
Does empowerment through corruption reduce gender inequalities? The case of women in sub-Saharan Africa

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Abstract

The objective of this study is to determine how perception of corruption affects the relationship between women's empowerment and gender inequality in Sub-Saharan Africa. To do this, it uses two estimators of the generalized method of moments on a sample of 45 countries between 2002 and 2021. It shows that empowerment produces beneficial effects in reducing gender inequalities in countries working to fight corruption. Especially regarding economic empowerment, a government integrity rating of at least 25% is required. This threshold rises to 31% for political empowerment and on average to 32% for social empowerment. These thresholds vary between the different components of each component, but they remain between 25 and 35%.

JEL codes: D63; J16; K0

Keywords: Empowerment; corruption; gender inequalities

1. Introduction

Closing the gap between women, and men is a social and economic problem. On the social level, inequalities lead to conflict, and social instability. Economically, a significant workforce must be mobilized. Developing countries such as those in Sub-Saharan Africa are among the most affected regions of the world in this problem. Data from the United Nations Development Program (UNDP, 2020) shows that, in Sub-Saharan Africa, more than 95% of women and more than 95% of men have at least one prejudice against women. While less than 20%, both men and women, have at least one prejudice against men.

However, the situation of women is not the same as it was a few decades ago. While barely 10% of women had access to secondary education in the 70s, more than 40% of them benefit from it to date (World Bank, 2022a). While life expectancy for women at

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birth in the region has risen from under 46 years to over 62 years in 2021, indicating better access to healthcare. Even on the political front, there has been clear progress, with, for example, an increase in the percentage of women in national parliaments. This percentage rose from less than 11% in 1997 to more than 25% in 2021. However, this progress in women's empowerment has not managed to push the gender inequality indices below the symbolic 50% mark. For example, the Gender Inequality Index (GII) proposed by the United Nations Development Programme (UNDP, 2022) shows that this index has hovered around 58% since 2014. This trend can also be seen by averaging the indices for the countries in the region in the mid-1990s.

This is not an aberrant fact when you look at the figures for women's participation in economic life. Women's participation in the labour market has decreased from 62.4% in 1991 to 60.3% in 2021, while over the same period the unemployment rate for women has risen from 6.4% to 7.5% in 2021. Although more women are in paid employment, from 12.7% in 1991 to 16.9% in 2021. The proportion of self-employed women is falling from 87.3% in 1991 to 83.1% in 2021. The sector in which women tend to proliferate is the informal sector (Asongu et al. 2020). Indeed, an average of the data for the countries in the region shows that 58.03% of women who were employed in the region in 2000 worked in the informal sector, compared with 77.072% in 2017. Not only do the beneficial effects of women's empowerment seem to be slow to be felt on the economic front in the region, with poverty remaining female, as Chamlou (2016) argues, but they also seem to be struggling to translate into a significant reduction in inequalities between women and men. This situation can be explained by the context of corruption in the region. The Worldwide Governance Indicators corruption control index, which ranges from -2.5 to 2.5, with -2.5 being the worst, shows that the situation deteriorated between 1996 and 2021. The index rose from -0.55254 to -0.6385 (World Bank, 2022b).

Persistent corruption, which has become a tool for escaping unemployment, as shown by the work of Ngono (2022), is present in several spheres and aspects of society and is experienced differently by women and men (Bauhr & Charron, 2020; Transparency International, 2018; Zúñiga, 2018; Frank et al. 2011). Corruption is based primarily on relationships and the ability to offer gifts (Transparency International, 2018). As women enter the labour market later, they often have less developed social capital and fewer financial resources. This often leads them to make less use of corruption than men

(Transparency International, 2018; Frank et al. 2011). In countries where corruption is a daily scourge, this can be quite disabling. The work of Transparency International (2018) or Zúñiga (2018) explains, for example, that women can be dispossessed of their land if they are unable to comply with requests to bribe the authorities, or if other people of interest decide to bribe the said authorities.

However, another form of corruption is often more common when it comes to women, namely sexual favours (Transparency International, 2018; Zúñiga, 2018). This form of corruption is more distressing than the others. It has physical and psychological effects. Moreover, it often turns into rape and harassment (Transparency International, 2018; Zúñiga, 2018). It is not only present in the labour market, but also in academia, hospitals and public services (Transparency International, 2018; Zúñiga, 2018). For example, teachers and thesis supervisors demand sexual favours from their female students. Although men are also exposed to this form of corruption, women are the main victims (Transparency International, 2018; Zúñiga, 2018). Given the preponderance of corruption in sub-Saharan African countries, and women's limited capacity to use it, women's empowerment may be limited and may not lead to a significant reduction in gender inequalities. Women may have access to education, health care or the labour market, but the quality of this access is likely to depend on the fight against corruption in the region.

However, although the economic literature is interested in the interactions between corruption and gender inequalities, the way in which this corruption undermines the beneficial effects of women's empowerment is less addressed. This is the case of the work of Jha & Sarangi (2018) which shows that the more women there are in parliaments, the less corruption there is. This is an aspect that needs to be addressed, since it could be assumed that the solution would be to enable women to make better use of corruption, and thus 'oil the wheels of the system', to reconcile empowerment and the reduction of gender inequalities. Policardo et al (2019) also raise this idea, stating that the possibility of corruption being used as a solution to correct income inequalities is not sufficiently addressed in the literature. Quite apart from the harmful aspect of such a solution, Policardo's (2019) work shows that it leads to a vicious circle in OECD countries, where corruption and income inequality are continually feeding each other. It is necessary to provide concrete answers through more studies, particularly empirical studies, on the

subject. Even if a vicious circle emerges, Policardo et al (2019) stress that the relationship is complex and depends on the context.

Hence the aim of this study, to determine how perception of corruption affects the effects of women's empowerment on gender inequalities in sub-Saharan Africa. A study of this kind in sub-Saharan Africa is interesting because the countries in this region are among the most corrupt, but also those where the empowerment of women is least significant. To achieve this objective, this study uses data from 2002 to 2021 on a sample of 45 countries. First, the use of the GMM estimator proposed by Roodman (2009a, b) shows that interactions between empowerment dimensions and corruption perception variables produce perverse effects on gender inequalities. Indeed, the results show that an increase in women's empowerment in countries where corruption is perceived to be high causes an increase in gender inequality. The estimator of Seo & Shin (2016) has made it possible to dig a little deeper into this result. The use of this estimator reveals the existence of a threshold of low perceived corruption for women's empowerment to result in a significant drop in gender inequality. Either 25%, 32% and 31% respectively for economic empowerment, social empowerment and political empowerment. Until the perceived integrity of governments in the region reaches these thresholds, women's empowerment cannot make a significant contribution to reducing inequalities. The fight against inequality in this region must therefore go hand in hand with the fight against corruption. Setting up supranational anti-corruption units could be a step in the right direction.

The rest of this paper is as follows: the first section reviews the economic literature; the second uses data from the World Bank (2022a, 2022b), UNDP (2022), Heritage Foundation (2022) and Cingranelli et al. (2018) to apply the generalised method of moments of Roodman (2009a, b), and the generalised method of moments of Seo & Shin (2016), on a sample of 45 countries between 2002 and 2021; the third section is an opportunity to discuss these results.

2. Literature review

This section is structured in three points. The first presents the concept of corruption, the second the theoretical foundations of women's empowerment, and the third addresses how corruption can interact with it.

