

Article

Does democracy reduce corruption? A cross-country causal counterfactual analysis

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This paper examines the causal effect of the levels of democracy in countries on the levels of corruption. Research shows that the levels of corruption in countries decrease when they reach higher levels of democracy. However, most of the evidence has been obtained through correlational or regression studies that do not make clear the causal connection between the variables. The research applied a robust estimator (IPWRA) to a database of 161 countries with average data from 2010-2019, assessing a causality model within the counterfactual framework. The results indicate that a causal relationship does exist; that is, a higher level of democracy in the countries reduces the levels of corruption.

Keywords: corruption; democracy; causality; counterfactual models; political regimes.

A democracia reduz a corrupção? Uma análise causal contrafactual entre países

Este artigo examina o efeito causal dos níveis de democracia dos países sobre seus níveis de corrupção. As pesquisas mostram que os níveis de corrupção nos países diminuem quando atingem níveis mais altos de democracia. No entanto, a maior parte da evidência foi obtida através de estudos correlacionais ou de regressão que não esclarecem a conexão causal entre as variáveis. O presente estudo utilizou dados médios de 161 países correspondentes ao período de 2010-2019 para estimar um modelo de causalidade usando um estimador robusto (IPWRA), seguindo o referencial teórico da análise contrafactual. Os resultados indicam que existe uma relação causal, ou seja, maiores níveis de democracia nos países resultam em reduções nos níveis de corrupção.

Palavras-chave: corrupção; democracia; causalidade; modelos contrafactuals; regimes políticos.

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¿La democracia reduce la corrupción? Un análisis causal contrafactual entre países

Este artículo examina el efecto causal de los niveles de democracia de los países sobre sus niveles de corrupción. Las investigaciones muestran que los niveles de corrupción en los países disminuyen cuando alcanzan niveles más altos de democracia. Sin embargo, la mayor parte de la evidencia se ha obtenido a través de estudios correlacionales o de regresión que no aclaran la conexión causal entre las variables. El presente estudio utilizó datos promedio de 161 países correspondientes al período 2010-2019 para estimar un modelo de causalidad mediante un estimador robusto (IPWRA), siguiendo el marco teórico del análisis contrafactual. Los resultados indican que sí existe una relación causal, es decir, mayores niveles de democracia en los países producen reducciones en los niveles de corrupción.

Palabras clave: corrupción; democracia; causalidad; modelos contrafactuales; regímenes políticos.

1. INTRODUCTION

Corruption is a phenomenon of great relevance in the field of public administration due to its negative impact on the development of a country by distorting the efficient allocation of public resources (Aidt, 2009; Dreher & Siemers, 2009), the increase in spending by state companies, and the reduction of its efficiency (Lopes et al., 2018). In addition, it distorts the structure of public spending (Gehrke et al., 2017) and influences the media (Edquist et al., 2021; Nordhaug & Harris, 2021), among other aspects. These phenomena reduce the levels of quality of life, distort public policies, and can even compromise people's lives (Dincer & Teoman, 2019).

Therefore, the study of corruption has gained importance in recent decades and has been developed through different approaches, methodologies, and tools. For example, the work of (Marani et al., 2018) contributes to the studies from the public administration angle, identifying different approaches in the study of this phenomenon. One of the approaches they identified is to conduct research that addresses the perception, causes, and effects of corruption through cross-country empirical studies on the determinants of corruption.

In this context, a set of economic, institutional, and cultural variables have been identified as relevant in the fight against corruption (Serra, 2006). Within these, the theory suggests that the institutional characteristics of a country's political regime, such as democracy, can affect levels of corruption (Dreher et al., 2007; Lambsdorf, 2006; Sandholtz & Koetzle, 2000; Serra, 2006). Empirical results have shown that countries with greater deficiencies in these variables tend to have higher levels of corruption (Sandholtz & Koetzle, 2000). However, most of the evidence is based on correlational or regression studies that do not establish a causal link between the variables (Viana, 2011).

At the same time, democratic institutions are currently in crisis worldwide. In recent decades, there has been an increase in citizen disaffection towards democratic institutions and political polarization. This phenomenon has manifested itself in populist and authoritarian movements that have been diminishing the political rights of citizens (Freedom House, 2023). For example, the OECD¹ recently identified "low voter turnout, greater political polarization and larger groups of citizens dissociating themselves from traditional democratic processes" as significant challenges for policy makers in many OECD countries today and call for the need to take action to strengthen the resilience of democracies. Therefore, the public administration must address the possible consequences of a weakening of democratic institutions on possible increases in corruption.

¹To see in <https://www.oecd.org/newsroom/oecd-ministers-commit-to-action-to-strengthen-trust-and-democracy.htm>

The present work contributes to the theoretical advance on the subject by corroborating the causal relationship between the levels of democracy as an institutional variable and the levels of corruption. This study addresses the following research question: Does democracy really cause less corruption? To answer it, a counterfactual causality model was estimated with data from 161 countries. This approach allows for estimating the causal relationship between variables despite the lack of before-and-after data for the same country regarding changes in the treatment variable (level of democracy). This is achieved by constructing the initial scenario before treatment through the development of counterfactual scenarios that emulate an experimental design.

As theoretical support for the observed quantitative results, the concepts of corruption and democracy are briefly analyzed and some theoretical explanations of how higher levels of democracy can reduce levels of corruption are presented in the following section.

Then, the third section presents a summary of key findings from previous studies on the connection between democracy and corruption. The fourth section exposes the research methods and the factors considered in the econometric model. The fifth section examines and evaluates the results. Finally, the main conclusions are presented in the final section.

