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THE IMPACT OF CORRUPTION ON INCOME INEQUALITY: THE ROLE OF THE POLITICAL REGIME

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Abstract:

Increasing evidence points to corruption as a key factor for income inequality. Notwithstanding, there is no unequivocal conclusion about the impact of corruption on income inequality. Regional particularities, with great emphasis on institutional specificities, are found to shape this relationship.

Hence, this dissertation tries to addresses the following research questions: how does corruption impacts income inequality? Are there regional differences in the impact of corruption on income inequality? What is the role of institutions, particularly the political regime, in the corruption-inequality relationship?

In order to reach our goals, we estimate the impact of corruption on income inequality through panel least squares and two-stage panel least squares estimations, considering a sample with 108 countries over the period 1996-2017, globally and allowing for regional dummies. Furthermore, we assess the role of the political regime in determining corruption and interpret its influence on the aforementioned relationship.

Results show that, overall, control of corruption is associated with increasing income inequality, particularly in Asian and Eastern European, while, in Western European and Latin American countries, control of corruption is associated with lower levels of income inequality. Also, more democratic political regimes are found to improve control of corruption.

JEL codes: O12; D63; D73; P16; C23

Keywords: Corruption; Income Inequality; Political Regime

Resumo

A literatura cada vez mais aponta a corrupção como um fator-chave para a desigualdade de rendimentos. Não obstante, não existe um consenso sobre qual o impacto da corrupção na desigualdade de rendimentos. Diferenças entre regiões, enfatizando as especificidades institucionais, tendem a moldar esta relação.

Posto isto, esta dissertação tenta abordar as seguintes questões: como é que a corrupção afeta a distribuição de rendimentos? Existem diferenças regionais no impacto da corrupção sobre a desigualdade de rendimentos? Qual é o papel das instituições, particularmente do regime político, nesta relação?

Portanto, estimamos o impacto da corrupção sobre a desigualdade de rendimentos por meio de estimativas de mínimos quadrados em painel e de mínimos quadrados em painel de dois estágios, considerando uma amostra de 108 países no período 1996-2017, global e regionalmente. Além disso, avaliamos o papel do regime político no controlo de corrupção e interpretamos a sua influência na referida relação.

Os resultados mostram que, de um modo geral, o controlo de corrupção está associado ao aumento da desigualdade de rendimento, especialmente na Ásia e na Europa de Leste, enquanto, nos países da Europa Ocidental e da América Latina, o controlo de corrupção está associado a níveis mais baixos de desigualdade de rendimentos. Além disso, regimes políticos mais democráticos tendem a melhorar o controlo de corrupção.

JEL codes: O12; D63; D73; P16; C23

Palavras-chave: Corrupção; Desigualdade de Rendimentos; Regime Político

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Chapter 1. Introduction

Institutions represent rules and norms that shape repeated human relations (North, 1989), designed to induce order and reduce uncertainty in exchange, constraining the political, social and economic interaction (North, 1991). These can assume a formal nature, such as property rights' protection and the extent of law enforcement, or they can be informal, for instance, traditions and religions (North, 1991).

These rules and norms are enforced by human agents, therefore, they are subject to errors or diversion (Hall & Jones, 1999). The enforcement of rules is imperfect due to costs regarding the measurement of the limits of rule compliance, and due to differentials in interests between the public and government officials, judges, or other enforcers, known as the principal-agent problem (North, 1989). Consequently, diversion can take the form of corruption, and, although governments try to "tame" such activities, they often promote diversion as well (Hall & Jones, 1999).

Corruption reflects the institutional framework, within political, legal and economic natures (Svensson, 2005) and frequently appears associated with state activities and its discretionary power, where an official, entrusted with a function by the public, gets involved in improper behaviour, difficult for the public to keep track, for private profit (Bardhan, 1997). Hence, it is predictable that corruption corrodes citizens' trust in institutions and democracy (Della Porta & Vannucci, 1999), possibly decreasing political participation. Democracy usually features certain characteristics that constrain corrupt activities: freedom of expression and elections. These maximize the likelihood of righteousness, transparency and healthy institutions. However, democracy is not the antidote for corruption (Rose-Ackerman, 1999).

The concept of corruption is very complex due to its many definitions and forms (Amundsen, 1999), which makes the selection of a proper measure difficult. There is a great number of indicators intended to measure corruption, and the most extensively used is the Corruption Perceptions Index (CPI, https://www.transparency.org/en/cpi), which reports annually the level of perceived public sector corruption throughout the world. This index ranges from 0 (highly corrupt) to 100 (very clean).

The 2020's CPI evidences the continued stagnation of the battle against corruption: "While most countries have made little to no progress in tackling corruption in nearly a decade, more than two-thirds of countries score below 50." (Transparency International, 2021a, p. 4). The 2020 CPI report also evidences that still are major regional differences, for instance,

the Western Europe score doubles the Sub-Saharan African countries' score, maintaining their positions of the last assessment. Notwithstanding, corruption also exists in top-tier countries, like Denmark, Sweden and Switzerland, which were involved in cases of private sector corruption, money laundering and abroad bribery in recent years. Often, they use the institutional fragilities of low-performing countries to engage in corrupt activities, increasing their profits, whilst worsening the situation of these countries (Transparency International, 2021b).

Commonly, literature on the topic of corruption is linked to cost-enhancing consequences. In this sense, corruption is seen as malfeasance which, for instance, may distort incentives and misallocate resources into rent-seeking activities, and may also hinder investment, harming growth and efficiency in the process (Tanzi, 1998). Nonetheless, there is a strand within the literature that focuses on the beneficial effects corruption may have, derived from the "grease-the-wheels" hypothesis (Leff, 1964). This theory postulates that corruption can speed up bureaucratic processes and other distortions associated with institutions, allowing an improvement in efficiency (Méon & Weill, 2010). Another term associated with this theory is "speed money" since corruption may reduce delays in administrative functions and accelerate queues in public services (Bardhan, 1997).

Evidence shows that African, Latin American and Middle East countries are the worst cases of the income distribution, according to World Inequality Database (WID, https://wid.world/). Nonetheless, although the developing countries remain the biggest concern, some developed countries have an increasing gap in income distribution. For instance, in OECD countries, in the last four decades, the income distribution gap between the richest and the poorest deciles has passed from seven to almost ten times larger (Keeley, 2015). Normally, the literature points to low levels of education and health-services attainment (Policardo, Carrera, & Risso, 2019), high unemployment rate (Mocan, 1999), overpopulation (Rodgers, 1983) and weak institutions (Glaeser, Scheinkman, & Shleifer, 2003) as the main causes of income inequality. We explore this last factor in more depth as we think that poor institutional quality and, more specifically, corruption, affect income distribution.

The impact of corruption on populations wellbeing, namely on inequality, has been widely studied, being possible to identify both positive and negative effects. The more traditional view over the impact of corruption on income inequality arguments a positive relationship, that is, more corruption is expected to increase income inequality since it allows well-connected individuals to use their status, in their favour, over government officials, at the

expense of the rest of the population (Tanzi, 1998). Corruption may aggravate income inequality as, in some states, low-income citizens pay a high proportion of their income in bribes; they are deprived of certain basic needs and, to secure them, resort to corruption (You & Khagram, 2005). This may also be a sign of decentralised corruption that may generate worst effects than centralised corruption.[1]

Conversely, in other cases, more corruption can reduce inequality, for instance, at a local level, as public power entities are closer to lower-income citizens, possibly benefiting them instead of the richest (Berggren & Bjørnskov, 2020). Or, cutting back on corruption can create a transaction cost, negatively affecting employment in the informal sector (Dobson & Ramlogan-Dobson, 2010). Another possibility can derive from the centralisation of corruption, mentioned above: if corruption becomes more and more organised, it may improve the provision of certain goods, as well as the well-being of the lower-income citizens (Andres & Ramlogan-Dobson, 2011). Hence, the relationship between corruption and income inequality can be ambiguous.

This research aims to understand how corruption affects inequality, but also to show that democracy did not mark the end of corruption and unequal distribution of income. Therefore, it is relevant to understand the role of democracy in mediating the corruption-inequality relationship. The topics of corruption and income inequality and their interaction have been explored intensively in the literature, but the influence of the political regime is less explored. Uslaner (2008) explores the relationship between democracy, corruption and inequality, but focuses on understanding the causality between them. Therefore, beyond extending the research on corruption and inequality, it is interesting to analyse the impact of the political regime on controlling corruption. We aim to fill this gap in the literature and also to pave new ways on tackling corruption and income inequality.

We consider an unbalanced panel dataset of 108 countries over the period 1996-20172017 for analysing the influence of corruption on income inequality. Moreover, we will also study the regional differences of the corruption's impact on income inequality to better understand differentials between regions of the world - Africa, Asia and Pacific, Latin America and the Caribbean, Eastern Europe and Western Europe and Others - by including regional dummy variables interacted with the corruption variable.

[1] With decentralised, disorganised or chaotic corruption, there is confusion in what and whom to pay the bribe, there is no certainty if that bribe will amount to anything and if there has to be any more payment (Myint, 2000). Also, with decentralised corruption, officials may intentionally delay queues to extract extra bribes (Li, Xu, & Zou, 2000).

The research questions we try to answer are the following: how does corruption impacts income inequality? Are there regional differences in the impact of corruption on income inequality? What is the role of institutions, particularly the political regime, in the corruption-inequality relationship?

Thus, our main research goals are: firstly, understand the channels through which corruption impacts income inequality; secondly, estimate the impact of corruption on income inequality, after controlling for other determinants of inequality; thirdly, identify regional differences across the world in the relationship between corruption and inequality; fourthly, to understand how democracy might influence corruption and consequently, income inequality; finally, to provide some political recommendations to fight inequality and corruption.

This dissertation is structured as follows. Chapter 2 discusses the theoretical and empirical background on corruption and income inequality concepts, as well as capturing their relationship and briefly introducing the impact of political regimes on corruption. Chapter 3 focuses on the methodology used and Chapter 4 describes how corruption impacts income inequality, presenting model estimations and results' discussion. Finally, Chapter 5 concludes by providing possible explanations for our results and limitations in the study.

Chapter 2. Corruption and Inequality: research background

The purpose of this chapter is to introduce the concepts of corruption and income inequality, whilst exploring and summarizing the main literary contributions on both topics. Therefore, we provide definitions and measures of corruption and income inequality and investigate the processes underneath their relationship. Finally, we briefly analyse the interaction between corruption and political regime.

2.1. Corruption: concepts and measures

Corruption is hard to define, due to its many forms (Amundsen, 1999) and due to the specificity of each country's culture, norms and conventions (Klitgaard, 1988).

There is a consensus in the literature that corruption is an illegal payment to a public agent for possible underserved benefits or the abuse of public power to obtain a private gain (Nye, 1967; Shleifer & Vishny, 1993). This may include bribery, cronyism, vote-trading, influence peddling, embezzlement and others.[2] Moreover, there are some caveats to this definition: Tanzi (1998) suggests that this conceptualisation neither supposes that corrupt acts cannot happen in the private sector nor that the "private gain" has to be in one's benefit, possibly benefitting an interest group or a political party; Bardhan (1997) argues that illegality is not a condition sine qua non for corrupt activities (political campaign endorsements/ contributions and gift-giving are forms of legal corruption) and not all illegal activities correspond to corruption; for instance, Jain (2001) argues that activities like fraud or black market operations, despite being illegal, do not constitute corrupt acts.

Furthermore, several authors specify different genres and approaches to the study of corruption: Shleifer and Vishny (1993) focus on government corruption, Blackburn and Forgues-Puccio (2007) study public sector corruption, while Yusuf (2012) stresses political corruption; some subdivide corruption into multiple categories, like the case of Deflem (1995) that separates it into bureaucratic and monetary, or Amundsen (1999) which stresses political and bureaucratic, while Jain (2001) differentiates grand or political, bureaucratic or petty and legislative corruption.

Typically, corruption assumes a political or public nature, in which a public agent obtains an unfair advantage, proportioned by its position, in exchange for a certain service. Corruption between private entities is a subject much less studied and its effects are less visible and

[2] We do not include lobbying in this group because it can be seen as a rent-seeking activity.

discredit, when compared to public sector corruption (Gopinath, 2008). Private sector corruption refers to the abuse of power or influence within private sector (non-governmental) organisations or corporations[3] and can assume different forms: bribery, extortion or solicitation, facilitation payments, illegitimate use or trading of information, nepotism, favouritism and others (Argandoña, 2003). Nonetheless, private sector corruption is no less important than the public sector one, as it has an alarming impact on the world (UNODC, 2019). PwC's Global Economic Crime and Fraud Survey studies the answers of thousands of respondents on their experience of fraud in the previous two years, and the 2020 report claims that the recorded fraud for companies ascend to 42 billion US dollars, whereas 30% of the respondents suffer from bribery and corruption (PwC, 2020).

Hence, corruption must not be seen only as an attempt by a private entity to gain influence over the actions of a public office, but also private/ non-governmental officials or even between governmental executives (Rose-Ackerman, 1975).

The tools selected to measure corruption are crucial for the study of its effects. Corruption works in secrecy, so it is hard to acknowledge and measure its effects. However, if the fight against corruption is to be taken seriously, there have to be reliable ways to measure it (Heywood & Rose, 2013).

Regularly, perception-based ways of measuring corruption are extensively used (see Table 1), which show the level of awareness of citizens on the subject of corruption, increasing transparency and helping the people to intervene in the fight against corruption (Transparency International, 2020b), as well as providing a cross-country analysis and comparisons on corruption (Golden & Picci, 2005).

However, it can be a problem relying upon perception-based measures because inferences of corruption do not necessarily mean clear observation of such activities (Heywood & Rose, 2013). Also, cultural or social norms of one region may make the perception of corruption different from other regions (Gyimah-Brempong, 2002) since, when a cultural framework sees corruption as unavoidable, necessary or even benign, these measures may not reflect the considerations about corruption in different contexts (Anderson & Tverdova, 2003). Despite constituting a setback relying on them, perception-based measures remain useful (Rose & Heywood, 2013).

[3] Private-to-private corruption can be within one company, like the misuse of corporate assets that affect consumers or investors) or between companies, for instance, collusion between firms (Svensson, 2005).

Table 1 - Perception-based Measures of Corruption

Indicator	Brief description	Source	First year of publication	Last year of publication
Corruption Perceptions Index (CPI, (https://www.transparency.org/en/cpi)	Measures from 0 to 100 the level of perceived corruption; based on experts/ business executives' analysis	Transparency International (TI)	1995	2020
Global Corruption Barometer (GCB, https://www.transparency.org/en/gcb)	Global survey on direct personal experience on corruption-related activities	Transparency International (TI)	2003	2017 (at a global level)
Bribe Payers Index (BPI, https://www.transparency.org/en/publications/bribe-payers-index-2011)	Measures the 28 world's largest economies' perceived likelihood to pay bribes abroad	Transparency International (TI)	1999	2011
Control of Corruption (CC, https://info.worldbank.org/governance/wgi/)	One of 6 dimensions from the World Governance Indicators; gathers information by enterprises, experts and citizens about perceived corrupt activities	World Bank (WB)	1996	2019
International Country Risk Guide (ICRG, https://www.prsgroup.com/explore-our-products/international-country-risk-guide/)	Based on political risk assessment, measures the probability of government officials demanding bribes, throughout government tiers	PRS Group	1984	2019
International Crime Victims Survey (ICVS, http://www.unicri.it/services/library_documentation/publications/icvs/data)	International survey about crime and the experience of being a victim; it also follows perceived bribes paid to public officials	United Nations (UN)	1989	2010

Source: Own elaboration.

Therefore, non-perceptual measures of corruption have been also considered (see Table 2), intending to diminish the aforementioned bias, accommodating countries' specificities and the types of corruption each nation is confronted by (Glaeser & Saks, 2006). The problems with non-perceptual measures are related to the definition of corruption that it considers, differences between the types of corruption and also the availability of data for some measures (Heywood & Rose, 2013).

Table 2 - Non-Perception- based Measures of Corruption

Author (s)	Brief description
Breunig and Goerres (2011)	Investigates electoral irregularities by using the Second Digit Benford Law (2BL),[4] assessing if the elections are rigged
Escresa and Picci (2017)	Called the Public Administration Corruption Index (PACI); measures cross-national corruption using the geographic distribution of public officials involved in cross-border corruption cases
Glaeser and Saks (2006)	Criminal convictions of public officials for corruption-related crimes
Golden and Picci (2005)	Uses the difference between the physical quantities of the public infrastructure and the cumulative price government pays for public capital stocks; the greater the difference, the "greater" the corruption
Gorodnichenko and Sabirianova Peter (2007)	A measure of bribery by estimating differences between public and private sectors' wages, comparing those differentials with each sectorial difference in expenditures, to identify the size of unofficial compensation by public sector employees
Olken (2009)	"Missing expenditures" in a road project-type of measure: it compares estimated price and quantity of inputs for constructing the road and the official expenditures

Source: Own elaboration.

Beyond their reliability and availability difficulties, the major problem regarding both types of indicators lies in the gap between what constitutes corruption (whether it is a micro or macro level) and how to measure it (Heywood & Rose, 2013).

2.2. Income Inequality

2.2.1. Concepts and measures

Inequality is related to imbalances in resources, opportunities and treatment. Just like corruption, it is a broad concept, with many different terminologies. Essentially, there are two important notions: economic inequality, which is the disparity between two individuals, households or groups, in which one is denied the same opportunities granted to the other (Ray, 1998); and income inequality, which is the "disproportionate distribution of total national income among households" (Todaro & Smith, 2003, p. 204).[5] We focus our analysis on income inequality.

[4] According to Benford (1938), various digits in lists of numbers do not occur with the same frequencies (apud Breunig and Goerres (2011)), more specifically, individually, small digits appear more than bigger digits. Within electoral fraud evaluations, it has been used 2BL tests, which apply the Benford's law, concerning the second digit of electoral return numbers.