2.1. Corruption: a complex concept

According to Sulemana & Kpienbaareh (2018), corruption in its broadest sense is a use of public office for personal gain and in exchange for various forms of payment. However, the definition of corruption remains difficult to pin down in the literature. Firstly, because there is not only political corruption. There are acts of corruption in which none of the actors is a public official. The challenge to this classic view of corruption has led more and more authors to consider it as the use of one's position for personal ends (Fang, 2024). However, this definition remains quite broad. This complexity of correctly defining corruption makes it more difficult to measure (Fang, 2024; Bello y Villarino, 2021). In addition to the difficulties linked to the definition, Bello y Villarino (2021) also mentions the difficulty of quantifying corruption. Indeed, some studies, such as those by Kaufman et al (2006), point to the secretive nature of corruption to illustrate the difficulty of quantifying it. Beyond the debate on quantification, the limitations of the various existing measures tend not to differentiate well between validity and reliability (Bello y Villarino, 2021).

This complexity gives rise to a multitude of measures. Bello y Villarino (2021) classifies them into two groups. Firstly, objective measures, which are based on experience and therefore on a more objective view of corruption. This is the case of the Index of Public Integrity. Then there are subjective measures, which are based on perceptions of corruption and therefore offer a more subjective view of corruption. Examples include the PCI, the CCWGI and Government Integrity. This last group is the most recurrent in the literature.

However, it is often criticised for several reasons. In particular, Razafindrakoto & Roubaud (2010) cite the lack of foundations, such as theoretical ones; the difficulty of comparing these measures over time; the choice of aggregation procedure and aggregated indicators are questionable; and the fact that these are measures of perception but not of corruption per se. Razafindrakoto & Roubaud (2010) support the last two criticisms, but explain that this does not mean that these measures of corruption perception should disappear. For Razafindrakoto & Roubaud (2010), these measures must be supplemented by objective measures. About the first two limitations, Razafindrakoto & Roubaud (2010) explain that they are the subject of debate in the literature and refer to the work of

Kaufman et al. (2007). The work of Kaufman et al (2007) rejects these criticisms, arguing that these measures allow comparisons to be made over time.

These perception-based measures are the most widely used in the literature. Kaufman (2006) states: ‘Since corruption usually leaves no paper trail, perceptions of corruption based on individuals’ actual experiences are sometimes the best, and the only, information we have’ (P. 2). In the context of this study in particular, using perception as a measure of corruption is also interesting, as studies such as those by Bauhr & Charron (2020) and Zúñiga (2018) explain that women and men do not have the same perception of corruption.

2.2. Women’s empowerment: theoretical foundations

Although women’s struggle for empowerment dates back centuries, it experienced significant enthusiasm in the 20th century. Both in everyday life with women’s right to vote for example, and in economic literature with an interesting theoretical debate. There are two opposing points of view in the literature, namely Becker’s and Boserup’s views. While Boserup argues, in his work such as his book *Woman’s role in economic development* published in 1970, that women are harmed by being relegated to unpaid family work, while men have access to education, and the labour market, which hinders economic development. Becker, in his work, such as *A Treatise on the family* published in 1981, argues, however, that this division of labour corresponds to a rational and free choice. For Becker, the woman is physiologically more adapted to family tasks, while the man is better suited to other economic activities. This dynamic has made it possible to increase work on women’s empowerment.

It is clear from this literature that women’s empowerment is a complex and multidimensional concept. It covers various aspects, from financial empowerment to more psychological notions (Tandon, 2016). As Mandal (2013) and Tandon (2016) explain, this complexity encourages a multiplication of definitions. However, some elements recur in most definitions, namely that it is a process that concerns women’s decision-making on different aspects of their lives and society (Mandal, 2013; Adjei, 2015). More specifically, three dimensions can be identified from this concept, namely economic empowerment, social empowerment, and political empowerment (Mandal, 2013; Ngono, 2021).

Economic empowerment refers to women's control of financial resources (Duflo, 2012). A mastery of financial resources that can be achieved through the deployment of women on the labour market and through their financial inclusion (Tandon, 2011-6; Ngono, 2021). Social empowerment refers to women's ability to achieve greater status in society (Mandal, 2013). This includes access to education, health, and inheritance (Mandal, 2013; Ngono, 2021). And political empowerment refers to the deployment of women in politics (Kabeer, 2005; Pospieszna, 2015; Ngono, 2021). However, there are some challenges to women's empowerment.

2.3. Barriers to Women's Empowerment: Is Corrupting a Solution?

Women's empowerment remains a challenge, as it faces several obstacles. The first barriers to women's empowerment come from institutions. Indeed, whether formal or informal, institutions can slow down women's empowerment (Ngono, 2021). In some parts of the world, laws do not guarantee women the same rights as men. Access to education, health and the labour market is sometimes conditioned by the authorisation of the husband or another male family member (Pathak et al. 2013).

Informal institutions, such as the family, unwritten social norms also greatly affect women's empowerment. They often contribute to restricting women's access to certain resources such as land (Ellé, 2022). Access to inheritance, for example, in several families, even when laws require an equal distribution of inheritance between women and men, remains limited to men. Women in these situations do not necessarily seek justice for fear of exclusion by the group (Carneiro, 2004; Ansoms & Holvoet, 2007; Bouchama et al. 2018; Ikpeze & Onyenirionwu, 2021).

Another obstacle to women's empowerment is the presence of security crises. Webster et al. (2019) explain that during wars, a new gender hierarchy emerges. Men, the majority in the military corps, dictate the law with their weapons. Under cover of security reasons, they question the laws in place and abuse their powers.

To overcome these various difficulties they face, women can resort to corruption. For example, to start a business, they can use corruption to move their files faster, avoid certain expenses vis-à-vis public authorities, or to pay less taxes. They may also use bribery to gain access to inheritance by paying themselves favours with certain family members or local authorities. Similarly, to evolve in the political scene, they can use corruption, and

nepotism to gain access to positions that are inaccessible to them. Stockemer & Sundström (2019) believe that this type of practice may be especially necessary in autocracies. However, if this practice is beneficial for the person who uses it, by facilitating his empowerment, does it significantly reduce the gap between men and women?

The literature is not unanimous on it. The likely benefits of corruption in gender inequalities are not accepted by all the literature. Indeed, some of the literature suggests that women are more recent in several activities, which were not open to them in the past, so they have less often had opportunities to make use of corruption (Rivas, 2012). Thus, if it is necessary to resort to corruption to gain any advantage, men will emerge victorious. Still in this vein, the work of Frank et al. (2011) explain that women's fraudulent contracts are more likely to fail, because they are more likely than men to break such contracts, not out of honesty but rather due to a lack of opportunism. Another argument present in the literature is that of "fairer sex" (Sung, 2012). Women would simply be more honest. Putting corruption into the equation in this case would only be pejorative for her. This theory of the "fairer sex" is opposed to that of a "fairer system". Indeed, according to this theory, an economy that facilitates women's empowerment is an economy where institutions are of better quality. It is an economy where institutions are already able to allocate resources efficiently. In this case, it is not women who are more honest, but simply institutions that are stronger (Sung, 2012). In this case too, corruption does not serve women, but it is an improvement in the quality of institutions that goes from being done with women's empowerment to reduce gender inequalities. This study focuses on the case of Sub-Saharan Africa, where gender inequalities and corruption are quite present. For women in this region, resorting to corruption may sometimes be the only way to overcome certain barriers.