2. DEMOCRACY AND CORRUPTION

2.1 What is corruption?

Corruption is a complex problem, and its empirical analysis is difficult, not just because the individuals involved are often anonymous, but also because it can be challenging to define or categorize certain actions as corrupt or not. Therefore, great importance has been attached to the search for an adequate definition (Gardiner, 2017; Lancaster & Montinola, 1997; Philp, 1997; Tanzi, 1998). The most widely used definition in academic publications and international organizations defines corruption as the abuse of entrusted power for private benefit².

This definition implies a conflict between public and private interest in situations where power has been delegated. In this sense, from the conceptual framework of public administration, corrupt actions can occur in different political regimes; democratic or not. This allows comparisons of corruption levels between countries with different levels of democracy. Following this definition, researchers have been able to compare the prevalence of corruption across nations with varying degrees of democratic governance. However, despite recognizing the role of private individuals and organizations in corruption, many studies have primarily focused on examining the unethical behavior of public officials (Viana et al., 2020).

2.2 What is democracy?

The concept of democracy is even more difficult to define. Democracy is often understood as “the institutional arrangement for reaching political decisions in which individuals acquire the power to decide through a competitive struggle for the people’s vote” (Schumpeter, 1942: 250). In practice, this means that the concept of democracy is associated with free and fair elections, the accountability of politicians to the electorate, and free entry into politics (Acemoglu & Robinson, 2005, p. 48).

² The first publication using this definition is attributed to (Klitgaard, 1988).

In turn, the right of citizens to choose their rulers is essential for democracy. Rulers must have some level of responsibility for their actions and institutions must curb the government's power to ensure the protection of citizens' rights and freedoms (Sodaro, 2004). Indeed, Sodaro (2004) provides a list of aspects to analyze the characteristics of a regime, such as elites committed to democracy, state institutions, homogeneous society, and citizen participation, among others. Thus, democracy is not a dichotomous variable; countries may exhibit different levels of democracy, which may increase or decrease over time.

This perspective on democracy is reflected in current indices and is crucial in examining the connection between corruption and democracy. It indicates that the impact of democracy on the levels of international corruption is due to how the institutional rules of the game are met and not to the existence or not of these institutions. Effective democratic institutions take time to take root and can suffer setbacks. In fact, the historical evidence seems to indicate that the establishment of efficient democratic institutions frequently stems from political battles and power struggles (Acemoglu & Robinson, 2005; Johnston, 2013; North et al., 2009).

2.3 Why more democratic institutions can help reduce corruption?

Certain corrupt practices such as bribery and extortion involve a direct victim. Citizens must incur additional explicit or implicit costs either to get access to a public service they are entitled to receive or to avoid a cost (e.g. a fine) that is not justified. In turn, for some other corrupt practices it is more difficult to identify a specific victim (e.g. corruption in public procurement or the embezzlement of public funds). The costs arising to the public interest then are more diffuse but not less real. Studies on these indirect costs of corruption to citizens and organizations are common in the literature, for example (Organisation for Economic Co-operation and Development [OECD], 2015).

If detected, the democratic vote then becomes a tool to punish corrupt politicians or reward them to the extent that the costs of corruption are lower. When an elected public official is directly involved, the punishment by the electorate should be even worse. It can be said that politicians' accountability to citizens' choices would help curb corruption. In less democratic states, this dependency is lower; therefore, they are likely to present higher levels of corruption (Drury et al., 2006).

However, in the 1980s and 1990s, most of the transition processes toward democracy obtained unfavorable results in terms of corruption (Sung, 2004, p. 181). In some countries, corrupt practices appear to have increased because of clientelistic practices such as vote buying to win elections, despite greater electoral competition (Lindberg, 2003). This implies that the relationship between democracy and corruption is influenced by factors beyond simple democratic elections.

Therefore, other variables related to democratic institutions must be important. For example, punishment by voters can only occur in situations where corruption cases come to light. But corrupt activities are characterized by high levels of anonymity. Only in circumstances in which there are power struggles, complaints, or scandals, this information reaches the ears of the voter.³

In this way, numerous empirical studies have established that the combined influence of democracy and press freedom have a meaningful effect on corruption mitigation (Bhattacharyya & Hodler, 2010; Chowdhury, 2004; Kalenborn & Lessmann, 2013). Likewise, greater access to the Internet and social

³ These variables are not only related to democracies but in dictatorial governments sanction through voting is not possible.

networks seems to have the same effect (Edquist et al., 2021; Nordhaug & Harris, 2021; Viana et al., 2022). Even when voters can no longer identify honest politicians because of high levels of perceived corruption, or citizens themselves perceive corrupt behavior as normal, knowledge of corrupt public officials can generate outrage and pressure for reforms.

Regarding the evidence on the use of the democratic vote as a punishment for corrupt elected public officials, some specific studies were carried out within several countries. In Italy, Chang et al. (2010) found that voters began to penalize corrupt politicians in the early 1990s, which they attribute to increased voter access to information. In Spain, Costas-Pérez et al. (2012) found that politicians implicated in corruption scandals can experience a loss of up to 14% of the vote if the press coverage of the scandal is substantial. Similarly, Ferraz and Finan (2008) conducted a random sample of local government audits before the 2004 elections in Brazil and found that corrupt mayors can lose 10-30% of their vote share and face a reduced likelihood of re-election (17%). However, it is important to note that other studies suggest that these effects are temporary. For example, Pereira et al. (2009) found that the aggregate levels of corruption in Brazil only reduce voter turnout if the scandal occurs during the election year. Similarly, Costas-Pérez et al. (2012) in Spain also noted a similar short-term effect.

