Democracy, Corruption and Unemployment: Empirical Evidence from Developing Countries

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12 April 2021

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April 12, 2021

Abstract

The literature on democracy and corruption is inconclusive on the effect of democracy on corruption. We intend to supplement this void by arguing that interaction between democracy and unemployment may exist in shaping the de facto corruption levels. This paper examines whether such conjuncture exists. We estimate a linear dynamic panel-data model using data from 80 developing countries over the period 1990–2018. We find that democracy reduces corruption. However, the potential beneficial effect of democracy on corruption is eroded by a higher unemployment rate. The results are robust and quantitatively similar across different empirical specifications. These results imply that developing countries should focus on decreasing the unemployment level so as to take advantage of democratization in their fight against corruption.

Keywords: Democracy, Corruption, Unemployment, GMM.

Jel classification: D7, O1, C23

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1 Introduction

Problem of corruption[1] is particularly acute in developing countries. Why is that so? As it seems, corruption is the greatest hurdle to economic and social development. International development agencies, such as the World Bank, have actively encouraged developing countries to pursue policies that will reduce corruption. However, many of those countries that want to deal with corruption also have weak democracies or nondemocratic governments. It is therefore important to understand the effect of democracy on corruption. For example, if democracy encourages corruption, then countries face a trade-off between increased democracy and reducing corruption.

This paper answers two questions: i) Does democracy reduce corruption? and ii) Does unemployment alter the relationship between democracy and corruption ? Answers to these questions cannot be discerned from theory because the theoretical impact of democracy on corruption is unclear. On the one hand, democratic institutions may have a negative effect on corruption, because democracy encourages controls (i.e political competition), empowers voters (i.e political rights) and increases the probability that corrupt behaviors will be exposed and punished (i.e transparency); this in turn fasters the development of management and law enforcement strategies within which corruption will become apparent, reduces the discretion exercised by officials, undercuts favorable treatment for special interests and affects the normative perceptions of corruption in a society, making corrupt activities less appealing (Manzetti, 2000; Montinola and Jackman, 2002; Bohara et al, 2004; Carothers, 2007; Carbone and Memoli, 2013). On the other hand, democratic institutions may encourage corrupt and dishonest practices. One reason is that election campaigns require funding, and more competitive elections may make political parties and candidates vulnerable to pressure from contributors (Rose-Ackerman, 1999). As a consequence, elected government may defend the private interests of funders rather than general interests. In addition, it is easier for democratic government to reinforce existing patron-client relationships, leading to the

[1]Corruption is defined as the abuse of public power for personal gains. While corruption exists also in the private sector, particularly when decision-makers' interests are at odds with those of shareholders, for the purpose of the present study, we assume only bribes received by government officials.

democratization of corruption rather than its reduction (Grassi and Memoli, 2017). Thus, the overall effect of democracy on corruption has to be determined empirically.

Unemployment may affect the democracy-corruption relationship. We provide two plausible explanations. First, note that job opportunities in developing countries are mainly created by the public sector[2] . In the presence of high level of unemployment, government officials, for a single job opening, may receive several entries. This creates competition for the candidates, and this in turn reinforces recruiters' roles (officials). In this context, both, job seekers and officials' agents might have stronger incentives to adopt corrupt practices. More precisely, as suggested by Bouzid (2016), job seekers' who consider that they cannot be selected in fair competition will be more likely to positively react to the signal from the corrupt official for a bribe. The government officials will use their power to grant the job to the applicant willing to pay the highest bribe (Shleifer and Vishny, 1993; Tanzi, 1998; Azfar et al., 2001; Bouzid, 2016). Such behaviors are supposed to occur more frequently in presence of a democratic government for two reasons. First, a high unemployment rate may lead to inequality, democratic societies, might not to be able to implement strict and transparent laws that would denounce fraudulent practices of government officials. This view is found in Kotschy and Sunde (2017) work who observe that where the inequality is too high, democracies appear not to be able to implement good institutional environments. Second, to the extent that democracies are typically associated with a frequent change of government officials, corruption may particularly increase in the presence of high unemployment rate, as officials would primarily care about the revenue it can generate before to get out.

The second explanation is related to the fact that high unemployment rate at the coun-

[2]Two important developments explain why the public sector has a monopolistic power to absorb the domestic workforce in developing countries. One is related to the fact that governments have used public-sector employment as a tool for generating and redistributing rents in developing countries. For example, in a widely cited paper, Gelb et al. (1991, p. 1186) state: "Consistent with theories of rent seeking behavior, public sector surplus labor is viewed in this paper as the consequence of lobbying for more high wage (and high-rent) employment." The second development out puts the safety of government jobs as a partial insurance against the undiversifiable external risk faced by the domestic economy. According to Rodrik, (2000, p. 231): "by providing a larger number of "secure" jobs in the public sector, a government can counteract the income and consumption risk faced by the households in the economy. While only those employed in the public sector are direct beneficiaries of such insurance, the benefits can be spread throughout the economy through informal risk-sharing arrangements within extended families".

try level may have a negative impact on individual's satisfaction towards the efficiency and the impartiality of government and the public administration (Laurence, 2015). As the inefficiency grows, individuals lose trust in the government; they are more likely to refuse all cooperative behavior, preferring instead instrumental and individualistic approaches to problems and opportunities (Grassi and Memoli, 2017). Following this idea, it is argued that low levels of satisfaction with government nurture corruption insofar as it transforms citizens into clients and bribers who look for private protection to gain access to decision-makers (Della Porta, 2000; Guerrero and del Castillo, 2003; Morris and Klesner, 2010). To the extent that survival in power of government requires the support of voters, democratic regimes are less prone to deal with corruption, because in presence of undesirable economic conditions (i.e. high unemployment rate), citizens are more likely to reveal their distaste towards the effectiveness of laws (Altindag and Mocan, 2010); this may induce even those who had initially refused to become a part of the corrupt machine to join for lack of viable alternatives.

