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Vretenar, Nenad; Filipas, Ana Marija; Briš Alić, Martina

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Nenad Vretenar
University of Rijeka, Faculty of Economics and Business, Croatia
nenad.vretenar@efri.uniri.hr
https://orcid.org/0000-0003-4689-0865

Ana Marija Filipas
University of Rijeka, Faculty of Economics and Business, Croatia
ana.marija.filipas@efri.uniri.hr
https://orcid.org/0000-0003-3539-0275

Martina Briš Alić
Josip Juraj Strossmayer University of Osijek, Faculty of Economics, Croatia
martina.bris.alic@efos.hr
https://orcid.org/0000-0002-3284-8300

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ABSTRACT

Purpose: Corruption is perceived as a widespread problem throughout the world, including in Central European countries. In terms of corruption, these countries still lag behind the leading EU countries (as indicated by the 2023 Worldwide Governance Indicators). As corruption itself is very difficult to measure, the perception of corruption is often used as a proxy. The aim of this paper is to analyse attitudes towards corruption in selected Central European countries and to draw conclusions on the factors influencing these perceptions. Based on the assumption that the difference between de jure and de facto transparency matters, we selected Czechia, Hungary, and Poland as countries with small differences between these two dimensions of transparency, and Croatia, Slovakia, and Slovenia as countries with large differences.

Design/Methodology/Approach: Using Eurobarometer data, we applied logistic regression to analyse attitudes towards corruption in the two groups of countries distinguished by differences in de jure and de facto transparency. Each group, consisting of three Central European countries, was used to create a model, i.e., Model 1 and Model 2, with a total number of observations of 901 and 902, respectively. Both models displayed ad-

equate fit indices and enabled predictions that allowed us to draw conclusions. All respondents were business representatives with decision-making responsibilities in their companies, ensuring that the results reflect company perceptions rather than those of the general public.

Findings: Attitudes towards corruption in the countries studied are related to perceptions of patronage and nepotism in business, perceptions of corruption in public procurement, perceived links between politics and business, and attitudes towards tax rates. In the group where there is little difference between de jure and de facto transparency levels, business attitudes towards corruption are also associated with perceptions of adequacy of infrastructure and complexity of administrative procedures. In the countries where these differences are substantial, attitudes towards corruption are related to perceptions of problems arising from frequent changes in the law, problems with debt collection, and differences in views regarding the severity of bribery depending on the value of the bribe.

Academic contribution to the field: This research provides a better understanding of the factors influencing the perception of corruption in Central European countries from a business perspective. In doing so, it introduces a methodology that is well-suited for the analysis of survey-collected data, especially since it allows the dependent variable to be categorical. Moreover, by using data from the Transparency Index to differentiate countries, the study has the potential to stimulate further theoretical and empirical research into the relationship between corruption and transparency. Lastly, by linking companies' perceived problems to overall perceptions of corruption, this paper helps to identify the areas within the studied countries where pockets of corruption are most likely to exist.

Originality/Value: Previous research has found that corruption tends to occur when the gap between de facto and de jure transparency is larger. This research demonstrates that the size of this gap can also be successfully used to achieve a better understanding of the factors influencing attitudes towards corruption. Therefore, this paper employs the difference between de jure and de facto transparency as a categorisation criterion to analyse the factors influencing the perception of corruption. This categorisation approach enabled the development of two separate logistic regression models with high predictive power.

Keywords: de jure transparency, de facto transparency, corruption, attitudes towards corruption, business

JEL: C01, D73, H83

1 Introduction

Transparency International defines corruption as "the abuse of entrusted power for private gain" (Transparency International, 2023). Similarly, corruption can be defined as a leakage of resources that should be used to fulfil social goals (Langseth, 2006). Corruption, that results in the abuse of entrusted power, can manifest itself in the acceptance, giving, demanding, or offering of bribes, valuable gifts, the granting or receiving of important favours, and other behaviours. Even from this brief explanation, we can deduce that corruption

is a situation in which someone who has been entrusted with power to serve a public interest uses that power for their own benefit. Transparency International goes on to explain that corruption in general, and political corruption in particular, "undermines good government, fundamentally distorts public policy, leads to the misallocation of resources, harms the private sector and private sector development, and particularly hurts the poor" (Kusek and Rist, 2004).

Thus, when we talk about corruption, we usually focus on the misconduct of politicians, public officials, and public employees. The social costs of corruption damage good governance (Scott, 1972), affect economic growth (Mauro 1995), investment (Mauro, 1997), gross domestic product (Manchanda, 2019), the level of public services delivered (Pellegata, 2012 and Brown et al., 2011), but also public trust in (local) government (Zhang et al., 2019), increases in the costs of private and public activities (Hakimi and Hamdi, 2017), and increases in managerial uncertainty.

Since corruption is illegal, it is not easy to detect and very difficult to measure. Even comparing collected data on the incidence of reported crimes can be problematic, as bribery and other forms of corruption may be viewed and handled differently in different countries (Lambsdorff, 2006). In addition, the persistence of corruption can be explained by the fact that it is difficult for citizens to observe it, which in turn makes it difficult to implement monitoring systems and create incentives for politicians to curb corruption (Olken, 2009). Moreover, some actions may be considered corruption in one country while acceptable behaviour in another (Chabova, 2017), making it difficult not only to measure but also to fundamentally understand corruption. Tolerance for corruption also varies from country to country, as well as from population group to population group (Gouvêa Maciel, 2021). Even when citizens are aware of the extent of corruption but do not know who is corrupt and who is honest, politicians' enthusiasm to make actual efforts to curb corruption may be low.