[5] According to Thirlwall (2011), there may be other types of inequality: vertical inequality, which studies the way incomes are distributed across individuals and households, close to the definition of income inequality; horizontal inequality focuses on how certain groups are treated based on race, religion, language, class or gender. This particular term may be related to income, as well as opportunities and possibilities. Within this approach, we can find concepts such as gender or racial discrimination.

First of all, it is important to understand that income inequality is not the same as poverty. Both concepts are related to income, but while income inequality is about income distribution among individuals, poverty is about people living under a specific income level to meet basic human needs (Bayar, Sasmaz, & Ozturk, 2017).

The study of the income distribution is very important to explain the stage of development of a country. Decision-makers have the power to control this tool, for instance, by making use of the redistributive function, which allows a more balanced society. However, income distribution is not equal, neither within countries nor across regions of the world (World Inequality Database, 2020).

Usually, in the literature, authors differentiate two principal measures of the income distribution, regarding quantitative and analytical purposes, respectively: functional or factor distributive share of income distribution and personal or size distribution of income (Todaro & Smith, 2003). The former focuses on returns to different factors of production such as capital, labour and land (Ray, 1998). It explains the share of total national income that each factor receives, disregarding the ownership of the factors (Todaro & Smith, 2003). Personal distribution of income, the most commonly used, mixes the functional distribution of income with the distribution of factor ownership (Ray, 1998) and deals with each person and/or household's total received income, notwithstanding its origin (Todaro & Smith, 2003). It refers to the way different categories of income (wages, rents and profits) reach households (Ray, 1998).

There are multiple ways to measure personal income distribution. The most common one is the Gini index, which results from dividing the area between the perfect equality line and the Lorenz curve that describes the actual distribution of income, by the total area lying below the equality line. The Gini index is widely used because it satisfies four main properties: anonymity, population independence, relative income/scale independence and transfer (Pigou-Dalton) principles (Ray, 1998).[6] There are other often used measures of income inequality, for instance, of statistical nature, as it is the case of Theil and Atkinson indexes, or resulting from population shares of total income such as the Kuznets ratio, which com-

[6] The anonymity principle specifies that it does not matter who earns the income; the population independence principle implies that the size of population does not matter; the scale independence property indicates that neither the size of the economy nor the way incomes are measured should matter; and the transfer principle suggests that, all other incomes constant, if we transfer some income from a richer person to a poorer person, but not enough to make it a rich one, the resulting new income distribution is more equal (Ray, 1998; Todaro & Smith, 2003).

pares the incomes received by the top 20% and the incomes received by the bottom 40% of the population.

2.2.2. Determinants of Inequality

Inequality is a social, cultural, economic and institutional characteristic, depending on many factors to explain it. We shall list some of the features that impact this variable.

Growth and structural change have been widely recognised as determinants of inequality. Kuznets (1955) argues that in the early stages of economic development, the distribution of income tends to worsen, improving in the later stages ("U-inverted" Kuznets theory of development). Explanations for this evidence comes from the Lewis (1954) analysis that claims that in developing countries, characterized by an unlimited supply of labour force in the traditional sector, the expansion of the modern sector with constant wages increases income factor inequality, through differences in capital accumulation. Nonetheless, there is evidence that contradicts the Kuznets curve hypothesis. Fields (1987) distinguishes three types of economic growth in a developing economy: high-income sector enrichment, low-income sector enrichment and high-income sector enlargement. This third form of economic growth refutes the Kuznets theory since it can lead to a reduction of inequality in the early stages and an increase afterwards. Also, investment may induce economic growth, which will benefit all the parts of society, with lower-income groups profiting the most, according to Deininger and Squire (1998).

The macroeconomic scenario might also influence income inequality, particularly inflation. As low-income groups tend to hold a larger part of their salaries than other groups, they are relatively more affected by inflation, which will further weaken their income status (Albanesi, 2007). However, Law and Soon (2020), despite defending that, in theory, this may occur, through lowering the purchasing power of the poor, suggest that it may reduce income inequality if inflation increases national income, affecting the rich the most. Concerning the labour market, structural unemployment is expected to increase income inequality, while cyclical may be partly substituted by unemployment benefits (Mocan, 1999).

International trade is one of the driven forces of (rapid) economic growth, and since the nineteenth century, the world has experienced an increasing economic interdependence between countries. The Heckscher-Ohlin theorem suggests that countries with abundant labour would specialise in labour-intensive goods and capital-abundant countries in capital-intensive goods. This means that in poor countries, typically unskilled labour-abundant, income inequality would diminish because the demand for such labour would increase, as

well as the gap between rich and poor countries. Furthermore, Chakrabarti (2000) asserts that participation in trade lowers income inequality, possibly through higher incomes and increased growth. Nonetheless, Calderón and Chong (2001) explore the effects of volume of trade and type of exports in household income inequality and they found that typically in developed countries there is an inequality reduction, opposite to developing countries. Similar to this argument, Fischer (2001) states that, in the short term, in labour-abundant countries, trade openness may increase income inequality if not accompanied by a policy of capital flow liberalisation.

Education has great, but bivalent, implications in the degree of income inequality. Higher attainment of education and a more equal distribution of education can reduce income inequality (Checchi, 2001). However, average schooling years and income inequality may have a U-shaped relationship, decreasing with primary education acquisition and rising with advanced schooling enrolment (Checchi, 2001), due to differences in the rate of returns between skilled and unskilled workers (Yang & Qiu, 2016). Increases in the proportion of skilled workers or in the productivity gap between skilled and unskilled workers alter the composition of jobs, increasing unemployment and, consequently, wage inequality (Acemoglu, 1999).

Demographic trends may as well affect income inequality. Increases in population size are expected to increase the scope of income inequality due to the reduction of the average labour remuneration, lower possibilities to save and unemployment (Rodgers, 1983).

Any economic or social factor of inequality cannot exist without an institutional framework that creates a structure capable of protecting property rights and legal contracts, guaranteeing market regulation, social insurance and economic stability, and also that arranges a proper clean government that provides strong leadership in solving collective action problems (Thirlwall, 2011). Understandably, countries that do not grant these types of rules may aggravate income inequality. Democracy functions as an alpha institution that allows other institutions to behave properly (Rodrik, 2000), and it is responsible for certain norms that guarantee political and civil freedom and tend to better steer economic development (Thirlwall, 2011).

2.3. Corruption and Income Inequality

Corruption affects the fundamental functions of a government: allocation of resources, stabilization and redistribution (Gupta, Davoodi, & Alonso-Terme, 2002). It may be used in favour of the most powerful and richest because their influence and wealth allow them

to escape their civilian duties and reinforce the corruption-inequality cycle: "In other words, the burden of corruption falls disproportionately on low-income individuals." (Dincer & Gunalp, 2012, p. 283).

Corruption may deregulate the tax system, which is responsible for social policies, accentuate the differentials in asset ownership and hinder the provision of goods, favouring the aforementioned interest groups (Dincer & Gunalp, 2012). For instance, it is easier for a tax collector to extort the earnings of these groups (despite the incentives for tax evasion being lower) in comparison to higher-income ones because it is easier to feasibly over-report a low income (Hindriks, Keen, & Muthoo, 1999). In some countries, corruption affects harshly income distribution so that low-income households cannot meet the basic needs of water, sanitation and electricity (Myint, 2000). However, there is also evidence of beneficial implications derivative from corrupt activities, especially in countries with high informal employment and with corrupt-intended government policies that benefit low-income groups (Dobson & Ramlogan-Dobson, 2010).

In this section, we explore the literature on corruption and income inequality. We start by describing the theoretical mechanisms through which corruption influences inequality and discuss empirical research afterwards.

2.3.1. The mechanisms

Table 3 sums ups the main channels through which corruption impacts income inequality:

Table 3 - Corruption and Inequality: Main mechanisms

Mechanism		The expected effect of corruption on inequality	Description	Authors
Economic Growth	Corruption → **Economic growth** → income inequality	+	Corruption may slow economic growth and this effect may affect adversely income distribution, especially the lower-income groups	Gupta et al. (2002); Gyimah-Brempong (2002); Policardo et al. (2019)
Tax System	Corruption → **Biased tax system** → income inequality	+	The well-connected and the rich, using their influence or wealth, can slope taxation, leaving the burden of paying the taxes for the poorer quintiles of society	Blackburn and Forgues-Puccio (2007); Gupta et al. (2002); Gyimah-Brempong (2002); Policardo et al. (2019); Ullah and Ahmad (2016)

Assets	Corruption → **Flow of assets** → Inequality	+	As bureaucratic households receive bribes, their flow of assets and, consequently, capital growth is higher than worker households, increasing income inequality.	Dwiputri, Arsyad, and Pradiptyo (2018)
	Corruption → **Assets distribution** → Income Inequality	+ (↓)	A high land Gini coefficient is associated with a larger traditional sector, less exposed to corruption, meaning that corruption may increase inequality to a lesser extent	Li et al. (2000)
	Corruption → **Assets ownership** → income inequality	+	If the assets are concentrated in special interest groups, there are opportunities for lobbying. This will direct returns into them, increasing inequality	Batabyal and Chowdhury (2015); Gupta et al. (2002); Gyimah-Brempong (2002)
Public Spending	Corruption → **Social spending** → income inequality	+	Corruption may increase income inequality through the quality and quantity of public services (especially in the education and health sectors)	Blackburn and Forgues-Puccio (2007); Gupta et al. (2002); Policardo et al. (2019); Tiongson, Davoodi, and Gupta (2000)
	Corruption → **Human capital formation** → income inequality	+	Corruption impedes the ability to invest in education, leading to less educational attainment and, consequently, to an aggravated income inequality	Eicher, García-Peñalosa, and van Ypersele (2009); Gupta et al. (2002)
	Corruption → **Redistributive policy of governments** → income inequality	+/-	Corruption can drain social welfare programmes, but it can also erect programmes intended to promote a more equal distribution of income.	Alesina and Angeletos (2005); Blackburn and Forgues-Puccio (2007); Dobson and Ramlogan-Dobson (2010); Gupta et al. (2002); Policardo et al. (2019); Ullah and Ahmad (2016)
	Corruption → **Government spending** → Income Inequality	+(↓)	Higher government spending, financed by the "extraction" of the modern sector's profits through corruption, reduces the income differentials between modern and traditional sectors.	Li et al. (2000)
Technological Choices	Corruption → **Capital intensity** → income inequality	+	Reducing income inequality is a labour-intensive development strategy By promoting a capital intensive one, corruption increases income inequality	Gyimah-Brempong (2002); Gyimah-Brempong and Camacho (2006)

Uncertainty and Investment decisions	Corruption → **Uncertainty** → income inequality	+	Corruption adds a risk premium to investment decisions to the poor, increasing income distribution differentials.	Gupta et al. (2002)
Skill Premium	Corruption → **Skill premium** → Income inequality	+	Corruption demands more skilled workers to oversee corrupt behaviour, and that will increase their incomes and generate uneven income distribution.	Pedauga, Pedauga, and Delgado-Márquez (2017)
Institutional Factors	Corruption → **Past political decisions** → Income inequality	+/-	A country that inherits a culture of corruption and rent-seeking may have an unequal income distribution, but inherited corruption may function in favour of economic development and inequality	Alesina and Angeletos (2005); Dobson and Ramlogan-Dobson (2012)
	Corruption → **Institutional Subversion** → Income inequality	+	If institutions are corruptible, moving in favour of the rich, income inequality will be perpetuated	Chong and Gradstein (2007); Glaeser et al. (2003)
Labour market	Corruption → Size of the **informal sector** →Income inequality	-	The informal sector employs majorly lower-income citizens. Less corruption would "formalize" it, aggravating income inequality.	Andres and Ramlogan-Dobson (2011); Dobson and Ramlogan-Dobson (2010)
Development strategy	Corruption → **Privatisation** → Income inequality	-	Corruption diminishes with the privatisation of state-corrupt-controlled industries, increasing income inequality	Andres and Ramlogan-Dobson (2008)

Source: Own elaboration.

Economic Growth

The literature on the economic effects of corruption mainly focuses on its impacts on growth (Mauro, 1995; Shleifer & Vishny, 1993; Tanzi, 1998). Corruption may slow economic growth through inefficient resource allocation, facilitation of rent-seeking activities instead of promoting productive activities, increased production and transaction costs, distortion of the competent functioning of institutions and reduced investment in physical and human capital (Gyimah-Brempong & Camacho, 2006). By lowering economic growth, corruption may exacerbate income inequality because it affects the poorest quintiles the most (Gupta et al., 2002).

Tax System

The tax system has an important role in explaining this relationship. The elites may use

their wealth and status to bias the tax system, affecting the system's progressivity and facilitating tax evasion and exemptions (Blackburn & Forgues-Puccio, 2007; Gyimah-Brempong, 2002). Nonetheless, corruption is a two-person game since not only do taxpayers try to avoid paying taxes but also tax collectors may ease that behaviour to ensure some gratification (Hindriks et al., 1999).

Assets

The concentration of asset ownership is also an important mechanism, especially if those assets are in the hands of interest groups. The asset owners may use their wealth to lobby the government for favouring policies (Gupta et al., 2002; Gyimah-Brempong, 2002). In addition, assets can be used as collateral to borrow and invest; hence, the asset ownership inequality can further aggravate income inequality through the limitation of borrowing and investing to low-income classes (Batabyal & Chowdhury, 2015).

Also, corruption can be seen as a tax on the profits of the modern sector (Murphy, Shleifer, & Vishny, 1991). If a country has a high land Gini coefficient, which means a more unequal distribution of assets, it hinders entry into the modern sector. Therefore, this country is associated with a larger traditional sector. Thus, corruption will affect a small part of this country, increasing income inequality to a smaller extent (Li et al., 2000).

Furthermore, as we look into Dwiputri et al. (2018) research, they divide households into bureaucratic and worker. In this case, corruption is viewed as a bribe to obtain a business permit and it is assumed that bureaucratic households receive these bribes more easily than worker ones. Both groups use the income to accumulate assets and, therefore, the flow of assets is greater in bureaucratic households and, consequently, it creates a gap in capital growth. This differential in capital growth leads to higher levels of income inequality.

Social Spending

Corruption can increase income inequality through social spending. It increases costs and lowers the provision and financing of health care and education services, lowering the quality and quantity of publicly provided services (Tiongson et al., 2000). Even when social spending does not decrease, corruption may alter its composition (Andres & Ramlogan-Dobson, 2011). In addition, corruption activities have costs intrinsic to their nature. The losses that result from it may be so large that leave no room for social welfare programmes, crucial for human capital formation (Gupta et al., 2002).

Redistribution policies designed to correct inequality - higher taxation, higher public spend-

ing and more regulation - can also promote corruption (Alesina & Angeletos, 2005; Tanzi, 1998). Some government projects, such as the construction of roads, erected under corrupt outlines, help to increase employment among the poor. If corruption is reduced, these projects may never happen, increasing unemployment and subsequent income inequality (Dobson & Ramlogan-Dobson, 2010).

Government spending

Corruption mainly affects the modern sector, as we have seen before. A larger share of government spending is highly financed by the taxes on the modern sector. Heavier taxation on this sector diminishes the differential between the mentioned sectors. Therefore, corruption is expected to increase income inequality to a smaller extent in countries with a sizeable quota of government spending (Li et al., 2000).

Capital Intensity

In some countries, corruption may impact income inequality through technological choices since capital is highly subsidized, whilst labour is heavily taxed, leading to businesses choosing capital intensive technologies. This strategy leads to low demand for labour and a consequent decrease in wages. This expands income inequality directly due to the non-investment in a labour-intensive strategy, but also indirectly, through taxation on labour, which falls unreasonably upon the poor (Gyimah-Brempong, 2002).

Uncertainty

Corruption, by favouring elites, adds a risk premium to the investment decisions of the poor. So, this unequal distribution of risk between classes increases the expected returns to the former group, leaving the latter discouraged from investing in human and physical capital and land, which will aggravate income inequality (Gupta et al., 2002)

Skill Premium

Corruption also induces governments to hire a larger number of skilled workers to supervise possible this type of activity. As the demand for this type of worker increases, their wages increase as well, when compared to the unskilled workers' wage, widening the differences in income distribution (Pedauga et al., 2017).

Institutional factors

Income inequality may be worsened if some institutions are subverted through corruption. For instance, if courts are corruptible and can be moved by wealth or influence, the legal

system will favour the rich or well-connected (Glaeser et al., 2003). Also, when a country inherits bigger governments (which leads to bigger rents), higher tax distortion and pervasive corruption, the present generation may face an unfair and unequal wealth distribution (Alesina & Angeletos, 2005).

Nonetheless, stemming from the institutional sclerosis hypothesis by Olson (1982) (apud Berggren and Bjørnskov (2020)), as institutions become more stable, the costs of corruption decrease, enabling elites to be favoured and to play an essential role in political and judicial decisions. In some countries marked by rooted corruption, elites influence on key institutions and government policies made it possible to find ways of prospering in such an environment and reduce income inequality (Dobson & Ramlogan-Dobson, 2012).

Labour Market

In countries with a relatively large informal sector, less corruption can entail an increase in income inequality (Andres & Ramlogan-Dobson, 2011). The informal sector, which is not subjected to government regulation, employs majorly the poorest quintiles of society. If an institutional reform is to be made to diminish corruption, compliance and transparency is ought to be imposed. Also, the firm will incur extra costs, like better-trained personnel and new infrastructures, which, consequently, will need new taxation. Hence, there may be a trade-off between corruption and income inequality (Dobson & Ramlogan-Dobson, 2012).

Development strategy

Andres and Ramlogan-Dobson (2008) argue corruption may decrease income inequality through the reduction of the weight of the government. More intervenient and protectionist governments tend to increase the scope for corruption and rent-seeking activities (also argued by Alesina and Angeletos (2005) and Tanzi (1998)), therefore a development strategy focused on privatisation and market liberalisation would reduce corruption, but, in turn, would need restructuration of industries, meaning more unemployment and, subsequently, worsened income inequality.

