond yields. 	The increase in sovereign risk in core countries during the crisis can be explained by the behaviour of regional macroeconomic fundamentals and the local, regional, and global market climate. In addition, the increase in sovereign risk could be explained by the interconnection between private debt and public debt, as during the crisis there was an increase in the importance of the bank level of indebtedness and the claims of foreign banks in the public sector (mainly in peripheral countries). The results also indicate that global market climate and investors' risk aversion increase their marginal effects after the onset of the sovereign crisis, especially in peripheral EMU countries.
Haugh, D., Ollivaud, P., & Turner, D. (2009) "What Drives Sovereign Risk Premiums? An Analysis of Recent Evidence from the Euro Area", <i>OECD Economics Department Working Paper</i> , No. 718, Paris.	<ul style="list-style-type: none"> • The evolution of the yield of sovereign bonds between Germany and other countries in the euro area. 	Fiscal performance (measured by the ratio of debt service to fiscal receipts and expected fiscal deficits) is a key determinant of the evolution of the sovereign bond yield spread. There is evidence to suggest that such effects are non-linear, such that incremental deteriorations in fiscal performance can lead to increasingly large increases in the spread. Thus, financial market reaction could become an increasingly important constraint on fiscal policy for some countries.
Afonso, A., Argyrou, M., & Kontonikas, A. (2012) "The Determinants of Sovereign Bond Yield Spreads in the EMU", <i>Working Papers 2012_14</i> .	<ul style="list-style-type: none"> • Determinants of long-term sovereign bond yields 	The drivers of government bond spreads in the euro area have changed significantly over time. In the pre-crisis period, macro and fiscal fundamentals are generally not

Reference	Items researched	Conclusions
Business School – Economics, University of Glasgow.		significant in explaining spreads. Instead, since the summer of 2007, movements in macro and fiscal fundamentals explain movements in spreads. During the crisis, the size, liquidity, and maturity of debt securities issues were valued by the markets. The results also show that sovereign credit ratings are statistically significant in explaining spreads, but relative to macro and fiscal fundamentals, their role was quite limited.
Reboredo, J. C., & Ugolini, A. (2015). Systemic risk in European sovereign debt markets: A CoVaR-copula approach. <i>Journal of International Money and Finance</i> , 51, 214–244.	<ul style="list-style-type: none"> • Systemic risk in European sovereign debt markets before and after the Greek debt crisis, considering conditional value at risk (CoVaR) 	The article calculates systemic risk by considering country-specific stock market returns. The results indicate a separation between peripheral and core EU countries. The results indicate that European debt markets were highly developed in the period before the onset of the debt crisis and that systemic risk trends were similar across markets. European decoupled debt and GIIPS markets were negatively correlated with the EMU index and exhibited lower tail dependence. As a result, the systemic risk changed dramatically and the CoVaR value increased. In contrast, for non-crisis countries, cooperation has not changed substantially, even though systemic risk has increased.
Favero, C. A. (2013) “Modelling and forecasting government bond spreads in the euro area: A GVAR model”, <i>Journal of Econometrics</i> , vol. 177, no. 2: 343-356. (Diebold and Yilmaz, 2009, 2011)	<ul style="list-style-type: none"> • Determinants of sovereign bond yields 	The article proposes an econometric model that captures not only local fiscal fundamentals and global market appetite for risk, but also expected exchange rate devaluations.
Beetsma, R., Giuliodori, M., de Jong, F., & Widijanto, D. (2013) “Spread the news: the impact of news on the European sovereign bond markets during the crisis”, <i>Journal of International Money and Finance</i> , vol. 34, 83-101.	<ul style="list-style-type: none"> • Determinants of sovereign bond yields 	The results find that more news, on average, raised the domestic interest spread of GIIPS countries since September 2009. The magnitude of this effect is related to cross-border bank holdings. A breakdown of the news into bad and good news shows that the upward pressure on domestic and foreign interest rates is being driven by the bad news.

Reference	Items researched	Conclusions
		<p>We also find bad news spillovers from GIIPS countries to non-GIIPS countries.</p> <p>However, the magnitude of these spillover effects is substantially lower than that of other GIIPS countries.</p>
Articles on bond market contagion effects		
<p>De Bruyckere, V., Gerhardt, M., Schepens, G., Vennet, R. V. (2013) "Bank/sovereign risk spillovers in the European debt crisis", <i>Journal of Banking & Finance</i>, vol. 37, no. 12: 4793-4809.</p>	<ul style="list-style-type: none"> • Contagion between bank default risk and sovereign default risk • Determinants of contagion 	<p>The articles present empirical evidence of the existence of three contagion channels: a collateral channel, an asset holding channel, and a collateral channel. They believe that banks with a weak capital buffer, a weak funding structure and less traditional banking activities are particularly vulnerable to contagion risks. At the country level, the debt ratio is the most important driver of contagion. Furthermore, the impact of government interventions on contagion depends on the type of intervention, with capital injections simply being the most effective measure to reduce contagion intensity.</p>
<p>Angeloni, C., & Wolff, G. (2012) "Are banks affected by their holdings of government debt?", <i>Bruegel Working Paper 07</i>.</p>	<ul style="list-style-type: none"> • Banks' sovereign exposure to GIIPS countries has effects on stock market values. 	<p>The article finds that bank market performance in July-October 2011 was affected by Greek debt holdings and, in October-December 2011, by Italian and Irish sovereign exposures. The Spanish exposure did not appear to have an impact on the banks' stock values. The second transmission channel is a collateral channel. Sovereign risk can spread to banks when the value of collateral that banks hold in the form of sovereign debt is reduced.</p>
<p>Arezki, R., Candelon, B., & Sy, A. (2011) "Sovereign rating news and financial markets spillovers: evidence from the European debt crisis", <i>IMF Working Paper 68</i></p>	<ul style="list-style-type: none"> • The effects of the weak fiscal position on the financial sector 	<p>The article shows that sovereign rating downgrades cause significant spillovers, both across markets and across countries. Finally, the guaranteed channel is linked to the too-big-to-fail status of some large banks. When sovereigns' fiscal position is weakened, implicit and explicit government guarantees could lose value, which could make it harder for the financial sector to reap the benefits of such guarantees.</p>