In turn, there are only a few studies that explore the punishment of corrupt politicians by the electorate using cross-country analysis. For example, Krause and Méndez (2009) find that corruption is effectively punished by voters by analyzing Transparency International's Corruption Perceptions Index between elections. Likewise, Crisp et al. (2014) used data from the Global Corruption Barometer and compared it to data obtained from 72 countries and 169 elections. They demonstrated that corruption does result in punishment from voters during elections.

3. RESEARCH ANTECEDENTS

3.1 Democracy as a determinant of the levels of international corruption

In one of the first cross-country analyzes of the determinants of corruption, Ades and Di Tella (1999) found a weak negative relationship between political rights and corruption. In a similar study Treisman (2000), found that there is no clear correlation between the current level of democracy and lower levels of corruption. However, the study shows that a prolonged experience with democratic systems does have a significant impact in reducing corruption.

In this sense, in a comprehensive examination of factors affecting corruption levels, Serra (2006) analyzed 16 variables commonly believed to have an impact. Out of these 16 variables, only 5 were found to be significant in explaining corruption levels globally: economic development, protestant religion, colonial heritage, uninterrupted democracy, and political stability. These results imply that the benefits of democratic systems are realized over time. This view is supported by subsequent studies, such as Picón and Boehm (2019).

On the other hand, Sung (2004) and Rock (2009) found evidence that the inverse relationship between democracy and corruption is not linear. This relationship seems plausible based on some previous research results and that in several countries undergoing recent democratization, there has been an observed rise in corruption levels. However, the evidence also shows that stronger democracies generally appear to be less corrupt, suggesting that the functional relationship between levels of

democracy and corruption is in the shape of an inverted U. In other words, when democratization processes begin, countries may experience an increase in levels of perceived corruption, but when the institutions and democratic culture are strengthened over time, the mechanisms described above start to show results and levels of corruption begin to decrease. Along the same lines, Rock (2009) finds that the inflection point occurs relatively quickly in the life of new democracies, and takes between 10 and 12 years.

Related to the above, McMann et al. (2020) demonstrates that the curvilinear relationship results from the collective impact of different components of democracy on different types of corruption. Examining data from 173 countries from 1900 to 2015, the study found that freedom of expression and freedom of association exhibit an inverted curvilinear relationship with corruption, but the introduction of free elections acts linearly and positively with corruption, while the strength of democratic institutions reduces corruption linearly.

However, these investigations, even though their titles or objectives are related to the study of the causes of corruption, have been carried out based on statistical regression analysis. Therefore, causal relationships are proposed only from a theoretical point of view. Some approaches are more rigorous when using more complex models such as quantile regression or panel data (Billger & Goel, 2009; S. Saha et al., 2009, 2014; S. Saha & Sen, 2021; Shrabani Saha & Su, 2012) but they still suffer from the same limitation with respect to causal inference.

4. METHODOLOGY

4.1 Definition of variables

For the definition of the causality model, cross-sectional information from 161 countries was used. Unless otherwise indicated, the data for the 2010-2019 period was averaged to minimize the impact of temporary fluctuations.

The dependent variable is “*Corruption*” measured by the *Corruption Perception Index* (CPI) published by Transparency International.⁴ This indicator is lower to the extent that the country is more corrupt. It is important to clarify that despite some significant criticism of the use of perception indicators to measure corruption in a country (Dreher et al., 2007) we employ a structural equation model—that treats corruption as a latent variable that is directly related to its underlying causes and effects—to derive an index of corruption. The index of corruption is derived for approximately 100 countries over the period 1976-1997. Journal of Comparative Economics 35 (3), the CPI can be considered a good indicator of corruption because it is highly correlated with other indicators of corruption (Alesina & Weder, 2002) and the perceptions captured from reputable sources such as international organizations, industry professionals, and experts in the field, which reduces the potential impact of sensationalized news and scandals on their perceptions (Charron, 2016).

Along the same lines, the treatment variable is the “*Democracy level*” of the different countries included in this study. For its measurement, the sum of the political and civil liberties indicators of the index *The Freedom in the World* published by Freedom House was used. By the characteristics of the relationship between corruption and democracy described above, democracy is understood as

⁴ The CPI measurement methodology can be analyzed from <https://www.transparency.org>

a variable with levels (Sodaro, 2004). The countries were grouped into 3 groups: 0 (non-democratic), 1 (partly democratic), and 2 (democratic).⁵

The covariates determinants of corruption were taken from the relevant literature on cross-country studies of corruption. Two economic variables were calculated. First, the variable “*Economic prosperity*” was calculated from the average *Gross Domestic Product per capita* for the indicated period and adjusted by Purchasing Power Parity (PPP) at 2011 prices. Second, to measure the “*State size*,” the ratio of government expenditure to gross domestic product (GDP) was used as a metric (Billger & Goel, 2009). The economic perspective suggests that an excessively large state can adversely impact corruption levels due to heightened inefficiency and diminished incentives for competition (Lambsdorf, 2006). The primary source of data for this indicator was obtained from the World Bank’s database.

Likewise, as an institutional variable, in addition to the level of democracy, the level of “*Economic freedom*” was estimated based on the 2010-2019 average of *Financial Freedom*, *Monetary Freedom*, *Business Freedom*, *Commercial Freedom*, *Labor Freedom* and *Investment Freedom* indicators from the *Index of Economic Freedom*.⁶

In addition, a binary variable “*British colony*” is employed as a historical factor (Lange, 2003; Mahoney, 2003). It is assigned a value of 1 if the country in question was previously a British colony, and 0 if it was not. This variable was generated based on the information available in The World Factbook of the United States Central Intelligence Agency (CIA) and complementary information published by the Worldstatesmen organization.