2.3.2. Main evidence

In this section we explore the main empirical evidence on the impact of corruption on income inequality, analysing model specifications and sample selected (see Appendix A for a summary of the literature).

2.3.2.1. Latin America

Latin America reveals both high levels of perceived corruption and inequality (Andres &

Ramlogan-Dobson, 2011). The region is constituted by ex-European colonies and it has a very recent history of dictatorships and economic and financial crisis (e.g. Brazil, Argentina, and Chile). Nonetheless, the impact of corruption on income inequality in this region divides opinions.

Dobson and Ramlogan-Dobson (2010) and Andres and Ramlogan-Dobson (2011) use panel data over a 20-year period for 19 Latin American countries, employing the ICRG index as a proxy for corruption. These pieces of research conclude that there is a trade-off between corruption and inequality. Nonetheless, Pedauga et al. (2017) and Bayar and Aytemiz (2019) provide estimations for more recent years, utilising the Control of Corruption index as a corruption measure. The latter investigate the interaction between a misery index (measuring unemployment and inflation), corruption and income inequality. Both studies state that corruption increases income inequality.

Thus, corruption may indeed reduce income inequality, possibly due to the large weight of the informal sector in GDP, pro-poor redistributive policies, the centralisation of corruption and a reduction of the role of the government in this area (Andres & Ramlogan-Dobson, 2008; Dobson & Ramlogan-Dobson, 2012). However, recent developments in growth, taxes and education have contradicted this argument and reinforce the traditional argument that corruption increases income inequality. The larger weight of the informal sector, although it decreases income inequality, may not be enough to alter the positive impact of corruption on inequality (Pedauga et al., 2017).

2.3.2.2. Asia

The Asian region, comprising mainly developing countries and by recent development boomers, is constituted by countries with diverse levels of corruption, despite inequality records appear to be controlled (close to levels of Europe and North America).

Kar and Saha (2012) and Dwiputri et al. (2018) study the corruption-income inequality relationship in this region, employing the CPI measure of corruption: the former investigate the interaction between corruption, income inequality and the shadow or informal economy; the latter use by both theoretical and empirical models. In short, both works concluded that corruption increases income inequality, with the former alerting that a large informal sector (more than 30% of the GDP coming from it) makes the impact negative, whilst the latter indicates that inequality may cause corruption, which, in turn, leads to more inequality, forming a vicious circle.

2.3.2.3 Africa

Not only does Africa score the highest values in perceived corruption (Transparency International, 2020a), but also features the worst scores in income inequality (UNU-WIDER, 2020). Similar to the case of Latin America, this region has a history of colonisation and autocratic leaderships, as well as problems related to money laundering and embezzlement, as well as lack of transparency, property rights' insurance and rule of law enforcement. Also, the African region has been suffering for decades with economic stagnation (Gyimah-Brempong & Camacho, 2006).

Gyimah-Brempong (2002) investigates the impacts of corruption on economic growth and income inequality. This research concludes that corruption is associated with high levels of income inequality, especially through decreased economic growth.

2.3.2.4. United States of America

The United States of America is known for being one of the world most powerful countries and it is in the top ranks of every macroeconomic indicator. Nonetheless, the USA has been declining in their position against corruption, with serious problems concerning influence peddling and shell companies (Transparency International, 2020a).

Dincer and Gunalp (2008) and (2012)choose to study the interaction between corruption, income inequality and poverty across states. These works select various measures for income inequality: Gini index, the standard deviation of the logarithms (SDL), relative mean deviation (RMD), and the coefficient of variation (CV) and Atkinson indices. Apergis, Dincer, and Payne (2010) opt to investigate solely the relationship between corruption and inequality, only using the Gini coefficient. The authors opt for a non-perceptual-based measure for corruption, the number of government officials convicted in a state for crimes related to corruption in a year

All three pieces of research find that corruption impacts negatively income distribution. Corruption effects on income inequality may even be accentuated if the inequality aversion is high (Dincer & Gunalp, 2012). Corruption convictions differ from state to state and Dincer and Gunalp (2012) highlight three possible reasons for more corrupt states: low voter turnout, less education and more elected men in public office. If states could alter these features, maybe inequality would be much lower.

2.3.2.5. Mixed sample data

In this sub-section, we focus on researches that opt for a more diverse sample of countries in exploring corruption-inequality interaction.

Mehrara, Firouzjaee, and Gholami (2011) choose a particular sample of OECD and OPEC countries for the period 2000-2007. They use Corruption Freedom as a corruption proxy.[7] The authors find differences between countries, as OECD countries show corruption is associated with higher levels of income inequality, while OPEC countries face the opposite situation.

Chong and Gradstein (2007) develop a theoretical dynamic model and then test it in a cross-section sample of 121 countries for the period 1960-2000, to understand the relationship between institutional quality (one of the dimensions is corruption) and inequality. Ullah and Ahmad (2016) analyse the relationship between corruption and income distribution for 71 countries over the period 1984-2012. Both investigations conclude that corruption increases income inequality.

Berggren and Bjørnskov (2020), in a sample of 145 countries over the period 1960-2014, analyse the implications of corruption and judicial accountability in income and consumption inequality. They consider as a measure of corruption Varieties of Democracy corruption index (V-Dem, https://www.v-dem.net/en/). They find a negative relationship between corruption and both types of inequality.

Li et al. (2000) employ OLS and 2SLS estimation in 1980-1992 for 47 countries (Latin America, Asia and OECD). They use the corruption index developed in Political Risk Services' IRIS dataset for corruption's measure. They find that corruption affects income distribution in a U-inverted pattern, so inequality is higher when corruption is intermediate than when it is low or high.

Wong (2017) and Khan and Naeem (2020) use the same proxies for corruption (CC) and income inequality (Gini coefficient), as the former studies their relationship of 16 Asian and 18 Latin American countries from 1996 to 2009, whilst the latter considers panel of 38 developing economies during the period 2000-2015. Khan and Naeem (2020) find evidence of a negative effect on income distribution, but Wong (2017) deduces that corruption has no direct impact on income inequality.

Gyimah-Brempong and Camacho (2006) and Gupta et al. (2002) study the distributional impacts of corruption over similar time-lapses. Both works consider more than one measure for corruption: the first considers three corruption proxies (CPI, Business Internation-

[7] This index ranges from 0 to 10 (higher scores indicate lower corruption) and it is obtained from the Gottingen University.

al's corruption index[8] and bureaucratic efficiency[9]); and the second considers six indices for measuring corruption: a combined ICRG and BI index, CPI scores for three years, an expanded 1997 index and a historical corruption averaged index for 1988-1992. Both studies conclude that corruption increases income inequality.

There is a vast literature that utilises CPI: Policardo et al. (2019) study the causality between the corruption-income inequality relationship in a sample of 34 OECD countries during the period 1995-2011. Batabyal and Chowdhury (2015) use data for 30 Commonwealth countries over the period 1995-2008, to study the interaction between financial development, corruption and income inequality. These two studies find arguments supporting the traditional argument. Policardo and Carrera (2018) estimate the relationship between corruption and income inequality for 50 countries in 1995-2015 and they do not find any evidence of corruption impacting income inequality.

To sum up, the large majority of the researches we presented in this sub-section concludes that corruption may increase income inequality through several mechanisms such as government spending (Ullah & Ahmad, 2016), subversion of institutions (Glaeser et al., 2003), inefficient spending in education and health, ineffective targeting of social programmes, lack of investment in labour-intensive growth or even a good management of natural resources (Gupta et al., 2002), the decrease of economic growth (Gyimah-Brempong & Camacho, 2006), distribution of assets (Li et al., 2000). Also, one possibility is that corruption and inequality have a bi-directional interaction, so that corruption increases inequality because there are high levels of inequality that foster such an environment (Chong & Gradstein, 2007) In some cases, corruption impacts positively income inequality in conjunction with other variables like financial development and human resource development (Batabyal & Chowdhury, 2015; Khan & Naeem, 2020).

Both Policardo and Carrera (2018) and Wong (2017) indicate that there is no direct link between corruption and income inequality, but the latter concludes that corruption conditions the distributive consequence of government spending with differences depending on the region. Other works find corruption decreases income inequality, such as Berggren and Bjørnskov (2020), who suggest that corruption works better for low-income individuals

[8] "Business International (BI), now incorporated into The Economist Intelligence Unit (…) is a private firm that sells these indices typically to banks, multinational companies, and other international investors. BI published indices on 56 "country risk" factors for 68 countries, for the period 1980-1983, and on 30 country risk factors for 57 countries, for the period 1971-1979." ((Mauro, 1995, p. 683).

[9] "On the basis of the definitions of the variables, it seems that the judiciary system, red tape, and corruption indices represent closely related variables and that their simple average may be a reasonable proxy for what I will label bureaucratic efficiency." (Mauro, 1995, p. 686).

(intentionally or non-intentionally) or because elites simply want them to benefit rather than themselves, and Mehrara et al. (2011), who conclude that in OPEC countries the significant government role and the oil revenues, although fostering corruption, diminished income inequality.

There are major differences between works; therefore, it is hard to find a regular trend. Differences in the selected group of countries, period, methodologies and measures for main and control variables play vital roles in the outcome. Hence, empirical evidence, despite shedding some light on the topic, does not clear any doubt about the impact of corruption on income distribution.

2.4. Political Regime and Corruption

A political regime refers to a set of rules and procedures that govern political participation (Gasiorowski, 1996). Whether a country is ruled by a monarch, a president, a sultan or an emperor, the existing political regimes have features that derive from the concepts of democracy or autocracy (Gasiorowski, 1996). Democracy is a regime where government seats are filled as a consequence of contested elections where the opposition has possibilities to win, based on freedom and equality, which guarantees political participation, inclusiveness, integrity and good rule of law while excluding the use of force (Cheibub, Gandhi, & Vreeland, 2010; Schedler, 2002). Autocracy refers to all the regimes where the leaders are not elected in contested elections (Cheibub et al., 2010).

The way each regime transitions power is important for its distinction. Democracy depends on the election for the validation of governments and presidents, as mentioned above. Leadership changes in dictatorships are more rigid, as incumbents whether die in power or are deposed by fellow members of the regime; in monarchies, these alterations are predictable and less violent, as usually, it depends on family succession (Cheibub et al., 2010). However, elections cannot be sufficient for the consideration of a democratic nation. Some countries make use of this instrument to circumvent any contestation and to legitimise the electoral process, disguising themselves as democracies (Schedler, 2002).

The principal-agent problem inherent to political behaviour opens doors for corruption due to asymmetric information between parties (Nur-Tegin & Czap, 2012). Democracies, typically, tend to better control corruption, since officials are publicly scrutinized by the press and citizens, possibly affecting their positions in the elections (Nur-Tegin & Czap, 2012). In addition, democratic elections can reduce corruption because incumbent leaders tend to change more often, increasing uncertainty about whom to corrupt and reduces the

incentive for corrupting certain politicians (Bohara, Mitchell, & Mittendorff, 2004).

Nonetheless, democratic elections may promote vote-buying and illegitimate party financing, benefiting the highest bidders, normally, the elites (Della Porta & Vannucci, 1999; Johnston, 1997). Corruption can be higher in countries with intermediate levels of political competition than in less democratic ones; even with free and fair elections, corruption may be significant among democracies with little political competition (Montinola & Jackman, 2002). Some authors conclude that there may be a U-inverted relationship between democracy and corruption, as in recent democracies, previous established authoritarian regimes may face higher levels of corruption than in dictatorships[10] (Montinola & Jackman, 2002).

Mohtadi and Roe (2003) explain the U-inverted relationship: the interaction between democracy and rent-seeking and corrupt activities depends on the government sanctions in a democracy. In early democratic governments, there are insufficient checks and balances and there may be a combination of actual and under-covered corruption of the previous regime. This triggers a growing number of individuals to seek rents, until a certain point. Democratisation leads to increased competition between rent-seekers but increased transparency and sanctions as well, decreasing the levels of corruption when democracies become well-established.

[10] Democracy and democratisation are two different subjects (Sung, 2004) and they can be seen as a stock and a flow, respectively. Democracy is not synonym of lower levels of corruption. The U-inverted relationship means that, as democratisation takes place, corruption tends to decrease.

Chapter 3. Methodology

In this chapter, we expose the methodology used for measuring the impact of corruption on income inequality. Firstly, we will provide some theoretical econometric background and present our models and, secondly, we will describe the variables of our sample and share their descriptive statistics. Thirdly, we describe all the variables employed in our study, giving a greater focus on income inequality and corruption variables.

3.1. The model

We want to study the relationship between corruption and income inequality worldwide; therefore, we combine annual data from 1996 to 2017 across 108 countries. For this purpose, we consider an unbalanced panel dataset, meaning that we study a group of countries over time, although not all countries are observed every year.

Panel data models are appropriate in such studies because they take into account the implied heterogeneity between units and explain better the dynamics of change (Gujarati & Porter, 2009). These models can assume forms such as pooled OLS, fixed effects (FEM) and random effects (REM).

The pooled OLS model estimates a "grand" regression. It does not distinguish any cross-section unit (e.g. race, sex, location) and the response of the dependent variable to the explanatory variables does not vary across these units, camouflaging the unobserved heterogeneity between them. By ignoring this individuality, estimates may be biased and inconsistent, as some regressors included in the model may be correlated with the error term, which can induce autocorrelation (Gujarati & Porter, 2009).

Fixed effects models (FEM) assume that each cross-section unit has its own intercept/ constant (β_1), although it remains invariant over time, incorporating the unobserved heterogeneity among subjects. These models are appropriate when the unobserved individual effect is correlated with the explanatory variables (Gujarati & Porter, 2009).

Random effects models (REM) also include unobserved heterogeneity. They consider that the used cross-section units are drawn from a larger population, allowing for each intercept to be distributed randomly and to share the common mean value for the intercept (Greene, 2012; Gujarati & Porter, 2009). These models have the particularity of considering a composite error term, which comprises the individual-specific error (reflecting the heterogeneity) and the idiosyncratic term (Gujarati & Porter, 2009).

We start by presenting the reduced linear model, estimated through ordinary least squares regression:

$$GINI_{it} = \beta_1 + \beta_2 CORRUPTION_{it} + \beta_3 X_{it} + \alpha_i + \varepsilon_{it}, \quad (1.1)$$

where i represents the country (i = 1, …, 108) and t represents the year (t = 1996, …, 2017). $GINI_{it}$ is the dependent variable and it refers to a measure of income inequality (Gini index) of a country i in the year t; β_1 is the common intercept; β_2 is the vector of coefficients associated with the corruption variable; $CORRUPTION_{it}$ is the vector of the explanatory variable characterizing corruption (CPI or CC) of a country i in the year t; β_3 refers to the vector of coefficients associated with the explanatory variables; X_{it} is the vector of explanatory variables for country i at year t; α_i is the unobserved specific effect if it exists (in the case of fixed effects, this is time-invariant, while in random effects it is random); and ε_{it} is the error term for country i in the year t.

The classical linear regression model outlines several assumptions which least squares models have to respect to provide unbiased, consistent and efficient estimates (Gujarati & Porter, 2009). One of these premises is that X values are independent of the error (exogeneity), which means that the dependent variable's error term must be uncorrelated with the explanatory variables. If this assumption is violated, least squares models cannot produce optimal estimates.

There are three main reasons for existing exogeneity: omission of relevant variables, in which the omitted variable associated with the dependent variable is correlated with any of the explanatory variables; error measurement, when variables are measured inadequately and their true values remain unobserved; and simultaneously causality/ bias, which means that the dependent and one or more independent variables simultaneously cause each other and casual effects run reciprocally (Zaefarian, Kadile, Henneberg, & Leischnig, 2017). One possibility that might mitigate this problem is the Two-Stage Least Squares (2SLS) method.

The 2SLS uses instrumental variables (IV) that "substitute" the endogenous explanatory variable(s) in the estimation. These variables have to comply with two requirements: the IV must be highly correlated with the endogenous variables; the IV must be exogenous (or else the problem subsists).

The first stage consists of using the endogenous variable as the dependent variable with the independent variables being the IV and the remaining exogenous explanatory variables, to obtain the predicted values from this regression. The second stage comprises the estima-

tion of the original equation, only substituting the endogenous variable by the predicted value (Gujarati & Porter, 2009):

$$CORRUPTION_{it} = \delta_1 + \delta_2 IV_{it} + \delta_3 X_{it}, \quad (1^{st} \text{ stage}) \quad (1.2)$$

$$GINI_{it} = \sigma_1 + \sigma_2 CORRÛPTION_{it} + \sigma_3 X_{it} + \omega_{it} \quad (2^{nd} \text{ stage}) \quad (1.3)$$

$CORRÛPTION_{it}$ represents the predicted value of the vector of explanatory variables characterising corruption of a country i in the year t. IV_{it} represents the vector of instrumental variables respective to the political regime, for country *i* at year *t*; and ω_{it} is the error term for country i in the year t.