However, because corruption is so difficult to measure and the actual level of corruption cannot be determined directly, the perception of corruption may be the only way to estimate actual corruption (Lambsdorff, 2006). Because measurement could only capture reported corruption, some of the most prominent international organisations (e.g., Transparency International and the World Bank) measure perceptions of corruption rather than the extent of corruption itself. This indirect way of measuring corruption allows us to overcome the difficulties of measuring corruption, but may raise questions about the relationship between perceptions and actual corruption. For example, Donchev and Ujhelyi (2014) warned that perceived corruption is subject to bias and may be problematic, and called for better measures of actual corruption. François et al. (2023) could not confirm the relationship between perceived and actual corruption, but found a relationship between municipality size and perceived corruption in France. Corrado et al. (2021) published the results of an experiment that showed that corruption perceptions are strongly influenced by available information and that actors who do not have information about bribery attempts are more likely to offer bribes.

Some research (Melgar et al., 2010) suggests that perceptions of corruption can do more harm than corruption itself by generating mistrust. However, the correlation between perception and actual corruption has been confirmed in some academic works (Charron, 2016; Villoria and Jimenez, 2012), as well as the reluctance of citizens to report corruption when corruption perception is high (Manzin et al., 2015). Moreover, both actual and perceived corruption are influenced by freedom of the press (Breen and Gilanders, 2020), where press reports of corruption cases can reinforce perceptions of corruption, while reporting of routine anti-corruption efforts leads to positive perceptions of efforts to reduce corruption (Sun et al., 2022). However, when free journalism is threatened by political, legal, and economic constraints, perceptions of corruption increase (Corrado et al., 2023). This is also true in reverse: when transparency is high, perceptions of corruption decrease (de Oliveira Santos et al., 2019). Therefore, the most important prerequisite for reducing corruption is to increase the level of transparency.

In her review of available surveys to measure corruption in the EU (including Eurobarometer), Chabova (2017) argues that, in addition to the well- known drawbacks of using public perceptions of corruption as a metric, the use of common public pools helps avoid the free-rider problem because: the general public expresses its opinion free of assumptions that might constrain expert responses. There is also the possibility of conducting micro-analyzes; and because there is a strong correlation of these pools across years and countries, they can be considered reliable. That public opinion about corruption is relevant is also confirmed by recent research (Shiroka-Pula et al., 2023), which has shown that greater trust in local and national institutions, i.e., less asymmetry between formal and informal institutions, is associated with higher well-being. As analyzed by Van de Walle & Migchelbrink (2020) using a logistic regression on regional Eurobarometer data, perceived corruption is also one of the most important variables for trust in public administration, together with public sector outcomes.

Transparency "enables organization insiders and outsiders to obtain accurate information about organizational activities" (Ingrams, 2016). Increased transparency therefore leads to easier detection of corruption and vice versa. However, although most economies, under internal and external pressure, are trying to increase transparency to curb corruption, there is a gap between de jure transparency and actual or de facto transparency. De jure transparency, or legal transparency, is measured by the existence of laws and other institutional measures that ensure free access to information (Mungiu-Pippidi, 2023). De facto transparency is actual transparency and represents "informal rules of game" (Mungiu-Pippidi, 2023).

The European Research Centre for Anti-Corruption and State-building (ERCAS) has created a transparency index that is the sum of de jure and de facto transparency. The de jure index examines legal transparency (a country's transparency laws), while the de facto index evaluates 14 major websites on the extent and accessibility of data. The 14 websites were selected based

on the transparency categories described in the United Nations Convention against Corruption and the Sustainable Development Goal 16. According to recently published research (Jeong et al., 2023), corruption occurs when the gap between de jure and de facto transparency is large. This interesting finding prompted us to investigate the possible differences in the perception of corruption in Central European countries. For the analysis, we selected six countries that have significant parts of their historical, cultural and political background in common. Another main argument for the selection of countries is the discrepancy between de facto and de jure transparency, as we selected three countries where this discrepancy is larger and three countries where it is smaller. We took the absolute values of the difference between these two index numbers, regardless of which index is higher and which is lower. Moreover, we did not focus on identifying the differences in corruption perceptions between countries with higher and those with lower transparency, but rather on the countries with a higher or lower discrepancy between de facto and de jure indicators, as calculated by ERCAS and presented on its website (corruptionrisk.org).