However, the validity of this practice is questionable. If it succeeds in helping a woman, can she generate beneficial seeding for a significant reduction in gender inequalities? One of the important elements in reducing gender inequalities is that the empowerment of some serve as examples for others who follow the movement (Duflo, 2012). Doesn't this aspect of example to follow dissipate in this case? Moreover, don't these women become under the domination of those they have corrupted, who can put pressure on them, either to denounce them or to break their agreements? The following empirical analysis provides answers to these questions. The analysis focuses specifically

on the perception of corruption, rather than the actual level of corruption, as individuals base their choices on the perception they have. Moreover, the perception of corruption enables a comparison between countries.

3. Methodology

This section first presents the choice of variables and then the model and estimation method.

3.1. Choice of variables

Gender inequalities are measured by the Gender Inequality Index from UNDP (2022). It is an index between 0 and 1. The closer the index is to 1, the greater the gap between men and women. Women's empowerment is measured by three groups of variables. A first group of variables focuses on economic empowerment. This is a dummy variable which takes the value 1 if women in the country considered on date t can legally set up an enterprise on the same basis as men and 0 otherwise; women's self-employment as a percentage of total employment; procedural costs as a percentage of the gross national income of the creation of a business by women; the time it takes for women to start a business, the number of procedures women face to set up a business.

To this is added a dummy variable which takes the value 1 if women in the country considered at date t can obtain a job on the same basis as men and 0 otherwise, the percentage of female employees in female employment. Finally, in this first group of variables, two dummy variables are added. A first dummy variable which takes the value 1 if in the country considered on date t , women can open a bank account in the same way as men and 0 otherwise. The second dummy variable takes the value 1 if in the country concerned at date t , the law prohibits discrimination based on gender in the granting of credits and 0 otherwise. Here, economic empowerment is approached from three aspects, the first subgroup of variables addresses the entrepreneurship aspect, considering the costs, time, and bureaucracy that women can face. The second subgroup focuses on wage employment, while the third focuses on financial inclusion. Data on these variables come from the World Bank (2022a). Added to this is an economic empowerment index proposed by Cingraneli et al. (2018). This index takes four values: the value 0 for the country considered at a date t , if the law does not guarantee economic empowerment to

women; the value 1, when the legislation goes in this direction but is not effective in practice; the value 2 when it is effective but sporadically and the value 3 when the legislation ensures women's economic empowerment and that this is true in practice.

A second group of variables that focuses on social empowerment. It is about women's access to education and inheritance. In terms of education, World Bank data (2022a) can mobilise women's primary, secondary and university enrolment rates. The inheritance is captured by a dummy variable that takes the value 1 if the right to inheritance is the same for children regardless of their sex. Data on this variable also come from the World Bank (2022a). Due to a lack of data, the social empowerment index proposed by Cingranelli et al. (2018) is not included here.

A third group of variables that captures political empowerment. Let be the index of political empowerment proposed by Cingranelli et al. (2018), whose values follow the same principles as the Economic Empowerment Index. Then, thanks to data from the World Bank (2022a), the percentage of women in parliaments of the countries in the sample.

According to Bello y Villarino (2021), there are two main families of corruption measures: objective measures, and subjective measures. Despite the concerns raised by studies such as that by Razafindrakoto & Roubaud (2010), this study chose subjective measures, in particular Government Integrity, and the CCWGI, primarily because of the availability and accessibility of the data. These are the measures whose data are freely accessible and available throughout the duration of the studies. This is ideal for a study covering several countries and several years, particularly in Sub-Saharan Africa, where data is often scarce. Then, among the subjective measures, the CCWGI and Government Integrity were chosen for two reasons. Firstly, the availability and comparability of the data. Of the two measures mentioned by Bello y Villarino (2021), namely CCWGI and Transparency International's Perception Corruption Index (CPI), we have chosen CCWGI. Since there was a change in methodology in 2012, it is difficult to conduct a study using this index for a period prior to 2012.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Source
Index of women economic empowerment	704	0.8792614	0.6540575	0	3	Cingranelli et al. (2018)
Index of women political empowerment	700	2.08	0.4686449	0	3	Cingranelli et al. (2018)
Government Integrity	849	29.37903	10.94169	10	67.9	Heritage Foundation
CCWGI	900	-0.5934299	0.6305758	-1.627693	1.633352	World Bank (2022b)
Gender Inequality Index	801	0.5895668	0.0783912	0.344	0.788	PNUD
Parliament	817	18.46246	11.84169	0	63.75	World Bank (2022a)
Cost of start-up procedure (% of GNI per capita)	733	113.8557	182.019	0	1540.2	World Bank (2022a)
School enrollment, primary (% gross)	658	99.60169	22.27374	32.02143	151.3142	World Bank (2022a)
School enrollment, secondary, female (% gross)	478	43.95755	26.28104	4.94572	112.8249	World Bank (2022a)
School enrollment, tertiary (% gross)	445	7.789832	8.921171	0.17145	52.60554	World Bank (2022a)
Self-employed (% of female employment)	792	77.7423	21.90712	11.82	99.29	World Bank (2022a)
Procedures	733	9.365293	3.176704	3	18	World Bank (2022a)
Time	733	40.81022	39.46731	2.5	261	World Bank (2022a)
Wage and salaried workers (% of female employment)	792	22.25874	21.90702	0.71	88.18	World Bank (2022a)
Credit	900	.8066667	.3951317	0	1	World Bank (2022a)
Employment	900	.7377778	.4400874	0	1	World Bank (2022a)
Inheritance	900	.7244444	.4470422	0	1	World Bank (2022a)
Bank	900	.8755556	.3302714	0	1	World Bank (2022a)
A woman can register a business	900	.92	.271444	0	1	World Bank (2022a)
GDP per capita	714	2125.293	2833.431	255.1003	15684.11	World Bank (2022c)
Remittances	670	3.331471	5.692365	0	50.10189	World Bank (2022c)
Political stability	720	-.4552056	.8434111	-2.699193	1.201015	World Bank (2022c)

Source: Authors, from Stata. CCWGI = Index of corruption provide by Worldwide Governance Indicators. Parliament = Proportion of seats held by women in national parliaments (%); Procedures = Start-up procedures to register a business; Time = Time required to start a business.

We added the Government Integrity index because it offers a more global view. It is a measure that considers the ICC, the CCWGI and Bribery Risk. The Heritage Foundation adjusted its calculations to take account of the change in ICC methodology in 2012. Thus, although Government Integrity and CCWGI belong to the same group of indices and are based on perception, they provide complementary information. Although these measures are not perfect, as Bello y Villarino (2021) explains, they remain good proxies. Furthermore, the fact that these indices are based on perception is interesting in a study such as this, because several studies show that women and men do not perceive corruption in the same way and each one base their decisions on their perception. This is the case, for example, with the work of Bauhr & Charron (2020), Transparency International (2018), Zúñiga (2018), Frank et al. (2011), or Bowman & Giligan (2008). For example, Bauhr & Charron (2020) talk about Need and Greed. For women, the use of corruption is seen as a necessity to get out of poverty, whereas for men it is just a way of gaining more power or keeping control over others. This measure is also interesting for this study, because corruption can be perceived differently from one country to another, depending on the specific characteristics of that country. As this study covers several countries, we have opted for this type of corruption rather than the actual level. The CCWGI provided by the World Bank (2022b). It is an index is between -2.5 and 2.5. The higher the index, the less corrupt the public sector is. Added to this is the variable Government Integrity which comes from Heritage Foundation (2022). This index ranges from 0 to 100. The closer the value is to 100, the more honest the government is.