3.2. Data

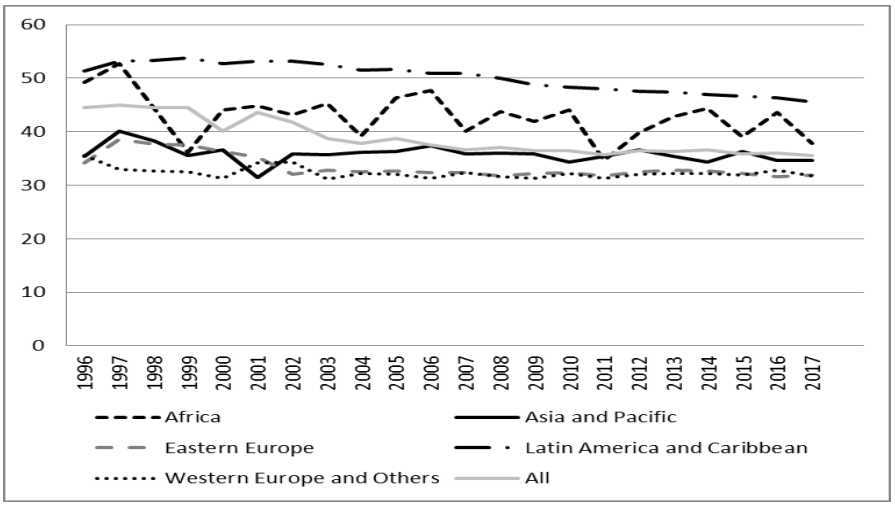
Our sample includes 108 countries over the period 1996-2017, with a minimum of four observations for the dependent variable throughout the studied period (see Appendix B for countries' descriptive statistics).

We have considered five subsamples according to the United Nations countries' classification (https://www.un.org/dgacm/en/content/regional-groups): African (20), Asia-Pacific (20), Eastern European (24), Latin American and Caribbean (19), and Western European and Others (25) states. This section introduces the variables used in our research.

3.2.1. Dependent Variable: Income Inequality

Our dependent variable is income inequality and, as mentioned before, the most common measure is the Gini Index (**GINI**). It ranges from 0 (perfect equality) to 100 (perfect inequality), and it is collected on an annual basis by the World Bank.

Figure 1 - Gini Index, 1996-2017



Source: Own elaboration. Data obtained at World Bank, Development Research Group; Available at http://databank.worldbank.org; Accessed on February 22, 2021.

Figure 1 shows the evolution of the Gini Index across our sample. The picture shows a generalised global downward trend, although with their idiosyncrasies. As Thirlwall (2011) pointed out, there are two distinct groups, on one side, Europe and North America[11] and, on the other, Asia, Africa and Latin America.

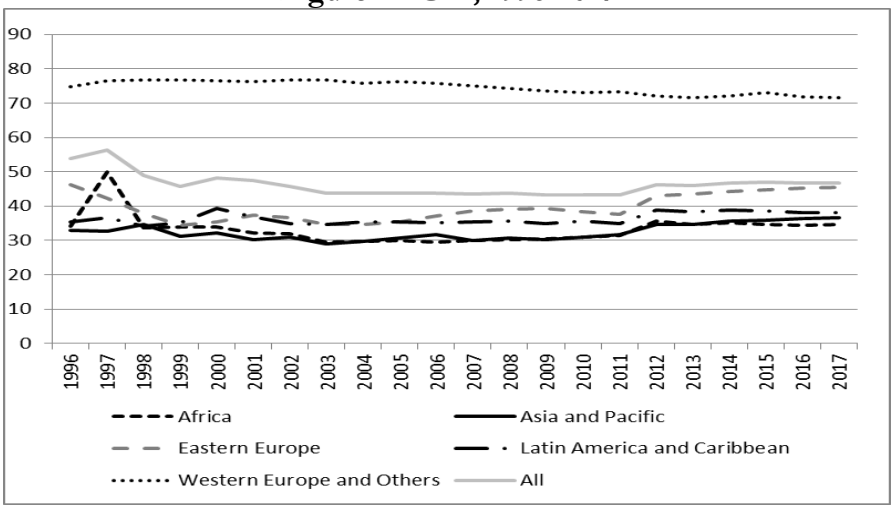
The former group register the lowest scores of the Gini index, below the mean. Nonetheless, they present a clear stagnation throughout the selected period. Asia has been closing the gap for these countries due to the rapid growth of countries like China, South Korea and Malaysia (Nafziger, 2012), while the Latin American and Caribbean region reveals the most concerning situation. Africa registers the most volatile scores, but the more recent year reveals a negative tendency.

3.2.2. Explanatory and Control Variables

We start by describing the main variables, related to corruption. In section 2.1 we mentioned an array of measures of corruption of perception and non-perception-based natures. Due to data accessibility and scope, we chose the former type, considering both the Corruption Perception Index (**CPI**) and the Control of Corruption (**CC**).

CPI (https://www.transparency.org/en/cpi) is developed by Transparency International annually and it is based on the perception of executives and experts of the level of corruption in the public sector and ranges from 0 (highly corrupt) to 100 (very clean). Previous to 2011, the scores ranged from 0 to 10; therefore, we multiplied those values for 10.

Figure 2 - CPI, 1996-2017



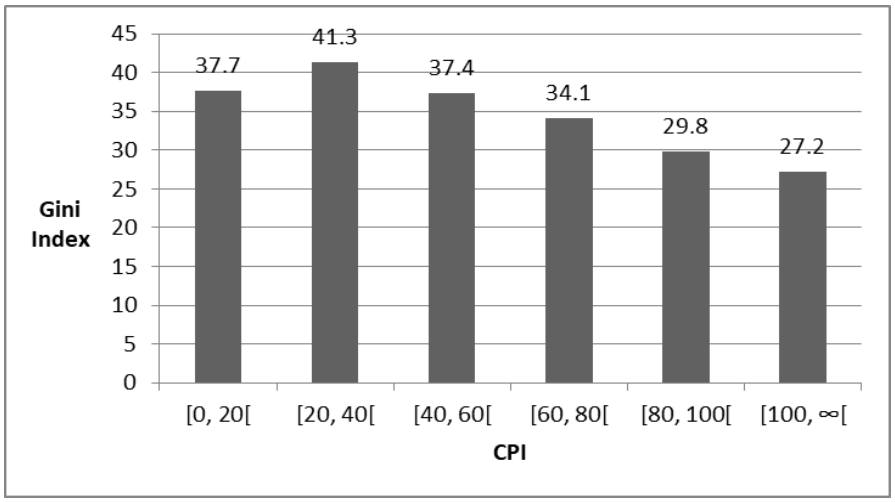
Source: Own elaboration. Data obtained at Transparency International; Accessed on February 22, 2021; available at https://www.transparency.org.

[11] The only countries that figure in our sample are the USA and Canada and they are comprised in the Western Europe and Others.

Figure 2 reveals three distinct phases of corruption trend: 1996-2003, where initially corruption decreased, but afterwards, it raised substantially, 2003-2012, marked by strict stagnation, and 2012-2017, characterized by a small improvement and followed by stagnation again. In regional terms, only Western Europe and Others show a negative trend, more specifically since 2006, but registers values clearly above the other regions.

Furthermore, Control of Corruption (CC, https://info.worldbank.org/governance/wgi/) is one of six dimensions developed by the World Bank, which focus on the state of governance. It ranges from approximately -2.5 to 2.5 and explores the degree of corruption in public, private and NGO institutions, as well as the "capture" of the state by elites and private entities.

Figure 3 - Gini by CPI, 1996-2017



Source: Own elaboration.

We also discriminate Gini Index in function to control of corruption (CPI), in Figure 3. There is no regular trend, but the overall tendency is negative: as CPI scores increase, meaning that perception of corruption decreases, income inequality values tend to decline.

The following variables are considered to control the impact of corruption on income inequality (Table 4) and explore their effect on the dependent variable.[12]

Per Capita Gross Domestic Product (**GDPPC**) is the variable used to measure the level of economic development; it is converted to international dollars using purchasing power parities, in constant 2017 international dollars. We use GDP at constant prices, as it is more suitable to use it when comparing countries over time, removing the impact of price inflation. Furthermore, we consider a quadratic functional form with the variable in a logarith-

[12] The data collected respective to the control variables is sourced from the World Bank database (https://databank.worldbank.org/source/world-development-indicators).

mic and a squared logarithmic, which grants fit to our model and diminishing the skewness of GDPpc, and allows us to test Kuznets (1955)' hypothesis of a quadratic relationship between GDPpc and inequality.

Manufacturing sector (**MANUF**) is used to control the degree of industrialisation of a country. We consider manufacturing (value added) as a percentage of the GDP. In the context of structural change, the Lewis model suggests that development occurs with the growth of the modern (manufacturing) sector. Nafziger (2012) alerts that the modern sector's overtaking typically worsens income inequality, only balancing the equation through government intervention.

Gross Fixed Capital Formation (**GFCF**) is considered to control the level of investment in a given country. It is measured in percentage of the GDP. If a country can attract investment, it may benefit the poorest quintiles (Deininger & Squire, 1998), so we predict a negative sign for this variable.

Inflation (**INF**), measured by the consumer prices index (annual %), explores the change of cost of a basket of goods and services. Inflation may harm low-income citizens, who find it very costly, but inflation may improve national income (Law & Soon, 2020), therefore, we can either have a positive or a negative sign.

Unemployment (**UNEMP**) is measured by the share of unemployment in the labour force. We expect that, as the unemployment rate increases, the level of inequality increases as well, (Mocan, 1999), therefore, we predict a positive sign.

Trade Openness (**TRADE**) corresponds to the sum of imports and exports of total goods and services as a share of gross domestic product, as we consider Trade (% of GDP). Trade may reduce income inequality, especially in countries with abundant low-skilled labour, as, with international openness, this sector becomes more expensive and the wages raise (Meschi & Vivarelli, 2009). Also, participation in the trade may decrease income inequality through growth, according to (Chakrabarti, 2000), but in countries labour abundant, inequality may increase (Fischer, 2001).

Education (**SEC_EDU**) is proxied for secondary education [School enrolment, secondary (% gross)]. Increasing the education attainment may secure lower levels of inequality, but it may as well enlarge the gap between skilled and unskilled labourers (Checchi, 2001).

Population (**POP**) is measured by the annual growth rate of the midyear population, and, since larger populations tend to affect negatively labour remunerations (Rodgers, 1983),

thus, we expect a negative effect.

3.2.3. Instrumental Variables

In line with the IV estimation, we consider an instrumental variable that focuses on political regimes. We select this variable because it is fundamental, when dealing with corruption, to understand the political and institutional framework. Democratic systems tend to be less corrupted and to be more proactive in controlling corruption, due to more public scrutiny, but also related to government checks and balances and fair rule of law (Nur-Tegin & Czap, 2012). Also, Gupta et al. (2002), in their research of the effects of corruption on inequality and poverty, opt for the extent of exposure to democracy as they find democracy is not associated with income inequality. We expect relatively more democratic regimes to be associated with lower levels of corruption.

The proxies are the following:

Polity V (POL) - produced by the Integrated Network for Societal Conflict Research, copyrighted by the Center for Systemic Peace, it characterises countries' institutional features, such as elections, political participation and checks and balances. It is reported on an annual basis and each score ranges from -10 (full autocracy) to +10 (full democracy).[13]

Vanhanen's **Democracy Index (DEMO)** - Vanhanen (2019) constructed, in his long-term research, a series that provides information on political competition, political participation, and an index of democratisation build with these variables. This index is the result of the multiplication of the competition and participation variables, divided by 100. It varies from 0 to 1, where higher values correspond to more democratic countries.

Direct democracy index (DIR_DEM) - developed by V-Dem, considered and discriminated by the International Institute for Democracy and Electoral Assistance (International IDEA) in the Global State of Democracy report, it combines the extent of the use of direct popular votes and the degree of multi-party competition, instruments of direct democracy. This ranges from 0 to 1, as higher scores represent more direct democracies.

Representative Government index (**REP_GOV**) - developed by the International IDEA's Global State of Democracy report, this index, which also ranges from 0 to 1 (higher values correspond to more democratic regimes), comprises four attributes: clean elections, free political parties, elected government and inclusive suffrage.

[13] Countries that register values between the interval [-5, +5] constitute anocracies, as well as three special values -88, -77, -66 ("standardised authority scores").

Voice and Accountability (**WGI_GOV**) - advanced by World Bank in the World Governance Indicators project, this is one of six dimensions (along with Control of Corruption) that measure governance. Voice and Accountability captures the perception of the extent to which citizens can select their respective government and the degree of expression, association and media freedom. This indicator varies between -2.5 and +2.5, as higher values represent better governance.

3.3. Descriptive Statistics

In this section, we present some statistical characteristics of the variables considered in our research. We gather basic statistics description (Table 4), as well as the correlation coefficients between each pair of variables (**Erro! A origem da referência não foi encontrada.**).

Table 4 - Summary Statistics

	Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.	Source
GINI	Gini Index	1248	37.9344	35.6500	9.0453	23.7000	65.8000	World Bank
CPI	Corruption Perceptions Index	2034	45.6593	38.0000	21.6643	4.0000	100.0000	Transparency International
CC	Control of Corruption	2049	0.0844	-0.2568	1.0011	-1.5273	2.4700	Worldwide Governance Indicators (World Bank)
POL	Polity V	2263	4.1401	8.0000	11.5968	-88.0000	10.0000	Center of Systemic Peace
DEMO	Democratisation Index	2315	20.4774	20.7000	12.2253	0.0000	48.8110	Vanhanen (2019)
DIR_DEM	Direct Democracy Index	2242	0.1508	0.0999	0.1788	0.0000	1.0000	V-Dem
REP_GOV	Representative Government index	2254	0.6399	0.6889	0.2247	0.0000	0.9621	International IDEA
WGI_GOV	Voice and Accountability	2032	0.1336	0.0853	0.9403	-2.1244	1.8010	Worldwide Governance Indicators (World Bank)
GDPPC	GDP per capita. PPP (constant 2017 international $)	2332	18702.5200	11832.2200	18114.1100	506.1519	115256.0000	World Bank
MANUF	Manufacturing. value added (% of GDP)	2238	14.2447	13.9793	5.4765	1.9967	34.5663	World Bank
GFCF	Gross fixed capital formation (% of GDP)	2302	22.9811	22.1781	6.7499	4.4522	69.6728	World Bank
INF	Inflation, consumer prices (annual %)	2223	7.3476	3.6223	26.3313	-18.1086	1058.3740	World Bank
UNEM	Unemployment, total (%) (ILO estimate)	2354	8.4000	7.0300	5.9234	0.2100	37.2500	World Bank
TRADE	Trade (% of GDP)	2329	83.5363	73.7469	46.6062	15.6356	408.3620	World Bank
SEC_EDU	School enrolment. secondary (% gross)	1887	84.2191	90.5787	28.5501	5.2834	163.9347	World Bank
POP	Population growth (annual %)	2376	1.1087	1.1064	1.2521	-10.9552	8.1179	World Bank

Source: Own elaboration.

Table 5 - Correlation Matrix

	GINI	CPI	CC	POL	DEMO	DIR_DEM	REP_GOV	WGI_GOV	GDPPC	MANUF	GFCF	INF	UNEM	TRADE	SEC_EDU	POP
GINI	1.0000															

CPI	-0.4723	1.0000														
	(0.0000)	---														
CC	-0.4532	0.9804	1.0000													
	(0.0000)	(0.0000)	---													
POL	-0.0632	0.3128	0.3315	1.0000												
	(0.0641)	(0.0000)	(0.0000)	---												
DEMO	-0.4754	0.6773	0.6812	0.4427	1.0000											
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	---											
DIR_DEM	-0.1425	0.0978	0.1063	(0.1277	0.1463	1.0000										
	(0.0000)	(0.0041)	(0.0018)	(0.0002)	(0.0000)	---										
REP_GOV	-0.1458	0.6105	0.6491	0.5694	0.6893	0.2199	1.0000									
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	---									
WGI_GOV	-0.3697	0.8421	0.8643	0.5205	0.7808	0.1881	0.8780	1.0000								
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	---								
GDPPC	-0.4996	0.8214	0.8228	0.2936	0.6523	0.0753	0.5232	0.7520	1.0000							
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0274)	(0.0000)	(0.0000)	---							
MANUF	-0.0464	-0.1215	-0.1214	-0.1031	-0.1275	0.0271	-0.1374	-0.1565	-0.1555	1.0000						
	(0.1739)	(0.0004)	(0.0004)	(0.0025)	(0.0002)	(0.4278)	(0.0001)	(0.0000)	(0.0000)	---						
GFCF	-0.1167	-0.1138	-0.1123	-0.1153	-0.1052	-0.0503	-0.2301	-0.1724	-0.0804	0.1846	1.0000					
	(0.0006)	(0.0008)	(0.0010)	(0.0007)	(0.0020)	(0.1405)	(0.0000)	(0.0000)	(0.0184)	(0.0000)	---					
INF	0.1615	-0.3458	-0.3299	-0.2214	-0.3094	-0.0515	-0.3156	-0.3945	-0.3043	0.1583	0.1042	1.0000				
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1316)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0022)	---				
UNEM	-0.0409	-0.0131	0.0047	0.0399	0.0332	0.0972	0.0836	0.0587	-0.0696	-0.1816	-0.2158	-0.0511	1.0000			
	(0.2313)	(0.7005)	(0.8899)	(0.2432)	(0.3311)	(0.0043)	(0.0142)	(0.0855)	(0.0415)	(0.0000)	(0.0000)	(0.1347)	---			
TRADE	-0.3455	0.2634	0.2577	0.0968	0.1364	0.1437	0.0747	0.2494	0.5043	0.0399	0.0890	-0.0954	-0.0513	1.0000		
	(0.0000)	(0.0000)	(0.0000)	(0.0045)	(0.0001)	(0.0000)	(0.0287)	(0.0000)	(0.0000)	(0.2433)	(0.0090)	(0.0051)	(0.1330)	---		
SEC_EDU	-0.4481	0.6254	0.6239	0.2452	0.6652	0.1432	0.4843	0.6041	0.5795	-0.0482	-0.0657	-0.2411	0.1926	0.2261	1.0000	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.1578)	(0.0541)	(0.0000)	(0.0000)	(0.0000)	---	
POP	0.3557	-0.1159	-0.1183	-0.1836	-0.2951	-0.2607	-0.1816	-0.2181	-0.0783	-0.0980	0.0485	0.0778	-0.3298	-0.0589	-0.4186	1.0000
	(0.0000)	(0.0007)	(0.0005)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0217)	(0.0041)	(0.1555)	(0.0227)	(0.0000)	(0.0844)	(0.0000)	---

Source: Own elaboration

Chapter 4. Featuring the impact of Corruption on Income inequality

In this chapter, we present and discuss the main results of the model that study the impact of corruption on income inequality. We start by analysing the Panel Least Squares regression and then the 2SLS estimation, using the political regime as an instrumental variable.