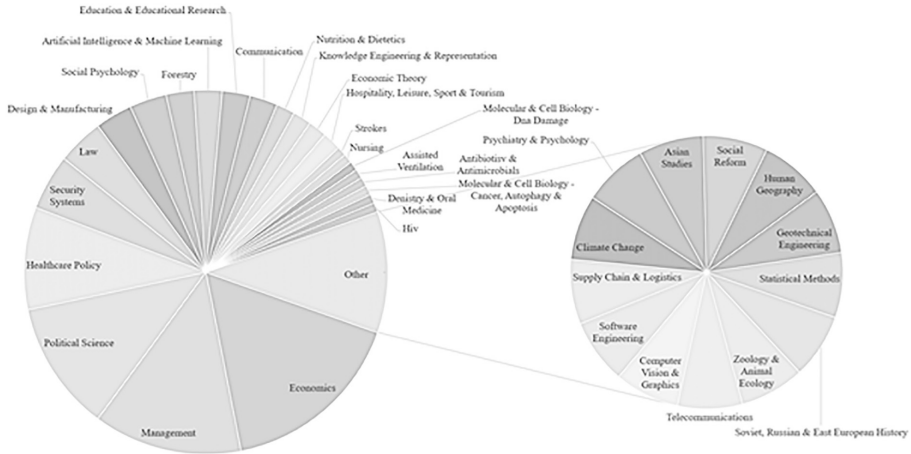
The survey, "Businesses' attitudes towards corruption in the EU", was commissioned by the European Commission and last conducted in April 2022. The survey involved 12,790 telephone interviews with company representatives who are decision-makers in the business. We believe that the fact that only company representatives with decision-making responsibility, rather than the general public, were included in the survey is significant both for methodological reasons and in terms of the relative importance of the conclusions. The survey report shows that 34% of companies in the EU consider corruption to be a problem when doing business in their country, although the extent varies widely across Member States. For example, 70% of companies in Romania consider corruption a problem, but only 7% in Denmark. In Croatia, 64% of companies consider corruption to be a serious problem in their business activities, while 50% in Slovakia, 45% in Hungary, 38% in Slovenia, 34% in Czechia and only 19% in Poland share this view. The most common type of corruption, also at the EU level, is favouring friends and family members in companies and public institutions, then funding political parties in order to obtain lucrative contracts later on, and finally offering gifts, trips, kickbacks and bribes (Businesses' attitudes towards corruption in the EU, Report, 2022).

The main aim of this research is to find out what are the most important factors influencing business people's attitudes towards corruption in Central European countries. Based on this idea, we decided to use logistic regression to show which are the key variables leading to the perception of corruption, using the analytical data from the Eurobarometer survey. However, to investigate whether the difference between de facto and de jure transparency makes a difference, we used the same methodology and variables to build separate models for two groups of selected countries. Therefore, the second aim of this research was to find out whether there are significant differences in corruption perceptions between peer countries grouped according to the criterion of the difference between de jure and de facto transparency.

2 Analysis of the prior research

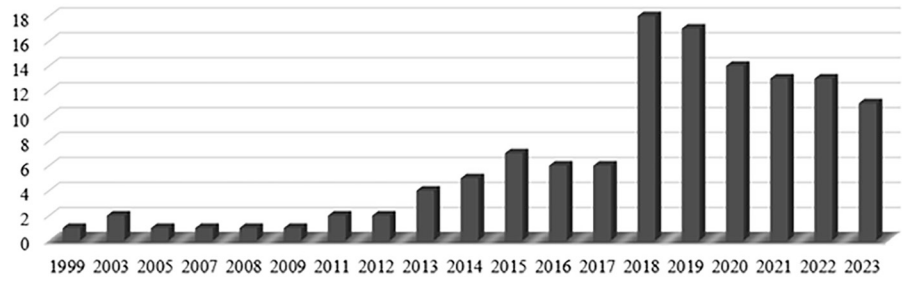
With the aim of reviewing previous research on corruption, we searched the Web of Science Core Collection database as the most important scientific database in the world. Considering that the WoS CC database contains 37,462 papers on the topic of "corruption", we decided to limit our search to papers that combine the term "corruption" with the term "logistic regression" and came across 125 papers. Most of these contributions are from the following areas: Economics - 20, Management - 16, Political Science - 14, Health Policy - 11, Security Systems 6, Law - 5. Less than 5 contributions are from the other fields (Figure 1). For further analysis of these 125 contributions we used the software package VOSviewer. As shown in Figure 2, most papers on corruption using logistic regression were published in the last 10 years, with a noticeable jump in 2018. In the years from 1999 to 2012, only a very modest number of research papers were published on this topic.

Figure 1. Representation of the papers in relation to the area.



Source: Authors using WoS CC database

Figure 2. Number of published papers by year



Source: Authors using WoS CC database

To identify the most productive authors in the field studied, as well as the most productive countries, both in terms of the number of published and the citation of papers from each country, we performed a co-authorship analysis (unit of analysis: authors and countries) and a citation analysis (unit of analysis: countries).

A total of 362 authors were included in the analysis. The most prolific author in this analysis is Colin C. Williams with 4 publications that met our criteria. Three of the authors included in this analysis have published 3 papers in the WoS CC (Horodnic, Sadigov, and Suresh) and 12 authors have published 2 papers (Table 1).

Table 1. The most productive authors

Author	Documents	Author	Documents
Williams, Colin C.	4	**CROATIA**	
Horodnic, Adrian Vasile	3	Cajner Mraovic, Irena	1
Sadigov, Turkhan	3	Modrusan, Nikola	1
Suresh, Ajith	3	Pavlovic Vinogradac, Valentina	1
Ayat, Muhammad	2	Rabuzin, Kornelije	1
Balabanova, Dina	2	**CZECHIA**	
Breuer, Christoph	2	Plaček, Michal	2
Chaudhari, Harsh	2	Gillernová, Ilona	1
Horodnic, Ioana Alexandra	2	Ochrana, Frantisek	1
Hutchinson, Eleanor	2	Schmidt, Martin	1
Kang, Changwook	2	Soukopova, Jana	1
Kuang, Xiaoxue	2	Vacekova, Gabriela	1
Mckee, Martin	2	Výrost, Jozef	1
Patra, Arpita	2	**HUNGARY**	
Plaček, Michal	2	Baji, Petra	1
Yang, Qi	2	Gulácsi, Laszlo	1
		Santoso, Cornelia	1
		SLOVAKIA	
		Falat, Lukas	1
		Holkova, Beata	1
		Malichova, Eva	1
		Pancikova, Lucia	1
		Výrost, Jozef	1

Source: Authors using WoS CC database

We thought it is important to note how many of the analysed papers were written by authors from the countries considered in the empirical part of the present work. Papers by Croatian, Czech, Hungarian and Slovak authors were found, which is also indicated in Table 1. One of the authors from the selected countries published two papers, while one author is associated with institutions in both Czechia and Slovakia. In addition, there were no papers by authors from Slovenia and Poland in this analysis.