Reference	Items researched	Conclusions
<p>Brown, C., & Dinc, I. (2011) "Too many to fail? Evidence of regulatory forbearance when the banking sector is weak", <i>Review of Financial Studies</i>, vol. 24, no. 4: 1378-1405.</p>	<ul style="list-style-type: none"> • Collapse of banks 	<p>A country's ability to support its financial sector, as reflected in the government deficit, affects the treatment of troubled banks: a government is less likely to take over or close a troubled bank if the banking system is weak. This <i>too-many-to-fail</i> effect is robust to controlling for macroeconomic factors, financial crises, the <i>too-big-to-fail</i> effect, domestic financial development, and concerns about systemic risk and information leakage. The article also shows that the <i>too-many-to-fail</i> effect is stronger for larger banks and when there is a large budget deficit.</p>
<p>Bhanot, K., Burns, N., Hunter, D., & Williams M. (2014) "News spillovers from the Greek debt crisis: impact on the Eurozone financial sector", <i>Journal of Banking & Finance</i>, vol. 38, 51-63.</p>	<ul style="list-style-type: none"> • The relationship between Greece's sovereign yield spreads and financial sector stock returns 	<p>The article finds evidence of spillover effects. For example, news announcements (rating downgrades and other news) about Greece lead to negative and significant abnormal returns of financial stocks in Portugal, Italy, and Spain. No evidence of spillover effects was found for financial firms in other European countries: Austria, Belgium, France, and the Netherlands. The spillover effect is amplified for countries with higher yield spreads. Collectively, the results point to the role of information (news announcements) as a transmission channel during the crisis.</p>
<p>Bae, K.H. (2012) "Determinants of local currency bonds and foreign holdings: Implications for bond market development", <i>People's Republic of China ADB working paper series on regional economic integration</i>.</p>	<ul style="list-style-type: none"> • Macroeconomic, institutional, and capital importance in explaining bond market development. 	<p>In government bond markets, the fiscal balance is the variable that strongly affects the value of outstanding bonds. A one standard deviation increase in the budget deficit is associated with a 10-percentage point increase in outstanding government bonds as a percentage of GDP. In financial bond markets, no variable is strongly related to the value of outstanding bonds except GDP per capita. In corporate bond markets, low interest rates, a large banking sector</p>

Reference	Items researched	Conclusions
		<p>and well-developed government bond markets are conducive to market development.</p> <p>Variables measuring a country's institutional quality do not explain cross-country variation in bond market development, whether it is government, financial, or corporate bond markets.</p>
Definition of connection within Diebold and Yilmaz		
<p>Acemoglu, D., Ozdaglar, A., & Tahbaz-Salehi, A. (2015) "Systemic risk and stability in financial networks", American Economic Review, vol. 105, no. 2: 564-608.</p>	<ul style="list-style-type: none"> • Financial contagion 	<p>The article shows that a more densely connected financial network (corresponding to a more diversified pattern of interbank liabilities) improves financial stability if the magnitude of negative shocks is small enough. However, beyond a certain point, dense interconnections serve as a mechanism for propagating shocks, leading to a more fragile financial system: contagion will be strengthened and manifested as connectivity increases, only if excess liquidity is insufficient to cover capital losses.</p>
<p>Karkowska, R. & Urjasz, S. (2021) "Connectedness structures of sovereign bond markets in Central and Eastern Europe", International Review of Financial Analysis, vol. 74.</p>	<ul style="list-style-type: none"> • Financial connectivity through volatility effects of CEE and developed markets sovereign bond markets 	<p>CEE countries are more interconnected with each other than global markets: EM bond markets can be contagious with each other creating the regional center of volatility transmission. Poland, Hungary, and the Czech Republic have the highest share of influence over other countries + similar two-way transmission, suggesting that they are strongly interconnected.</p> <p>In advanced countries (USA) government bond markets turn out to be the most connected in terms of volatility.</p> <p>The integration of government bond markets is stronger for EMU members compared to non-EMU countries, as well as stronger for old EU member states than for new ones.</p>

Reference	Items researched	Conclusions
<p>Davidson, S. N., (2020) “Interdependence or contagion: A model switching approach with a focus on Latin America”, <i>Economic Modelling</i>, vol 85 (May 2019), 166-197.</p>	<ul style="list-style-type: none"> • New econometric strategy proposal in which the nature of interdependencies, the extent of interdependencies, and the selected transmission channels change over time 	<p>The results generally indicate interdependence, not contagion, during the currency crises of the 1990s and the Argentine crisis of 1998-2002.</p> <p>During the global financial crisis, the results show sudden contagion from the US to Argentina and Brazil. Mexico, however, experiences contagion through existing interdependencies with the US.</p> <p>The results also show that macroeconomic and uncertainty channels play a role during various crises, not just financial channels.</p>
Studies on the EU		
EMU		
<p>Fernández-Rodríguez F., Gómez-Puig, M., & Sosvilla-Rivero, S. (2015) “ Volatility spillovers in EMU sovereign bond markets”, <i>International Review of Economics and Finance</i>, vol. 39, 337-352.</p>	<ul style="list-style-type: none"> • Spillover effects on EMU sovereign bond market volatility and the determinants of net directional spillover effects on detected pairs (macroeconomic fundamentals and investor sentiment) 	<p>Slightly more than half of the total variation in forecast errors is explained by cross-country shocks rather than idiosyncratic shocks, implications: in the pre-crisis period, most volatility triggers were core countries – peripheral countries imported credibility from them, while during the crisis peripheral countries became the dominant transmitters. [see also Antonakakis and Vergos (2013)]</p>
<p>Caporin, M., Pelizzon, L., Ravazzolo, F. & Rigobon, R. (2018) “ Measuring sovereign contagion in Europe”, <i>Journal of Financial Stability</i>, vol. 34, 150-181.</p>	<ul style="list-style-type: none"> • Transfer of sovereign risk-contagion 	<p>The article finds that the propagation of shocks in euro bond yield spreads indicates almost no presence of sovereign risk transfer-contagion in the sample periods considered. Shock transmission is no different on days with large spread changes and small changes. This is the case even though a significant number of countries in our sample have been severely affected by their sovereign debt and fiscal situation. The risk of spreading between these countries is not affected by the size or sign of the shock, implying that contagion has thus far remained subdued. However, the US crisis does not generate a change in the intensity of</p>

Reference	Items researched	Conclusions
		shock propagation in the euro area between the pre-crisis period 2003-2006 and November 2008-November 2011 post-Lehman one, but the coefficients actually go down, not up.
Frijns, B., & Zwinkels, R. C. J. (2020) "Absence of speculation in the European sovereign debt markets", <i>Journal of Economic Behavior and Organization</i> , vol.169, 245-265	<ul style="list-style-type: none"> • The determinants of extreme dynamics in the bond market and the CDS market 	The article finds that bond markets are driven 80% by liquidity trading, 13% by credit news, and only 5.4% by speculation. The CDS market is 49% driven by credit news, 45% by liquidity trading, and 5.5% by speculation. The relative importance of different types of agents varies over time.
Gomez-Puig, M., & Sosvilla-Rivero, S. (2014) "Causality and contagion in EMU sovereign debt markets", <i>International Review of Economics and Finance</i> , vol. 33, 12-27.	<ul style="list-style-type: none"> • Contagion after the current euro debt crisis 	The article concludes that, during the crisis period, not only some new patterns of causality can be observed, but also an intensification of the causal link in 70% of cases, which means that these links may be purely crisis contingent. Causality in peripheral EMU countries shows an important increase in the crisis period: not only causality in peripheral countries, but also causality running from peripheral EMU to core EMU countries. This suggests that problems in peripheral countries may spill over not only to other peripheral countries but also to core EMU countries, as some of these banks (especially German and French banks) are highly exposed to peripheral debt.
Martin, F., & Zhang, J. (2017) "Modelling European sovereign bond yields with international portfolio effects", <i>Economic Modelling</i> , vol. 64 (December 2016), 178-200.	<ul style="list-style-type: none"> • A two-country portfolio choice model to assess the specific role of volatility and co-volatility risks in the formation of long-term European interest rates in crisis and post-crisis periods, with an active role of the European Central Bank 	This shows that the decline in long-term rates in Germany and France since March 2011 is partly due to the decline in both risk premia and covariances with the peripheral countries. These decreases amplify the flight-to-quality mechanisms. Finally, a lower volatility and co-volatility risk sensitivity during the crisis lends credence to the hypothesis of an occasional fragmentation of European sovereign bond markets.