Finally, we control the model by real GDP per capita, migrant remittances and political stability. These variables allow us to consider the economic and political environment in which the study takes place. The study covers 45 countries in Sub-Saharan Africa. Data range from 2002 to 2021. The starting point is 2002 because this is the year that CCWGI data become regular per year. Nevertheless, the data provided by Cingraneli et al. (2018) are limited to 2017, so whenever these indices are mobilised, the study period is 2002-2017.

3.2. Estimation model and method

This study draws on the approach of Ngonu's (2021) work, which determines how women's self-employment affects the relationship between women's empowerment and

income inequality in Sub-Saharan Africa. This study takes this approach by focusing instead on how corruption affects the relationship between women's empowerment and gender inequalities. When analysing panel data, the persistence of specific individual effects over time cannot be overlooked. But as Angrist & Pischke (2009) explain, taking account of lags in the dependent variable can also be relevant. For example, people who suffer from gender inequalities may be those most targeted by anti-corruption programs such as surveys of their perceptions of corruption. For Angrist & Pischke (2009), rather than choosing between the two specifications, it is better to opt for a specification that takes both aspects into account. Either,

$$\begin{aligned}
 \text{Gender inequality}_{i,t} = & n_i + \beta_0 \text{Gender inequality}_{i,t-h} + \\
 & \beta_1 \text{index of economic empowerment}_{i,t} + \\
 & \beta_2 \text{index of political empowerment}_{i,t} + \beta_3 \text{self - employment}_{i,t} + \\
 & \beta_4 \text{register business}_{i,t} + \beta_5 \text{cost}_{i,t} + \beta_6 \text{time}_{i,t} + \beta_7 \text{procedure}_{i,t} + \\
 & \beta_8 \text{wage worker}_{i,t} + \beta_9 \text{employment}_{i,t} + \beta_{10} \text{bank}_{i,t} + \beta_{11} \text{credit}_{i,t} + \\
 & \beta_{12} \text{ccwgi}_{i,t} + \beta_{13} \text{government integrity}_{i,t} + \beta_{14} \text{GDP per capita}_{i,t} + \\
 & \beta_{15} \text{Remittances}_{i,t} + \beta_{16} \text{Political stability}_{i,t} + \alpha_j \text{ccwgi}_{i,t} * X_{i,t} + \\
 & \gamma_j \text{government integrity}_{i,t} * X_{i,t} + n_t + \varepsilon_{i,t} \quad (1)
 \end{aligned}$$

With $i = 1, \dots, 45$ representing the individual dimension, $t = 2002, \dots, 2021$ the temporal dimension, and $X_{i,t}$ the vector of the empowerment variables. These include, index of economic empowerment, index of political empowerment, self-employment, register business, cost, time, procedure, wage worker, employment, bank, and credit. β_p with $p = 1, \dots, 16$, α_j and γ_j with $j = 1, \dots, 11$ are coefficients to be estimated. $\varepsilon_{i,t}$ is the error term, n_t and n_i represent temporal and individual effects respectively.

First, we look for the optimal lag of the dependent variable, i.e. the optimal h . To do this, we regress the dependent variable on itself. After a unit root test, we proceed to the optimal delay test. The regression associated with this test can be found in the appendix (see Table A.1.). The various information criteria reveal that the optimal lag of the dependent variable, gender inequalities, is $h = 1$. Either,

$$\begin{aligned}
\text{Gender inequality}_{i,t} = & n_i + \beta_0 \text{Gender inequality}_{i,t-1} + \\
& \beta_1 \text{index of economic empowerment}_{i,t} + \\
& \beta_2 \text{index of political empowerment}_{i,t} + \beta_3 \text{self - employment}_{i,t} + \\
& \beta_4 \text{register business}_{i,t} + \beta_5 \text{cost}_{i,t} + \beta_6 \text{time}_{i,t} + \beta_7 \text{procedure}_{i,t} + \\
& \beta_8 \text{wage worker}_{i,t} + \beta_9 \text{employment}_{i,t} + \beta_{10} \text{bank}_{i,t} + \beta_{11} \text{credit}_{i,t} + \\
& \beta_{12} \text{ccwgi}_{i,t} + \beta_{13} \text{government integrity}_{i,t} + \beta_{14} \text{GDP per capita}_{i,t} + \\
& \beta_{15} \text{Remittances}_{i,t} + \beta_{16} \text{Political stability}_{i,t} + \alpha_j \text{ccwgi}_{i,t} * X_{i,t} + \\
& \gamma_j \text{government integrity}_{i,t} * X_{i,t} + n_t + \varepsilon_{i,t} \quad (2)
\end{aligned}$$

Table 2. Unit root test

Method	Probabilities
Null: Unit root (assumes common unit root process)	
Levin, Lin & Chu t*	0.0000
Breitung t-stat	0.9695
Null: Unit root (assumes individual unit root process)	
Im, Pesaran and Shin W-stat	0.0017
ADF - Fisher Chi-square	0.0002
PP - Fisher Chi-square	0.0225

Source: Authors, from EViews.

Table 3. Lag selection

Lag	AIC	SC	HQ
0	-2.310934	-2.303937	-2.308218
1	-6.608863*	-6.594870*	-6.603430*
2	-6.607072	-6.586083	-6.598923
3	-6.606841	-6.578855	-6.595976
4	-6.603710	-6.568727	-6.590128

Source: Authors, from EViews AIC: Akaike Information Criterion; SC: Schwarz Criterion; HQ: Hannan Quinn

However, this challenges the assumption of exogeneity. Indeed, in this case, the error term, and the first-order lag of the dependent variable are correlated, since in the first-order lag of the dependent variable is the first-order lag of the error term. This endogeneity bias affects the quality of results. To overcome this situation, this study uses the system estimator of the generalised method of moments proposed by Arellano & Bover (1995) and Blundell & Bond (1998). For this purpose, only the temporal variables are considered strictly exogenous. They are used as instruments, with the equation in difference, i.e. $iv(\text{years}, eq(\text{diff}))$. However, Angrist & Pischke (2009) explain that for this method to be consistent, the error term must not be correlated with the first difference of our equation. But this condition is not met in all cases. The difficulty in finding a correct estimation method for a model that mobilises both the fixed effects and the lags of the dependent variable can again lead to the problem of choosing between two models that consider them separately. For Angrist & Pischke (2009), these two models should be considered as bounds on the causal effect being sought. This has two consequences for this study. Firstly, for the results with the GMM method, the AR(2) test must be insignificant in each case. the test of Arellano & Bond (1991) makes it possible to test at the threshold of 10% the null hypothesis of absence of autocorrelation of the error terms at order 2 of the equation in difference (AR(2)). Secondly then the estimates of the fixed effects without and with lags are added to our estimates to complete our analysis.¹

Several other tests are carried out to ensure the consistency of the results. First, the robustness of the instruments used. To perform this test, Hansen's statistic is used. This statistic tests at the 10% threshold the null hypothesis of robustness of the instruments if there is no proliferation of the instruments. To avoid this proliferation of instruments, the extension of GMMs into a system proposed by Roodman (2009a, 2009b) is used to estimate the model. In particular, the two-step estimator since the latter has the advantage of dealing with heteroscedasticity problems. Another important test is the restrictive exclusion process. The Hansen difference test makes it possible to test at the 10% threshold the null hypothesis of a correct choice of strictly exogenous variables and endogenous variables.

¹ The results of these regressions are not reproduced here, as they did not yield any interesting results, but they were passed on to the evaluator during the process of evaluating the article.

4. Discussion of results

This section is divided into two parts. First, a descriptive analysis, followed by a multivariate analysis.

4.1. Descriptive analysis

The results show that the indicators of empowerment and control of corruption are negatively correlated with the gender inequality index. Even the Time and Cost variables, which show positive signs, confirm this result.