Figure 3 shows the most productive countries in terms of the number of publications included in the study. The authors of the papers studied come from 56 countries. The most productive country is the United States of America (USA) with 32 published papers, followed by England with 14 published papers and the Republic of China with 11 published papers. Other countries that are the subject of this study have less than 10 publications.

Figure 3. The most productive countries

Source: Authors

As expected, the United States of America ranks first with 1,073 citations, while England, which ranks second in the number of published works, ranks fourth in the number of citations (319 citations). India and Australia follow in second and third place, with 438 and 436 citations, respectively. The Republic of China, which ranks third in the number of published papers, ranks sixth in the number of citations (246 citations). Wales ranks fifth in the number of citations (310), while papers by authors from other countries have fewer than 100 citations.

Looking at the countries analysed in the empirical part of this paper, it is interesting to note that Czechia has three publications, while Hungary, Croatia and Slovakia have two publications. No work from Poland and Slovenia met the criteria to be included in the analysis. Looking at the mentioned papers by the number of citations, the papers of Hungarian authors were cited the most, 34 times. The works of Czech authors were cited 10 times, those of Croatian authors 8 times, while the works of Slovak authors were not cited.

At the end of this bibliometric analysis, we will shortly present the main topics of the papers published by authors from the countries we analysed in our research. A paper published by Rabuzin and Modrušan (2019) presents results in using machine learning methods to detect fraud in public procurement. Public procurement, its efficiency and the occurrence of corruption are also the focus of papers published by Plaček (2017) and Plaček et al. (2019). Scholars' interest in corruption in public procurement is understandable, as public procurement mechanisms in the EU were created to prevent corruption in local government. However, apart from the fact that corrupt officials still try

to circumvent the restrictions, there are concerns that public procurement leads to centralization of decision-making at a higher level of administration, which could mean that corruption takes place up the ladder (Kaštelan Mrak et al., 2016). The study published by Kutnjak Ivkovich et al. (2022) focuses on corruption within the police and examines the factors that influence the willingness to report police misconduct.

Perceptions of corruption were one of four social factors that predicted global life satisfaction in a psychological study (Výrost and Gillernová, 2015). Research from Hungary (Baji et al., 2015) noted a mostly positive attitude toward informal payments (bribes) made by patients to health professionals on the grounds that they are not adequately paid by the health care system. Rajan et al. (2022) addressed the problem of informal payments in 34 African countries. Their data showed that men were more likely to bribe medical personnel than women, regardless of age, education, occupation, and social status. Holkova et al. (2023) examined factors influencing the tendency to evade taxes and emphasised the close relationship between tax evasion and corruption.

3 Data, sample and methodology

Following the study of Jeong et al. (2023) which found that one of the main reasons for the persistence of corruption in a given country is the gap between de jure and de facto transparency, we decided to conduct our research for the countries that have the smallest and the largest difference between these two indicators. As shown in Table 2, in our study we included the three countries with the smallest difference between de jure and de facto transparency: Hungary, Czechia and Poland, and three countries with the largest difference between de jure and de facto transparency: Croatia, Slovakia, and Slovenia.

From the table it can be seen that Estonia has the same difference as Croatia and Slovakia and could also be included in a model. However, besides our goal to balance the number of countries in the included country groups, we decided to include countries that have a common historical, cultural and geographical origin. Therefore, we chose to include nearby countries and all Slavic countries except Hungary. Although Hungary is not Slavic, it has many historical similarities with other countries and is a neighbouring country to three other countries in our analysis.

Logistic regression looks for an equation that predicts an outcome for a binary variable based on one or more response variables. Unlike linear regression, the response variables need to be categorical, as the model does not strictly require continuous data. To predict group membership, logistic regression uses the log odds ratio instead of probabilities and an iterative maximum likelihood method instead of least squares to create the final model (Kleinbaum and Klein, 2010).

Table 2. *De jure* and *de facto* transparency, Central and Eastern EU countries

Country	*De jure* transparency	*De facto* transparency	Difference between *de jure* and *de facto* transparency (|*de jure* transparency – *de facto* transparency|)
Bulgaria	6.00	11.00	5.00
Croatia	6.00	13.00	7.00
Czechia	6.00	9.50	3.50
Estonia	6.00	13.00	7.00
Hungary	5.00	8.00	3.00
Latvia	6.00	11.50	5.50
Lithuania	6.00	12.50	6.50
Poland	9.00	5.00	4.00
Romania	6.00	12.00	6.00
Slovakia	6.00	13.00	7.00
Slovenia	5.00	12.50	7.50

Source: Authors using European research centre for anti-corruption and state-building, ERCAS (2022)

The data used in this article come from a Eurobarometer survey conducted via telephone interviews in 2022, the aim of which was to investigate the level of corruption as perceived and experienced by companies with one or more employees in six key sectors: Financial Services, Banking and Investment; Construction and Building; Energy, Mining, Oil and Gas, Chemicals; Engineering and Electronics, Motor Vehicles; Healthcare and Pharmaceuticals; Telecommunications and Information Technology. Table 3 provides an overview of the characteristics of the sample in each of the countries for which we conducted the analysis and provides information on the companies for which respondents work: industry sector to which the company belongs, how many employees the company has, and how long the company has been in business.