Reference	Items researched	Conclusions
CEE		
Cappiello, L., Engle, R. F., & Sheppard, K. (2006) "Asymmetric dynamics in the correlations of global equity and bond returns", <i>Journal of Financial Econometrics</i> , vol. 4, no. 4: 537-572.	<ul style="list-style-type: none"> • Conditional asymmetries in volatilities and correlations for a collection of global equity and bond indices 	While equity returns show strong evidence of asymmetries in conditional volatility, little has been found for bond returns. However, both stocks and bonds show asymmetries in conditional correlations, with stocks responding more strongly than bonds to common bad news. The introduction of a fixed exchange rate regime leads to an almost perfect correlation between bond yields within European Monetary Union (EMU) countries, which is not surprising when monetary policy harmonization is considered. However, the increase in return correlation is not limited to bond yields in EMU countries: the correlation of equity returns, both within and outside EMU, is also increasing.
Christiansen, C., (2014) "Integration of European bond markets", <i>Journal of Banking and Finance</i> , vol. 42, no. 1: 191-198.	<ul style="list-style-type: none"> • Variation over time in the integration of EU government bond markets 	The article shows that the integration of government bond markets is stronger for EMU than non-EMU members and stronger for old EU members than new ones. For EMU countries, integration is weaker the lower the credit rating. In recent crisis periods, integration is weaker, especially for EMU countries.
Ters K. & Urban (2018), Intraday dynamics of euro area sovereign CDS and bonds, BIS Working Papers No 423	<ul style="list-style-type: none"> • Which market (the CSD market or the bond market) is more important in terms of sovereign credit risk pricing? 	The pricing of sovereign credit risk in the bond and CDS market converges over time, deviations between the two market segments do not persist for long. A key result is that the CDS market dominates the bond market in terms of price discovery in many cases which were examined: CDS premiums, in many cases, adjust faster to reflect new information than bond spreads.
Yang, L., & Hamori, S. (2015) "Interdependence between the bond markets of CEEC-3 and Germany: A wavelet coherence analysis",	<ul style="list-style-type: none"> • Interdependence between bond markets in CEEC-3 (Poland, Czech Republic, and Hungary) and Germany 	The article finds that, first, contagion occurred in these markets during the global financial crisis and the European debt crisis, to varying degrees and in different directions.

Reference	Items researched	Conclusions
<p><i>The North American Journal of Economics and Finance</i>, vol. 32 (April 2015), 124-138</p>		<p>Second, it shows that the degree of bond market integration was relatively high before 2004 for Poland and Hungary and very high for the Czech Republic during the sample period. Finally, the panel notes that interest rate developments in Poland and the Czech Republic have mirrored those in Germany.</p>

EFFECTIVE COMMUNICATION AS A SUCCESS FACTOR IN PROJECT MANAGEMENT IN AN UNIVERSITY CONTEXT

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Abstract. This paper examines the effectiveness of communication of university students with high school students from all over the country. We look to provide a deeper understanding of how effective communication contributes to the success of a project in the sector of education and we identify some strategies that contribute to the improvement of some key aspects of communication. Thus, we have analyzed the importance of communication both inside and outside the team using three qualitative methods: project case study, document analysis and in-depth interviews with project participants. Our results are relevant for the potential new project participants, but also for the stakeholders in the public education sector in general, who aim to foster the bridge between university and pre-university education. We finally address conclusions and recommendations, which may serve as a guide for future participants and those who want to know how they can benefit from better communication in similar projects.

JEL Classification: M14, H43, I23

Key words: project management; effective communication; higher education projects

1. Introduction

Effective communication is the basis for good cooperation and coordination within a project and ensures its success. Programs that provide a certain continuity in the curriculum by bridging the gap between pre-university and university curricula have become a necessity.

One such program where students are introduced to the academic environment at short notice is the Student University, offered by the German Department of the Babeș-Bolyai University in Cluj-Napoca. Through the “Student University” project, students could visit faculties that offer courses in German. Thus, this program plays an important role in facilitating the transition to academic life and developing communication skills in a specific context.

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This article is divided into three chapters. In the first chapter, we present the main theoretical aspects and concepts related to project success factors and the effectiveness of project communication with internal and external stakeholders. In the second chapter, we describe our research objectives and the scientific methods used (i.e., case study, document analysis and interview). The third chapter presents the most important aspects of the “Student University” program, the interpretations of the conducted interviews and the analysis of the internal and external documents of the project.

With this work, we aim to gain a comprehensive understanding of the effectiveness of communication in the “Student University” project and identify successful practices and aspects of communication in project management that could be improved. We believe that the results and findings of this research contribute to the development of a solid foundation in the field of effective project communication and provide useful recommendations to improve future practices.

2. Theoretical foundations for effective project communication

Project management researchers have been theorizing and trying to identify the elements that contribute to project success since the late 1960s. The factors that make projects successful are part of a strategic perspective and several influences are derived from stakeholder expectations (Jugdev et al. 2013; cited in Besteiro, de Souza Pinto and Novaski 2015). Project outcomes remain unsatisfactory for stakeholders, despite these well-known research findings, decades of individual and collective experience in project management, the rapid increase in project membership, and the proliferation of project work in the industry.

So, what are the critical factors that ‘really’ lead to successful projects? Various authors (Pinto and Slevin, 1988; Nicholas, 1989; Hartman and Ashrafi, 1996; Kharbanda and Pinto, 1996; Belassi and Tukel 1996; Graham and Englund, 1997; Chua et al, 1999; Cleland, 2004) have identified several Critical Success Factors (CSFs) for projects. A review of the literature reveals nine common important CSFs for projects: (1) project understanding, (2) top management support, (3) communication, (4) customer involvement, (5) competent project team, (6) project manager authority, (7) realistic cost and time estimates, (8) adequate project control and (9) problem-solving skills.