The importance of unemployment in determining the effect of corruption on democracy can be gleaned from Fig1, which shows the association between democracy and corruption for 80 developing countries. The countries are grouped according to their unemployment levels: Group 1 consists of countries where the rate of unemployment averaged over the period 1990 – 2018, is less than the average value of unemployment over the period 1990-2018, namely 8,025% and Group 2 consists of countries where the unemployment rate is more than 8,025%. The corruption variable is derived from The International Country Risk Guide (ICRG). It ranges from 1 (most corrupt) to 6 (least corrupt). This is an assessment of corruption within the political system. The democracy variable is downloaded from Polity IV. It is conceived as three essential, interdependent elements, the presence of institutions, the existence of institutionalized constraints on the exercise of executive power and the guarantee of civil liberties. The Democracy indicator ranges from 0 (Least democratic) to 10 (most democratic). For, the countries in Group 1, corruption seems to be positively associated with democracy (Fig1.a). The same result is obtained in Group 2. However, it is worth noting that when the unemployment rate is high (in Group 2) the beneficial effect of democracy on

Figure 1: Corruption and Democracy.

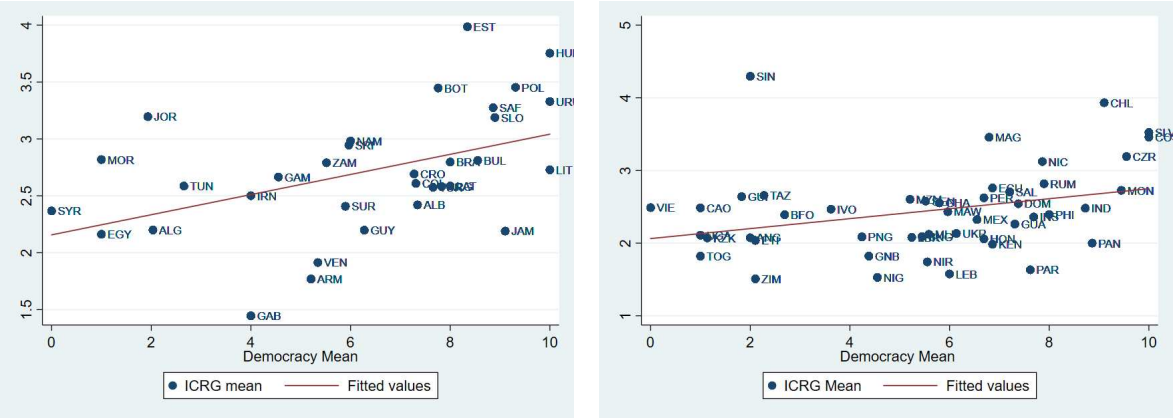

Fig1.a. lower unemployment rate countries (Group 1). Fig1.b. higher unemployment rate countries (Group 2). The data on corruption and democracy are averaged from 1990 to 2018. The democracy variable ranges from 0 to 10, a higher number implies more democratic rights. The corruption variable ranges from 1(most corrupt) to 6(least corrupt). A lower unemployment rate country (i.e. Group 1) consists of countries where the unemployment rate is less than the average value of unemployment over the period 1990-2018, namely 8,025% and higher unemployment rate countries (i.e. Group2) consists of countries where unemployment rate >8,025%. There are 33 countries in Group 1 and 47 countries in Group 2.

corruption seems to be eroded. This is illustrated by the rate curve slope which becomes smaller. Thus the data suggest that there might be an interaction between democracy and unemployment in determining corruption level.

Few studies provide evidence that the effect of democracy on corruption is conditional on economic and social factors. Neudorfer (2015), using a large-N approach (up to 139 countries, 1984–2006), finds robust empirical support that democratic rights are more likely to limit corruption levels in rich countries with educated and informed voters who demand public goods from the government than in poor countries with less-informed voters who demand little spending on public goods. Thus, economic development and democracy indeed conditionally affect corruption. Dong and Torgler (2011), with a theoretical and empirical investigation, document that the effect of democracy on corruption is conditional on income distribution and property rights protection. In particular they indicate that democracy will work better as control of corruption if the property right system works and there is a low level of income inequality. On the other hand if property rights are not secured and there is strong income inequality, democracy may even lead to an increase in corruption. Rose-Ackerman (1999) focuses on honesty and trust as they affect the functioning of the democratic state and the market. In particular the author discusses the mutual interaction between trust and democ-

racy and how such interaction may affect corruption. She argues that anticorruption agenda is part of overall efforts to increase democratic legitimacy by enhancing the trustworthiness of government, improving the transparency, wide spreading compliance with the rules and by increasing the role of citizens beyond simply voting for the parties and candidates of their choice. Kotschy and Sunde (2017) investigate the role of economic equality in moderating the effect of democracy on institutional quality. In particular, they test whether the quality of economic institutions is affected by an interaction between political institutions and equality. Based on a panel of 96 countries over the period 1970-2010, the authors provide evidence for a non-monotonic effect of democracy on the institutional quality that is moderated by inequality.

However, empirical studies on the relevance of unemployment in shaping the relationship between democracy and corruption remain remarkably scarce. To our knowledge, this paper is the first empirical study that attempts to examine the interaction effect of unemployment and democracy on corruption across a range of developing countries. We examine the period 1990-2018. We apply the dynamic panel generalised method of moments (GMM) techniques to correct any potential bias resulting from omitted variables, simultaneity, or unobserved country-specific effects. This paper employs two available dynamic panel GMM estimators: i) the "Difference GMM" estimator developed by Arellano and Bond (1991), and ii) the "System GMM" estimator developed by Blundell and Bond (1998) and Arellano and Bover (1995). Both reference methods produced consistent results. We find that the potential beneficial effect of democracy on corruption is eroded by higher unemployment. These results are robust across different empirical specifications. They imply that excessively high levels of unemployment raise corruption even in democracies, i.e. democracies appear not to be able to implement good governance quality if unemployment is high.