In addition to the characteristics of their company, respondents were required to answer a series of questions related to: business difficulties, perceptions of corruption in their country, the prevalence of activities that lead to corruption. They were also asked to assess the occurrence of corrupt practices in public tendering and procurement procedures and how corruption is investigated, prosecuted, and punished in their country. The variables used in the analysis, as well as their notation, operationalization, and scale, can be found in Table 4.

Table 3. Sample characteristics overview

Sample characteristics	Croatia	Czechia	Hungary	Poland	Slovakia	Slovenia
Sector of activity (SA)						
Financial services, banking and investment	8.7%	8.7%	17.3%	16.7%	17.6%	16.9%
Construction and building	21.7%	18.7%	18.3%	16.3%	18.3%	17.3%
Energy, mining, oil and gas, chemicals	13.7%	17.3%	14.0%	16.7%	7.6%	17.3%
Engineering and electronics, motor vehicles	21.7%	19.3%	17.9%	16.7%	19.3%	17.6%
Healthcare and pharmaceutical	19.0%	18.0%	15.9%	17.0%	18.3%	17.3%
Telecommunications and Information technologies	15.3%	18.0%	16.6%	16.7%	18.9%	13.6%
Number of employees (NUME)						
1 to 9 employees	45.0%	57.7%	56.5%	63.3%	72.1%	36.5%
10 to 49 employees	33.3%	24.3%	31.9%	17.0%	19.9%	30.9%
50 to 249 employees	17.0%	12.0%	9.0%	16.0%	4.7%	23.9%
250 employees or more	4.7%	6.0%	2.7%	3.7%	1.3%	8.3%
Don't know	0.0%	0.0%	0.0%	0.0%	2.0%	0.3%
Company business duration (CBD)						
Less than 1 year	10.3%	14.0%	0.3%	0.7%	14.6%	0.3%
1 - 5 years	13.3%	13.3%	6.3%	10.3%	20.9%	10.3%
6 - 10 years	75.7%	71.7%	19.6%	13.3%	63.8%	15.0%
11 years or more	0.7%	1.0%	73.8%	75.0%	0.7%	73.1%
Don't know	0.0%	0.0%	0.0%	0.7%	0.0%	1.3%

Source: Authors using Eurobarometer survey

Table 4. Variables operationalisation

Variable	Notation	Operationalisation	Scale
Do you consider the following to be a problem or not for your company? - Patronage and nepotism	*PAN*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Complexity of administrative procedures	*APC*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Fast-changing legislation and policies	*LPC*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Inadequate infrastructure in your country	*IINF*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Lack of means or procedures to recover debt from others	*DRD*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Restrictive labour regulations	*RLR*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Tax rates	*TR*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
Do you consider the following to be a problem or not for your company? - Access to financing, including credits	*AFC*	1 = not a serious problem; 2 = a serious problem; 3 = don't know	Categorical
In the past three years, has your company taken part in a public tender or a public procurement procedure?	*PPP*	1 = no; 2 = yes; 3 = don't know	Categorical
If a public official receives money, a gift or a service from someone, what would be the minimum value at which you would consider this to be a bribe?	*BCL*	1 = 0 euros (any gift is a bribe); 2 = 1 - 1000 euros; 3 = 1001+ euros; 4 = don't know	Categorical
Do you agree or disagree that there is sufficient transparency and supervision of the funding of political parties in your country?	*STS*	1 = disagree; 2 = agree; 3 = don't know	Categorical
Do you agree or disagree that too close links between business and politics in your country lead to corruption?	*BPL*	1 = disagree; 2 = agree; 3 = don't know	Categorical
Do you agree or disagree that people and businesses caught for petty corruption are appropriately punished in your country?	*AP*	1 = disagree; 2 = agree; 3 = don't know	Categorical
Do you agree or disagree that people and businesses caught for bribing a senior official are appropriately punished in your country?	*BSO*	1 = disagree; 2 = agree; 3 = don't know	Categorical
How likely do you think that people or businesses engaging in corrupt practices will get caught by or reported to the police or prosecutors generally?	*RPP*	1 = very or fairly unlikely; 2 = very or fairly likely; 3 = don't know	Categorical
How widespread do you think the following practices are generally? - Corruption in public procurement managed by national authorities	*NAC*	1 = very or fairly rare; 2 = very or fairly widespread; 3 = don't know	Categorical

How widespread do you think the following practices are generally? - Corruption in public procurement managed by regional or local authorities	*RLAC*	1 = very or fairly rare; 2 = very or fairly widespread; 3 = don't know	Categorical
How widespread do you think the problem of corruption is in your country?	*CW*	0 = very or fairly rare; 1 = very or fairly widespread	Dummy