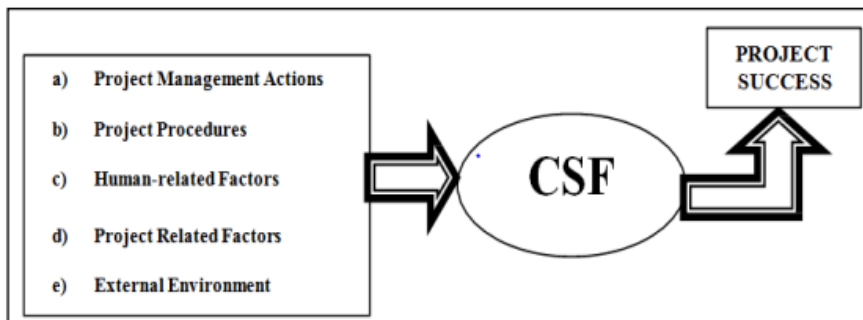


Figure 1. Conceptual framework (Alias et al., 2014)

As in Figure 1, from a project management perspective, CSFs are characteristics, conditions or variables that can have a significant impact on the success of the project if they are properly maintained, nurtured or managed (Milosevic and Patanakul, 2005; cited in Alias et al., 2014).

2.1. Communication as a success factor

Communication management is one of the most intensively researched areas of project management. On the one hand, most stakeholders emphasize its importance, but on the other hand, the communication processes and practices formalized in the company's project management methodology are neither followed nor prioritized by project managers (Monteiro de Carvalho 2013; cited in Muszynska et al., 2015).

A shared understanding is established through communication, which is derived from the Latin verb "communicare", which means "to do something together", "the transmission of meaning from one person to another or many people, whether verbal or nonverbal" (cf., Barrett, 2006, p.386). There is a group of researchers who consider the communication skills of the project manager as the single most important aspect that determines the success of a project. If it is true that everything depends on communication and leadership, it is obvious that leadership communication skills are the fundamental skills that a project manager must acquire in order to be effective.

Communication involves capturing all pertinent information, understanding it and passing it on effectively to the people who need to hear it. Information is described by Bowen and Edward (1996, p.396) as "data that has been processed and presented in a format that gives it meaning". Thus, to achieve the project objectives, the members of the project team need to collaborate, share, collate and integrate information and knowledge. Therefore, it is important to understand the communication process. A sender, a transmission channel or medium and a receiver make up communication at its most basic level.

Effective communication can be an excellent tool for systematically managing stakeholder relationships at multiple levels. Communication and Stakeholder engagement processes are often described as "soft" because dealing with people (stakeholders) and developing appropriate messages for information exchange (communication) is difficult. In other words, people's behavior is unpredictable and therefore it is difficult to develop objective (tangible) means to effectively engage progress or even success with stakeholders (Bourne, 2009; cited in Rajhans, 2018).

Inadequate communication can lead to misunderstandings. Insufficiently defined tasks and critical processes, uncertainty about responsibilities, scope or objectives of projects can lead to project failure. Managing a project requires constant idea exchange and change, explaining the scope and methods of the project to different groups of people (the public, management, departments and other stakeholders), threatening or negotiating with service providers and suppliers, or negotiating to resolve disputes or conflicts between project team members or others (Steyn et al. 2016; Zulch 2014).

To provide clear guidance to all stakeholders, it is advisable to agree on a communication plan in advance, especially for complex projects. When creating a communication plan, the focus should be on keeping key stakeholders informed of project progress and promoting the project by always making it public. The communication plan should include the following points, which are also shown in Figure 2:

- Who (communication channels - sender and recipient - responsibility and authority)
- What (scope of communication and format)
- When (schedule)
- Acknowledgement (confirmation that the message has been received and understood - document control)
- Storage (retrieval, storage, emergency recovery)
- How (email, document, phone, meeting, presentation) (Burke, 2013).

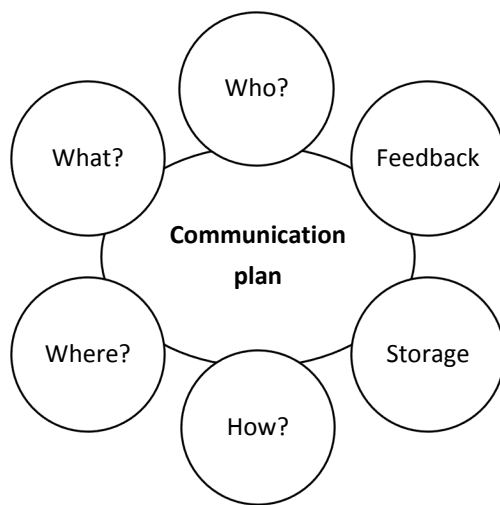


Figure 2. Communication plan

Project communication occurs as soon as two or more actors refer to a project and its objectives in their communicative actions. Project communication includes communication within projects (internal project communication between project members), communication between project members and non-members (stakeholder communication) and communication about projects among non-members (public communication) (Freitag, 2016).

Other categories help to differentiate between forms and media of communication. Formal communication is provided for in the project plan and regulated organizationally, while informal communication is ad hoc and not centrally controlled. A distinction is made between personal communication and mass communication according to the number of participants and between one-way and two-way communication according to the possibility of feedback. Vertical communication takes place top-down or bottom-up along the hierarchical organization, while horizontal communication predominates in hierarchical organizational structures such as the project team. If the initiative for the use of media lies with the communicator, this is *push communication*. If it lies with the recipient, it is *pull communication*. Communication can take place directly and without aid (usually as face-to-face communication) or based on a technical infrastructure. These technical communication media differ in terms of their sign systems (verbal/nonverbal), the sensory organs they address and their ability to bridge spatial and temporal distances. Actors use this media mix according to availability, task, personal preference, and experience (Freitag 2016, Irimiaş, 2019).

The creation, collection, dissemination, and storage of information, as well as the definition of roles for project team members and other project participants, are necessary to ensure that project communication is appropriate and effective. However, it is also crucial to maintain good personal relationships with team members and adhere to the basic principles of effective and positive communication.

3. Methodology

Our objective has been to analyze and evaluate the role of communication in the “Student University” project; to what extent it contributes to the success or failure of the project, using qualitative research methods such as case studies, interviews, and document analysis. This research aims to identify key factors influencing communication in the project and practical suggestions for improving communication in future projects. From this, the descriptive research question is developed:

“How can clear and effective communication between the project leader and the project members within the “Student University” project contribute to the project achieving its goals and being successfully completed?”

In order to answer the research question, a qualitative study was conducted. The research methods used in this thesis are: (1) case study, (2) interview and (3) document analysis. Case study research is a qualitative research method in which a particular phenomenon or person is studied in their real-life context in order to understand the complexity and uniqueness of the case. This method is particularly suitable for research questions that ask ‘how’ and ‘why’ and for research projects that seek to investigate complex, multi-layered phenomena in their natural setting (Yin, 2018). The case study will focus on Babeş-Bolyai University’s “Student University” project, which is dedicated to high school students from all cities.

An interview is a commonly used research method in many fields. It involves a structured or unstructured conversation between an interviewer and an interviewee to gather information or assess a candidate’s knowledge, skills, competencies and attitudes. According to Salant and Dillman (1994), an interview is a method of data collection through a conversation with an interviewee, usually face-to-face but sometimes by telephone or videoconference, to inquire about the interviewee’s attitudes, beliefs, opinions, behaviors, or experiences.