4.1. Reduced Model - Panel Least Squares

Our research aims to understand the effect of corruption on income inequality, through an econometric model across 108 countries from 1996 to 2017. In Table 7, we show the baseline models with two alternative measures of corruption, CPI and CC, and a proxy for the level of economic development with a quadratic functional form to capture the Kuznets hypothesis (Models 1 and 4). We then add the reminiscent control variables (Models 2 and 5) and finally the regional dummies (Models 3 and 6).

We run two diagnostic tests to test if the models are influenced by any effect: the Hausman test that allows us to test whether the omitted heterogeneity is correlated or not with the explanatory variables. If the null hypothesis is rejected, fixed effects should be used, if not, random effects are appropriate; and the Redundant Fixed Effects Test to perceive if we should consider fixed effects in our model or utilise a pooled OLS model (the null hypothesis). These tests are displayed in Table 6.[14]

Table 6 - Diagnostic Tests

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Hausman Test	Cross-section Random	11.4855 *** (0.0094)	72.2077 *** (0.0000)	---	8.0437 ** (0.0451)	46.9459 *** (0.0000)	---
Redundant Fixed Effect Test	Cross-section F	303.6653 *** (0.0000)	85.9339 *** (0.0000)	57.2483 *** (0.0000)	109.7999 *** (0.0000)	89.01627 *** (0.0000)	74.9589 *** (0.0000)
	Cross- section Chi-sq.		2169.8358 *** (0.0000)	1842.3841 *** (0.0000)	2884.7177 *** (0.0000)	2205.3033 *** (0.0000)	2067.0098 *** (0.0000)

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

The results exhibited in Table 6 show that the appropriate model should specify one-way fixed effects in the cross-section dimension.[15] GLS weights may be considered to accommodate correlation between residuals; we select cross-section GLS weights, which allow a different residual variance for each cross-section. Finally, the coefficient covariance method should be specified for computing the coefficient standard errors. We opted for White

[14] We display in Appendix C, Appendix D, Appendix E, and Appendix F, other estimations and diagnostic tests.

[15] In Appendix F, relative to model 5, we see that random cross-section effects should be the appropriate model, as the null hypothesis of the Hausman test is not rejected. Nevertheless, fixed effects models remain consistent even if they are not the appropriate ones (Gujarati & Porter, 2009).

cross-section, robust for cross-section correlation and heteroskedasticity and cross-section weights (PCSE), fit for accommodating heteroskedasticity.

Results are displayed in Table 7 concerning the baseline models with CPI (Model 1) and CC (Model 4), the extended model with all controls (Models 2 and 5) and finally with the regional dummies (Models 3 and 6). Overall, R-squared values are very high, between 0.94 and 0.97, approximately, which indicates a good fit of the models. Also, Prob (F-statistic) is null for all models, meaning that they all are globally significant.

Table 7 - The impact of corruption on income inequality: Panel Least Squares

	Dependent Variable: Gini					
	Model 1 (CPI)	**Model 2** (CPI)	**Model 3** (CPI)	**Model 4** (CC)	**Model 5** (CC)	**Model 6** (CC)
Constant	37.5116 ** (0.0320)	263.0997 *** (0.0000)	352.9797 *** (0.0000)	12.5807 (0.6452)	156.9151 *** (0.0000)	163.3675 *** (0.0000)
Corruption	-0.0251 *** (0.0018)	0.0372 ** (0.0476)	-----	0.7626 * (0.0612)	1.0496 ** (0.0161)	-----
Log (GDPpc)	5.7777 (0.1222)	-41.3845 *** (0.0000)	-59.0618 *** (0.0000)	11.5948 ** (0.0463)	-20.1033 *** (0.0082)	-20.4312 ** (0.0108)
(Log (GDPpc))^2	-0.5751 *** (0.0039)	1.8089 *** (0.0000)	2.6848 *** (0.0000)	-0.9251 *** (0.0027)	0.7533 * (0.0557)	0.7311 * (0.0757)
Manuf	-----	-0.0369 (0.4455)	-0.0162 (0.7203)	-----	0.0051 (0.9185)	0.0128 (0.7870)
GFCF	-----	0.0849 *** (0.0039)	0.0699 ** (0.0165)	-----	0.0798 *** (0.0025)	0.0888 *** (0.0008)
Inf	-----	0.0201 (0.4367)	0.0155 (0.3052)	-----	0.0061 (0.7227)	0.0042 (0.7984)
Unemp	-----	0.2101 *** (0.0000)	0.1885 *** (0.0000)	-----	0.1948 *** (0.0000)	0.1600 *** (0.0000)
Trade	-----	0.0025 (0.7686)	0.0017 (0.7575)	-----	0.0092 * (0.0959)	0.0109 ** (0.0484)
Sec_Edu	-----	-0.0066 (0.4691)	-0.0133 (0.1359)	-----	-0.0070 (0.4430)	-0.0081 (0.3624)
Pop	-----	0.2975 (0.1451)	0.2358 (0.1142)	-----	0.2688 ** (0.0252)	0.2201 ** (0.0412)
Corruption* Africa	-----	-----	0.1242 (0.1518)	-----	-----	-0.3799 (0.8236)
Corruption* Asia	-----	-----	0.5277 *** (0.0000)	-----	-----	5.0989 *** (0.0064)
Corruption* East_Eur	-----	-----	0.0780 *** (0.0015)	-----	-----	2.6591 *** (0.0000)
Corruption* Latin_Am	-----	-----	-0.1154 *** (0.0047)	-----	-----	-1.7738 (0.1916)
Corruption* West_Eur	-----	-----	-0.0144 (0.4795)	-----	-----	-0.8116 * (0.0838)
R-squared	0.9742	0.9504	0.9569	0.9367	0.9501	0.9520
Adj. R-squared	0.9716	0.9443	0.9513	0.9301	0.9439	0.9458
F-statistic	371.2646	155.5091	172.1892	142.0126	152.2852	151.8913
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Obs.	1161	921	921	1156	918	918
Method (effects; GLS weights; coefficient covariance method)	Cross-section fixed effects; Cross-section GLS weights; White cross-section	Cross-section fixed effects; ---; White cross-section	Cross-section fixed effects; ---; Cross-section weights	Cross-section fixed effects; ---; Cross-section weights	Cross-section fixed effects; ---; Cross-section weights	Cross-section fixed effects; ---; Cross-section weights

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

Table 7 indicates that control of corruption has a positive impact on inequality, in almost

every model. Only the baseline model with CPI (Model 1) has an opposite result, which is identical to that of Gupta et al. (2002) and Dincer and Gunalp (2008). Control of corruption impacts positively income inequality in models 2, 4 and 5. Particularly, in model 2, which includes CPI as a proxy for corruption, an increase of one point in the control of corruption increases income inequality by 0.04 points, while in model 5, with CC, as control of corruption increases by one point, income inequality increases 1.05 points. Main explanations might be drawn from Dobson and Ramlogan-Dobson (2010) that states that corruption may decrease inequality because of the informal sector's size since, in some countries, this sector represents a large part of the employment rate, or governments can design programmes that foment employment, through corrupt activity. Inherited or encrusted corruption may also work in favour of lower-income groups as institutions become more stable and elites can concentrate on solving social inequalities (Dobson & Ramlogan-Dobson, 2012). Moreover, the ruling elites may not want their power and status to change and allow the "non-elites" to benefit (Berggren & Bjørnskov, 2020).

Models 3 and 6 include dummy interaction terms, multiplying both measures of corruption (CPI and CC, respectively) by regional dummy variables for Africa, Asia and Pacific, Eastern Europe and Latin America and the Caribbean and Western Europe and Others regions to understand regional differences for the inequality impact of corruption.[16] Corruption decreases inequality in Asia and the Pacific, with a more significant effect when considering CC as a corruption measure. This result is corroborated by Kar and Saha (2012), who defend that in some Asian countries, if the share of the shadow economy in GDP is higher than 30%, then, corruption decreases inequality. The same result occurs for Eastern European countries, also with a more significant impact in model 6. Opposite to Dobson and Ramlogan-Dobson (2012) conclusion, model 3 suggests that corruption increases income inequality in the Latin American and Caribbean region. This follows the same train of thought pointed by Gyimah-Brempong and Camacho (2006), who much like our research, explored regional differences in the impact of corruption on inequality (and growth), and finds that corruption has the greatest negative impact on income distribution in this region. The results for Western European and Others region are only significant in model 6, at α=10%, and also show that increased control of corruption impacts negatively income inequality. The regional impact of corruption in Africa is not significant in any model.

[16] When using dummy variables, one must avoid the "dummy variable trap" which will cause perfect collinearity (https://www.eviews.com/Learning/dummies.html). Therefore, when estimating the model, the constant or one of the dummy variables must be withdrawn. However, when estimating the model with fixed effects or random effects, Eviews' software includes the constant automatically.

Concerning the level of economic development (GDPpc), models 2, 3, 5 and 6 do not behave following Kuznets' development theory, whilst only baseline model 4 has a significant and concordant to Kuznets' hypothesis result. Fields (1987) identifies three types of economic growth: high-income sector enrichment, low-income sector enrichment and high-income sector enlargement. The first two types describe a U-inverted shape relationship between the level of economic development and income inequality (in conformity with Kuznets theory of development and model 4). The last form may lead to a decrease of inequality in the first stages of development and an increase afterwards, describing a U-shape relationship (similar to models 2, 3, 5 and 6).

Considering the remaining control variables, the investment rate (GFCF) is significant and has a similar positive impact on the Gini index in all models, meaning that the growth of the investment rate increases income inequality, contrary to our suppositions.

Unemployment (UNEM) also has a positive impact on income inequality. A possible explanation for this is that increases in unemployment, for example, in an economic downturn, tend to aggravate the relative position of the lower-income group (Mocan, 1999), especially in the long-term since short-run inequality aggravation may be offset by unemployment benefits.

Openness to trade (TRADE) is significant for models 5 and 6 and, in both, reveals a positive impact on the dependent variable. Calderón and Chong (2001) alert for the possibility that trade increases income inequality in developing countries, while Fischer (2001) states that it may happen in labour abundant countries. These features may condition our results.

Finally, population (POP), which is also significant for models 5 and 6, has a positive impact on income inequality, similar to Rodgers (1983) findings, as population increases have negative effects on labour (earnings and employment) and savings.

The variables that control for the manufacturing sector (MANUF), inflation (INF) and education (SEC_EDU) are not significant for all the extended models, whereas trade openness (TRADE) and population (POP) are not significant for models concerning CPI as a corruption proxy, therefore we cannot withdraw any conclusion from these variables.

4.2. Instrumental Variable Estimation - Panel Two-Stage Least Squares

In the previous section, we tried to understand the impact of corruption on income inequality, but the results from the panel least squares models may be inconsistent and biased.

You and Khagram (2005) argue that corruption may be caused by income inequality, ex-

plaining, first, that inequality distorts social structural beliefs and norms, so that corruption is viewed as acceptable behaviour, and second, the rich have much more opportunities to engage in corruption than the poor. Then, corruption widens inequality, fostering a downward spiral. Also, Chong and Gradstein (2007) produced a theoretical and empirical approach to this relationship, in which they find that corruption and inequality may reinforce each other. The dynamics are very simple: initial income inequality conditions the institutional quality, which subsequently determines income inequality and further on.

Therefore, our estimation may be affected by endogeneity, in the form of simultaneous causality, where the explanatory variable is jointly determined with the dependent variable. To overcome such an issue, we use IV and more specifically, Panel Two-Stage Least Squares estimation. The selection of a suitable instrument must respect two restrictions: the instrumental variable has to be highly correlated with the endogenous one, and it must be exogenous, or else the endogeneity problem subsists (Gujarati & Porter, 2009).

Table 5 shows correlation values between variables. If we look merely at the correlation between the dependent variable, corruption proxies and the candidates to be instrumental variables, we can see that the only proxy that meets the mentioned requirements is Voice and Accountability (WGI_GOV), as it is low correlated with the dependent variable (roughly -0.37) and highly correlated with both corruption measures (above 0.80), CPI and CC. Representative Government and Democratisation indexes (REP_GOV and DEMO, respectively) are moderately correlated with corruption (between 0.5 and 0.7) and are low correlated with our dependent variable (-0.15 and -0.48, respectively).

Furthermore, we conduct a battery of tests to understand if there is endogeneity and which one of the proxies highlighted is suitable to be a proxy for the instrumental variable. To do such tests, we use the equation referent to the first stage of the 2SLS estimation.

First, we test the veracity of the endogeneity possibility (see Table 8). Thus, we estimate the residuals for each proxy and test their significance (Gujarati & Porter, 2009). We conducted a Wald Test where if the null hypothesis is rejected, there is endogeneity affecting our estimation. Second, we test the "strength" of the proxies for our instrumental variable (see Table 9), also through a Wald Test. The general rule of thumb for 2SLS estimation states that if the first stage F-statistic is smaller than 10, the considered instrument is weak (Stock, Wright, & Yogo, 2002). If the instrument is weak, there may be biased estimates for the explanatory variables and/ or the hypothesis tests may have size distortions, hampering our estimation and its reliability (Isaiah, James, & Liyang, 2018).

Table 8 - Endogeneity test

		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		No effects; Cross-section Weights; White cross-section	**Cross-section effects random; ---; Cross-section weights**	**Period random effects; ---; White cross-section**	**Cross-section fixed effects; ---; Cross-section weights**	**Period fixed effects; ---; White cross-section**	**Cross-section and period fixed effects; ---; Cross-section weights**	**No effects; Cross-section weights; White cross-section**	**Cross-section random effects; ---; White cross-section**	**Period random effects; ---; White cross-section**	**Cross-section fixed; ---; Period weights**	**Period fixed; ---; White cross-section**	**Cross-section and period fixed; ---; Period weights**
Corr		**CPI**	**CPI**	**CPI**	**CPI**	**CPI**	**CPI**	**CC**	**CC**	**CC**	**CC**	**CC**	**CC**
Pol	**t-statistic**	-4.0093 ***	-1.1317	-2.9796 ***	-1.4792	-3.2272 ***	-1.2852	-4.1911 ***	-1.6052 ***	-3.0323 ***	-1.1001	-3.2977 ***	-1.0010
		(0.0001)	(0.2581)	(0.0030)	(0.1395)	(0.0013)	(0.1991)	(0.0000)	(0.1088)	(0.0025)	(0.2716)	(0.0010)	(0.3171)
Demo		6.9556 ***	1.4999	4.4003 ***	-0.6159	-4.5375 ***	-0.0588	7.4523 ***	3.0209 ***	4.7304 ***	1.7971 *	4.8173 ***	0.8798
		(0.0000)	(0.1340)	(0.0000)	(0.5381)	(0.0000)	(0.9531)	(0.0000)	(0.0026)	(0.0000)	(0.0727)	(0.0000)	(0.3792)
Dir_Dem		-1.8102 *	5.13872 ***	0.8252	4.9928 ***	0.1871	5.3721 ***	-3.8273 ***	3.9183 ***	0.6392	5.0715 ***	0.2818	5.4030 ***
		(0.0706)	(0.0000)	(0.4095)	(0.0000)	(0.8516)	(0.0000)	(0.0001)	(0.0001)	(0.5229)	(0.0000)	(0.7781)	(0.0000)
Rep_Gov		-16.8202***	-0.1706	-10.5789 ***	-0.3289	-9.8802 ***	-0.1968	-16.8209 ***	-0.0860	-12.7142 ***	0.8779	-12.1105 ***	0.9472
		(0.0000)	(0.8646)	(0.0000)	(0.7427)	(0.0000)	(0.8441)	(0.0000)	(0.9315)	(0.0000)	(0.3803)	(0.0000)	(0.3438)
Wgi_Gov		-11.2550 ***	-1.1222	-9.6442 ***	-0.8157	-8.3936 ***	-1.1089	-11.6972 ***	-0.9047	-8.4687 ***	-0.2979	-7.5282 ***	-0.5940
		(0.0000)	(0.2621)	(0.0000)	(0.4149)	(0.0000)	(0.2678)	(0.0000)	(0.3659)	(0.0000)	(0.7659)	(0.0000)	(0.5527)

Source: Own elaboration

Table 9 - Weak Instrument Test

		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		No effects; Cross-section Weights; White cross-section	**Cross-section effects random; ---; Cross-section weights**	**Period random effects; ---; White cross-section**	**Cross-section fixed effects; ---; Cross-section weights**	**Period fixed effects; ---; White cross-section**	**Cross-section and period fixed effects; ---; Cross-section weights**	**No effects; Cross-section weights; White cross-section**	**Cross-section random effects; ---; White cross-section**	**Period random effects; ---; White cross-section**	**Cross-section fixed; ---; Period weights**	**Period fixed; ---; White cross-section**	**Cross-section and period fixed; ---; Period weights**
Corr		CPI	CPI	CPI	CPI	CPI	CPI	CC	CC	CC	CC	CC	CC
Pol	F	2.9725 *	2.7663 *	3.1932 *	1.6696	2.2319	2.1582	10.0591 ***	3.2219 *	7.9344 ***	1.1787	6.2564 ***	1.5497
		(0.0849)	(0.0965)	(0.0742)	(0.1965)	(0.1354)	(0.1420)	(0.0015)	(0.0729)	(0.0049)	(0.2778)	(0.0125)	(0.2134)
Demo		0.0860	1.0719	0.0670	0.0051	1.3097	0.1694	6.7359 ***	3.337388 *	4.0254	2.0627	1.0290	6.7904 ***
		(0.7694)	(0.3007)	(0.7958)	(0.9429)	(0.2526)	(0.6808)	(0.0095)	(0.0679)	(0.0450)	(0.1512)	(0.3106)	(0.0093)
Dir_Dem		5.0988 **	1.8461	2.9706 *	2.9902 *	9.4127 ***	4.5800 **	34.1532 ***	10.7227 ***	42.1657 ***	8.2305 ***	47.3768 ***	8.3955 ***