Source: Authors using Eurobarometer survey

Combining the data from Hungary, Czechia, and Poland (i.e. countries with smallest differences between de jure and the facto transparency) with the total of 901 observations enabled us to create the first logistic regression model (referred to as *Model 1* in the sequel). Second logistic regression model (referred to as *Model 2* in the sequel) was created from the data from Croatia, Slovakia, and Slovenia (i.e. countries with largest differences between de jure and the facto transparency) with a total of 902 observations. We aimed to find out what influences the respondents' opinion on corruption widespread in their country. With that purpose, two separate binary logistic regression models with the dependent variable CW were build, respectively:

$$CW = log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 SA + \beta_2 PAN + \beta_3 APC + \beta_4 LPC + \beta_5 IINF + \beta_6 DRD + \beta_7 RLR + \beta_8 TR + \beta_9 AFC + \beta_{10} PPP + \beta_{11} BCL + \beta_{12} STS + \beta_{13} BPL + \beta_{14} AP + \beta_{15} BSO + \beta_{16} RPP + \beta_{17} NAC + \beta_{18} RLAC + e,$$

where p denotes the probability that

$$y = \beta_0 + \beta_1 SA + \beta_2 PAN + \beta_3 APC + \beta_4 LPC + \beta_5 IINF + \beta_6 DRD + \beta_7 RLR + \beta_8 TR + \beta_9 AFC + \beta_{10} PPP + \beta_{11} BCL + \beta_{12} STS + \beta_{13} BPL + \beta_{14} AP + \beta_{15} BSO + \beta_{16} RPP + \beta_{17} NAC + \beta_{18} RLAC + e$$

will take the value 1. The empirical analysis presented in the next section was performed using Stata 17.0 MP-Parallel Edition. As it can be seen from Table 5, CW is a dummy variable indicating *respondents' general perception of the prevalence of the corruption problem in their country*.

4 Empirical results and analysis

The variable CW was used as the dependent variable, whereas the variable representing the field of activity in which the respondent is employed (SA), described in Table 4, and all other categorical variables, described in Table 5, were used as independent variables to build binary logistic regression models in this research. The fit indices for each of the constructed models can be seen in Table 5, which provides insight into the likelihood ratio test statistics, the p-values associated with the likelihood ratio test statistics, deviances, the McFadden and Cragg-Uhler (Nagelkerke) pseudo-R2 values, the AIC and BIC values, and the values of the correctly classified instances.

Table 5. Fit indices for each of the constructed logistic regression models - Model 1 and Model 2

	Model 1 – Czechia, Hungary and Poland	Model 2 – Croatia, Slovakia and Slovenia
Number of observations	901	902
LR x2(40) / LR x2(40)	299.550	553.140
Prob > x2	0.000	0.000
Deviance	845.590	551.224
McFadden R2	0.262	0.501
Cragg-Uhler (Nagelkerke) R2	0.393	0.649
AIC	1.069	0.742
BIC	-4882.962	-5185.066
Correctly classified	77.47%	87.14%

Source: Authors

The likelihood ratio chi-square of 299.550 (LR x2(40) = 299.550), with a p-value of 0.000 (Prob > x2 =0.000) for the first model, and the likelihood ratio chi-square of 553.140 (LR x2(40) = 553.140), with a p-value of 0.000 (Prob > x2 =0.000) for the second model suggest that constructed binary logistic regression models fit our data significantly better than models containing only constants (Chen et al., 2020). In addition, the Pearson test values of the postestimation goodness of fit (x2(838) = 912.46, p > x2 = 0.0961 for the first model and x2(838) = 870.55, p > x2 = 0.2115 for the second model), as well as the Hosmer-Lemeshow test values of the postestimation goodness of fit test (x2(8) = 4.98, p > x2 = 0.7598 for the first model and x2(838) = 7.42, p > x2 = 0.4923 for the second model) indicate that the constructed models are well fitted to our data (Hosmer et al., 2013). The same is confirmed by the McFadden and Cragg and Uhler pseudo-R2 (McFadden R2=0.262, Cragg-Uhler (Nagelkerke) R2 = 0.393 for the first model and McFadden R2=0.501, Cragg-Uhler (Nagelkerke) R2 = 0.649 for the second model) (McFadden, 1974; Cragg and Uhler, 1970). The results for each of the two constructed models are shown in Table 6, which reports the coefficients, standard errors, and associated p-values.

Table 6. Logistic regression results - Model 1 and Model 2

	Model 1			Model 2		
	exp(ß)	**se (exp(ß))**	**sig.**	**exp(ß)**	**se (exp(ß))**	**sig.**
SA						
Construction and building	0.876	0.284	0.684	0.980	0.403	0.961
Energy, mining, oil and gas, chemicals	0.673	0.214	0.213	1.218	0.531	0.650
Engineering and electronics, motor vehicles	0.761	0.239	0.384	0.812	0.315	0.592
Healthcare and pharmaceutical	0.833	0.261	0.560	0.908	0.365	0.810
Telecommunications and Information technologies	0.741	0.239	0.352	0.437	0.183	0.048**
PAN						
a serious problem	1.961	0.421	0.002***	3.419	1.089	0.000***
don't know	0.954	0.496	0.928	7.826	6.203	0.009***
APC						
a serious problem	0.991	0.206	0.965	0.802	0.216	0.411
don't know	4.383	3.537	0.067*	0.778	0.708	0.782
LPC						
a serious problem	1.047	0.224	0.829	1.948	0.523	0.013**
don't know	0.331	0.242	0.130	0.709	0.915	0.790
IINF						
a serious problem	1.457	0.283	0.052*	0.857	0.224	0.556
don't know	1.324	0.675	0.583	5.735	4.706	0.033**
DRD						
a serious problem	1.191	0.240	0.385	2.104	0.584	0.007***
don't know	1.033	0.463	0.942	1.198	0.702	0.757
RLR						
a serious problem	0.851	0.169	0.418	0.859	0.253	0.606
don't know	1.869	0.993	0.239	1.768	0.941	0.285
TR						
a serious problem	1.431	0.273	0.060*	1.531	0.388	0.092*
don't know	2.543	1.524	0.119	0.769	0.452	0.655