To collect our empirical data, we used a standardized, fully structured interview according to a guideline with identical questions. The interviewees were not deprived of their desire to talk during the interviews and were allowed to recount their experiences in breadth and depth. The literature offers some recurring themes that we examined in our interviews. Thus, we asked about the efficiency of communication in the “Student University” project, to what extent the objectives were achieved and what could have been changed in terms of the approach and communication in the project, but also how everything worked from the perspective of the project participants, including the problems they encountered and how they were able to solve them. The interview consists of 13 questions relating to 4 key areas, namely: effectiveness of communication within the project team, effectiveness of communication outside the

project team, evaluation of the quality of communication and motivation of the project team members. These domains are further detailed in the appendices.

Document analysis is a research method that involves collecting, reviewing, and analyzing written materials such as policies, laws, regulations, reports, memos, and minutes to answer research questions or achieve research objectives (Bowen, 2009). The documents we analyzed are the project file, reports, permits and certificates related to the “Student University” project.

Case study, document analysis of the project and interpretation of the interview results

In this chapter, we have focused on the detailed case study of the selected project and analyzed both internal and external product documents. We also present the results of the four interviews conducted with key project stakeholders. The aim of this study is to gain a comprehensive understanding of the project, identify the challenges encountered and assess the impact of communication on the success of the project.

Case study “Student University” project

Participating in a faculty visit project provides an opportunity to experience the academic atmosphere and familiarize students with the campus and facilities of the University. They can obtain important information about academic programs, extracurricular activities, and resources available to students. In addition, participation in the Faculty Visit Project allows students and faculty to interact in an informal setting. Students can ask questions and receive advice and assistance in choosing a faculty. Participation in the “Student University” Project not only provides students with academic experience, but also helps them develop social, teamwork, organizational and communication skills. These skills are of great value for long-term personal and professional development.

The case study for this project explores how hands-on experiences can influence students’ learning and development. By having the opportunity to visit universities and interact with students and faculty from different fields, students can gain a concrete insight into what it means to study and work in a field. Through this project, students can interact with students and professors at the universities, ask questions and receive relevant information about study programs, career opportunities and admission requirements. In this way, they are encouraged to improve their communication skills and gain more confidence in different areas. Visiting universities and interacting with students and teachers can motivate and inspire students. This hands-on experience can develop a passion for learning and spark an interest in studying and finding more out about future career opportunities. Students can see examples of success and understand that there are real opportunities to pursue their passion in their favorite field.

“Student University” is a project of the Babeş-Bolyai University, organized by the German language department of the Babeş-Bolyai University. The target group consists of German-speaking students in the 11th and 12th grades who are learning German as a native, intensive, or foreign language. The aim of the project is to show high school students the possibilities of studying in German. Faculties from Babeş-Bolyai University with a German language focus are involved: Faculty of

Mathematics and Computer Science, Faculty of Biology and Geology, Faculty of Geography, Faculty of Economics and Business Management, Faculty of Literature, Faculty of European Studies, Faculty of Political, Administrative and Communication Sciences, Faculty of Psychology and Educational Sciences.

The 11th edition of the project took place in Cluj-Napoca from March 6 to 10, 2023. In the edition of this year, 8 schools (both with a humanities profile and a real profile) with a total of 109 students and 6 accompanying persons from and outside Cluj took part. The participating schools were: German Theoretical High School "Friedrich Schiller" from Oradea, National High School "Samuel von Brukenthal" from Sibiu, National Pedagogical High School "Andrei Saguna" from Sibiu, Theoretical High School "Adam Müller Guttenbrunn" from Arad, Theoretical High School "Joseph Haltrich" from Sighișoara, Theoretical High School "Roth-Oberth" from Mediaș, National High School "George Coșbuc" from Cluj-Napoca and Theoretical High School "Báthory István" Cluj-Napoca.

The project was promoted in the following ways: invitation to German-speaking high schools in the country, Gutenberg Caravan, LSLG (German Study Line) Facebook page, press release - presence of TVR Cluj at the opening gala and the invitation to participate in the "Transilvania Policromă" program.

As part of the project, high school students participated in a series of activities to get to know study programs in German at Babeș-Bolyai University in Cluj, having the opportunity to get to know the elements of the infrastructure of each faculty. In addition to these activities, the organizers also prepared a cultural and entertainment program for the students, in cooperation with the Gutenberg Association and the Student Council of the German-language field of study, in order to familiarize them with student life in Cluj-Napoca. At the opening gala, the students also had the opportunity to meet representatives of the sponsoring companies and hear about the career opportunities they offer. This year, for the first time, the Babeș-Bolyai University Treasure Hunt was offered, an activity that was very well and successfully received by the students. The faculties and the German-speaking Student Council also facilitated contact with current students.

Communication within the project has taken place both internally and externally. In terms of internal communication, it took place between the organizing team (student volunteers: coordination, initiation, meetings, logistics), with the offices and departments involved (i.e., 1. financial, legal - for sponsorship contracts, expenses, invoices, grants, 2. image: promotional items + social media, photo-video, press releases, 3. applications and approvals: Lodging, transportation, catering, room booking, other materials and image, 4. Communication with each faculty for integrating the program into the bigger picture, 5. Billing: lodging and catering + visuals). External communication includes communication with the participating schools (approx. 50 invitations sent out, average 7 schools present per session, approx. 100 students per session, check-in and check-out logistics, accommodation, mobility within the event) and with the sponsors (approx. 20 invitations sent out, average 6 sponsors per session, average 6 emails per sponsor, information on: sponsorship amount, conditions, event logistics, presentation and online and offline presentation/ promotion), as well as media communication (interviews, media appearances, coordination of social media presence).

The following communication channels are used:

- With UBB schools, students and colleagues: Econ and UBB institutional emails.
- With the student team: WhatsApp, Teams, and One-Drive.
- With all stakeholders: social media - advertising: LinkedIn, Facebook, Instagram, TV, radio.

To summarize, the “Student University” project is a motivating project that could lead to success because the communication channels were very well chosen, and each project member was clearly informed. The students benefited from an experience that was useful for educational purposes as well as for socialization and communication. It is crucial for the project to establish a clearly defined communication system and use the appropriate channels to ensure effective information transmission. We will also investigate using the following research method: document analysis.

Analysis of the documents as part of the “Student University” project

Document analysis makes it possible to group and analyze the most important documents related to the communication of the project and observe how they contributed to the success of the project. Document analysis in a project can be of great help in assessing a communication process (its efficiency and effectiveness). It provides an objective view of the communication within the project and allows the identification of patterns and problems related to the flow of information and communication between team members.

In Appendices 1 and 2, the documents are grouped according to the following criteria: Document Name, Document Type, Subject of Communication, Departments Involved and Communication Type.

Internal communication documents (Appendix 1)

Document (1) contains a table with the list of the 14 volunteer students - names, surnames and the signature that they have received the amount of 100 lei for their efforts for the Student University project. Documents (2) to (6) present different perspectives and aspects related to the Student University program. For example, document (2) contains information about the bus timetable: for each day of the schedule, it shows the address and time from where students take the bus, the number of trips and the number of people who can board the bus. Document (3) shows the meal program in the Hasdeu school canteen. Document (4) contains the detailed program of the project to help student volunteers understand their tasks and responsibilities. The official program of the event is presented in documents (5) and (6), with the difference that one is intended for students from Cluj-Napoca and the other for students from outside Cluj-Napoca. At the beginning there is the poster promoting the School University project, then the division of the events by days and the activities of each day.