Finally, a cultural variable, the percentage of individuals adhering to the Protestant Christian faith in each country, was utilized (Pellegrini & Gerlagh, 2007; Treisman, 2000). This variable, named “*Protestants*” was generated based on the information available in The Religious Freedom Report, provided by the United States Department of State, and The World Factbook of United States Central Intelligence Agency (CIA).

As will be indicated later, it is also necessary to specify a model that isolates the covariates that may influence the level of democracy in different countries. In the case of the above variables, it was found that “*Economic freedom*,” “*Economic prosperity*,” and “*State size*” determine the level of democracy in a country. Therefore, these variables were used for this purpose.⁷

4.2 Approximation to causal estimation

As previously mentioned, most of the studies that attempt to estimate causal relationships between a set of variables and levels of corruption are based on regression models. Some are more complex than others, but they cannot live up to the causal analysis that they suggest. Despite this, it should be noted that regression models do not simply reflect correlation between variables; they assume that the dependent variable follows a specific probability distribution and that the independent variables are fixed in repeated theoretical samples. Therefore, the interpretation of regression models is dependent on a theoretical framework and the selection of which variables will be considered explanatory and which will be explained.

⁵ This classification is made directly by Freedom House according to the score obtained by each country.

⁶ Published by The Heritage Foundation and The Wall Street Journal. For details see <http://www.heritage.org>

⁷ Table 3 in the annexes shows the multinomial logistic regression results that gave rise to this decision.

As such, this paper contributes to the study of corruption by proposing a quantitative analysis through models designed to approach causality between variables. Causality is a philosophical category, subject to controversy and philosophical positions that range from an absolute denial of causality to the acceptance of the interrelationship of all events. In this sense, econometric approaches⁸ have not been the exception (Zellner, 1979). Consequently, the present investigation only proposes the hypothesis that there is causality between the variables (Lewis, 1973), without trying to give an ontological explanation of the matter. Likewise, the objective is not to verify if the theories that explain the causal relationship between democracy and corruption raised above are correct or not. What is sought is to verify if there is causality between the variables of interest.

In this order of ideas, the approach from which the problem of causal estimation between the variables analyzed will be addressed can be situated within the framework of counterfactual models (Holland, 1986; Imbens & Wooldridge, 2009; Robins, 1986; Rubin, 1973). They are widely employed in the context of impact assessments of public policies. The objective is to emulate an experimental situation with observable data to measure the impact of a treatment (for example, being a beneficiary of a subsidy program or a medical treatment) on one or more outcome variables in a set of individuals. In the problem analyzed in this research, the impact of the level of democracy in a country on its level of corruption will be estimated. Therefore, democracy will be understood as a treatment variable where its levels will be the different treatments and the countries with the lowest levels of democracy will be the control group.

The preceding approach highlights several crucial aspects for research. Firstly, it surpasses the limitations of quantitative correlational methodologies by incorporating prior theoretical aspects that justify the causal relationship. Impact assessment, using counterfactual matching methods, resembles qualitative research in its focus on understanding intervention effects in specific contexts rather than seeking generalizations for large populations. While utilizing quantitative tools, its emphasis lies in local causality, involving the selection of control units similar to treatment units. In summary, despite the use of quantitative data, its contextual approach and emphasis on detailed understanding aligns with idiographic induction. This perspective is articulated in (Goertz & Mahoney, 2012), where the distinction is drawn between the “From Causes to Effects” approach (Nomothetic Deduction) and the “From Effects to Causes” approach (Idiographic Induction).

The proposed methodology, by simulating an experimental scenario, enables the establishment of causal relationships without the necessity of having intertemporal scenarios in the data. The internal validity criterion of temporal precedence in causality studies is achieved by creating counterfactual scenarios, rather than observing temporal changes after treatment (more or less democracy). A country could have a continuous history as either a democracy or a dictatorship, yet its situation can still be compared against a hypothetical scenario based on other countries with similar characteristics.

In this context, to obtain the treatment effect (level of democracy), it is necessary to assess the difference between the outcome variable (level of corruption) of the countries exposed to the different levels of treatment and the outcome variable that the same countries would have obtained in the absence of the treatment, called counterfactual. From the above, we have the following notation in the simplified case of two levels of treatment:

⁸ See (Angrist & Pischke, 2015; Heckman, 1997) to analyze different methodologies and models used in econometrics to estimate causal relationships.

$D_i = 1$ if the country i receives the upper level of democracy treatment, 0 in the opposite case.

$Y_i(D_i)$: Potential result. Outcome variable for each country i given its status D_i .

$Y_i(1)$: Corruption level of country i if it has a higher level of democracy.

$Y_i(0)$: Corruption level of country i if it is in the control group.

According to the above, the individual effect of exposure to a treatment is:

$$1) \tau_i = Y_i(1) - Y_i(0)$$

However, since one of the outcomes in equation 1) cannot be calculated for a given country, since it can only belong to one level of democracy, it is not possible to estimate the individual treatment effect. Therefore, we seek to estimate the average treatment effect among those who receive the treatment (ATET). This corresponds to the difference between the average value of corruption in the group of countries with a higher level of democracy and the average that they would have obtained if they belonged to the group with the lowest level of democracy.