Table 4. Correlation matrix

Variables	GII	Government Integrity	CCWGI
GII	1.000		
Government Integrity	-0.642	1.000	
CCWGI	-0.620	0.810	1.000
Index of women economic empowerment	-0.2418	0.2588	0.2975
Index of women political empowerment	-0.3828	0.1007	0.1362
Bank	-0.068	0.204	0.197
A woman can register a business	-0.039	0.105	0.101
Cost of start-up procedure	0.379	-0.416	-0.346
Parliament	-0.619	0.225	0.240
School enrollment, primary	-0.505	0.235	0.270
School enrollment, secondary	-0.740	0.720	0.682
School enrollment, tertiary	-0.719	0.645	0.558
Self-employment	0.686	-0.664	-0.619
Inheritance	-0.039	-0.041	-0.091
Procedures	0.202	-0.268	-0.179
Credit	-0.257	0.239	0.283
Employment	-0.239	0.057	0.031
Time	0.159	-0.179	-0.131
Wage and salaried workers (% of female employment)	-0.686	0.664	0.619
GDP per capita	-0.231	0.115	0.100
Remittances	0.015	0.042	-0.023
Political stability	-0.168	0.208	0.151

Source: Authors, from Stata. We have only carried forward part of the results. The part we need for our interpretations.

This means that their downward trend is correlated with a decline in gender inequality. This matrix also shows that real GDP per capita and political stability are negatively correlated with gender inequality. Only remittances are positively correlated with gender inequality. These initial results, which only describe correlations and not probable effects, nevertheless suggest that empowering women is conducive to reducing gender inequalities. By gaining access to human capital, financial services, inheritance and the labour market, women are reducing the gap between themselves and men. However, this initial descriptive analysis needs to be supplemented by a more interesting analysis. This is the subject of the next section.

4.2. Multivariate analysis

For the multivariate analysis, we start by estimating the interactions and then look for the existence of probable thresholds.

4.2.1. Results with interactions

Tables 3 to 5 show that the dependent variable is persistent because the estimated coefficients of its lagged value of order 1 are greater than the threshold of 0.800 (Tchamyu, 2020). They also show that there is no proliferation of instruments, which makes the Hansen test valid. And the probabilities of the latter are all greater than 10%, which means that the instruments used are valid. Hansen's difference test also validates the exclusive restriction process. Finally, the test of Arellano & Bond (1991) shows that there is no autocorrelation of the error terms of the equation in difference to order 2.

Table 5. Results for economic empowerment (I)

	CCWGI	GOV	CCWGI	GOV	CCWGI	GOV	CCWGI	GOV	CCWGI	GOV
L.GII	0.908*** (0.00852)	0.973*** (0.0248)	0.876*** (0.0196)	0.944*** (0.0349)	0.895*** (0.0410)	0.838*** (0.0258)	0.912*** (0.0182)	0.909*** (0.0625)	0.983*** (0.0124)	0.931*** (0.0323)
GDP per capita	0.000111 (0.00134)	0.000800 (0.00238)	-5.83e-05 (0.00190)	-0.000597 (0.00185)	-0.000619 (0.00198)	0.00199 (0.00142)	-0.000914 (0.000988)	0.00345 (0.00234)	-0.000328 (0.00211)	-0.000987 (0.00518)
Remittances	-3.49e-05 (0.000141)	-0.000621*** (0.000159)	0.000126 (0.000227)	-0.00108*** (0.000344)	- (0.000131)	- (0.000106)	-2.96e-05 (0.000141)	- (0.000235)	- (6.92e-05)	- (0.000268)
Political Stability	-0.00244 (0.00187)	0.00384 (0.00259)	-0.00212 (0.00281)	-0.00278 (0.00390)	0.00245 (0.00293)	0.00230 (0.00286)	0.000765 (0.00179)	-0.00855** (0.00388)	-0.00549*** (0.00122)	-0.00811* (0.00413)
Corruption	0.0146*** (0.00502)	0.000574** (0.000275)	-0.00424 (0.00604)	9.09e-05 (0.000274)	0.00967* (0.00559)	0.00145*** (0.000438)	0.0174*** (0.00628)	0.00152* (0.000764)	0.00777*** (0.00182)	0.000680** (0.000320)
Wage and salaried workers	-0.000340*** (9.01e-05)	0.000759 (0.000458)								
Corruption*Wage and salaried workers	-0.000527*** (0.000129)	-1.71e-05* (9.93e-06)								
Employment			-0.0116** (0.00525)	0.00150 (0.0113)						
Corruption*Employment			-0.0123* (0.00716)	0.000128 (0.000384)						
Bank					-0.00423 (0.00970)	0.0185 (0.0147)				
Corruption*Bank					-0.00938* (0.00519)	-0.00114** (0.000504)				
Credit							-0.00878* (0.00436)	0.0297 (0.0191)		
Corruption*Credit							- 0.0265*** (0.00890)	-0.00137** (0.000635)		
Index of women economic empowerment									-0.00441*** (0.000726)	0.00818 (0.00491)

Corruption*Index of women economic empowerment									-0.00563*** (0.00162)	-0.000317** (0.000136)
C	0.0628*** (0.0106)	-0.0111 (0.0302)	0.0690*** (0.0196)	0.0293 (0.0324)	0.0695** (0.0279)	0.0509** (0.0209)	0.0613*** (0.0150)	-0.0122 (0.0620)	0.0117 (0.0213)	0.0245 (0.0472)
Study period	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2017	2002-2017
Countries	33	33	33	33	33	33	33	33	40	40
Obs	504	491	565	552	565	552	565	552	569	551
ar1p	0.000590	0.00163	0.000356	0.000801	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ar2p	0.601	0.213	0.924	0.247	0.000775	0.00101	0.000271	0.00111	0.007	0.001
F_p	0.0000	0.0000	0.0000	0.0000	0.526	0.210	0.658	0.443	0.504	0.330
sarganp	0.0700	0.680	0.177	0.635	0.0692	0.277	0.323	0.596	0.119	0.0166
hansenp	0.630	0.783	0.472	0.908	0.490	0.907	0.377	0.733	0.257	0.429
Instruments	27	28	22	23	22	29	29	19	38	31

Source: Authors, from Stata. Standard deviations in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. CCWGI = Index of corruption provide by Worldwide Governance Indicators; GOV = Government Integrity; Employment The law prohibits discrimination in employment based on gender (1=yes; 0=no); Bank = A woman can open a bank account in the same way as a man (1=yes; 0=no); Credit = The law prohibits discrimination in access to credit based on gender (1=yes; 0=no); GDP per capita is taken as logarithm

However, it should be noted that these two tests, Hansen's and AR(2), relate to the validity of the instruments but are less relevant to the quality of the empirical specification used in this study. Indeed, the work of Wintoki [... et al.] (2012) has shown that the Hansen test is not very effective in rejecting results when the empirical specification is not good if the sample size is not large. Ideally, this means more than 1000 observations. The AR(2) test, on the other hand, is not at all effective, even with a larger sample size. So, the validity of our tests does not rule out the possibility that the specification used is not the most correct.

About the estimated coefficients, the results of tables 2 to 5 show that increased control of corruption accentuates gender inequalities. This result is true for both CCWGI and government integrity. However, for the different aspects of women's empowerment, as well as the indices that are syntheses of them, the results are negative and significant when corruption is measured by CCWGI. However, the interactions between the different aspects of women's empowerment and the measures of corruption show negative and significant signs except for the employment variable whose estimated coefficients are not significant.