The presentations of the faculties have been divided according to certain criteria: different cities, different profiles (real or humanities) and interests of the students. The addresses and times of the individual activities are listed next to each activity. In the free time between the presentations, the students could visit Cluj-Napoca and its tourist attractions: the Botanical Garden, museums, exhibitions, Central Park and others.

The document (7) contains some useful tips and important points that were discussed in the preliminary design meeting on March 1st.



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Figure 3. Public project presentation

External communication documents (Appendix 2)

Document (8) shows the project's support packages, while also including some notes on the location of the opening gala, the fact that everything will be presented in a live streaming on the event page for other interested students, pupils or teachers, and the fact that the local press will also be invited to provide audio and photo montage.

Document (9) includes a list of subjects from which student volunteers must be exempted during the project if they are unable to attend classes. The first and last name of the respective teacher, the subject taught and whether a seminar/course took place during the week in question are added.

Documents (10) to (12) are applications submitted by the project coordinator to various departments of the university. Document (10) contains an application sent by the coordinator of the "Student University" 2023 project to the Dean of the Faculty. It gives detailed information about the program with the request to book the room "Aula". The analysis of document (11) shows a request from the project coordinator to the PR department of the university to approve the production of video material for the organization and promotion of the event. Document (12) contains a request for approval from the project coordinator for the production of printed materials for the organization and promotion of the event.

The final report (13) contains relevant information about the project: organizer, period, objective, target group, participants, promotion of the project, program, partners, sponsors, facilities, as well as some answers and conclusions from a questionnaire filled in by the participating students.

Document (14) contains some questions received at the “Transilvania Policromă” broadcast on 20 February 2023, where some important aspects of the project were discussed by the project coordinator, when this event was organized and who was invited to participate. Participation in the program provides a comprehensive platform for promoting the project. This will make more students aware of the opportunity to visit colleges and the benefits they can gain from it. On the show, the project coordinator mentioned success stories of past projects and how these experiences have positively affected the students. This can inspire and motivate other students to sign up for and participate in the project. So participating in a program can be beneficial in several ways when it comes to communicating the visiting faculty project.

In summary, the document analysis has deciphered the communication channels used, the frequency and methods of information transmission, and their effectiveness in conveying project messages and instructions. The roles and responsibilities of participants in the communication process have come to light as to how information was conveyed to both indirect and direct participants in the project.

The analysis of the “Student University” project documents provides a solid basis for understanding the background and development of the project. However, in order to get a more complete picture and learn the direct perspective of those involved, we conducted four interviews with team members who played an active role in the project. These interviews bring additional information to light and provide a deeper understanding of key aspects of the project.

4. Interview results and discussion

As part of this research, we conducted four interviews, each lasting 40 minutes. These interviews took place online on the Zoom platform, both with the project coordinator and with three student volunteers involved in the project. The interviews were conducted in Romanian for easier and more efficient communication and were further translated using DeepL. The aim of these interviews was to discuss the most important aspects of communication in the project, communication strategies, motivation, communication channels, problem solving and evaluation of communication quality. This analysis gave us valuable insights and helped me to formulate concrete recommendations for improving communication in similar projects in the future. The following table provides some information about the interviewees, namely 4 out of 15 project members from the core team (26.67%).

Table 1. The project members interviewed

Crt. No.	Team role in the project	Gender	Duration of the interview
11	Project coordinator	Masculine	50 minutes
12	Volunteer	Feminine	30 minutes
13	Volunteer	Feminine	30 minutes
14	Volunteer	Feminine	30 minutes

The results of these interviews were interpreted with the help of Maxqda software, whereby we coded and analyzed the texts obtained. In the next figure, one can see the relationships between codes and units of analysis (such as text segments or data fragments). The code matrix browser provides a tabular representation of the data, with codes on the horizontal axis and units of analysis (interviews) on the vertical axis. There are 4 main categories of codes: Effectiveness of communication within the project team, Effectiveness of communication outside the project team, Evaluation of communication quality and Motivation of project team members, with each of these codes having 2 or 3 sub-codes.

Code System	I1	I2	I3	I4	SUM
Effective communication within the project team				•	1
Communication tools	●	●	●	●	31
Volunteer involvement	●	●	●	●	37
Overcoming communication problems	●	●	•	●	23
Effectiveness of communication outside the project team					0
Means of communication	●	•			9
Cooperation with other stakeholders	●	•	•		14
Top management support	●	•	•	•	14
Evaluation of the quality of communication					0
Communication evaluation	●	●	•	•	20
Feedback	●	•	•	•	18
Motivation of the project team members					0
Team collaboration and communication strategies	●	●	•	•	19
Instruction of new members	●	•	•	•	15
Σ SUM	96	37	31	37	201

Figure 4. Code Matrix Browser

Effectiveness of communication within the project team

First, we will discuss the results of the analysis of the effectiveness of communication within the project team. Effective communication within the project team is the key to the success of the project. Good communication enabled team members to work together effectively, share ideas and coordinate activities properly.

The sub-code 'Communication tools' (30 segments) refers to the most important online platforms and apps for collaboration through which team members were able to interact effectively and coordinate activities.

“Teams gave us access to the entire Microsoft platform, which also offers Pages and OneDrive. All relevant documents were therefore accessed via the institutional Email account and internal team documents such as schedules, times and places where a particular person had been sent via WhatsApp” (I1, pos. 14)

“During the 4 months there was a lot of communication via phone, WhatsApp, emails and about 7 face-to-face meetings” (I1, pos. 16)
“We also had a separate WhatsApp group with all team members where we discussed every problem or task in detail.” (I2, Pos. 11)

The sub-code ‘Volunteer involvement’ (36 sections) is a crucial aspect of the project that contributed to its success. The volunteers brought enthusiasm, commitment and valuable resources and it was important that they were given meaningful opportunities to get involved and make their personal contribution to the project.

“We, as volunteers, received training on the guidelines and values relevant to the project. “ (I4, pos. 7)

“Each of us was assigned different tasks and everyone had a responsibility, the work was evenly distributed, and everything was done with maximum organization” (I3, pos. 15)

“Also, in the first session we discussed how to be careful when working with personal data, e.g. about pupils or schools” (I2, pos. 7)

Another aspect of internal communication is ‘Overcoming communication problems’, as indicated by the third sub-code (22 segments). This ensured effective collaboration and avoided certain delays or misunderstandings, which strengthened the team and forced it to overcome difficult moments and unpleasant situations.