From the above:

$E[\tau|D = 1]$: Average effect of democracy on corruption in countries with the highest level of democracy

$E[Y(1)|D = 1]$: Average corruption in the group with the highest levels of democracy

$E[Y(0)|D = 1]$: Average corruption that these countries would have obtained if they had a lower level of democracy (Counterfactual)

Therefore, the objective of the causal evaluation is to estimate:

$$2) ATET = E[\tau|D = 1] = E[Y(1)|D = 1] - E[Y(0)|D = 1]$$

Undoubtedly, the average corruption that countries with higher levels of democracy would have obtained if they had a lower level of democracy is a hypothetical result, since it is not recorded in the data because it is not observable. It is called counterfactual to the extent that it expresses the idea of a result that could have occurred.

On the other hand, it is not possible to estimate the ATET simply by taking the difference between the mean of corruption for countries with higher levels of democracy and those of countries with lower levels of democracy, because there are covariates that are related to treatment and possible results. Therefore, the theory can be used to specify enough of these covariates so that after isolating them, the estimated causal effects only come from the level of democracy.

If the above is possible, as seems to be the case with corruption, different estimators can be used that allow a solution to this problem of missing data and allow estimating the distribution of the effects of the level of democracy for each country. These types of models are called Potential-outcome

models, which are widely used in medicine and policy impact assessment, among other applications. In this context, they specify the potential outcomes $Y_i(D_i)$ that each country would obtain under each level of democracy, isolating covariates, and its influence with the potential results.

4.3 The model

As indicated above, the aim is to estimate the average treatment effect among those who receive the treatment (ATET). To achieve this, Potential-outcome models isolate a set of covariates that influence the values of the dependent variable, the assignment of individuals to different levels of the treatment variable, or both. Some of these models only isolate the variables that affect the outcome variable, others do it with the variables that affect treatment assignment, and the most complex cover both aspects. More specifically, more complex models would not only isolate the covariates that affect levels of corruption using an outcome model, but also those covariates that would determine or explain different levels of democracy using a treatment model.

Therefore, from formula 2 we have the simplified functional forms that indicate and isolate a set of covariates that explain the dependent variable (Corruption) for the potential outcomes $Y_i(D_i)$ will be:

$$\begin{aligned} 1) \quad & Y_i(0) = f(X, \beta_0, \mu_0) \\ 2) \quad & Y_i(1) = f(X, \beta_1, \mu_1) \end{aligned}$$

Where β_0 and β_1 are the coefficient vectors of the explanatory covariates, X is a vector of covariates that affects corruption levels, and μ_i is an uncorrelated, unobservable error term with X nor the vector of covariates that explain the treatment variable (Democracy).

On the other hand, the treatment assignment process, that is, the model that predicts the levels of democracy that a country has, is given by:

$$3) \quad D = \begin{cases} 1 & \text{if } f(Z, \theta, \epsilon) > 0 \\ 0 & \text{otherwise} \end{cases}$$

Where Z is a vector of covariates that affect the level of treatment (Democracy), θ is the corresponding vector of coefficients and ϵ is an unobservable error term and uncorrelated with Z or X . Following the above, an estimator must be chosen according to the characteristics of the data and the needs of the investigation.

In the case of this paper, due to the complex relationship between democracy and corruption, a robust estimator called *Inverse-Probability-Weighted Regression-Adjustment (IPWRA)* was used, extended to a multivalued treatment model, which meets the characteristics and desired functions (Wooldridge, 2007). The IPWRA estimators use the inverse of the estimated weights of the probability of receiving a treatment to estimate the regression coefficients corrected for missing data that are subsequently used to calculate the ATETs. This estimator is considered doubly robust since it is only

necessary to correctly specify the outcome model or the treatment model so that the effects can be consistently estimated (Kang & Schafer, 2007; Tan, 2010).

However, like all statistical estimators, the IPWRA must meet a set of assumptions to estimate ATET. In the first instance, *the Conditional Mean Independence (CMI) assumption is required*. The CMI assumption says that after accounting for the covariates X , the treatment variable does not affect the conditional mean of potential outcome. Specifically, the CMI requires that $[Y(1)|X, D] = E[Y(1)|X,] \text{ y } E[Y(0)|X, D] = E[Y(0)|X,]$. In other words, it is necessary that the outcome model must be well specified and therefore any other factor that affects the level of democracy in a country must be independent of the possible levels of corruption, and any other factor that affects the possible levels of corruption must be independent of the level of democracy. Figure 1 in the annexes shows the distribution of the estimated errors in the regression model that was used to assess the relevance of vector X .⁹ It is observed that there is no evidence that the errors are correlated with the estimates of corruption, so the model specification can be trusted.

Secondly, *The Overlap Assumption* guarantees that everyone has a positive chance of receiving the other levels of treatment. However, it is possible to estimate ATET considering only treated individuals (Heckman, 1997). In other words, when estimating the impact of a level of democracy on levels of corruption, there must be similar countries in the control group in terms of the patterns of the covariates. Compliance with this assumption is evidenced by comparing the probability densities of receiving the treatment of the other level in groups 1 (moderately democratic) and 0 (non-democratic) (see Figure 2 in the annexes), as well as 2 (democratic) and 1 (moderately democratic) (see Figure 4 in annexes), so these results are reliable in terms of this assumption. However, as shown in Figure 3 in the annexes, compliance with this assumption is weak between levels of democracy 0 (non-democratic) and 2 (democratic). It is observed that the estimated probability density that a democratic country has a similar country in its covariate patterns within the group of countries with the lowest level of democracy is biased towards zero, that is, these groups are different, and it is not clear if the assumption is met.