	(0.0241)	(0.1744)	(0.0850)	(0.0840)	(0.0022)	(0.0325)	(0.0000)	(0.0011)	(0..0000)	(0.0042)	(0.0000)	(0.0038)
Rep_Gov	55.7970 *** (0.0000)	1.1117 (0.2919)	18.0867 *** (0.0000)	0.5468 (0.4597)	15.1998 *** (0.0001)	0.6386 (0.4244)	199.6668 *** (0.0000)	36.8255 *** (0.0000)	120.4277 *** (0.0000)	38.0963 *** (0.0000)	134.8632 *** (0.0000)	57.0544 *** (0.0000)
Wgi_Gov	1020.0920 *** (0.0000)	59.6083 *** (0.0000)	436.5688 *** (0.0000)	17.5448 *** (0.0000)	406.7723 *** (0.0000)	13.6204 *** (0.0002)	365.1708 *** (0.0000)	294.1804 *** (0.0000)	447.1829 *** (0.0000)	155.6186 *** (0.0000)	690.2650 *** (0.0000)	152.2237 *** (0.0000)

Source: Own elaboration

Table 10 - Diagnostic Tests

			II	**III**	**IV**	**V**	**VI**	**VIII**	**IX**	**X**	**XI**	**XII**
			Cross-section effects random; ---; Cross-section weights	**Period random effects; ---; White cross-section**	**Cross-section fixed effects; ---; Cross-section weights**	**Period fixed effects; ---; White cross-section**	**Cross-section and period fixed effects; ---; Cross-section weights**	**Cross-section random effects; ---; White cross-section**	**Period random effects; ---; White cross-section**	**Cross-section fixed; ---; Period weights**	**Period fixed; ---; White cross-section**	**Cross-section and period fixed; ---; Period weights**
Corr			CPI	CPI	CPI	CPI	CPI	CC	CC	CC	CC	CC
WGI_Gov	Hausman Test		---	---				---	---			
	Redundant Fixed Effects Test	F			64.02636 *** (0.0000)	1.8399 ** (0.0171)	57.6079 *** (0.0000)			96.6600 *** (0.0000)	4.0564 *** (0.0000)	87.9467 *** (0.0000)
		Chi_sq.			2395.6657 *** (0.0000)	33.4235 ** (0.0148)	2491.1941 *** (0.0000)			3024.4180 *** (0.0000)	72.6600 *** (0.0000)	3141.4685 *** (0.0000)

Source: Own elaboration

Table 8 indicates that at least for one proxy and for all estimation methods, corruption is endogenous. Complementing these results and the ones from the weak instrument test (Table 9), we can assume that there are only two possible proxies for our instrumental variable, Voice and Accountability (WGI_GOV) and Representative Government (REP_GOV). Additionally, given the correlation coefficients (Table 5), we only select the former since only Voice and Accountability respects the requirements for 2SLS regressions.

Table 10 analyses what type of effects are influencing our estimation. The results indicate that the estimations concerning the above-mentioned proxy for the instrumental variable should specify cross-section, fixed and both dimensions, in CPI and CC regressions. Nevertheless, taking into account that only the model that considers period fixed effects has endogeneity (see Table 8) we only consider this one in the 2SLS estimation.

Table 11 - Panel Two-Stage Least Square (First Stage)

Dependent Variable: Corruption		
	Model 7 (CPI)	**Model 8 (CC)**
Constant	328.1292 *** (0.0000)	13.1625 *** (0.0000)
Wgi_Gov	8.1510 *** (0.0000)	0.4582 *** (0.0000)
Log(GDPpc)	-74.8704 *** (0.0000)	-3.4764 *** (0.0000)
(Log(GDPpc))^2	4.4982 *** (0.0000)	0.2090 *** (0.0040)
Manuf	-0.1006 ** (0.0195)	-0.0054 *** (0.0000)
GFCF	0.2478 *** (0.0000)	0.0167 *** (0.0001)
Inf	-0.1787 *** (0.0000)	-0.0054 ** (0.0286)
Unem	-0.0911 *** (0.0028)	0.0021 *** (0.0000)
Trade	-0.0201 *** (0.0000)	-0.0010 *** (0.0000)
Sec_Edu	0.1543 *** (0.0000)	0.0062 *** (0.0000)
Pop	2.5319 *** (0.0000)	0.1220 *** (0.0000)
R-squared	0.7964	0.8166
Adj. R-squared	0.7922	0.8131
F-statistic	186.9675	229.6535
Prob (F-statistic)	0.0000	0.0000
Obs.	1367	1473
Method	Fixed period; ---; White cross-section	Fixed period; ---; White cross-section

Source: Own elaboration.

Table 11 corresponds to the first stage equation of the 2SLS estimation. The R-squared values vary from 0.79 and 0.82, which are relatively high, and the F-statistic is null for every model, meaning that they are globally significant.

The political regime is statistically significant and impacts positively control of corruption in both models, meaning that regimes that allow free participation in government elections and guarantees freedom of expression, media and association (e.g. unions or political par-

ties), all typical characteristics of democratic regimes and institutions, are associated with lower levels of corruption. This is the argument of Nur-Tegin and Czap (2012), who claim that democratic regimes, as accounting for citizens' freedom to scrutinize their leaders and participation in regular elections, control more efficiently corrupt activities.

Table 12 - Panel Two-Stage Least Squares

Dependent Variable: Gini Instrumental Variable: Wgi_Gov		
	Model 9 (CPI)	**Model 10 (CC)**
Constant	-278.7927 *** (0.0000)	-285.7222 *** (0.0000)
Corruption	0.1050 *** (0.0000)	2.4829 *** (0.0000)
Log(GDPpc)	73.3504 *** (0.0000)	76.0222 *** (0.0000)
(Log(GDPpc))^2	-4.0347 *** (0.0000)	-4.1669 *** (0.0000)
Manuf	-0.1791 *** (0.0000)	-0.1535 *** (0.0000)
GFCF	-0.2565 *** (0.0000)	-0.2780 *** (0.0000)
Inf	-0.0056 (0.9014)	0.0126 *** (0.0000)
Unem	-0.0426 (0.4013)	-0.1244 (0.7510)
Trade	-0.0152 *** (0.0000)	-0.0159 ** (0.0139)
Sec_Edu	-0.0966 *** (0.0000)	-0.1100 *** (0.0000)
Pop	2.6249 *** (0.0000)	2.3002 *** (0.0000)
R-squared	0.4457	0.4259
Adj. R-squared	0.4277	0.4078
F-statistic	28.4081	27.2885
Prob (F-statistic)	0.0000	0.0000
Obs.	891	917
Method	Fixed period; ---; White cross-section	Fixed period; ---; White cross-section

Source: Own elaboration.

Table 12 exhibits the results of the 2SLS estimation considering Voice and Accountability (WGI_GOV) as the proxy for political regime. The R-squared values for both models have R-squared values roughly below 0.5 (0.43 and 0.45, respectively), which is generally considered low, very close to moderate effect size, which may signify prediction imprecisions. Furthermore, F-statistic's p-values are null, so both models are globally significant.[17]

Control of corruption has a positive impact on income inequality in models 9 and 10; therefore, higher levels of corruption are associated with lower levels of income inequality, corroborating the reduced models' results.

There is statistically significant evidence proving Kuznets' theory of development for both models, contradicting the previous results from the reduced model. Concerning the re-

[17] Eviews' software cannot test if Panel Two-Stage Least Squares estimation is influenced by any effects, so neither Hausman nor Redundant Fixed Effect tests were developed and we maintain the method considered in Table 11.

maining control variables, the results are much more significant than the ones from the reduced model. In terms of the structural change variables, the manufacturing sector (MANUF) has a negative impact on income inequality. This means that a larger weight of the manufacturing sector leads to lower income inequality. Lewis (1954) suggests that development depends positively on the degree of industrialisation, supporting our results. The investment rate (GFCF) also has a negative impact on income inequality, which contradicts the reduced form models and verifies Deininger and Squire (1998) findings of investment promoting income equality. Inflation is only significant for model 10 and it has a positive sign, which indicates that inflation aggravates income inequality. Low-income citizens tend to hold a greater part of their wages, so, when inflation increases, this group is the most affected, further aggravating their status - cycle of inequality-inflation (Albanesi, 2007). Openness to trade (TRADE) leads to lower levels of income inequality. This is similar to Chakrabarti (2000) conclusion, which suggested that trade triggers lower inequality because it would increase wages and economic growth. Secondary school enrolment (SEC_EDU) is statistically significant and it is expected to decrease income inequality, much like Checchi (2001) states. Finally, population (POP) has a positive impact on Gini index, as concluded in the reduced model.

4.3. Discussion of Results

We opt to analyse the impact of corruption, via CPI and CC, on income inequality by two scopes: the main one, through a diverse sample, investigating the whole impact of corruption on income inequality; and through regional divisions, exploring differences between sub-samples to understand regional specificities when studying the corruption-inequality relationship. We shall divide the discussion on these results separately.

Analysing the first scope, control of corruption is associated with higher levels of income inequality.[18] This contradicts the traditional argument of the negative income distribution impact of corruption. Within the literature, we find several reasons that point to such outcome: inefficient redistributive function of the government, corrupt institutional structure, informal economy size and also reduction of the role of the government.

Redistributive policies intended to correct income inequality open the scope for corruption; in these cases, corruption is a prevarication worth paying. This is more common in devel-

[18] The impact is higher for the models concerning the CC proxy. However, the differences between CPI and CC in terms of range maybe explain these differentials since the former ranges from 0 to 100, while the latter ranges from -2.5 and +2.5. Therefore, a one point increase in CC represents a more significant increase in CPI.

oping countries with populist regimes, where, even with inefficient and corrupt public spending towards the poor, there appears to be an arrangement between the rich and the poor since both classes benefit from such policies (Alesina & Angeletos, 2005).

Inherited or institutionally encrusted corruption may favour the exposed lower-income groups because, as institutions become more stable within these conditions, corruption grants them time to prosper and to deal with social inequalities (Dobson & Ramlogan-Dobson, 2012). Interest groups, who benefit from corruption, can play a part in government and judicial legislation, prompting a change in economic development. This stability may lead corruption to become more and more organised, improving the provision of certain government goods, which, in turn, improves income distribution (Andres & Ramlogan-Dobson, 2011).

The size of the informal sector may also play an important our results. For instance, in some countries, the informal sector's employment reaches 40 to 50% of the total workforce and nearly 50 % of GDP is originated in that sector. Corruption serves as its backbone since its continuity depends on detection avoidance and, if caught, bribery. Some formal businesses depend on the functioning of the informal economy, whether it is for accessing inputs or for not declaring wages (Dobson & Ramlogan-Dobson, 2012). If governments opt for an anti-corruption reform, the costs of formalisation would increase unemployment and income inequality.

Finally, control of corruption may increase income inequality employing a development strategy focused on privatisation and liberalisation. These policies reduce the government's intervention, removing certain industries from its control, reducing the scope for corruption. The restructuring of these industries aimed at efficiency and profit-driven goals worsen income inequality, through increased unemployment, increased prices and lower access and quality of goods and services (Andres & Ramlogan-Dobson, 2008)

Regional differences potentially stem from different natures of corrupt activities, contrasting sizes of the economies or even both (Gyimah-Brempong & Camacho, 2006), and the opinions on the impact of corruption on income inequality, inside the same regions, often collide, as illustrated in section 2.4.2.

Asia-Pacific region has a positive coefficient, meaning that control of corruption impacts positively income inequality. The idea of a large informal sector is explored empirically by Kar and Saha (2012) for Asian countries, suggesting that if a country has a percentage above 30% of the aggregate output coming from that sector, corruption decreases income

inequality.

Latin American and Caribbean region is often studied regarding this topic. Most of the works argue that corruption decreases income inequality as a result of the sizeable significance of the informal economy and the corrupt redistributive programmes that foster employment (Dobson & Ramlogan-Dobson, 2010; 2012). Nevertheless, our findings reveal the control of corruption is associated with lower levels of income inequality, in concordance with Pedauga et al. (2017). They conclude that the substantial informal sector does not alter the influence of corruption on income inequality since this sector represents losses in tax revenue that could be used in government transfer policies.

Eastern Europe and Western Europe and Others areas describe opposite behaviours. In the former, control of corruption impacts positively income inequality, whilst the opposite happens in the latter. Chong and Calderon (2000) also find that the impact of corruption on income inequality varies depending on the level of income, as for poor countries corruption decreases income inequality and for rich countries, corruption increases income inequality.

The political regime plays an important part in controlling corruption. Results indicate that more democratic regimes are associated with less corruption. Democratic institutions tend to be more transparent and to be more supervised, through thorough checks and balances. The principal-agent problem inherent to governments is eclipsed by regular voting and the desire for reelection (Nur-Tegin & Czap, 2012). This leads to increased trust by citizens, which increases the strength of institutions and compliance with the law (Uslaner, 2006). Nevertheless, transition democracies have not yet developed into well-established structures, leading many to think that decentralised governments and democratic regimes lack discipline and fairness (Tanzi, 1998). Thus, not only is corruption still present but also institutional reforms intended to reducing it may hamper income distribution.

Chapter 5. Conclusions

Corruption and inequality are two inseparable concepts. They breed on each other, "Corruption gives some people advantages that others don't have" (Uslaner, 2008, p. 24). However, it remains a challenge to find ways to effectively tackle both issues.

The main purpose of this dissertation was to assess the impact of corruption on income inequality for 108 countries over the period 1996-2017. We started our analysis by defining our central variables, introducing their many concepts, forms and measures. Next, we undertook an overview of the impact of corruption on income inequality and explored the major mechanisms through which it flows, shedding some light on the role of institutions. Then, we introduced empirical evidence on the topic, highlighting the regional specificities. Subsequently, we conducted the estimation: first, through a panel least squares estimation controlled for cross-section effects, we estimated the overall impact of corruption on income inequality and the regional differences in the effect of corruption on income inequality; and second, through a panel two-stage least squares estimation controlled for time effects, we re-estimated the overall impact of corruption on income inequality. Income inequality was measured by the Gini index, while corruption was proxied by two perception-based dimensions, the Corruption Perceptions Index (CPI) and Control of Corruption (CC). Moreover, the political regime was proxied by Voice and Accountability.

The results from both regressions suggest higher levels of control of corruption are associated with increased income inequality. This result is similar to that of Andres and Ramlogan-Dobson (2008), Berggren and Bjørnskov (2020), and Dobson and Ramlogan-Dobson (2012), which indicated the large size of the informal sector, inherited corrupt institutional framework, redistributive government projects and reduction of the weight of the government as possible explanations for such outcome. In addition, more democratic regimes are associated with lower levels of corruption. When allowing for regional specificities, we observed that the control of corruption impacted positively income inequality in Asia-Pacific and Eastern Europe regions, but negatively in Western Europe and Others and Latin America-Caribbean areas region. Africa was the only region where none of the corruption measures impacted significantly income inequality, further reinforcing the need for development and institutional oversight in this region. Finally, the weight of industrialisation, investment, trade openness and education affected negatively income inequality, whilst population growth and inflation impacted positively.

These results should be handled carefully. Corruption may impact negatively income inequality, but allowing corruption to grow may have deleterious effects in the long-term: corruption may aggravate the state's institutional weakness and generate a bad governance-low productivity trap (Andres & Ramlogan-Dobson, 2011); it may design a self-sustained and never-ending circle of corruption, high levels of government intervention and market inefficiency, and ruin the accuracy of redistributive programmes (Alesina & Angeletos, 2005); also, in countries highly dependent of the informal sector outcomes, corruption may accentuate the size of this sector, which exploits many of its workers and, in some cases, employs children (Dobson & Ramlogan-Dobson, 2012). Therefore, governments should find ways to tackle corruption while minimising its impact on income inequality.

This trade-off could be mitigated by: efficient spending on education and human capital formation since education is associated with lower levels of income inequality, therefore, if the state promotes this type of programme, not only will low-income groups will acquire more skills and increase their earnings, but also individuals are more willing to hold their leaders into account and to act when they perceive corruption; effective targeting of social spending, accompanied by an efficient tax system, since strong governments, with an honest and visible commitment to reducing corruption, could decrease income inequality through well-intended redistributive policies that promote employment; in the case of countries with a large informal sector, promote an anti-corruption strategy whilst allocating the workers from this sector on "formal" jobs (Dobson & Ramlogan-Dobson, 2012). The underlying recommendation is a reform of the role of the government: a democratic, decentralised and less interventionist government capable of enduring reduced-corruption shocks while placing efficient redistributive and regulatory policies.

This study contributes to the literature by concluding that corruption has positive distributional impacts on income, particularly in Asia-Pacific and Eastern Europe regions, but negative effects in Western Europe and Others and Latin America-Caribbean, and reinforces the need for institutional reforms capable of reducing corruption whilst protecting lower-income groups.

Notwithstanding, this dissertation has some limitations. First, we work with unbalanced panel data regarding countries with a minimum of four observations in the selected period for the dependent variable, meaning there is the absence of observations for some countries in several years (around 900 to 1000 observations throughout estimations). Second, we measure corruption through CPI and CC that, although widely used and functional, depends not on actual corruption, but on people perception of corruption, which may be

misleading. Finally, the regional divisions provide an interesting approach to the question we tried to answer, but it compounds countries with a different set of values and characteristics, broadening our interpretations.