“There were delays and I asked a student volunteer to take care of it. In times of crisis, I kept in touch with her and then the student volunteer took care of it and called the person directly, knocked on their door and helped me a lot in that direction” (I1, pos. 14)

“Some problems with unavailable student volunteers were solved by replacing them with other team members. There was always a replacement person to take care of an action. If there were delays, these were resolved either by phone, directly with the person who had responded late, or with their replacement if it was an urgent matter” (I1, pos. 28)

“We avoided some problems by simply talking in advance and planning the day’s schedule carefully” (I2, item 9)

The team used various means of communication, including online platforms such as Teams, WhatsApp, emails, and face-to-face meetings, to collaborate effectively and share information. Volunteer training and clear assignment of tasks helped to ensure that they were engaged and made valuable contributions. Direct communication, substitutes and careful planning helped to avoid delays and misunderstandings. Overall, these measures led to efficient collaboration, the achievement of goals and the overcoming of challenges within the project team.

Effectiveness of communication outside the project team

In the following, we analyze the results of the interviews with regard to the importance of effective communication outside the project team, i.e. external communication. Collaboration with other stakeholders is crucial to the success of the

project and requires constant communication and interaction to exchange information, clarify issues and obtain feedback.

The first sub-code 'Means of communication' (9 segments) again contains the main forms of communication with external partners: sponsors, professors, UBB Directorate of Communication and Public Relations, GDPR staff and other stakeholders.

"We also informed the dean's office by email, but also personally with our faculty management, and at the level of the rector with the vice-rector responsible for the German line, we had personal discussions, by institutional email, but also via WhatsApp. We also used WhatsApp and institutional email with the vice-rector's secretary, who took care of all the bureaucratic matters" (I1, item 6)

"We communicated with external members both in person and by email, e.g. the coordinating teacher sent invitations to sponsors online, by email" (I2, item 11)

Regarding the sub-code 'Cooperation with other stakeholders' (14 segments), it was important to build trusting relationships and maintain constant and open communication. This included sharing relevant information and actively responding to the needs and concerns of other stakeholders. Effective communication and good collaboration helped to increase stakeholder engagement and gain support for the project.

"Communication with other schools and other departments outside the project was through the project coordinator" (I2, pos. 5)

"Each faculty had a teacher in charge of the project, sometimes with the task of welcoming the students on a specific day and introducing them to the infrastructure of that faculty. Before the event, either the sponsors sent the promotional materials to the rectorate by courier, or I went to the sponsors myself and in about 90% of the cases personally took care of taking these materials and displaying them at the opening gala on Monday or including them in the welcome packet" (I1, pos. 17)

"Efficient communication was sought with other external teams, members and departments, which is why the coordinating professor took on these tasks" (I3, pos. 11)

In relation to the next sub-code 'Top management support' (14 segments), we can say that the top management provided strategic guidance, resources, and support in solving problems or obstacles encountered when communicating with other stakeholders. They also ensured that the project team had the necessary authority and resources to communicate effectively and respond to all participants' needs. Both the Dean's Office and the Rectorate were responsive to the needs of the project and helped with interest and commitment.

"The dean's office was informed that a visit was coming and that students would be in the faculty premises and that the dean's office approval was needed for the classroom, and in the rector's office the requests were facilitated or somehow guided by the vice rector's secretary" (I1, pos. 7)

“At every step, we were supported by the coordinating faculty member, but we also motivated each other and received support from the other team members. The teaching staff were very supportive throughout the project and provided us with everything we needed. Communication with other schools and departments was handled by the project coordinator” (12, pos. 5)

“Support for the project was provided both financially through sponsorship and verbally through encouragement and collaboration with team members and participating students” (14, pos. 5)

The analyzed interview results emphasize the importance of effective communication in the external collaboration in the project, which was about 5% of all communications. The use of various means of communication such as emails, face-to-face meetings and even messaging applications enabled a flexible exchange of information with external partners. Constant and open communication with other stakeholders encouraged engagement and support from the project participants.

Evaluation of the quality of communication

In the following, we will look at the assessment of communication quality and the implementation of a communication evaluation, important steps for assessing the effectiveness and efficiency of communication in the project. Such an evaluation makes it possible to identify weaknesses, recognize potential for improvement and adapt the communication strategy.

The sub-code ‘Communication evaluation’ (20 segments) illustrates that communication was mostly effective, well organized, and even praised by external parties, but nevertheless some areas for improvement were also identified.

“We intend to develop together a good practice that can be passed on from generation to generation, with some key points, some chapters that are dealt with in a qualitative and descriptive way” (11, pos. 30)

“We evaluated the communication from the first day of the project, day by day, every evening there was a small team meeting” (11, pos. 32)

“Communication, even if it was a bit chaotic at times, has improved because everyone knows what their tasks are” (13, Pos. 21)

“During the whole project we realized that communication is the key to solving any problem, and without listening and proper communication nothing will work as we imagined.” (14, Pos. 23)

The sub-code ‘Feedback’ (18 segments) was provided by several parties involved in the project. An evaluation questionnaire completed by the participating students at the end of the project provided information about their satisfaction with the project. In addition, a final board meeting with the teachers and faculty representatives involved in the project provided an opportunity to gather feedback and suggestions for improving communication in future projects, as well as to praise the entire project team for the excellent organization.

"It was important to give and receive feedback to my colleagues and so we could avoid arguments by simply following each other's advice" (12, pos. 25)

"The evaluation of communication was also based on the feedback questionnaire we sent to the students, which 60% of the participants completed. A final evaluation took place at the German Line board meeting, to which I was invited to present the results of the event. There I also received feedback from colleagues and teaching staff from the individual faculties who were involved in welcoming the students, and here too the level of satisfaction was high." (11, pos. 33)

"The feedback helped us to become a more professional organizational team from year to year. The project received general feedback through the final questionnaire completed by the students" (14, pos. 25)

In summary, communication was effective, transparent, clear and well-coordinated and contributed to the successful implementation of the project. It was emphasized that communication is the key to problem solving. The feedback from the students and the board meeting was positive and praised the quality of communication. It also helped the participants in the project to become a more professional organizing team. The communication evaluation has helped to identify weaknesses and adjust the communication strategy.

Motivation of the project team members

To motivate team members and promote collaboration and effective communication in the project, it was important that objectives and roles were clarified, open communication was encouraged, and regular meetings were held. Collaboration and knowledge sharing between team members needed to be facilitated by the project coordinator, who provided ongoing support and constructive feedback and ensured that new team members received an appropriate instruction and were provided with the resources they needed to perform their tasks and that the old team members were at least as committed as in the previous project.

The next sub-code 'Team collaboration and communication strategies' (19 segments) includes some motivating factors such as: a volunteer diploma that confirms their commitment and dedication, a small amount of money in recognition of their efforts, the opportunity to take on a leadership role that allows them to develop their leadership skills, and the opportunity to have an unforgettable experience that enriches their knowledge and opens up new perspectives.

"We motivated each other and were supported by the other team members. The faculty was very supportive throughout the project and provided us with everything we needed" (12, pos. 5)

"The motivation for us was the fact that we really wanted to help future high school graduates who are still at the beginning of their path" (13, Pos. 13)

"We showed them that they can make the most of the opportunities available to them" (14, item 13)

The next sub-code 'Instruction of new members' (15 sections) contains useful tips for new volunteers from both the project coordinator and the student volunteers. The new volunteer should listen to and learn from the more experienced members and the project coordinator, actively engage and collaborate with the whole team, enjoy the experience and be open to feedback while showing respect and a desire for personal development and learning.