Finally, a third assumption called the *Stable Unit Treatment Value Assumption* requires that the potential outcomes and the level of treatment assigned is not related to those of another individual in the sample. That is, the statistical characteristics of a country should not be correlated with the other countries. The present investigation starts from this assumption. Even though it can be argued that the levels of corruption may depend to some extent between countries, the research team is not aware of evidence that supports any related statistical pattern and, therefore, if there is a case, it will be taken as an isolated event.

In summary, it can be affirmed that the necessary assumptions are met to continue with the application of the IPWRA. However, it is clarified that the results should be taken with caution when estimating the causal impacts between democratic countries (level 2) vs non-democratic (level 0) due to their marked differences. Likewise, *the Stable Unit Treatment Value Assumption* is a theoretical assumption and its implications for the results will depend on future research.

On the other hand, in addition to the estimator, the functional form of equations 3, 4, and 5 must be chosen. Following the recommendations in the literature (Cattaneo et al., 2013), the Poisson distribution was chosen for the estimation of the coefficients in formulas 3 and 4 and the multinomial

⁹ See the results from the model for MCO estimated in Table 2 in the Annex.

logit for the estimation of the coefficients in 5. All the estimates and models were calculated in STATA mainly thanks to the tools included in the “teffects” command.

5. RESULTS

Table 1 shows the IPWRA estimate of the causal impact of the level of democracy on levels of corruption. The first column of the table classifies countries according to their levels of democracy, providing a framework for comparative analysis. The second column corresponds to the coefficients, based on the average differences in the levels of corruption perception concerning the control group. This coefficient is positive if the countries at that level of democracy have higher scores on the CPI indicator compared to the corresponding control group. Therefore, they present lower average corruption. The third and fourth columns show additional information. The estimated z value indicates the magnitude of the effect, while the significance level denotes the statistical reliability of the results. Notably, all results in the table are considered statistically significant, underscoring the robustness of the findings.

TABLE 1 IPWRA ESTIMATION OF THE IMPACT OF THE LEVEL OF DEMOCRACY ON LEVELS OF INTERNATIONAL CORRUPTION

	Democracy level	Coef.	z	p>z
(1Vs0)	Moderately Democratic Vs Not Democratic	4.90 (16.7%)	3.48	0.001
(2Vs1)	Democratic vs Moderately Democratic	13.38 (31.5%)	5.72	0.00
(2Vs0)	Democratic Vs Not democratic	19.53 (53.7%)	9.57	0.00

Estimator: IPW regression adjustment

Outcome model: Poisson

Treatment model: Multinomial logit

In parentheses, the coefficients expressed in percentage are observed.

Source: Elaborated by the authors.

The first result reveals that once the other characteristics of each country have been controlled for, the estimated average score of corruption represented by the CPI increases by 4.9 points as the level of democracy of the countries goes from not democratic to moderately democratic. Similarly, the CPI increases on average by 19.53 points when comparing democratic countries with not democratic¹⁰ ones and by 13.3 points when comparing democratic countries with moderately democratic ones.

In other words, corruption levels measured by CPI are on average 16.7% lower when countries are moderately democratic instead of non-democratic. In the same way, corruption is reduced by 31.5% when it is possible to enter the group of democratic countries instead of being moderately

¹⁰ It should be remembered that this specific result does not have evidence of compliance with the Overlap Assumption.

democratic. Finally, the average corruption levels are 53.7% lower if the country is democratic instead of non-democratic.

These findings diverge from outcomes observed in traditional regression models. When the statement suggests that countries decrease their corruption levels, as measured by the CPI, with increasing levels of democracy, it does not refer to a prediction based on the average values of the population or a comparison between different countries. Instead, it should be interpreted as a comparison of a country's current situation with its counterfactual – meaning, how that specific country would fare with varying levels of democracy.

6. CONCLUSION

Corruption produces both direct and indirect costs for citizens and organizations. Direct costs include explicit or implicit payments to obtain services that should be accessible without corruption, while indirect costs refer to the broader impact on the public interest. Regarding its mitigation, the review of the literature indicated that the democratic vote serves as a tool to punish or reward corrupt politicians, and its accountability to citizens can help reduce corruption. However, transitions to democracy have sometimes seen an increase in corruption due to factors such as clientelist practices. Therefore, variables beyond elections, such as democratic institutions and press freedom, play a crucial role in controlling corruption.

Studies have shown that the combined influence of democracy, press freedom, and access to the Internet and social media can significantly reduce corruption. However, most of these investigations are based on correlational studies that provide a theoretical foundation but do not make it clear whether there really is a causal relationship between these variables. At the same time, given the current international crisis of democratic institutions, it is relevant to delve into these causal relationships to anticipate possible increases in international corruption.

In this context, this study responds to the question: Does democracy cause less corruption? The answer is yes. After analyzing the possible justifications for such a relationship and applying a robust estimator (IPWRA) through a counterfactual model, evidence of a causal relationship between the levels of democracy in the countries and their levels of corruption was found. Countries with higher levels of democracy have lower levels of corruption when compared to countries with the same characteristics at other levels of democracy.

In this sense, the present work contributes to the theoretical knowledge of corruption by statistically corroborating that there is a causal relationship between these variables, clarifying doubts about the methodologies previously applied in other investigations. Therefore, if the variables used in this research are accepted, it can additionally be concluded that policies to reduce corruption will be more effective if they focus on strengthening democratic institutions. Indeed, because of its values and instrumental role in shaping good governance, safeguarding democracy appears to be key to ensure a sustainable and inclusive development of countries. However, the extent to which specific institutions such as control over politicians via free voting and access to free media are more or less effective, need further investigation to identify in how far they contribute to explain the results found in this paper.