These findings mean that the proliferation of corruption prevents women's economic empowerment from reducing gender inequalities in the region. Women therefore benefit little from the corruption that plagues the countries of the region. One explanation can be that given by Rivas (2012) who explains that women are more recent in the labour market, in the financial market, in the political scene and others. As a result, in countries where corruption is rife, men who are more accustomed to the economic sphere, have more contacts, more resources can benefit better. This would not lead to a decrease in gender inequalities but to an increase, even if society gives women the opportunity to participate in the same economic, social, and political activities as men.

Table 6. Results for economic empowerment (II)

	CCW GI	GO V	CCW GI	GOV	CCW GI	GOV	CCW GI	GOV	CCW GI	GOV
L.GII	0.902 *** (0.023 9)	0.836 *** (0.05 22)	0.874 *** (0.02 19)	0.903* ** (0.017 5)	1.074* ** (0.034 9)	1.020 *** (0.02 65)	0.924 *** (0.01 46)	1.094 *** (0.039 3)	0.919 *** (0.04 83)	0.994* ** (0.030 5)
GDP per capita	5.80e- 05 (0.000 965)	- 0.013 3*** (0.00 469)	4.27e -05 (0.00 104)	0.0059 6*** (0.001 57)	0.0031 9 (0.001 91)	0.001 96 (0.00 198)	0.000 558 (0.00 0585)	- 0.003 01 (0.004 10)	- 0.000 753 (0.00 261)	0.0030 3 (0.001 86)
Remittances	- 0.000 303* (0.000 174)	- 0.000 394 (0.00 0436)	- 0.000 260* (0.00 0145)	- 0.0001 95 (0.000 172)	- 0.0002 24 (0.000 501)	- 0.000 609* (0.00 0346)	8.83e -05 (6.98 e-05)	- 0.001 19*** (0.000 432)	- 0.000 270 (0.00 0307)	- 0.0006 31*** (0.000 182)
Political Stability	0.001 47 (0.002 63)	0.010 0 (0.00 613)	0.003 83 (0.00 229)	- 0.0096 4*** (0.002 53)	- 0.0061 3** (0.002 82)	- 0.003 79 (0.00 370)	0.001 32 (0.00 0895)	- 0.000 495 (0.003 94)	0.004 68 (0.00 417)	- 0.0072 5** (0.003 09)
Corruption	0.033 1* (0.017 6)	0.002 65* (0.00 143)	0.018 7** (0.00 789)	0.0011 1*** (0.000 165)	0.0049 5 (0.006 79)	0.000 311 (0.00 0246)	- 0.002 54 (0.00 228)	0.002 17** (0.000 793)	0.042 0** (0.01 81)	0.0009 69 (0.001 11)
Self- employed	- 0.000 364* (0.000 188)	0.001 21 (0.00 0733)								
Corruption*S elf-employed	- 0.000 446** (0.000 193)	- 3.32e -05* (1.89 e-05)								
Register			- 0.010 1 (0.00 632)	0.0188 (0.015 8)						
Corruption*R egister			- 0.015 4** (0.00 651)	- 0.0008 40*** (0.000 240)						
Cost					- 0.0001 27*** (4.50e- 05)	7.70e- 05 (5.09e- 05)				
Corruption*C ost					-8.49e- 05** (3.67e- 05)	- 6.00e- 06** (2.42e- 06)				
Time							- 0.000 481	0.005 92		

							(0.00 0541)	(0.005 37)		
Corruption*Time							- 0.001 25* (0.00 0630)	- 0.000 370** (0.000 149)		
Procedures									- 0.021 3** (0.00 923)	0.0018 8 (0.009 69)
Corruption*Procedures									- 0.023 3*** (0.00 739)	- 0.0004 53 (0.000 468)
C	0.079 7*** (0.016 3)	0.093 1* (0.05 34)	0.083 7*** (0.01 70)	- 0.0198 * (0.011 6)	- 0.0644 ** (0.027 6)	- 0.032 8 (0.02 52)	0.034 7*** (0.00 949)	- 0.083 9 (0.064 4)	0.092 2*** (0.03 26)	- 0.0271 (0.046 8)
Study period	2002- 2021	2002- 2021	2002- 2021	2002- 2021	2002- 2021	2002- 2021	2002 - 2021	2002- 2021	2002- 2021	2002- 2021
Countries	33	33	33	33	33	33	33	33	33	33
Obs	504	491	565	552	484	475	484	475	484	475
F_p	0.000 0	0.000 0	0.000 0	0.0000	0.0000	0.000 0	0.000 0	0.000 0	0.000 0	0.0000
ar1p	0.000 877	0.002 72	0.000 698	0.0008 66	0.0015 2	0.002 19	0.001 24	0.004 70	0.001 33	0.0013 8
ar2p	0.649	0.225	0.491	0.444	0.242	0.167	0.399	0.223	0.423	0.220
sarganp	0.794	0.297	0.449	0.441	0.265	0.530	0.541	0.797	0.479	0.958
hansenp	0.282	0.526	0.899	0.546	0.224	0.579	0.665	0.679	0.373	0.375
Instruments	27	19	30	32	20	23	29	23	29	30

Source: Authors, from Stata. Standard deviations in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. CCWGI = Index of corruption provide by Worldwide Governance Indicators; GOV = Government Integrity; Procedures = Start-up procedures to register a business; Time = Time required to start a business; Register = A woman can register a business in the same way as a man (1=yes; 0=no). Time, Procedures and GDP per capita are taken as logarithms.

About self-employment, Table 4 reveals that the increase in the number of procedures and the costs of these procedures accentuate gender inequalities in Sub-Saharan Africa. This necessarily handicaps the self-employment of women in the region. The more expensive, and cumbersome procedures it takes, the fewer women can afford.

The results also show self-employment that struggles to significantly reduce gender inequalities. Table 4 shows that the percentage of women's self-employment, and the dummy variable that indicates whether women can start a business in the same way as men, rarely show a negative and significant sign. Indeed, the results show that the rise in corruption prevents self-employment from significantly reducing gender inequalities in Sub-Saharan Africa.

This translates into a negative and significant sign of the interaction between corruption and self-employment. This shows that women's access to the various economic spheres of society must be accompanied by a fight against corruption. Otherwise, women's economic empowerment will manifest itself, as is already the case in these countries, in a rush of women into the informal sector both in terms of jobs and the use of financial services.