The remainder of the paper is organized as follows. Section 2 describes the data and the variables, Section 3 discusses the estimation procedure, Sections 4 shows the empirical results, and Section 5 concludes.

2 Data and Variables

Our empirical analyses utilize panel data of 80 developing countries over the period 1990-2018 (see the Appendix for the list of countries). The descriptive statistics of all variables are reported in Table 1.

2.1 Corruption

There are many sources that provide ratings on the level of corruption in various countries. As shown none of the measures of corruption is perfect. For instance, Rohwer (2009) argues that due to the absence of an international consensus on the meaning of corruption and because of the many different faces of corruption and its very nature, it is almost impossible to deliver a precise and objective measure for the phenomenon. Shukhova and Nisnevich(2017) caution that different measures of corruption may lead to different, and even opposite, conclusions. Donchev and Ujhelyi (2014), distinguishing perceptions from experience, observe that corruption measures may be more problematic than suggested by the existing literature. Therefore in order to increase the credibility of our results, we employ three different measures of corruption from three different sources for our benchmark regressions.

The first measure of corruption, *icrg*, is derived from the data on political rights published by International Country Risk Guide. The ICRG corruption index captures the degree of corruption within the political system (e.g., demand of special payments, bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans) prevailing in countries on the basis of the experts assessment. The data ranges from 0 (most corrupt) to 6 (least corrupt). The second measure, *control corruption*, is derived from the control corruption index published by the World Government Indicators (WGI). WGI consists of 6 indicators measuring the quality of government, one of which is Control of Corruption Index. This corruption index captures "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. The index ranges from 0 to

100, where a higher rating implies higher levels of control corruption. The third measure, *v-dem* corruption index is derived from the political corruption index published in the QOG Standard Dataset 2020, and it includes measures of six distinct types of corruption that cover both different areas and levels of the polity realm, distinguishing between executive, legislative and judicial corruption. The index ranges from least corrupt to most corrupt.

To ease comparison between the different measures of corruption, we follow Acemoglu et al.(2008) and normalize *icrg*, *vdem* and *control* to lie between zero and one, such that a higher number implies less corruption for *icrg* and *control* and more corruption for *vdem*. The regressions that employ *icrg* and *vdem* as measures of corruption cover 80 countries and have up to 2320 observations while the *control* regressions have 1840 observations, as the control corruption index starts from 1996. This clearly generates a potential sample selection problem.

2.2 Democracy

Like corruption, democracy also suffers from the problem of measurement. Coppedge (2002) argues that the measurement of democracy is disputed due to the problems of conceptualization, measurement and aggregation and no single index offers a satisfactory response to these problems, and even the best indices have significant weaknesses. For the purpose of this study, the PolityIV democracy index is used as a measure of democracy. This index reflects the openness and the competitiveness of the political process as well as the presence of institutions that foster political participation. The index ranges from zero to ten, where a higher rating implies higher levels of democracy.

2.3 Unemployment rate

We employ as a measure of unemployment, *Unemployment rate*, derived from the International Labour Organization, ILOSTAT database, published by the World Development Indicators (WDI). This index refers to the number of unemployed persons as a percentage

of the labor force (the total number of people employed plus unemployed), modeled ILO estimate.

We hypothesize a positive association between the unemployment rate and corruption level for the following three reasons. The first reason is that unemployment is likely to raise income inequality leading to increased poor disproportionately. To the extent that the poor are more often subject to corrupt practices in the course of their routine interactions with public institutions (Transparency International, 2009), an increase in the poverty level in the economy might increase the level of corruption. The second reason is based on the idea that sustained unemployment leads to an economic instability and an increase in illegal activities (often in the forms of black market), which then makes it easier and cheaper for corruption practices (Lim, 2018). Finally, unemployment, in developing countries is linked to the absence of pragmatic labor market policies that could have re-energized the weak labor market situation in the country. Note that the effective labor market reforms are necessary to facilitate human capital development to improve social cohesion. Thus the incentive for corruption to preview may be eroded.

2.4 Others Variables

2.4.1 Control variables

In order to control for countries' economic characteristics, our analysis includes variables based on previous studies, we include the following control variables:

1 The economic development of a country, measured by *the GDP growth rate*. A richer country will be able to devote more resources to the detection and prevention of corruption (Paldam, 2001; Serra, 2006; Pellegrini and Gerlagh, 2008; Melgar et al., 2010).

2 The level of a country's integration into the international economy, measured by *the Foreign direct investment, net inflows (% of GDP)*. The empirical evidence suggests that corruption is lower in countries where the intensity of international trade is stronger

(Ades and Di Tella, 1999, Leite and Weidmann, 1999). However, the literature is very ambiguous on this issue. Hodge et al., (2010) show that the greater this ratio, the higher the potential of corruption as restriction on trade such as quota, tariff and license provides mean for rent-seeking.

3 The level of macroeconomic uncertainty, measured by the *inflation rate*. According to Bouzid (2016) inflation rate signals real wage deterioration which is positively correlated with the development of rent seeking behaviors.

4 The quality and the level of education, as measured by *the government expenditure on education % of GDP*, is likely to be able to control corruption. Melgar et al. (2010) found that people who have completed at least secondary education are more likely to perceive the level of corruption than people with a primary education level.

5 The population size, as indicated by *the log of total population*. Several authors (Fisman and Gatti, 2002; Treisman, 2000) have found evidence that corruption is less severe in small countries than it is in large countries. Knack and Azfar (2003), however, argue that this relationship between country size and corruption is an artifact of sample selection, suggesting that the significance of a country's population size remains controversial.

6 *The Ethnic fragmentation* is a significant predictor of corruption. Evidence suggests that countries with strong ethno-linguistic fragmentation tend to be more corrupt (Mauro, 1995; Shleifer and Vishny, 1993; Pellegrini and Gerlagh, 2008). This effect is however not confirmed in Brunetti and Weder (2003).