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Frédéric Boehm: Conceptualization (Lead); Data curation (Supporting); Formal Analysis (Supporting); Methodology (Supporting); Project administration (Equal); Validation (Lead); Writing - original draft (Supporting); Writing - review & editing (Equal).

DATA AVAILABILITY

The entire dataset supporting the results of this study is available upon request to the corresponding author (Cristian Johan Picón Viana). The dataset is not publicly available due to the authors suggest the corresponding citation for future research.

NOTE

The opinions expressed in this article do not necessarily express the point of view of the Organisation for Economic Co-operation and Development (OECD) or its member countries.

ANNEXES

TABLE 2 DETERMINANTS OF CORRUPTION – ORDINARY LEAST SQUARES [OLS] REGRESSION, AVERAGE 2010-2019

Variables	MCO
Democracy level	-4.78*** (-3.97)
Economic prosperity	-0.00045*** (-9.08)
Economic freedom	-0.47*** (-5.50)
Size of the State	-0.18*** (-2.78)
Protestants	-0.11*** (-3.23)
British colony	-0.65 (-0.39)
Constants	10.85** (2.00)

Notes: The dependent variable is the Corruption Perception Index (CPI).

Sample of 161 countries. Mean with up-to-date data for the 2010-2019 period.

The absolute values of the statistic t appear in parentheses.

(***), (**) and (*) denote significant coefficients at the 0.01, 0.05 and 0.1 levels, respectively.

Source: Elaborated by the authors.

TABLE 3 DETERMINANTS OF DEMOCRACY LEVELS – MULTINOMIAL LOGISTIC REGRESSION, AVERAGE 2010-2019

Variables	Coef.	z
Democracy level 1		
Economic prosperity	-0.0001	0.0020
Economic freedom	0.1518	0.0000
Size of the State	0.0184	0.5070

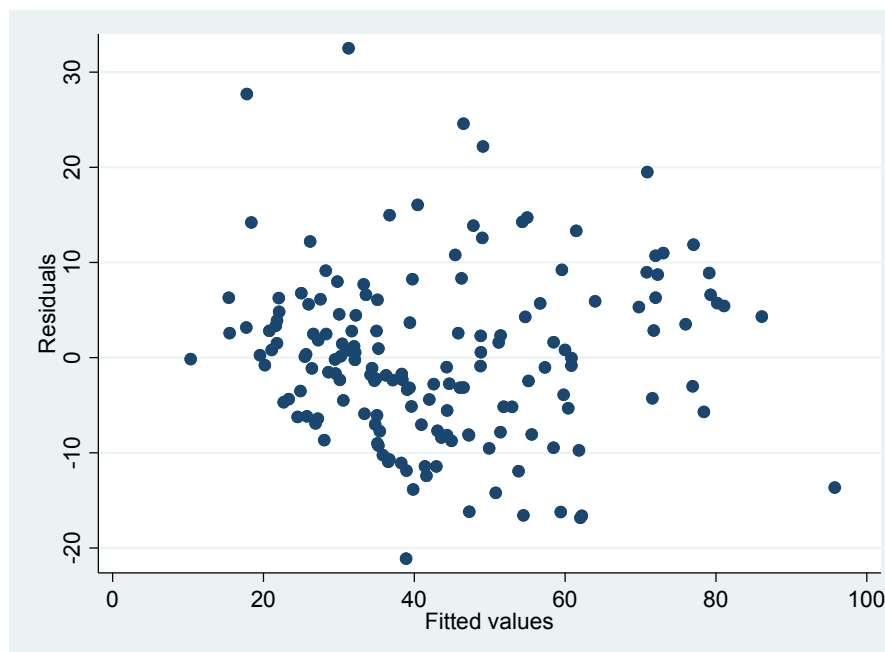
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Variables	Coef.	z
Protestants	-0.0182	0.2150
British colony	0.3224	0.6190
Constant	-7.6638	0.0010
Democracy level 2		
Economic prosperity	0.0000	0.0090
Economic freedom	0.2292	0.0000
Size of the State	0.0714	0.0110
Protestants	-0.0065	0.6590
British colony	-0.0139	0.9840
Constant	-14.7348	0.0000

Notes: Sample of 161 countries.
Level 0 is the base outcome
Mean with up-to-date data for the 2010-2019 period.

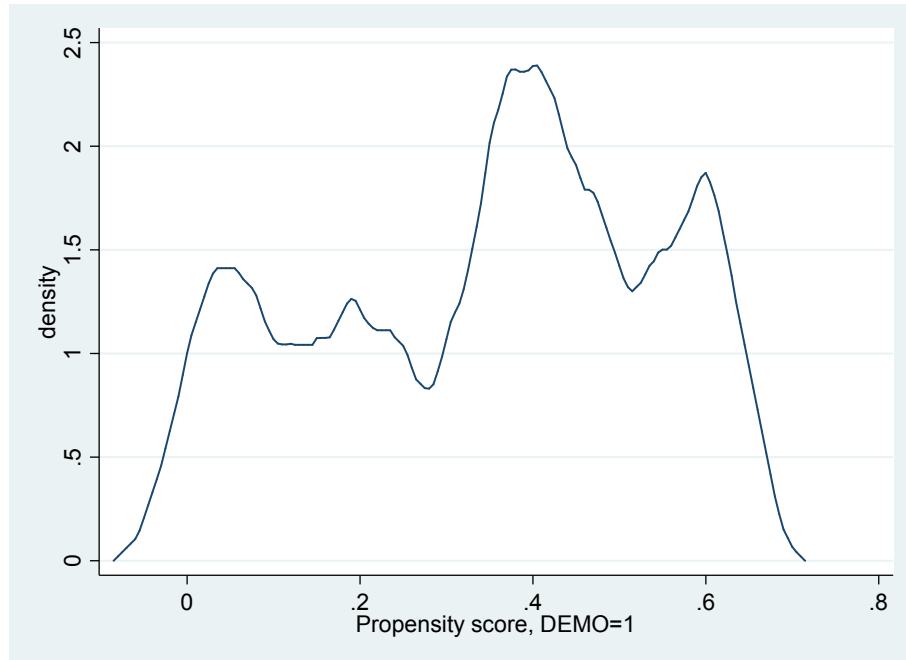
Source: Elaborated by the authors.