Regarding future researches, it would be interesting to study how the recent pandemic crisis impacted this relationship. The pandemic crisis, which was reflected heavily in the economic growth, was fed by a corruption crisis since many lives were lost due to its harmful effects that weaken a global response (Transparency International, 2021a). Also, non-perception-based measures should be further developed so that scientific researches regarding corruption could be much more reliable. Finally, private sector corruption could be an interesting topic for future investigations, focusing on the micro analysis of company and industrial corruption impacts on wage inequality.

Corruption is a phenomenon that persists over time (Mauro, 1995), which has rooted into our social, judicial and political framework. There is no doubt that it can hinder efficiency and economic growth, and lead to social injustices, but ending corruption is not feasible, at least, in the short term. Such an institutional reform would be very costly, whether in terms of resources - e.g. higher public sector wages and severe penalties - whether in structural terms - e.g. significant changes in the legal and organisational framework and limitations in civil rights (Tanzi, 1998). The transition to a "clean" and fair society has to be gradual.

Democracy, per se, does not reduce corruption and inequality; it provides the tools to battle corruption and inequality, but leaders and citizens are responsible for their use (Uslaner, 2008). Governments, state agencies, courts, schools, all institutions should nurture an environment where people should not feel the need to be corrupt to be successful and condemn such actions so that institutions can be trustworthy and work towards the common welfare.

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Appendices

Appendix A - The impact of Corruption on Inequality: Summary of the literature

Author	Title	Sample	Estimation Model	Main Variables	Explanatory Variables	Conclusions
Andres and Ramlogan-Dobson (2008)	Corruption, privatisation and the distribution of income in Latin America	1981-2000 19 Latin American countries	Fixed effects least squares method and IV estimation	Income Inequality - Gini coefficient Corruption - ICRG	Natural logarithm of real output per capita; Natural logarithm of real output per capita squared; Primary and Secondary gross school enrolment rates, Share of agriculture in total output; Financial development; Distribution of land resources; Democracy; Ethnicity; Quality of Bureaucracy	Lower levels of corruption are associated with higher values of income inequality. Privatisation of industries in corrupt states leads to the restructuring of industries and aggravates income inequality.

Andres and Ramlogan-Dobson (2011)	Is Corruption Really Bad for Inequality? Evidence from Latin America	1982-2002 19 Latin American countries	Fixed effects least squares model lagged explanatory variables estimation	Income Inequality - Gini coefficient Corruption - ICRG	Natural logarithm of real output per capita; Natural logarithm of real output per capita squared; Primary and Secondary gross school enrolment rates, Share of agriculture in total output; Openness of the economy; Financial development; Distribution of land resources; Foreign direct investment; Inflation; Concentration of natural resources; Privatisation	The results show that corruption reduces inequality, in Latin America, and they may benefit from allowing corruption to grow. There are three reasons for these results: large weight of the informal sector organised corruption and "special" government projects that foster employment.
Apergis et al. (2010)	The relationship between corruption and income inequality in U.S. states: evidence from a panel cointegration and error correction model	1980-2004 50 U.S.A. states	Granger-causality test	Income Inequality - Gini coefficient Corruption - Number of government officials convicted in a state for crimes related to corruption in a year;	Real per capita personal income; Unemployment rate; Education; Unionization rate for each state	Corruption has a positive impact on income inequality; there is evidence of short and long-run bidirectional Granger-causality between variables.
Batabyal and Chowdhury (2015)	Curbing corruption, financial development and income inequality	1995-2008 30 Commonwealth	OLS and IV estimation	Income Inequality - Gini coefficient Corruption - CPI Financial development - the ratio of M2 to nominal gross domestic product or credit issued by financial institutions to the non-financial private sector as a share of GDP	GDP growth; Primary completion rate; Market capitalization of listed companies, Real interest rate; Openness Instrumental Variable - Polity IV	Lower corruption or greater financial development, individually, leads to lower levels of income inequality. However, the effect of financial development is offset excessive levels of corruption.

Bayar and Aytemiz (2019)	The Misery Index, Corruption and Income Inequality in Latin American Countries: A Panel Cointegration and Causality Analysis	2002-2014 11 Latin American countries	Panel unit root test, Westerlund and Edgerton (2007) LM bootstrap panel cointegration test and Kónya (2006) bootstrap panel Granger causality test	Income Inequality - Gini coefficient Corruption - CC Misery Index - the sum of inflation and unemployment rate	-	Increases in the misery index and corruption increase income inequality; the results of the causality test revealed causality between corruption and income inequality
Berggren and Bjørnskov (2020)	Corruption, judicial accountability and inequality: Unfair procedures may benefit the worst-off	1960-2014 145 countries	Panel least squares with two-way fixed effects	Income inequality - Gini coefficient Consumption inequality - Theil index Corruption and judicial accountability - V-Dem indexes	Log population; Trade share; Government size; Investment price; Coup, success; Coup, failed; Single-party regime; Electoral autocracy; Democracy; Bicameral system; Proportional voting; Large institutional change; Log time since change	Corruption decreases income and consumption inequality and judicial accountability increase both inequality forms.
Chong and Calderon (2000)	Institutional quality and income distribution	ICRG - 1982-1995 105 countries Business Environment Risk Intelligence (BERI) - 1972-1995 55 countries	Generalized Method of Moments	Income inequality - Gini coefficient Institutional quality (corruption as one of the dimensions) - ICRG and BERI index	Initial level of development; Share of agriculture (% total value added); Share of the urban population, Schooling; Number of physicians per inhabitant; Macroeconomic instability; Black market premium on foreign exchange; Government spending on defence (% of GDP,); Legislative tradition of the country	Institutional quality and income inequality describe an inverted U-relationship. Institutional quality increase (decreases) income inequality in poor (rich) countries.

Chong and Gradstein (2007)	Inequality and Institutions	1960-2000 121 countries	GMM-system estimator and panel Vector Autoregression Regressions method	Income inequality - Gini coefficient Institutional quality (including one dimension for corruption) - ICRG;	-	The findings indicate that institutions cause inequality as well as inequality causes institutions - there is a mutual reinforcing influence.
Dincer and Gunalp (2008)	Corruption, income inequality, and poverty in the United States	1981-1997 50 U.S.A. states	OLS, IV, Maximum Likelihood (ML) estimations; Hadi's methodology and Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS).panel unit root tests	Income inequality - Gini Index, the standard deviation of the logarithms (SDL), relative mean deviation (RMD), the coefficient of variation (CV) and various Atkinson indexes Corruption - the number of government officials convicted in a state for crimes of corruption Poverty - the percentage of people whose income is under the poverty threshold	Ethnic and Religious Fractionalisation index; Earned income tax credit benefit rate; Earned income tax credit phase-out rate; Aid to the families with dependent children/temporary assistance to needy families; Real per capita personal income; Unemployment rate; Unionisation rate; Secondary school enrolment	Increases in corruption increase income inequality and poverty. Corruption is higher where inequality aversion is higher, meaning that lower-income groups are most affected by its deleterious effects.
Dobson and Ramlogan-Dobson (2010)	Is there a trade-off between income inequality and corruption? Evidence from Latin America	1984-2003 19 Latin American countries	Fixed effects models; OLS and IV estimation	Income inequality - Gini coefficient Corruption - ICRG	Democracy; Government Consumption; Real output per capita; Real output per capita squared; Primary and Secondary gross school	There is evidence of a trade-off between income inequality and corruption. The corruption-

					enrolment rates; Share of agriculture in total output; Ratio of broad money to output; Domestic credit to the private sector; Distribution of land resources; Openness of the economy; foreign direct investment; Inflation; Concentration of natural resources; Privatisation	inequality relationship may be negative where there are a large informal sector or government corrupt projects that promote employment.
Dobson and Ramlogan-Dobson (2012)	Why is Corruption Less Harmful to Income Inequality in Latin America?	2000-2004/5 period 138 countries	Random effects model; OLS, IV estimations and modified limited information maximum likelihood (LIML) estimator.	Income inequality - Gini coefficient Corruption - ICRG;	Real output per capita; Primary and Secondary gross school enrolment rates; Domestic credit to the private sector as a ratio of GDP: Openness of the economy; Share of agriculture in total output; Inflation	When the informal sector is large, corruption does less harm to inequality.
Dwiputri et al. (2018)	The corruption-income inequality trap: A study of Asian countries	14 Asian countries with different periods each	Ramsey growth model's development; OLS, Tobit, and 2SLS estimations	Income inequality - Gini coefficient Corruption - CPI	Ethnolinguistic and Religion Fractionalization index; Mature cohort size; Unemployment; Ln GDP pc; Primary education; Secondary education; Tax revenue; Health expenditure; Share capital; Population growth; FDI; Democracy; Governance; Trade; Capital growth; GDP pc growth; Expense	The results indicate that a lower level of corruption leads lower level of income inequality. Furthermore, inequality can also lead to an increase in corruption - mutual influence - proving the corruption-inequality trap.
Gupta et al. (2002)	Does corruption affect income inequality and poverty?	1980-97 37/38 countries	OLS and IV estimation	Income inequality - Gini coefficient Corruption - a combination of ICRG and BI, CPI, expanded 1997	Length of exposure to democracy; Initial distribution of assets; Education inequality; Education stock; Capital stock-to-GDP ratio; Natural	Corruption is likely to increase income inequality and poverty. This may be mitigated by sound management

				Lambsdorff index and a historical corruption index averaged over the 1988-92 period Poverty - income growth of the bottom 20% of the population	resource endowment; Social spending; Expenditure dummy; Recipient dummy; Net income dummy; Initial income of the poor; Initial secondary education; Real per capita GDP; Latitude; Ethnolinguistic fractionalisation; Government intervention	of natural resources, labour-intensive growth, efficient spending on education and health and effective targeting of social programmes.
Gyimah-Brempong (2002)	Corruption, economic growth, and income inequality in Africa	1993-1999 21 African countries	Dynamic GMM panel estimator; OLS, IV estimation and LIML	Income inequality - Gini coefficient Corruption - CPI Economic growth - the annual growth rate of real GDP	Education; Ethnolinguistic fractionalization index; Gross investment/GDP ratio; Government consumption/GDP ratio; Savings rate; Real per capita income	Corruption decreases the growth rate of per capita income, through decreasing productivity of existing resources and reduced investment. The higher the level of general government consumption, the slower is the growth rate of per capita income. In addition to slowing the growth rate of per capita income, corruption is also associated with high-income inequality.

Gyimah-Brempong and Camacho (2006)	Corruption, growth, and income distribution: Are there regional differences?	1980-1998 61 countries	Dynamic panel (DPD) estimator; 2SLS estimation	Income inequality - Gini coefficient Corruption - CPI, BI corruption index and bureaucratic efficiency	Total investment; Private Investment Growth rate of real exports; Education; Government consumption/GDP ratio; Political Instability; GDP per capita; GDP growth	Corruption has a negative effect on the growth rate of per capita income. Nevertheless, corruption increases income inequality. There are regional differences in the effects of corruption on economic growth and income distribution;
Kar and Saha (2012)	Corruption, Shadow Economy and Income Inequality: Evidence from Asia	1995-2008 19 Asian countries	Panel least squares and fixed effects models; 2SLS estimation	Income Inequality - Gini coefficient Corruption - CPI and ICRG Shadow Economy - in terms of percentage of 'official GDP	Government military spending; Life expectancy; Log real GDP per capita; Government Final Consumption; Secondary education enrolment; Tertiary education enrolment; Share of the Service sector; Openness to trade; Democracy	Corruption is expected to increase income inequality. In addition, a larger shadow economy is associated with more corruption and inequality. Past the share of 30% of GDP coming from the shadow economy, the level of inequality decreases with corruption.
Khan and Naeem (2020)	Corruption, Income Inequality and Human Resource Development in Developing Economies	2000-2015 38 developing countries	3SLS estimation	Income inequality - Gini coefficient Corruption - CC Human Resource Development - HRD index (health and education indicators)	Urbanisation; Health expenditure; Economic freedom, Gross fixed capital formation; Economic Development; Trade openness; Tax revenue; Political instability; Unemployment	Human resource development decreases with higher levels of both corruption and income inequality. Income inequality is positively affected by corruption and negatively by human resource development;

						Corruption is positively is associated with increased income inequality and decreased human resource development.
Li et al. (2000)	Corruption, Income distribution and growth	1980-1992 47 countries	OLS and 2SLS estimations	Income inequality - Gini coefficient Corruption - Political Risk Services/IRIS corruption index Economic Growth - Real GDP per capita (PPP adjusted)	Initial GDP levels; Primary years of schooling; Financial development; Openness; Terms-of-trade shocks; Black market premium; Government spending; Average arable land; Urbanization ratio; Population growth rate; Initial distribution of assets	Corruption affects income distribution in a U-inverted relationship, meaning that, when corruption is whether low or high, inequality is low; but when corruption is intermediate, inequality is higher. Corruption explains little of the differentials in income inequality across continents. Nevertheless, it explains many differences in Gini scores between developed and developing countries.
Mehrara et al. (2011)	The corruption and income distribution in OPEC and OECD countries: a comparative study	2000-2007 OPEC and OECD countries	Pooled OLS, Fixed effects, Random effects and GMM estimator	Income inequality - Gini Coefficient Corruption - Corruption Freedom	OPEC - Growth of GDP; Ratio of government expenditure to GDP; Import value index; Population growth; Ratio domestic credit to the private sector (% of GDP); OECD - the above variables plus: Ratio of private investment to GDP; Age dependency; Ratio of Subsidies to government expenditure; Ratio of consumption to	Corruption is associated with higher income inequality in OECD countries and with lower in OPEC countries.

					GDP; Inflation Enrolment ratio in secondary school	
Pedauga et al. (2017)	Relationships between corruption, political orientation, and income inequality: evidence from Latin America	1996-2011 18 Latin American countries	Pooled OLS, fixed effects model, generalized and mixed models with a covariate measurement error, according to maximum likelihood, estimation; Case deletion model (CDM)	Income Inequality - Gini index in the equalised household market Corruption - CC and CPI	Democracy; Informality; Educational inequality; Public expenditures on education; Natural resources endowment; Openness of the economy; GDP growth; Lagged values of growth volatility and its squared term; Leftist government dummy variable	Corruption has a positive relationship with income inequality and it is not compromised by the weight of the informal sector.
Policardo and Carrera (2018)	Corruption causes inequality, or is it the other way around? An empirical investigation for a panel of countries	1995-2015 50 countries	Dynamic GMM model, panel unit roots tests, Granger causality test and Dumitrescu and Hurlin's homogeneous non-causality test	Income Inequality - Gini coefficient Corruption - CPI;	Real per capita GDP; Human capital index; Government gross debt; Inflation index; Unemployment rate; Population; Total fertility rate; Oil production value; Life expectancy; Unified Democracy Score	Increases in income inequality are responsible for increasing corruption. Corruption does not statistically impact inequality. There is causality in both directions, but with less significance in corruption-to-inequality causality.
Policardo et al. (2019)	Causality between income inequality and corruption in OECD countries	1995-2011 34 OECD countries	Granger causality and Dumitrescu and Hurlin homogeneous non-causality test	Income inequality - Gini coefficient Corruption - CPI,	Income per capita; Education expenditure	There is a mutual influence, as income inequality affects corruption (if interacted with education) and corruption affects income inequality, positively.
Ullah and Ahmad (2016)	Inequality and Corruption: Evidence from Panel Data	1984-2012 71 countries	GMM estimation and Random effects model	Income inequality - Gini index Corruption - ICRG,	Log of GDP per worker; Growth rate of the population; External competitiveness; Secondary school enrollment rate; Government	Corruption worsens income inequality. Corruption impairs economic growth in countries with higher

					expenditure; Log of capital per worker; Lag of Gini index.	government spending.
Wong (2017)	Public spending, corruption, and income inequality: A comparative analysis of Asia and Latin America	1996-2009 16 Asian and 18 Latin American countries	Prais-Winsten AR(1) process; Country fixed effects, random effects and lagged dependent variables	Income inequality - Gini coefficient Corruption - CC	Political regime; Economic development; Trade openness; Oil as a share of GDP; Taxation; Government spending Unemployment; Proportion of the population over 65; Political competition	Corruption is not directly associated with income inequality, but it strongly conditions the distributive consequence of government spending. Increased spending in corrupt systems is expected to lead to a concentration of assets in elites, in the Asian case, whilst the opposite is found for Latin America.