7 The institutional quality influences the corruption levels. Most studies argue that better institutions imply lower levels of corruption (Sandholtz and Koetzle, 2000). We consider two measures of institutional quality: (i) *bureaucratic quality*, which reflects that the recruitment and education of bureaucrats take place within the framework of an established mechanism irrespective of political power and (ii) *law and order*, which indicates citizens' commitment to laws and the rule of law.

8 The political instability is an important determinant of corruption. Authors claim that political instability accounts for the high level of corruption found in many countries (Billger and Goel, 2009; Campbell and Saha, 2013; Zhang et al., 2009) and that political stability tends to moderate the adverse effects of corruption in an economy (Habib and Zurawicki, 2002). We captured political instability by using: *internal conflict index* and *external conflict index*.

Table 1: Summary statistics.

	Eastern Europe		Latin America		MENA		Sub-Saharan Africa		Asia, Pacific and Caribbean	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
icrg	0,568	0,194	0,518	0,186	0,480	0,168	0,463	0,182	0,503	0,180
vdem	0,465	0,277	0,621	0,273	0,713	0,182	0,692	0,226	0,529	0,265
control	0,544	0,222	0,422	0,234	0,390	0,165	0,312	0,205	0,422	0,222
Democacy	0,784	0,254	0,768	0,192	0,292	0,263	0,436	0,255	0,607	0,286
Unempl rate	10,109	4,612	5,878	2,912	10,525	4,887	7,206	6,111	5,125	2,886
GDP growth rate	5,325	4,608	4,249	2,501	4,884	4,230	5,098	3,573	5,156	2,863
FDI% GDP	4,710	5,692	3,296	2,557	2,765	3,311	3,705	7,474	4,964	6,499
Inflation (%)	56,497	305,782	67,287	499,658	12,235	16,726	25,825	203,770	14,175	35,575
EducatExp%GDP	4,323	1,133	3,717	1,505	4,213	1,633	3,993	2,669	3,376	1,709
Population	15,714	1,051	16,448	1,158	16,932	1,028	16,257	1,222	16,596	2,342
Ethnic	0,334	0,156	0,409	0,175	0,367	0,207	0,739	0,124	0,407	0,198
Bureaucracy	0,555	0,219	0,463	0,179	0,479	0,103	0,354	0,212	0,583	0,205
Law and Order	0,679	0,153	0,462	0,168	0,660	0,165	0,499	0,171	0,521	0,192
Internal conflict	0,859	0,096	0,733	0,144	0,684	0,176	0,686	0,160	0,724	0,185
External conflict	0,862	0,104	0,852	0,098	0,755	0,147	0,799	0,144	0,862	0,113

The corruption variables icrg, vdem and control are from International Country Risk Guide (ICRG), QOG Standard Dataset 2020 and WGI, respectively. The data are normalized to lie between zero and one, such that a higher number implies less corruption for *icrg* and *control* and more corruption for *vdem*. Democracy is the democracy index published in Polity IV. Similar to the corruption measure, the data are normalized to lie between zero and one such that a higher number implies more democracy. Unemployment, total (% of total labor force) is the share of the labor force that is without work but available for and seeking employment, GDP growth rate is the annual percentage growth rate of GDP at market prices based on constant local currency, FDI%GDP is the net inflows of investment to GDP, inflation is the ratio of the GDP in current local currency to GDP in constant local currency, EducatExp%GDP is the ratio of government expenditure for all levels of education to GDP, population is the total population. The data are from The World Development Indicators (2020), published by the World Bank. Ethic is the Ethnic Fractionalization in the year 2000 downloaded from the QOG standars dataset 2020. The data on institutions, bureaucratic quality and law and order are from the International Country Risk Guide (ICRG), law and order measures the effectiveness of the rule of law, bureaucracy refers to the institutional strength and quality of the bureaucracy. The data on political instability, internal conflict (such as political violence within the country) and external conflict (such as cross-border conflicts) are also from the International Country Risk Guide (ICRG). Similar to the corruption measures, the data are normalized to lie between zero and one, such that a higher number implies stronger bureaucracy, better law enforcement and higher political instability.

3 Estimation Model and Methodology

3.1 Model Specifications

We consider two model specifications: In the first one, we regress corruption, as a function of democracy, unemployment and a set of the macroeconomic control variables. In the second one, we add to the first specification, an interaction term, that captures the interaction effect of democracy and unemployment on corruption.

The first model specification of the corruption equation follows:

$$corr_{i,t} = \alpha dem_{i,t} + \delta une_{i,t} + \sigma cor_{i,t-1} + \nu Z_{i,t} + \theta_i + \epsilon_{i,t} \tag{1}$$

Where i refers to countries, t to time, $\epsilon_{i,t}$ is the country-specific effect, $corr_{i,t-1}$ represents the perceived corruption at time $t-1$ for country i which allows to model the corruption as a dynamic process and thus captures its persistent effect, $dem_{i,t}$ captures the level of democratization, $une_{i,t}$ measures the unemployment rate, $Z_{i,t}$ is the set of control variables.

Looking if unemployment undermines the democracy - corruption nexus, we extend the model, by $dem_{i,t} * une_{i,t}$ that represents the interaction term. The specification for the corruption equation becomes:

$$corr_{i,t} = \alpha dem_{i,t} + \beta dem_{i,t} * une_{i,t} + \delta une_{i,t} + \sigma cor_{i,t-1} + \nu Z_{i,t} + \theta_i + \epsilon_{i,t} \tag{2}$$

3.2 Econometric strategy

To obtain consistent and unbiased results, we estimate the equation (1, 2) using a linear dynamic panel-data (DPD) model. DPD models contain unobserved panel-level effects that are correlated with the dependent variable, and this renders standard estimators inconsistent. The GMM estimator proposed by Arellano and Bond (1991) provides consistent estimates for such models. This estimator often referred to as the "difference" GMM estimator takes the first difference of the data and then uses lagged values of the endogenous variables as instruments. However, lagged levels are poor instruments for first differences. Blundell and

Bond (1998) proposed a more efficient estimator, the "system" GMM estimator. The merit of this method is that it mitigates the poor instruments problem by using additional moment conditions. However, it utilizes too many instruments. Thus, the difference estimator suffers from the "weak" instruments problem and the system estimator exhibits the "too many" instruments problem. Thus, in order to increase the credibility of our results, we report the estimations for both the difference and system estimators.