Table 7. Results of social empowerment and political empowerment

	Social empowerment	Political empowerment										
	CC WG I	GO V	CC WG I	GO V	CC WG I	GO V	CC WG I	GO V	CC WG I	GO V	CC WG I	GO V
L.GII	1.003*** (0.0146)	0.951*** (0.0346)	0.960*** (0.0570)	0.933*** (0.0402)	1.019*** (0.0578)	1.023*** (0.0412)	0.884*** (0.0240)	0.906*** (0.0145)	0.799*** (0.0531)	0.868*** (0.0212)	0.883*** (0.0156)	0.901*** (0.0190)
GDP per capita	0.000443 (0.000959)	-0.00361** (0.00155)	0.00462 (0.00301)	-0.000576 (0.00212)	0.00931*** (0.00191)	-0.000726 (0.00324)	-0.000937 (0.00113)	-0.00090*** (0.000838)	0.00300 (0.00279)	0.00151 (0.000982)	-0.00687* (0.00306)	-0.00571* (0.00253)
Remittances	-0.000359** (7.54e-05)	0.000139 (9.07e-05)	-4.76e-05 (0.000420)	5.32e-05 (0.000135)	-0.000285 (0.000325)	0.000117 (0.000431)	-0.000513** (0.000191)	-0.000156** (5.75e-05)	-0.000123 (0.000224)	-6.56e-05 (9.48e-05)	-0.000195** (8.51e-05)	-0.000105 (0.000125)
Political Stability	-0.000173 (0.00201)	-0.00035 (0.00185)	-0.00034 (0.00544)	0.000451 (0.00266)	-0.00074* (0.00378)	0.0014 (0.00513)	-0.00110 (0.00145)	-0.00103 (0.00131)	-0.00593* (0.00340)	-0.00524* (0.00153)	-0.00713* (0.00215)	-0.00103 (0.00139)
Corruption	0.0511*** (0.0155)	0.000718* (0.000416)	0.0399** (0.0195)	0.000898** (0.000273)	0.0318*** (0.0101)	0.000826** (0.000396)	0.00242 (0.00435)	0.000512** (0.000123)	0.0202 (0.0133)	0.000394*** (0.000128)	0.0288** (0.000784)	0.00108** (0.000313)
School enrollment, primary	-0.000241** (0.000116)	0.000159 (0.000106)										
Corruption* School enrollment, primary	-0.000564** (0.000134)	-9.07e-06** (3.88e-06)										
School enrollment, secondary			-0.000515** (0.000226)	0.000148 (9.64e-05)								

Corruption* School enrollment, secondary			-0.000861** (0.000341)	-1.04e-05*** (3.32e-06)								
School enrollment, tertiary					6.51e-05 (0.000530)	0.00126 (0.000880)						
Corruption* School enrollment, tertiary					-0.00310*** (0.000845)	-4.07e-05** (1.72e-05)						
Inheritance							-0.0143** (0.00603)	-0.00631 (0.00456)				
Corruption* Inheritance							-0.0170* (0.00951)	-0.000428** (0.00152)				
Parliament									-0.00103* (0.000541)	-0.000341** (0.000162)		
Corruption* Parliament									-0.000899** (0.000418)	-9.92e-06** (3.69e-06)		
Index of political empowerment											-0.0157** (0.00301)	0.00707 (0.00484)
Corruption* Index of political empowerment											-0.0132** (0.00235)	-0.000372** (0.000161)
C	0.0159 (0.0153)	0.0393** (0.0150)	0.0166 (0.0455)	0.0207 (0.0423)	-0.0711* (0.0381)	-0.0370 (0.0450)	0.0771*** (0.0210)	0.0710*** (0.0142)	0.114*** (0.0370)	0.0610** (0.0154)	0.145*** (0.0287)	0.0710** (0.0303)
Study period	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2021	2002-2017	2002-2017

Countries	33	33	31	31	32	32	33	33	33	33	40	40
Observations	417	409	329	323	303	301	565	552	512	499	565	547
F _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ar1p	0.00350	0.00674	0.00671	0.0169	0.0135	0.0347	0.000350	0.000618	0.00690	0.00489	0.004	0.000
ar2p	0.383	0.458	0.167	0.210	0.190	0.434	0.571	0.320	0.814	0.420	0.475	0.473
sarganp	0.554	0.910	0.520	0.166	0.783	0.420	0.918	0.870	0.255	0.00558	0.0119	0.290
hansenp	0.681	0.349	0.719	0.460	0.259	0.370	0.860	0.756	0.642	0.552	0.396	0.448
Instruments	30	32	23	27	21	19	33	33	20	29	37	36

Source: Authors, from Stata. Standard deviations in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. CCWGI = Index of corruption provide by Worldwide Governance Indicators; GOV = Government Integrity; Inheritance = Sons and daughters have equal rights to inherit assets from their parents (1=yes; 0=no); Parliament = Proportion of seats held by women in national parliaments (%). GDP per capita is taken as logarithm.

Due to lack of data, the women's social empowerment index proposed by Cingranelli et al. (2018) was not used. However, two aspects are addressed. Women's access to education and inheritance. The results in Table 5 show that the interactions between measures of education and inheritance and those of corruption show negative and significant signs. While education provides women with better access to the labour market, financial services, and even the political sphere, it may become of low importance when corruption is widespread enough in society. This is the result found by Ngono (2022), namely that in the presence of corruption, education loses its preponderant role in access to the labour market. This situation can lead to an accumulation of women graduates but without employment and access to financial services. About inheritance, women's right to inheritance could be violated.

When corruption is rife, other family members can bribe local authorities to obtain decisions to the detriment of women. Thus, even when they are legitimate heirs, they can be relieved of this right due to strong institutions. This also affects access to self-employment and financial services. The inheritance can be used as collateral to obtain a loan and in case of refusal of the loan, it can be a subsidiary source of financing. Corruption is therefore a significant obstacle to the beneficial effects of women's social empowerment on gender inequalities.

The results in Table 5 also show that women's political empowerment has perverse effects on gender inequalities when accompanied by corruption. This result is true for the political empowerment index and particularly for the percentage of women present in the national parliaments of these countries. Appointments to governments, for example, are sometimes motivated by the ability of nominees to act in favour of those who nominate them. Nepotism can therefore play a significant role in removing women from important positions in government. Similarly, in Sub-Saharan Africa, candidates presented by political parties in elections are often not appointed after internal elections. Therefore, it opens the possibility of using nepotism and/or bribery, to be the representative of the party in each election. Also, if the hypothesis of more honest women is considered, it is interesting to think that political parties that want to use their members in various important positions for their personal needs, may be less inclined to put women forward. Women's political empowerment in Sub-Saharan Africa can therefore only play

its full role in reducing gender inequalities if it is accompanied by strong institutions capable of significantly combating corruption.

4.2.2. Threshold analysis

Since the fight against corruption accentuates the effects of empowerment in the reduction of gender inequalities, this study wants to observe whether this cohesion is done in a linear way or there is a threshold from which the control of corruption becomes beneficial. This approach is interesting in that it serves as a point of reference for decision-makers in their policies to combat corruption and gender inequalities. To conduct this analysis, the estimator proposed by Seo & Shin (2016) as well as by Seo et al. (2019). This method uses the method of moments in first differences to estimate equation (2). Two alternatives exist, the first consists in estimating a dynamic panel, the second in estimating a static panel, i.e., removing the first order lag from the dependent variable.

$$y_{i,t} = \alpha y_{i,t-1} + n_i + \theta'_l X_{i,t} I(\text{corruption}_{i,t} \leq \gamma) + \theta'_h X_{i,t} I(\text{corruption}_{i,t} > \gamma) + n_t + \varepsilon_{i,t} \quad (2)$$

The threshold value it's γ , and $X_{i,t}$ represents the vector of the other explanatory variables. Table 6 summarise the results of applying this method to our data. This table shows that the impact of corruption control is non-linear. Except for some static models. Apart from these cases, there are still some findings that draw attention, including those on the percentage of women in parliaments interacting with CCWGI, on dynamic models of women's financial inclusion, on salaried workers in interaction with Government Integrity and on the dynamic model of university enrolment rates.

Indeed, they do not show a negative and significant effect after the corruption control threshold.