AFC						
a serious problem	1.394	0.321	0.149	1.059	0.315	0.845
don't know	0.452	0.181	0.047**	0.824	0.460	0.728
PPP						
yes	1.336	0.265	0.144	1.454	0.361	0.131
don't know	2.989	1.824	0.073*	0.439	0.365	0.322
BCL						
1 - 1000 euros	1.375	0.303	0.148	0.924	0.296	0.805
1001+ euros	2.251	1.462	0.212	0.191	0.136	0.020**
don't know	0.747	0.181	0.227	1.431	0.545	0.348
STS						
agree	1.183	0.264	0.451	0.565	0.152	0.034**
don't know	1.224	0.372	0.507	0.471	0.167	0.034**
BPL						
agree	1.920	0.482	0.009***	3.292	0.896	0.000***
don't know	1.186	0.479	0.673	2.326	1.286	0.127
AP						
agree	0.861	0.177	0.467	1.112	0.299	0.692
don't know	0.838	0.245	0.545	1.016	0.453	0.971
BSO						
agree	0.668	0.151	0.075*	0.492	0.141	0.014**
don't know	0.829	0.257	0.545	0.599	0.279	0.272
RPP						
very or fairly likely	0.643	0.128	0.026**	1.168	0.281	0.519
don't know	0.815	0.275	0.544	0.711	0.433	0.576
NAC						
very or fairly likely	2.887	0.734	0.000***	6.666	2.284	0.000***
don't know	0.940	0.333	0.862	3.593	1.871	0.014**
RLAC						
very or fairly likely	4.548	1.149	0.000***	3.656	1.169	0.000***
don't know	2.982	1.059	0.002***	1.264	0.669	0.659
Constant	0.282	0.117	0.002	0.137	0.063	0.000

* p<0.1. ** p<0.05. *** p<0.01

Source: Authors

Because we used two models in our analysis (Model 1 and Model 2), with each model comprising three different countries grouped according to their differ-

ences in de jure and de facto transparency, the technical interpretation of the results presented is also divided.

4.1 Model 1 (Hungary, Czechia and Poland) findings

If a respondent believes that there is a serious problem with patronage and nepotism for his or her company, the odds increase by 96.13% that the respondent will answer that corruption is widespread in his or her country. Also, if the respondent is not sure whether the complexity of administrative procedures is a serious problem for his or her company, the odds increase by 338.33% that he or she will answer that corruption is widespread. For a question related to the adequacy of infrastructure in a country, the odds that the respondent perceives corruption to be widespread increase by 45.70% for respondents who perceive infrastructure to be inadequate. Similarly, the odds that the respondent who perceives tax rates as a problem for his or her business perceives corruption as widespread increase by 43.14%.

Interestingly, the odds that the respondent answers that corruption is widespread in his or her country decreases by 54.80% if he or she is not sure whether there is a serious problem in access to finance (including credit) for his or her company. On the other hand, if the respondent is not sure whether his or her company has participated in a public tender or public procurement procedure in the last three years, the odds increase by 198.92% that the respondent answers that corruption is widespread in his or her country.

The odds for respondents who claimed that too close ties between business and politics lead to corruption in their country increase by 92.00% to answer that corruption is widespread. The odds for respondents who believe that individuals and companies caught bribing a senior official are appropriately punished decrease by 33.18% to answer that corruption is widespread in their country. In addition, the odds that corruption is widespread in a country decreases by 35.70% for respondents who believe that individuals or companies who engage in corrupt practices will be caught.

The results of the link between corruption and public procurement management are also very interesting. If the respondent believes that corruption in public procurement is generally managed by national authorities, the odds increase by 188.69% that the respondent answers that corruption is widespread in his or her country. If the respondent believes that corruption in public procurement is generally managed by regional or local authorities, the odds increase by 354.81% that the respondent answers that corruption is widespread. Even if the respondent is not sure whether there is corruption in public procurement that is managed by regional or local authorities, the odds increase by 198.80% that the respondent answers that corruption is widespread in his or her country.

4.2 Model 2 (Croatia, Slovakia and Slovenia) findings

If a respondent believes that there is a serious problem with patronage and nepotism for his or her company, the odds increase by 241.89% that the respondent will answer that corruption is widespread in his or her country. Curiously, the perception of widespread corruption is even more likely (682.61% increase in odds) for respondents who are not sure whether there is a serious problem with patronage and nepotism for their company. Somewhat more understandably, in this model, if respondents believe that rapidly changing legislation and policies are a serious problem for their company, this increases the odds by 94.82% that they think that corruption is widespread in their country. If respondents were not sure if the infrastructure in their country is inadequate, this increases the odds by 473.46% that they believe corruption is widespread in their country.

If the company's ability (in terms of means or procedures) to collect debts from others is perceived as a serious problem, the odds that the respondent perceives corruption as widespread increase by 110.38%. Similar to Model 1, the odds that those respondents who perceive tax rates as a problem for their business consider corruption to be widespread increases by 53.12%.

This model also shows an interesting difference between respondents who value differently the value of the gift or bribe received, which they see as a problem. Odds for those who consider only gifts or bribes worth more than 1,000 euros to be a serious problem consider corruption to be widespread in their country decreases by 80.92% compared to those who have a low tolerance for bribes and consider the acceptance of gifts or bribes of any kind to be a problem.

If a respondent agrees that there is sufficient transparency and oversight of political party funding in his or her country, the odds that the respondent answers that corruption is widespread decrease by 43.50%. Even if a respondent is not sure that there is sufficient transparency and monitoring of political party funding, the odds that the respondent answers that corruption is widespread in their country decreases by 52.88%. If a respondent agrees that too close ties between business and politics lead to corruption, the odds increase by 229.18% that the respondent answers that corruption is widespread in their country. If a respondent agrees that individuals and companies caught bribing a senior official are appropriately punished in their country, the odds decrease by 50.76% that the respondent answers that corruption is widespread.