Note that, the two estimation procedures assume that there is no autocorrelation in the idiosyncratic errors. Hence, for each regression, we test for autocorrelation and the validity of the instruments. Specifically, we report the p-values for the test for second order autocorrelation as well as the Hansen J test for overidentifying restrictions. These tests, however, lose power when the number of instruments, i, is large relative to the cross section sample size (in our case, the number of countries).

Taking all of this into consideration, our estimation strategy is as follows: First, we use the two-step GMM estimator, which is asymptotically efficient and robust to all kinds of heteroskedasticity. Second, the independent variables are treated as strictly exogenous in all the regressions. Third, our regressions utilize only internal instruments — we do not include additional (external) instruments. Specifically, both the difference and system estimators use the first difference of all the exogenous variables as standard instruments, and the lags of the endogenous variables to generate the GMM-type instruments described in Arellano and Bond (1991).

4 Results

We start by looking at the effects of democracy on corruption without the interaction term, $dem(i,t) * unempl(i,t)$. Table 2 reports the estimates of Eq (1). The parameter of interest is the coefficient of democracy, $\widehat{\alpha}$.

We note that $\widehat{\alpha}$ is positive and significant at the 1% level, suggesting that all else equal, democracy reduces corruption in developing countries. This result implies that higher democ-

racy results in lower corruption. This is consistent with a number of prior studies (Manzetti, 2000; Montinola and Jackman, 2002; Bohara et al, 2004; Carothers, 2007; Carbone and Memoli, 2013) that find that democratic institutions may have a negative effect on corruption. According to the authors, democracy encourages controls (i.e political competition), empowers voters (i.e political rights) and increases the probability that corrupt behaviors will be exposed and punished (i.e transparency).

We use an example to illustrate the beneficial effect of democracy on corruption. Consider two countries in the same sub-region in Sub Saharan Africa (SSA) that have extremely different levels of democratization — Cameroon, Togo and Uganda, the least democratic country and South Africa, the country with the highest democracy score. Then the regressions that employ the measure of corruption, icrg, show that an improvement in democracy from the level of Togo (dem=0,1) to the level of South Africa (dem=0.88) will decrease corruption by about, $[\frac{\partial corr_i}{\partial dem} = 0.0874 * (0.88 - 0.1) = 0.068]$, 6.80 percent points for the difference regression and about, $[\frac{\partial corr_i}{\partial dem} = 0.0699 * (0.88 - 0.1) = 0.054]$, 5.40 percent points for the system regression . The decrease in *corr* is economically important because the average annual decrease in *corr* in Togo, over the period 1990-2020 was about 0.38 percent points.

Table 2: The direct effect of democracy on corruption

	Difference GMM			System GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
	icrg	vdem	control	icrg	vdem	control
Democracy,$\widehat{\alpha}$	0,0874***	-0,0167***	0,0375***	0,0699***	-0,0546***	0,0273***
	(0,0384)	(0,0115)	(0,0133)	(0,0411)	(0,0201)	(0,0093)
Unemployment rate, $\widehat{\sigma}$	-0,0146***	0,0014*	-0,0015*	-0,0132***	-0,0038***	0,0011***
	(0,0020)	(0,0010)	(0,0009)	(0,0023)	(0,0014)	(0,0004)
Lagged	0,7831***	0,1763***	0,5830***	0,8622***	1,0395***	0,8456***
	(0,0344)	(0,0191)	(0,1468)	(0,0285)	(0,0376)	(0,0409)
GDP growth rate	0,0002	-0,0002	0,0001	0,0004	0,0001	0,0011***
	(0,0004)	(0,0002)	(0,0003)	(0,0004)	(0,0003)	(0,0002)
FDI%GDP	-0,0007***	0,0003	0,0001	-0,0009***	-0,0001	-0,0003***
	(0,0004)	(0,0003)	(0,0003)	(0,0003)	(0,0002)	(0,0001)
Inflation(%)	-0,0033***	0,0012***	-0,0001	0,0016	-0,0002	0,0000
	(0,0016)	(0,0006)	(0,0012)	(0,0016)	(0,0012)	(0,0008)
EducaExp%GDP	0,0064***	-0,0024***	0,0025***	0,0028*	0,0005	0,0011***
	(0,0022)	(0,0015)	(0,0010)	(0,0018)	(0,0009)	(0,0006)
Population	-0,1464***	0,0603***	-0,1820***	-0,0470***	0,0331***	-0,0132***
	(0,0400)	(0,0230)	(0,0562)	(0,0262)	(0,0101)	(0,0120)
Ethnic2000	0,6372***	-0,0412***	-0,6311	-0,0667	-0,1359***	-0,0440***
	(0,1172)	(0,0069)	(0,4697)	(0,1068)	(0,0476)	(0,0241)
Bureaucracy	0,2949***	0,0015	0,1267***	0,1452*	-0,0728*	0,1095***
	(0,0929)	(0,0185)	(0,0617)	(0,0934)	(0,0456)	(0,0330)
Law and Order	0,1901***	-0,0298***	0,1386***	0,2207***	-0,0120	-0,0016
	(0,0627)	(0,0186)	(0,0457)	(0,0645)	(0,0202)	(0,0170)
Internal Conflict	-0,0468	0,0740***	-0,0505**	-0,1209***	0,0327***	-0,0144
	(0,0510)	(0,0192)	(0,0313)	(0,0510)	(0,0186)	(0,0115)
External Conflict	-0,2373***	0,0034	0,0252	-0,1677***	0,0255	-0,0117
	(0,0516)	(0,0168)	(0,0453)	(0,0533)	(0,0257)	(0,0167)
Constant				0,9099***	0,6409***	0,1697
				(0,4801)	(0,1787)	(0,1946)
Hansen J test[a] (p-value)	0,797	0,343	0,527	0,176	0,262	0,978
Serial correlation test (p-value)[b] (p-value)	0,256	0,606	0,615	0,601	0,881	0,837
Number of observations	2106	2106	1638	2184	2184	1716
Number of countries	80	80	80	80	80	80
Number of instruments	39	40	37	41	41	21