Table 8. Threshold estimates

	GII	Low	Thresh old	High	Threshold variables	Boost rap	P- value
	Dynamic						
Economic empowerment	Index of women economic empowerment	0.00386* ** (0.000530)	24.61* ** (2.844)	- 0.00304* ** (0.000756)	Government Integrity	1000	0.000
	Bank	-0.0232 (0.0197)	28.93* ** (2.356)	0.0425** (0.0171)	Government Integrity	1000	0.000
	Credit	0.000433 (0.00115)	- 0.345* ** (0.0800)	0.0336** * (0.00799)	CCWGI	1000	0.000
	Register	0.00906* * (0.00409)	-0.347 (0.265)	0.00972 (0.00727)	CCWGI	1000	0.000
	Self-employment	0.00129* ** (0.000192)	- 0.346* ** (0.0847)	- 0.00137* ** (0.000390)	CCWGI	1000	0.000
	Employment	0.00280* * (0.00117)	- 0.933* ** (0.132)	- 0.00859* ** (0.00138)	CCWGI	1000	0.000
	Wage and salaried workers	- 0.00187* ** (0.000466)	24.62* ** (3.268)	0.00266* ** (0.000393)	Government Integrity	1000	0.000
Political empowerment	Index of women political empowerment	0.0102** * (0.000671)	- 0.378* ** (0.0575)	- 0.0299** * (0.00599)	CCWGI	1000	0.000
	Parliament	- 0.00223* ** (0.000176)	-0.314 (0.470)	- 0.000747 (0.000735)	CCWGI	1000	0.000
Social empowerment	School enrolment, primary	6.25e-05*** (1.90e-05)	28.02* ** (2.942)	- 0.000145 ***	Government Integrity	1000	0.000

				(1.93e-05)			
	School enrolment, secondary	7.50e-05*** (1.89e-05)	-0.366** (0.0901)	-0.000170*** (2.74e-05)	CCWGI	1000	0.000
	School enrolment, tertiary	-0.000524*** (8.48e-05)	31.03** (0.401)	0.000714*** (9.49e-05)	Government Integrity	1000	0.000
	Inheritance	0.00420 (0.00265)	34.01** (2.632)	-0.0207** (0.00772)	Government Integrity	1000	0.000
Static							
Economic empowerment	Index of women economic empowerment	0.0113** (0.00243)	-1.033** (0.129)	-0.0119** (0.00320)	CCWGI	1000	0.944
	Bank	0.204 (0.137)	-0.952** (0.238)	-0.449*** (0.143)	CCWGI	1000	0.000
	Credit	0.000254*** (3.79e-05)	31.21** (2.727)	-0.112*** (0.0333)	Government Integrity	1000	0.000
	Register	0.0302 (0.0802)	31.62** (2.890)	-0.514* (0.273)	Government Integrity	1000	0.000
	Self-employment	0.00386** (0.000343)	31.92** (1.599)	0.000131 (0.000401)	Government Integrity	1000	0.000
	Employment	0.0659** (0.0103)	30.51** (2.161)	-0.189*** (0.0349)	Government Integrity	1000	0.000
	Wage and salaried workers	-0.00316** (0.000229)	-0.891** (0.119)	-0.00321** (0.000321)	CCWGI	1000	0.277
Political empowerment	Index of women political	-0.000563*	31.30** (2.643)	-0.00714**	Government Integrity	1000	0.062

	empowerment	(0.000333)		(0.00196)			
	Parliament	-0.00393** (0.000316)	32.33** (5.329)	0.000400 (0.000442)	Government Integrity	1000	0.000
Social empowerment	School enrolment, primary	-0.000178*** (3.58e-05)	-0.570** (0.179)	0.000402*** (2.93e-05)	CCWGI	1000	0.463
	School enrolment, secondary	0.000254*** (3.79e-05)	32.92** (1.702)	-0.000622*** (6.86e-05)	Government Integrity	1000	0.665
	School enrolment, tertiary	0.00848** (0.00101)	-0.603** (0.0919)	-0.0107** (0.000868)	CCWGI	1000	0.828
	Inheritance	-0.00559 (0.00568)	-0.256** (0.0292)	-0.404*** (0.0612)	CCWGI	1000	0.000

Source: Authors, from Stata. Standard deviations in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. CCWGI = Index of corruption provide by Worldwide Governance Indicators; Parliament = Proportion of seats held by women in national parliaments (%). P-value is the p-value of the linearity test, whose null hypothesis is the rejection of nonlinearity.

However, overall, it appears that there is a threshold of corruption control that changes the effects of women's empowerment on gender inequalities. For the Economic Empowerment Index, Table 6 shows that the threshold is 24.61% Government Integrity. Regarding Political Empowerment Index, it is 31.30% of Government Integrity and with CCWGI it is -0.378. Table 9 shows the financial inclusion aspect of economic empowerment. The thresholds for opening accounts and obtaining loans are higher. Thus, for the opening of accounts, the threshold which makes it possible to derive the beneficial effects is -0.952 of CCWGI. For obtaining the credits, it is 31.21% of Government Integrity. About inheritance, the standardisation of the right to inheritance between women and men becomes beneficial for the reduction of gender inequalities from 34.01% of Government Integrity or -0.254 of CCWGI. For self-employment and employment, these thresholds range from 30.51 and 31.92% for Government Integrity and -0.346 to -0.933. Although Register's threshold for the dynamic model is not significant. For education, we have 28.02% for primary education and -0.366 for secondary education.

Overall, these thresholds suggest that in economies where the control of corruption is still in its infancy, the use of corruption will be an important element for women who want to empower themselves. The impact in terms of reducing gender inequalities could be fictitious and not be significant in time and space.

5. Conclusion

The objective of this study was to determine how perception of corruption affects the relationship between women's empowerment and gender inequality in Sub-Saharan Africa. To achieve this, the analysis was structured in two parts. The first part discussed conducting a review of the existing literature. It emerged that it is not unanimous on the subject. Some of the studies explain that in countries where institutions are not optimal, the use of corruption can make it possible to overcome certain barriers, for example when starting a business or looking for a job. However, empirically, while there are studies that assess the effects of women's empowerment on corruption, few assess the effects of corruption on women's empowerment. Even less, on how corruption affects the relationship between women's empowerment and gender inequality. This is what was done in the second part of this work. To do this, data from the World Bank, UNDP,

Heritage Foundation and Cingranelli et al. (2018) made it possible to apply GMMs in a system first, and Seo & Shin (2016) estimator, on a sample of 45 countries observed between 2002 and 2021 in Sub-Saharan Africa. It found that when women's empowerment is accompanied by increased corruption, gender inequalities increase.

Thus, corruption destroys the virtuous and strong relationship between women's empowerment and the reduction of gender inequalities in the region. This result is more worrying as corruption in these countries is at record levels. It is therefore necessary on the part of the authorities to make greater efforts to reduce this scourge as much as possible. This could result in the establishment of a complaints unit. Such a cell would receive complaints from people who feel they have been side-lined for reasons of corruption or who are themselves forced to corrupt in some situation. To be effective, such a cell requires funding and distance from the government. Ideally, it would be supranational and located in sub-regional or pan-African institution.

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Appendices

Table A.1. Lags regression

Date: 10/09/24 Time: 02:55	
Sample (adjusted): 2004 2021	
Included observations: 719 after adjustments	
Standard errors in () & t-statistics in []	
	GII
GII(-1)	0.937427
	(0.03593)
	[26.0886]
GII(-2)	0.055344
	(0.03587)
	[1.54274]
C	-0.000317
	(0.00287)
	[-0.11047]
R-squared	0.983484
Adj. R-squared	0.983438
Sum sq. resids	0.070406
S.E. equation	0.009916
F-statistic	21317.49
Log likelihood	2298.451
Akaike AIC	-6.385120
Schwarz SC	-6.366019
Mean dependent	0.584715
S.D. dependent	0.077052

Source: Authors, from EViews