"They can learn to coordinate an event, get involved in the organization and gain some practical skills that will help them in their future career, but also in some subjects related to projects and communication" (I1, pos. 41)

"I think the best advice I can give to a new member of the volunteer team is to enjoy the whole process to the fullest and to do everything they do with heart, because in the end they will be proud of their work and of the fact that they have left their mark on such a beautiful project. I would advise them to always listen to the other teachers around them and to the advice of the coordinating teacher, because that is very important" (I2, pos. 27)

"I would point out to him that effective communication is the most important factor in the smooth running of a project" (I3, pos. 27)

"It is very important to listen to the views of the team and discuss them together to find optimal solutions. It is not acceptable for everyone to impose their own opinion and ignore the opinions of colleagues." (I4, pos. 27)

In summary, we can say that the student volunteers' experiences were rewarding as they were constantly motivated by various factors, both intrinsic, through personal interests, passions and satisfaction from the desire to learn and develop, and extrinsic, such as the rewards in the form of money and the diploma for volunteering and participation. They recommend volunteering in such a project and give good advice to potential new members.

Based on the project case study, the analysis of internal and external documents and the interviews conducted with the four interviewees, we have come to a solid conclusion: communication was a crucial factor for the success of the project. This conclusion is supported by all four interviewees, who unanimously recognize the importance of effective communication within the team and with external stakeholders. Through a coherent and transparent communication strategy, the project was able to overcome obstacles and achieve positive results. This underlines the importance placed on communication in project management and its relevance in ensuring ultimate success.

5. Conclusions

Our study, which used scientific methods such as the project case study, analysis of internal and external documents and interviews with the project coordinator and the three student volunteers, provided an in-depth understanding of how clear and effective communication between the project leader and the project members can contribute to the achievement of the objectives and successful completion of the 'Student University' project.

The results confirmed that communication was one of the key factors in the success of the project. We found that effective communication within the internal team motivated the volunteers and actively involved them in the project, which facilitated the coordination of the process and supported the efforts of the project leader. We also found that effective communication with external stakeholders such as sponsors, faculty, dean's office, and rectorate helped to gain additional support and ensure compliance with university policies and values. At the same time, we have found the importance of assessing the quality of communication and providing feedback, both in terms of the project itself and the involvement of project members. This evaluation and feedback process has contributed to the continuous improvement of communication and the effectiveness of the project.

The results of this study also clearly emphasize that a well-functioning team is closely connected to effective coordination and a clear distribution of roles. Smooth communication, which was identified as a fundamental factor, not only enables efficient collaboration, but also promotes the motivation and active participation of team members. The successful implementation of the project was significantly influenced by the team's ability to share information clearly, approach tasks in a coordinated manner and utilize the different skills of its members.

However, the limitations of our study should also be mentioned. One of them is that the empirical data was only collected by the project coordinator and three student volunteers, and the views of the participating students were not considered. Including the perspectives of the high school students involved would be an essential aspect of not only uncovering potential weaknesses, but also gaining a deeper insight into their positive internal experiences. Looking from their perspective would allow a better understanding of any challenges or ambiguities in communication within the team and the project. This perspective could potentially highlight inconsistencies or misunderstandings that have arisen from their perspective and therefore help to make specific improvements. Another limitation is the time constraint of the study, as we only focused on communication during one edition, and the fact that we were not able to analyze all relevant documents in depth due to privacy restrictions or other issues.

To get a more comprehensive picture and to observe the development of the entire communication process, further research is needed, which should include all 11 editions of the project. These further investigations may provide important information for the continuous improvement of the communication and effectiveness of the 'Student University' project and may stimulate future research.

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Appendix 1: Internal communication documents

Crt. No.	Document name	Document type	Subject of the communication	Departments involved	Communi-cation type
1	Nominal table with the list of student volunteers who receive a participation grant	Financial - Presentation document of the volunteers of the 11th edition of the Student University	First and last name of the volunteer and signature for receipt of the amount	Volunteers participating in the project	Internal
2	Student university bus program	Presentation document for the bus timetable	Place and time of meals for breakfast/lunch/dinner	Pupils participating in the project	Internal
3	Schüleruni – Canteen food program	Presentation document for meals	Place, time and number of people requiring bus transportation	Pupils participating in the project	Internal
4	Schüleruni – Student program	Progression document of the tasks of the volunteers	First and last name of each volunteer, abbreviation and responsibility of each volunteer for different activities	Volunteers and students participating in the project	Internal
5	“Student University”– Program Participating students from Cluj-Napoca	Presentation document of all project activities	Location, date and time of the individual activities as part of the Student University project, participant limit for each faculty	Students from Cluj-Napoca taking part in the project	Internal
6	“Student University”– Program Participating students outside of Cluj-Napoca	Presentation document of all project activities	Place, date and time of the individual activities as part of the Student University project, participant limit for each faculty, including the type of transport and meals	Pupils participating in the project outside Cluj-Napoca	Internal
7	Schüleruni – Meeting	Implementation document of the project and all activities	Organization and communication rules, volunteer responsibilities, signatures, speeches, treasure hunt game	Internal project team	Internal

Appendix 2: External communication documents

Crt. No.	Document name	Document type	Subject of the communication	Departments involved	Communi-cation type
8	Schüleruni 2023 Sponsorship Package	Financial - Presentation document of the sponsors of the 11th edition of the Student University	The main sponsors, their contributions and other information about their involvement in the project	Students and sponsors participating in the project	External
9	Professors FSEGA - Reasons for absences	Request for justification of absence of voluntary students	First and last name of the teachers and subject (course or seminar)	Volunteers and professors participating in the project who should justify the absence	External
10	FSEGA Application for assembly hall Aula – Schüleruni 2023	Application to reserve the “Aula” classroom for the “Student University” 2023	Reservation of the auditorium for the presentation of the German section of FSEGA for approval	Project coordinator and faculty dean’s office	External
11	Video request - from LSLG to the DCRP (Directorate for Communication and Public Relations)	Request for the creation of video material required for the organization and promotion of the event	Live streaming during the opening gala on UBB’s electronic channels without saving or processing the material	Project coordinator, Design and PR	External
12	Order form for printed materials for faculties	Form for the production of print products for the project	Printed materials for the organization and promotion of the Student University, including their number and type of sheets, as well as promotional materials in digital form	Project coordinator, Design and PR	External
13	Schüleruni 2023 – Report	Final report of the “Student University” 2023 project	General information about the project (organizer, faculties involved, aim of the project, target group, funding, participants, partners, sponsors),	All project participants	Internal & External

Crt. No.	Document name	Document type	Subject of the communication	Departments involved	Communi-cation type
			recommendations from students for future editions and acknowledgements		
14	Interview about Schöleruni Policromă	Project funding document	Questions asked during the interview and answers given by the project coordinator	Interviewer and project coordinator	External