• The corruption variables icrg, vdem and control are from International Country Risk Guide (ICRG), QOG Standard Dataset 2020 and WGI, respectively. The data are normalized to lie between zero and one, such that a higher number implies less corruption for *icrg* and *control* and more corruption for *vdem*. ***significant at 1%.**significant at 5%.* significant at 10%. a:The null hypothesis is that the instruments are not correlated with the residuals. b:The null hypothesis is that the errors in the first difference regression exhibit no second order serial correlation.

We turn our attention to the other variables. We observe that $\widehat{\sigma}$ is negative and significant at the 1% level, implying that high levels of unemployment raise corruption. This finding is in line with Bouzid (2016), who examining the relationship between corruption and unemployment, find that the development of corruption practices tend to increase the unemployment rate among youth and educated job seekers which in turn contribute to sustain

those unlawful practices by forcing the latter to bribe rent-seeking government officials in order to secure a job. This result suggests that corruption levels are derived by labor market distortions. Such a conclusion is interesting for developing countries, where corruption is pretty prevalent. It is also relevant for policy makers who attempt to deal with corruption. Furthermore, we find that control variables are expected in signs, such as higher GDP growth rate, more government expenditure on education (%of GDP), greater Ethic fragmentation and better institutional quality decrease the level of corruption while greater FDI(% GDP), higher inflation rate, more population and political instability have an adverse effect on the corruption level. The estimated coefficient of lagged corruption is positive, suggesting that current corruption is positively correlated with future corruption.

Now, we examine how the effect of democracy on corruption depends on the level of unemployment rate. We estimate Eq. (2). We note that $\frac{\partial corr_i}{\partial dem} = \alpha + \beta * une$, and therefore the parameters of interest are $\widehat{\alpha}$ and $\widehat{\beta}$. Table 3 reports the results.

The estimates values suggest that unemployment significantly alters the relationship between corruption and democracy by reducing the beneficial effect of democracy on corruption. Indeed, $\widehat{\alpha}$ is positive and significant and the 1% level, and $\widehat{\beta}$ is negative and significant at the 1% level. This result illustrates that the effect of democracy on corruption is less positive as the level of unemployment expands. This result is very important for both development practitioners and policymakers as corruption and unemployment are often two of the most pressing policy issues facing these economies.

To elucidate our results, we evaluate the marginal effect of democracy and unemployment on corruption, obtained as follows: $\frac{\partial corr_i}{\partial dem} = \widehat{\alpha} + \widehat{\beta} * une$. More precisely, we assess the estimated value of $\frac{\partial corr_i}{\partial dem}$ at reasonable values of unemployment, *une*. Specifically, for each country, we calculate the average value of *une* over the period 1990-2018, which we denote $\overline{une}$ and evaluate $\frac{\partial corr_i}{\partial dem}$ at 10th, 25th, 50th, 75th and 90th percentile and the mean of $\overline{une}$. The 10th, 25th, 50th, 75th and 90th percentile and the mean of *une* correspond to the average value of *une* for Guinea-Bissau, Burkina Faso, Costa Rica, Lithuania, Albania and Sri Lanka respectively. The results are reported in Table 4.

Table 3: The interaction effect of democracy and unemployment on corruption

	Difference GMM			System GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
	icrg	vdem	control	icrg	vdem	control
Democracy, $\widehat{\alpha}$	0,0708***	-0,0422**	0,0230***	0,2246***	-0,1245***	0,0431***
	(0,0208)	(0,0243)	(0,0100)	(0,0740)	(0,0559)	(0,0144)
Democracy * Unemployment rate, $\widehat{\beta}$	-0,0058***	0,0024**	-0,0030***	-0,0323***	0,0090*	-0,0032***
	(0,0021)	(0,0016)	(0,0013)	(0,0084)	(0,0055)	(0,0019)
Unemployment rate, $\widehat{\sigma}$	-0,0028***	0,0023**	-0,0025***	-0,0324***	0,0089***	-0,0029***
	(0,0015)	(0,0017)	(0,0012)	(0,0081)	(0,0046)	(0,0013)
Lagged	0,7928***	0,7583***	0,6550***	0,9230***	1,0214***	0,8253***
	(0,0125)	(0,0489)	(0,0403)	(0,0353)	(0,0360)	(0,0350
GDP growth rate	0,0002	-0,0002	0,0004***	0,0005	0,0002	0,0011***
	(0,0002)	(0,0002)	(0,0002)	(0,0005)	(0,0003)	(0,0002)
FDI%GDP	-0,0012***	0,0000	0,0001	-0,0009***	0,0000	-0,0001
	(0,0001)	(0,0001)	(0,0001)	(0,0003)	(0,0002)	(0,0001)
Inflation(%)	-0,0064***	0,0005	-0,0017***	0,0004	0,0004	-0,0007
	(0,0009)	(0,0010)	(0,0005)	(0,0019)	(0,0012)	(0,0009)
EducaExp%GDP	0,0040***	-0,0010	0,0037***	0,0032	0,0003	0,0017***
	(0,0009)	(0,0009)	(0,0007)	(0,0022)	(0,0008)	(0,0006)
Populationp	-0,0691***	0,0488***	-0,0032	-0,0307	0,0447***	-0,0262***
	(0,0126)	(0,0108)	(0,0163)	(0,0255)	(0,0109)	(0,0129)
Ethnic2000	-0,4449	0,0024	0,3253***	-0,1090	-0,0757***	-0,0200
	(0,3108)	(0,0681)	(0,0943)	(0,0687)	(0,0309)	(0,0442)
Bureaucracy	0,0240	0,0169	0,1837***	-0,1166	-0,0445	0,0355
	(0,0346)	(0,0248)	(0,0633)	(0,0830)	(0,0378)	(0,0531)
Law and Order	0,1563***	-0,0169	0,1575***	0,2485***	-0,0139	0,0030
	(0,0233)	(0,0165)	(0,0306)	(0,0745)	(0,0214)	(0,0199)
Internal conflict	-0,0176	0,0427***	-0,0223	0,0769	0,0329	0,0036
	(0,0204)	(0,0155)	(0,0147)	(0,0596)	(0,0197)	(0,0104)
External Conflict	-0,0231***	0,0016	-0,0119	-0,1981	-0,0006	0,0068
	(0,0126)	(0,0198)	(0,0244)	(0,0635)	(0,0281)	(0,0216)
				0,8043***	0,8450***	0,4414***
				(0,4787)	(0,2170)	(0,2419)
Hansen J test (p-value)[a]	0,934	0,497	0,993	0,920	0,528	0,818
Serial correlation test (p-value)[b] (p-value)	0,135	0,220	0,808	0,604	0,962	0,976
Number of observations	2106	2106	1638	2184	2184	1716
Number of countries	80	80	80	80	80	80
Number of instruments	39	40	24	42	42	21