If the respondent believes that corruption in public procurement is generally managed by national authorities, the odds increase by 566.58% that the respondent answers that corruption is widespread in his or her country. Even if the respondent is not sure whether corruption in public procurement is generally managed by national authorities, the odds increase by 259.31% that the respondent answers that corruption is widespread. If the respondent is of the opinion that corruption in public procurement is generally managed by

regional or local authorities, the odds increase by 265.50% that the respondent answers that corruption is widespread in his country.

The last significant finding in Model 2 is industry related. If a respondent works in the Telecommunications and Information Technologies sector, the odds of answering that corruption is widespread in their country decrease by 56.33% compared to respondents working in the Financial Services, Banking and Investment sector.

5 Discussion and conclusion

Combining countries into two groups based on their differences in de facto and de jure transparency allowed us to build two logistic regression models and analyse what factors influence general attitudes toward corruption in each group, but also to observe differences between groups of countries that have many connections and similarities in their historical, political, cultural, and geographic characteristics. The group consisting of Hungary, Czechia and Poland had the smallest difference between de jure and de facto transparency, but interestingly, their combined overall transparency level (sum of de jure and de facto transparency index) is lower than that of the countries in the other group. The key findings for this group of countries are that respondents who consider the infrastructure in their countries to be inadequate and think that this is a problem for their businesses tend to perceive corruption to be widespread in their country. In addition, the attitude that corruption is widespread in their country is much more likely among respondents who are not sure whether their companies have problems in dealing with administrative procedures. The same is true for respondents who are not sure whether their companies have difficulties obtaining funding for their activities.

The other group of countries consisted of Croatia, Slovakia and Slovenia, as they show the largest differences between de jure and de facto transparency, although their overall level of transparency is higher than that of the countries in the first group. In this group, we were able to identify sectoral differences in attitudes toward corruption, as respondents from the financial sector were significantly more likely to indicate that corruption is widespread in their country than their counterparts from the telecommunications sector. The negative impact of frequent legislative changes is also significant in this group, as respondents who believe that frequent legislative and regulatory changes are a problem for businesses in their countries are also much more likely to believe that corruption is widespread. Moreover, respondents from companies that have problems with debt collection are also among those more likely to perceive the prevalence of corruption as a major problem. And not surprisingly, the perception that corruption is widespread is more likely among respondents who consider gifts or bribes of any value to be corruption, while those who only have problems with gifts and bribes exceeding 1000 euros are more relaxed in this regard.

In both groups, respondents who think clientelism and nepotism are a problem in their companies are much more likely to think that corruption is high in their country overall. This result was to be expected, as it is a clear exposure effect due to familiarity with the phenomenon. It is interesting to note, however, that those who believe that nepotism is widespread in their company, and thus in their country, are much more likely to be among respondents in Model 2 countries. Another general finding is that respondents who believe that tax rates are a problem for their companies are also more likely to believe that corruption is widespread. The next general finding is related to public procurement, as perceptions of widespread corruption are more likely for respondents who believe that local or national authorities are involved in corruption in public procurement processes. Perhaps this finding is partly related to the finding that perceptions of widespread corruption are also more likely for those who claim that there is an unhealthy link between politics and business in their country. The final general finding we want to highlight is that respondents who believe that in their country those caught in corruption are appropriately punished are less likely to perceive corruption as widespread.

As already noted, among the main limitations to using perception as a means of assessing corruption are various biases that might influence that perception. However, because the survey Businesses' attitudes towards corruption in the EU included only the decision makers of the companies included, we consider the results based on their opinions to be much more relevant to assess to business climate than the results of surveys in which the respondents would be drawn from the general public. The insights from our analysis might be useful in understanding how corporate attitudes toward corruption are shaped and what variables are associated with the perception that there is a lot of corruption in the country. But beyond that, these results could also provide a better understanding of where corruption is a problem that affects companies' chances of success. This conclusion can be drawn from the observation that the significance of many variables in both models used shows that the perception that corruption is widespread is more likely when respondents emphasise their company's problems in a particular area. That is, if their company faces problems with public procurement, frequent changes in regulations, complicated administrative requirements, or perceives the relationship between politics and business to be unreasonably close, respondents will perceive the level of corruption to be high. Keeping in mind that the perception of corruption is only an approximation of the assessment of corruption and does not mean that corruption actually exists, it is nevertheless possible to conclude that respondents whose companies face some of the problems mentioned are more likely to "shout" corruption.

Developing two models based on the differences between de jure and de facto transparency was inspired by findings that this difference, when large, favours the occurrence of corruption (Jeong et al., 2023). However, as the goal was to analyse the factors associated with general attitudes toward the corruption, we used the difference between de facto and de jure transparency only as a criterion for grouping selected Central European countries. This approach

proved fruitful, as both models showed high predictive accuracy and we were therefore able to draw some general conclusions for all selected countries, but also to find some differences between the groups. Our results contribute to the body of knowledge about perceptions of and attitudes toward corruption in various fields such as economics and sociology. But they are also a contribution for scholars and professionals in the fields of public administration and law. In our future research, we intend to further explore the findings on attitudes toward corruption from the Eurobarometer data. In addition, we will seek to better understand how the difference in de jure and de facto transparency matters for perceptions of corruption and corruption itself.

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