FIGURE 1 DISTRIBUTION OF ESTIMATED ERRORS IN THE BASE OLS MODEL



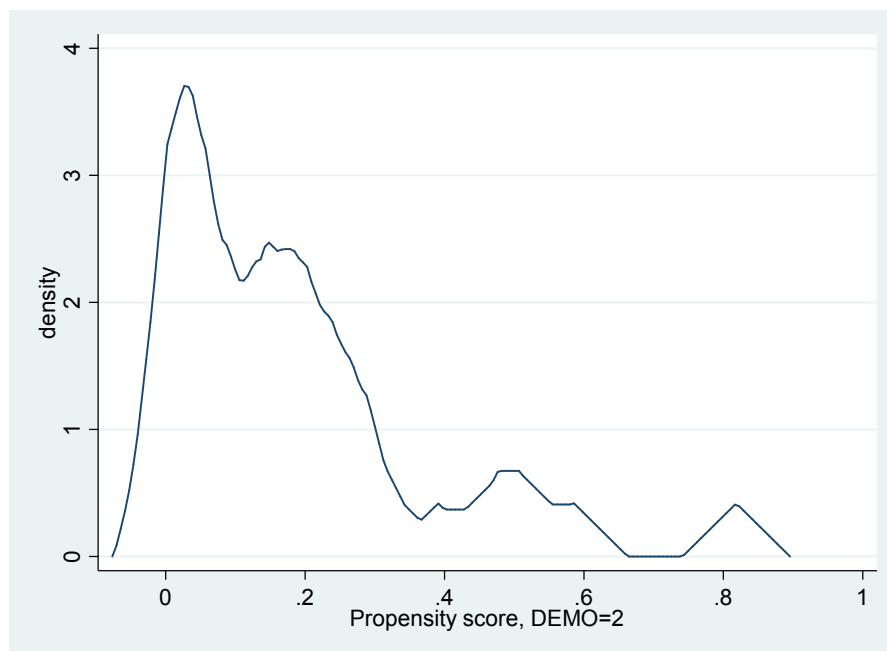
Source: Elaborated by the authors.

FIGURE 2 PROBABILITY THAT A MODERATELY DEMOCRATIC COUNTRY (LEVEL 1) COULD BE NON-DEMOCRATIC (LEVEL 0) GIVEN ITS PATTERN OF COVARIATES



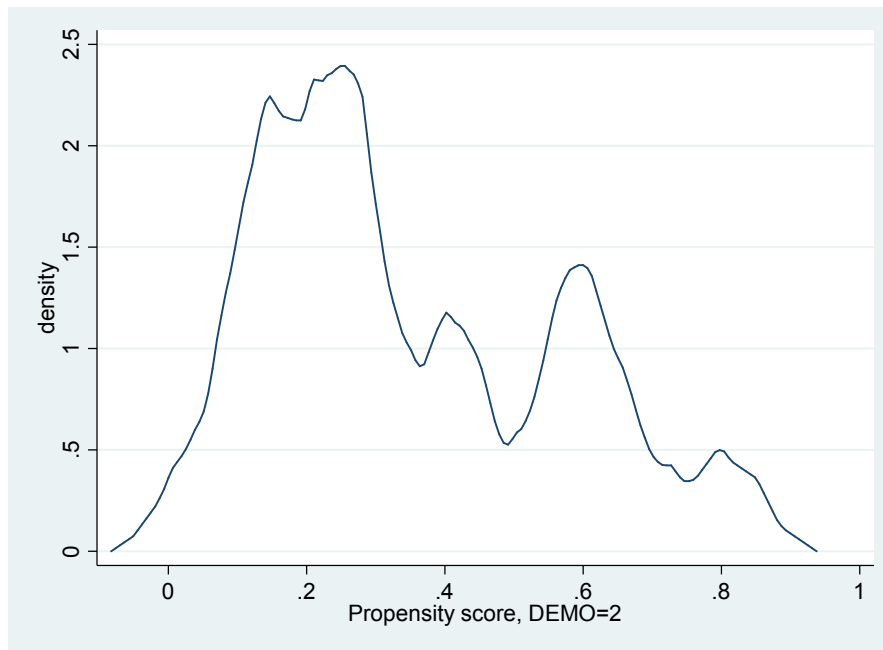
Source: Elaborated by the authors.

FIGURE 3 PROBABILITY THAT A MODERATELY DEMOCRATIC COUNTRY (LEVEL 2) COULD BE NON-DEMOCRATIC (LEVEL 0) GIVEN ITS PATTERN OF COVARIATES



Source: Elaborated by the authors.

FIGURE 4 PROBABILITY THAT A MODERATELY DEMOCRATIC COUNTRY (LEVEL 2) COULD BE NON-DEMOCRATIC (LEVEL 1) GIVEN ITS PATTERN OF COVARIATES



Source: Elaborated by the authors.