• The corruption variables icrg, vdem and control are from International Country Risk Guide (ICRG), QOG Standard Dataset 2020 and WGI, respectively. The data are normalized to lie between zero and one, such that a higher number implies less corruption for *icrg* and *control* and more corruption for *vdem*. ***significant at 1%.**significant at 5%.* significant at 10%. a:The null hypothesis is that the instruments are not correlated with the residuals. b:The null hypothesis is that the errors in the first difference regression exhibit no second order serial correlation.

Note that $\frac{\partial corr_i}{\partial dem}$ drops as $\overline{u}ne$ increases from the 10th to the 50th percentile of une. For the difference GMM estimations, the decline in $\frac{\partial corr_i}{\partial dem}$ is about 41% for the regression using icrg and 26% for vdem and for the system estimations, $\frac{\partial corr_i}{\partial dem}$ decreases by about 92%, 36% and 32% for icrg, vdem and control respectively. This indicates that the unemployment rate

reduces the effectiveness of democracy in promoting corruption.

Also, it is worth noting that when taking the icrg regressions, the estimated value of $\frac{\partial corr_i}{\partial dem}$, is positive and significant up to the 50th percentile of $\overline{u}ne$, suggesting that democracy has a positive effect on corruption for at least half of the countries in the sample. However, the estimated value of $\frac{\partial corr_i}{\partial dem}$ loses significance or turns negative and significant when evaluated at the third quarter of $\overline{u}ne$, an indication that for at least 25% of the countries in our sample, democracy has no significant effect on corruption or has a negative effect.

Table 4: $\frac{\partial corr_i}{\partial dem} = \widehat{\alpha} + \widehat{\beta} * une$, evaluated at various values of une.

Value of une	Percentile of $\overline{une}$	Corresponding	Diffence GMM			System GMM		
		Country	icrg	vdem	control	icrg	vdem	control
2.651	10th	Guinea	0,0554***	-0,0359*	0,0151***	0,1388***	-0,1006***	0,0509***
			(0.0173)	(0,0210)	(0,0124)	(0,0553)	(0,0425)	(0,0172)
3.825	25th	Burkina	0,0487***	-0,0332*	0,0116	0,1008***	-0,0901***	0,0544***
			(0,0159)	(0,0196)	(0,0136)	(0,0480)	(0,0370)	(0,0185)
6.602	50th	Costa Rica	0,0327***	-0,0266*	0,0034	0,0110***	-0,0651***	0,0625***
			(0,0141)	(0,0168)	(0,0167)	(0,0166)	(0,0257)	(0,0218)
10.661	75th	Lithuania	0,0094	-0,0170	-0,0085	-0,1202***	-0,0286	0,0345***
			(0,0158)	(0,0145)	(0,0217)	(0,043)	(0,0220)	(0,0267)
15.785	90th	Albania	-0,0200	-0,0049	-0,0237	-0,2859***	0,0174	0,0296***
			(0,023)	(0,0154)	(0,0282)	(0,0769)	(0,0412)	(0,0331)
8.025	Mean	Srilanka	0,0241*	-0,0236***	0,0429***	-0,0373	-0,0522**	0,0272***
			(0,0142)	(0,0218)	(0,009)	(0,0356)	(0,029)	(0,0023)

• Notes: une is the share of the labor force that is without work but available for and seeking employment(%), and $\overline{une}$ is the average of une, from 1990 to 2018. ***significant at 1%.**significant at 5%.* significant at 10%.

5 Robustness check

Next to these estimations, we perform a number of robustness checks. The robustness estimations employ the measure of corruption that has been widely used in the literature, i.e., icrg[3]. Furthermore, to keep the discussion focused and also conserve on space, we report a summary of the results in Table 5. The full estimation results are available in the supplementary file, available from the authors upon request. Below, we provide a brief discussion

[3]See Swaleheen (2011), Dal BÓ and Rossi (2007) and Knack and Keefer (1995) for details.

of the robustness estimations.

First, it is commonly argued that the marginal value of money in poor economies is greater as compared to rich economies. As such, wealthier countries are likely to undergo less corruption (Gundlach and Paldam, 2000; Lučić et al., 2016). According to Treisman (2000) in rich countries, corruption decreases with the improved living standards, on the one hand, and with many institutional, sociological, and demographic changes which usually accompany the improvement in national income, on the other hand. Hence, we could suspect that the determinants of corruption to poor countries are different from the determinants of corruption to more developed economies. We, therefore, run separate regressions for high income, upper-middle-income, lower-middle-income and low-income countries. In Panel A of Table 5, we report the values of $\widehat{\alpha}$, $\widehat{\beta}$ and $\widehat{\sigma}$. Clearly, the results are robust: and are significant at the 1% level in 6 out of the 8 regressions.

Second, we assess the extent to which the coefficients change if we remove transition countries, we think that this country may be an outlier because of its political transformation. We refer to Treisman (2007)'s following logic: the stability of political institutions, whether democratic or not, is a significant corruption deterrent and that greater civil liberties in young democracies may lead to higher corruption levels because of an ineffective rule of law and larger scope for private transactions. Panel B in Table 4 shows that our results are robust.

Third, we recognize that our benchmark regressions do not include time fixed effects. One reason for including time fixed effects is to expunge the effect of business cycles. However, including time dummies increases the number of instruments employed in the regressions, and this in turn weakens the reliability of the empirical results. Here, we test whether our results hold when we include time fixed effects. As shown in Panel C, $\widehat{\alpha}$ and $\widehat{\beta}$ are significant at the 1% level in all regressions.

Fourth,, we suspect a potential endogeneity problem associated with democracy and unemployment. Specifically, it is possible that an unobserved variable may affect both corruption and unemployment. The difference and the system estimators mitigate the endogeneity

problem. However, in order to be thorough, we address this issue explicitly by specifying democracy and unemployment as endogenous variables in our regressions. Note that if democracy is endogenous, then the interaction between democracy and unemployment is also endogenous. We consider two cases. In case 1, only democracy is endogenous. Thus here, we re-estimate Eq. (1) where we specify *democracy* and *demcracy*unemployment* as endogenous variables. In case 2, both democracy and unemployment are endogenous and therefore the endogenous variables are democracy, unemployment rate, and unemployment*democracy. The results hold in both cases: $\widehat{\alpha}$ and $\widehat{\beta}$ are significant at the 1% level in all regressions.

Table 5: Robustness regressions

	Difference GMM			System GMM		
	$\widehat{\beta}$	$\widehat{\alpha}$	$\widehat{\sigma}$	$\widehat{\beta}$	$\widehat{\alpha}$	$\widehat{\sigma}$
Panel A: Income sub-samples						
High income	-0,0073***	0,1410***	-0,0086***	-0,0208***	0,2008***	-0,0126***
	(0,0036)	(0,0566)	(0,0048)	(0,0072)	(0,0965)	(0,0061)
Upper-middle income	-0,0639***	0,8883***	-0,0318***	-0,0517*	0,7039*	-0,0399***
	(0,0311)	(0,4364)	(0,0149)	(0,0348)	(0,4808)	(0,0215)
Lower-middle income	0,0025	0,1134	-0,0156***	-0,3334***	0,9009***	-0,3170***
	(0,0103)	(0,0643)	(0,0077)	(0,1429)	(1,1625)	(0,1663)
Low income	0,1204	0,8131	-0,0951**	-0,5195***	0,6929***	-0,4192***
	(0,0695)	(0,5110)	(0,0554)	(0,2111)	(0,3841)	(0,1687)
Panel B:						
Exclude transition countries	-0,0033***	0,0475***	-0,0042***	-0,0264***	0,1469*	-0,0265***
	(0,0017)	(0,0194)	(0,0014)	(0,0096)	(0,0912)	(0,0081)
Panel C:						
Include time fixed effects	-0,0038***	0,0297*	-0,0046***	-0,0166***	0,1623***	-0,0136***
	(0,0017)	(0,0183)	(0,0019)	(0,0078)	(0,0606)	(0,0067)
Panel D: Endogenity problem						
Case 1	-0,0032***	0,0596***	-0,0021***	-0,0024***	0,0852***	-0,0038**
	(0,0010)	(0,0210)	(0,0010)	(0,0012)	(0,0282)	(0,0012)
Case 2	-0,0078***	0,1022***	-0,0104***	-0,0061***	0,0290***	-0,0111***
	(0,0038)	(0,0533)	(0,0030)	(0,0012)	(0,0146)	(0,0012)

• The corruption variables icrg, vdem and control are from International Country Risk Guide (ICRG), QOG Standard Dataset 2020 and WGI, respectively. The data are normalized to lie between zero and one. A higher number implies less corruption. p-values in parenthesis. ***significant at 1%.**significant at 5%.* significant at 10%.

6 Conclusion

This paper has examined the interaction between democracy, unemployment and corruption. Based on a panel of 80 developing countries over the period 1990-2018, dynamic panel estimates deliver evidence that democracy decreases corruption and that the effect of democracy on corruption depends on the level of unemployment in the country. More precisely, we show that the potential beneficial effect of democracy on corruption is eroded by a higher unemployment rate. These results robust across different empirical specifications, suggest that excessively high levels of unemployment increase corruption even in democracies, up to the point that democracies appear not to be able to implement good governance quality if unemployment is too high. We believe that these findings contribute to the literature and have important policy implications for developing countries, where both corruption and unemployment are often two of the most pressing policy issues facing them (Bakare, 2011).

There are limitations of our analysis that can serve as avenues for future research. First, future research should investigate the mechanisms by which unemployment erodes the beneficial effect of democracy on corruption. Second, the analysis should also exploit the heterogeneities that exist between countries in our database (for instance, geographical and cultural differences) and apply Spatial panel data estimation. This estimation technique is commonly used in the regional science and the spatial econometrics literature and it could be applied in our context to further explore the role of unemployment on the democracy-corruption nexus. Finally, it would be worthwhile to include more countries in the analysis as well as to estimate the model over a much longer time span.

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Appendix

List of countries under the study:

Albania, Algeria, Angola, Argentina, Armenia, Bangladesh, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Chile, Colombia, Costa Rica, Cote D'Ivoire, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Latvia, Lebanon, Liberia, Lithuania, Madagascar, Malawi, Mali, Mexico, Mongolia, Morocco, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Romania, Senegal, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, Suriname, Syria, Tanzania, Togo, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Zambia and Zimbabwe.