Appendix B - Countries' statistics

Country	*Region*	*Income Group*	*Mean Gini*	*Mean CPI*	*Mean CC*	*Mean Polity*	*Mean GDPpc*
Albania	Eastern Europe	Upper Middle	31.4111	30.4118	-0.6873	7.4091	8770.4723
Argentina	Latin America and the Caribbean	Upper Middle	46.7762	31.0455	-0.3663	4.0000	20956.3681
Armenia	Eastern Europe	Upper Middle	32.2556	30.4118	-0.6368	10.0000	7769.4616
Australia	Western Europe and Others	High	34.1000	85.0000	1.9290	-6.9091	42589.3198
Austria	Western Europe and Others	High	30.1765	77.5909	1.7290	-7.0000	49671.4554
Azerbaijan	Eastern Europe	Upper Middle	28.3600	23.1579	-1.1147	9.0000	9458.6937
Bangladesh	Asia and Pacific	Lower Middle	32.7750	20.9444	-1.0707	-66.0000	2629.6824
Belarus	Eastern Europe	Upper Middle	28.2250	31.8421	-0.5319	8.7727	13246.8450
Belgium	Western Europe and Others	High	28.5059	70.3182	1.4771	2.4545	45973.5685
Belize	Latin America and the Caribbean	Upper Middle	56.3000	---	-0.2066	10.0000	6879.0760
Bhutan	Asia and Pacific	Lower Middle	38.8000	59.5000	0.9859	9.4545	6675.2751
Bolivia	Latin America and the Caribbean	Lower Middle	52.3722	28.1364	-0.6276	10.0000	6343.4830
Bosnia and Herzegovina	Eastern Europe	Upper Middle	32.5250	34.6000	-0.3574	8.5000	9551.4176
Brazil	Latin America and the Caribbean	Upper Middle	55.6600	38.1364	-0.0869	10.0000	13314.4115

Bulgaria	Eastern Europe	Upper Middle	36.5667	38.5000	-0.1657	10.0000	15213.2090
Burkina Faso	Africa	Low	42.0750	35.2143	-0.2282	5.2273	1583.2241
Cameroon	Africa	Lower Middle	43.9750	22.4762	-1.1359	10.0000	3029.6338
Canada	Western Europe and Others	High	33.2875	86.6818	1.9733	10.0000	42287.1660
Chile	Latin America and the Caribbean	High	48.9600	70.5909	1.4145	10.0000	19600.0061
China	Asia and Pacific	Upper Middle	40.3417	34.8636	-0.4185	---	7190.1595
Colombia	Latin America and the Caribbean	Upper Middle	54.2833	34.6364	-0.3052	10.0000	11179.5854
Costa Rica	Latin America and the Caribbean	Upper Middle	48.5591	51.3810	0.6515	10.0000	15123.7597
Côte d'Ivoire	Africa	Lower Middle	41.2500	25.4286	-0.8294	8.0000	3975.5524
Croatia	Eastern Europe	High	31.8111	41.0000	0.0504	8.0000	22481.5810
Cyprus	Western Europe and Others	High	32.5500	60.1333	1.0561	10.0000	35146.3694
Czech Republic	Eastern Europe	High	26.2313	47.7273	0.4081	10.0000	30694.5094
Denmark	Western Europe and Others	High	26.7375	94.0455	2.3464	---	50633.4782
Djibouti	Africa	Lower Middle	42.7000	31.8182	-0.6093	8.3636	4470.2079
Dominican Republic	Latin America and the Caribbean	Upper Middle	48.2900	30.4706	-0.7249	8.2500	11526.2300
Ecuador	Latin America and the Car-	Upper Middle	49.8412	26.3810	-0.7285	10.0000	9927.2102

	ibbean						
Egypt, Arab Rep.	Africa	Lower Middle	31.0714	31.9524	-0.6063	8.1818	9003.9966
El Salvador	Latin America and the Caribbean	Lower Middle	46.3810	37.6500	-0.4468	10.0000	7178.7424
Estonia	Eastern Europe	High	32.9200	63.3500	1.0040	9.7273	24908.4720
Ethiopia	Africa	Low	32.0000	29.0000	-0.6130	10.0000	1119.2672
Finland	Western Europe and Others	High	27.5000	93.3182	2.2991	8.6364	43234.8599
France	Western Europe and Others	High	31.9875	69.3182	1.3748	4.4545	41347.4017
Gambia, The	Africa	Low	43.8250	27.8667	-0.5982	7.4667	2177.1387
Georgia	Eastern Europe	Upper Middle	38.3545	38.0588	-0.1338	9.3636	8341.2777
Germany	Western Europe and Others	High	30.5875	79.2273	1.8428	10.0000	46084.0044
Ghana	Africa	Lower Middle	42.2000	38.7500	-0.1558	10.0000	3517.3515
Greece	Western Europe and Others	High	34.6250	43.8636	0.1807	10.0000	31415.2715
Honduras	Latin America and the Caribbean	Lower Middle	54.6619	25.5263	-0.8602	10.0000	4657.3501
Hungary	Eastern Europe	High	29.8857	50.4545	0.4718	6.0000	23385.5201
Iceland	Western Europe and Others	High	27.9846	87.7500	2.0538	9.8182	45799.7493
Indonesia	Asia and Pacific	Upper Middle	35.0238	26.0909	-0.7449	8.0000	7606.7553
Iran, Islamic Rep.	Asia and Pacific	Upper Middle	41.2333	26.4000	-0.5976	---	12018.6914

Ireland	Western Europe and Others	High	32.8438	75.6818	1.5820	7.9091	54016.2028
Israel	Western Europe and Others	High	40.3125	65.2727	0.9726	8.0000	33414.3006
Italy	Western Europe and Others	High	34.7235	46.3636	0.2882	10.0000	42488.4123
Jamaica	Latin America and the Caribbean	Upper Middle	44.5750	36.5556	-0.2155	9.3636	9639.0654
Jordan	Asia and Pacific	Upper Middle	34.7200	48.4762	0.1665	7.0000	10024.0874
Kazakhstan	Asia and Pacific	Upper Middle	30.4611	26.2105	-0.9776	10.0000	17298.5881
Korea, Rep.	Asia and Pacific	High	31.9000	49.3636	0.4786	5.7727	30186.9369
Kosovo	Eastern Europe	Upper Middle	29.0167	33.1250	-0.4391	7.9091	7863.0368
Kyrgyz Rep.	Asia and Pacific	Lower Middle	31.0895	23.0625	-1.1238	6.0909	3816.2787
Lao PDR	Asia and Pacific	Lower Middle	34.8250	24.3846	-1.0567	7.4091	4294.5044
Latvia	Eastern Europe	High	35.8857	44.4500	0.2578	6.8636	19882.9003
Lithuania	Eastern Europe	High	35.8357	50.0526	0.3719	9.0000	22060.4174
Luxembourg	Western Europe and Others	High	31.7294	84.5238	1.9843	7.5455	102147.1023
Madagascar	Africa	Low	41.7333	28.1875	-0.4899	8.2273	1567.2526
Malawi	Africa	Low	48.9750	32.3500	-0.5705	9.0000	875.5898
Malaysia	Asia and Pacific	Upper Middle	44.7143	49.4545	0.2168	7.8636	19381.2039
Malta	Western Europe and Others	High	29.1167	58.3571	0.8380	2.7727	31088.2920

Mauritania	Africa	Lower Middle	36.8750	27.8333	-0.6129	10.0000	4758.0998
Mexico	Latin America and the Caribbean	Upper Middle	50.0583	33.2273	-0.4251	10.0000	17967.9341
Moldova	Eastern Europe	Lower Middle	33.2952	29.4737	-0.7246	3.8182	7681.6571
Mongolia	Asia and Pacific	Lower Middle	33.0125	33.0667	-0.4382	-0.1364	7081.3603
Montenegro	Eastern Europe	Upper Middle	39.5000	40.4545	-0.1840	-4.4091	15470.2204
Morocco	Africa	Lower Middle	40.0750	36.2105	-0.2440	-32.2273	5642.9491
Mozambique	Africa	Low	50.0500	28.0000	-0.5702	0.8636	903.0506
Netherlands	Western Europe and Others	High	28.5667	87.1364	2.0598	-1.3636	49876.5352
Nicaragua	Latin America and the Caribbean	Lower Middle	49.2400	26.5789	-0.7294	-4.6364	4551.9163
Niger	Africa	Low	36.8750	29.0714	-0.7537	6.3636	1019.9552
North Macedonia	Eastern Europe	Upper Middle	37.3556	35.8125	-0.3311	5.8182	12079.4490
Norway	Western Europe and Others	High	27.3000	87.0909	2.1290	5.7727	60289.6388
Pakistan	Asia and Pacific	Lower Middle	31.3900	24.7143	-0.9472	-3.6818	3735.3941
Panama	Latin America and the Caribbean	High	53.6190	35.1176	-0.3139	-5.4545	19737.2821
Paraguay	Latin America and the Caribbean	Upper Middle	51.5579	22.5556	-1.0580	5.0000	9789.1461
Peru	Latin America and the Car-	Upper Middle	48.5857	37.7000	-0.3315	3.9091	8827.8594

	ibbean						
Philippines	Asia and Pacific	Lower Middle	46.4500	29.3182	-0.5691	-3.8182	5573.8108
Poland	Eastern Europe	High	33.3857	48.5909	0.5280	9.0000	21077.0153
Portugal	Western Europe and Others	High	36.4600	63.5909	1.0803	-0.4545	30694.9054
Romania	Eastern Europe	High	36.3500	36.0000	-0.2491	-13.1818	18205.3094
Russian Fed.	Eastern Europe	Upper Middle	39.5455	25.1364	-0.9635	-2.0909	20570.3303
Rwanda	Africa	Low	47.3000	42.6923	0.0283	4.9091	1311.4295
Serbia	Eastern Europe	Upper Middle	39.2333	35.7857	-0.4971	10.0000	12626.7377
Slovak Rep.	Eastern Europe	High	26.6077	43.7000	0.2458	3.7273	21938.2104
Slovenia	Eastern Europe	High	24.8857	60.5789	0.9237	-2.9545	30705.9405
South Africa	Africa	Upper Middle	62.1167	47.0909	0.2598	-7.0000	11549.0882
Spain	Western Europe and Others	High	34.6125	63.2273	1.0690	-6.0000	36301.1537
Sri Lanka	Asia and Pacific	Lower Middle	39.3400	34.6875	-0.2619	-2.3182	8171.3890
Sweden	Western Europe and Others	High	27.6250	91.3182	2.2140	-7.0000	45096.2591
Switzerland	Western Europe and Others	High	32.7786	87.5909	2.0795	4.1818	61494.3182
Tajikistan	Asia and Pacific	Low	32.1333	21.6667	-1.2027	10.0000	1969.1614
Tanzania	Africa	Lower Middle	38.9750	28.2500	-0.6019	2.0000	1828.5651
Thailand	Asia and Pacific	Upper Middle	39.8111	34.3636	-0.3195	8.0000	12960.0022

Tunisia	Africa	Lower Middle	36.7750	44.9500	-0.1265	7.8182	8821.3923
Turkey	Western Europe and Others	Upper Middle	40.6313	39.2273	-0.0834	4.9091	19479.4027
Uganda	Africa	Low	42.5857	24.9048	-0.9084	-2.7727	1627.7791
Ukraine	Eastern Europe	Lower Middle	26.9824	24.8500	-0.9711	4.7727	10328.0462
United Kingdom	Western Europe and Others	High	34.3643	82.5000	1.8400	9.0000	41278.3198
United States of America	Western Europe and Others	High	40.5000	74.5455	1.4820	7.0000	53244.8158
Uruguay	Latin America and the Caribbean	High	43.2048	62.2500	1.1850	-8.2727	15861.8218
Uzbekistan	Asia and Pacific	Lower Middle	37.2750	20.3158	-1.1682	-3.5909	4077.3614
Venezuela, Bol. Rep.	Latin America and the Caribbean	Upper Middle	49.5500	21.9091	-1.1371	6.0000	---
Vietnam	Asia and Pacific	Lower Middle	36.1778	27.8095	-0.5692	-2.5000	4421.1884
West Bank and Gaza	Asia and Pacific	Lower Middle	34.5250	---	-0.2160	5.9545	5039.6716
Zambia	Africa	Lower Middle	51.5857	31.5500	-0.5142	---	2657.1570

Source: Own elaboration.

Appendix C - OLS estimation - The impact of corruption (CPI) on income inequality

	Dependent Variable: GINI					
	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f
Constant	-204.8371 (0.0000)***	106.4204 (0.0001)***	-211.1830 (0.0000)***	-203.3769 (0.0000)***	217.1499 (0.000)***	-211.1830 (0.0000)***
CPI	-0.051875 (0.0000)***	0.010394 (0.5092)	-0.028948 (0.1384)	-0.053457 (0.0000)***	0.024239 (0.1608)	-0.028948 (0.0000)***
Log(GDPpc)	57.04347 (0.0000)***	-10.67784 (0.0677)*	57.89427 (0.0000)***	55.78963 (0.0000)***	-36.61729 (0.0000)***	57.89427 (0.0000)***
(Log(GDPpc))^2	-3.102020 (0.0000)***	0.324752 (0.2979)	-3.110141 (0.0000)***	-2.984055 (0.0000)***	1.794552 (0.0000)***	-3.110141 (0.0000)***
Manuf	-0.115184 (0.0000)***	0.042757 (0.3098)	-0.172250 (0.0001)***	-0.199827 (0.0000)***	-0.131415 (0.0106)**	-0.172250 (0.0000)***
Pop	2.360741 (0.0000)***	0.366939 (0.0075)***	2.755943 (0.0000)***	2.913988 (0.0000)***	0.265754 (0.0564)*	2.755943 (0.0000)***
Unem	-0.090089 (0.0110)**	0.212055 (0.0000)***	-0.060864 (0.2183)	-0.063889 (0.2256)	0.266730 (0.0000)***	-0.060864 (0.0000)***
GFCF	-0.290407 (0.0000)***	0.044948 (0.0454)**	-0.268989 (0.0000)***	-0.244081 (0.0000)***	0.052630 (0.0291)**	-0.268989 (0.0000)***
Sec_Edu	-0.053861 (0.0000)***	-0.012087 (0.2123)	-0.076460 (0.0000)***	-0.057788 (0.0000)***	0.009789 (0.3611)	-0.076460 (0.0000)***
Trade	-0.015452 (0.0000)***	-0.001264 (0.7991)	-0.021152 (0.0000)***	-0.020027 (0.0000)***	0.014349 (0.0169)**	-0.021152 (0.0000)***
Inf	0.014614 (0.0000)***	0.029940 (0.0202)	-0.005323 (0.8680)	-0.060444 (0.1546)	0.022157 ((0.0968)*	-0.005323 (0.5330)
R-squared	0.738387	0.206656	0.477231	0.495146	0.953410	0.477231
Adj. R-squared	0.735512	0.197938	0.471486	0.477542	0.946287	0.476825
F-statistic	256.8417	23.70432	83.07290	28.12601	133.8534	1176.075
Prob (F-statistic)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
DW stat	0.237376	0.392329	0.179329	0.187329	0.477011	0.183373
Observations	921	921	921	921	921	921
Method	No effects; Cross-section GLS weights; White cross-section	Cross-section random effects; ---; Ordinary	Period random effects; ---; Ordinary	Period fixed effects; period GLS weights; White cross-section	Cross-section and period fixed effects; ---; Ordinary	Pooled OLS

Notes: p-value in parenthesis, 1% (***), 5% (**) and 10% (*); the estimation method is a combination of effects specification, GLS weights and coefficient covariance method.

Appendix D - OLS estimation - The impact of corruption (CC) on income inequality

	Dependent Variable: GINI					
	Model 5a	Model 5b	Model 5c	Model 5d	Model 5e	Model 5f
Constant	-220.0294 (0.0000)***	67.20999 (0.0068)***	-220.2962 (0.0000)***	-217.5848 (0.0000)***	131.3484 (0.0000)***	-220.2962 (0.0000)***
CC	-0.930523 (0.0000)***	0.608890 (0.1011)	-0.339669 (0.4057)	-0.748200 (0.0031)***	0.348741 (0.4175)	-0.339669 (0.0017)***
Log(GDPpc)	59.37871 (0.0000)***	-2.434639 (0.6510)	59.52843 (0.0000)***	58.41293 (0.0000)***	-19.28884 (0.0037)***	59.52843 (0.0000)***
(Log(GDPpc))^2	-3.204095 (0.0000)***	-0.103839 (0.7187)	-3.184148 (0.0000)***	-3.108121 (0.0000)***	0.931232 (0.0090)***	-3.184148 (0.0000)***
Manuf	-0.093967 (0.0001)***	0.055876 (0.1828)	-0.148861 (0.0008)***	-0.172459 (0.0000)***	-0.103086 (0.0406)**	-0.148861 (0.0000)***
Pop	2.122207 (0.0000)***	0.332537 (0.0110)**	2.480585 (0.0000)***	2.588129 (0.0000)***	0.229122 (0.0833)*	2.480585 (0.0000)***
Unem	-0.115551 (0.0010)***	0.184057 (0.0000)***	-0.115381 (0.0171)**	-0.122100 (0.0187)**	0.253862 (0.0000)***	-0.115381 (0.0000)***
GFCF	-0.274304 (0.0000)***	0.045274 (0.0441)**	-0.273625 (0.0000)***	-0.257568 (0.0000)***	0.050456 (0.0352)**	-0.273625 (0.0000)***
Sec_Edu	-0.059763 (0.0000)***	-0.011435 (0.2388)	-0.086003 (0.0000)***	-0.074943 (0.0000)***	0.005276 (0.6212)	-0.086003 (0.0000)***
Trade	-0.017123 (0.0000)***	0.003199 (0.5199)	-0.021479 (0.0000)***	-0.020478 (0.0000)***	0.020105 (0.0009)***	-0.021479 (0.0000)***
Inf	0.011705 (0.6680)	0.012010 (0.3545)	-0.000438 (0.9894)	-0.036571 (0.3721)	0.015143 (0.2603)	-0.000438 (0.9599)
R-squared	0.704586	0.176944	0.449202	0.460702	0.953198	0.449202
Adj. R-squared	0.701329	0.167870	0.443129	0.443716	0.946151	0.448773
F-statistic	216.3270	19.49909	73.97012	27.12285	135.2675	1047.244
Prob (F-statistic)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
DW stat	0.226535	0.364164	0.151884	0.165202	0.444848	0.157463
Observations	918	918	918	918	918	918
Method	No effects; Cross-section GLS weights; White cross-section	Cross-section random effects; ---; Ordinary	Period random effects; ---; Ordinary	Period fixed effects; period GLS weights; White cross-section	Cross-section and period fixed effects; ---; Ordinary	Pooled OLS

Notes: p-value in parenthesis, 1% (***), 5% (**) and 10% (*); the estimation method is a combination of effects specification, GLS weights and coefficient covariance method.

Appendix E - Diagnostic tests (CPI)

		2b	2c	2d	2e
Hausman test		20.594540 (0.0241)**	---	---	---
Redundant Fixed Effects test	F	---	85.933906 (0.0000)***	1.241464 (0.2076)	72.821902 (0.0000)
	Chi-sq.	---	2169.835793 (0.0000)***	---	2226.750484 (0.0000)

Source: Own elaboration.

Appendix F - Diagnostic tests (CC)

		5b	5c	5d	5e
Hausman Test		11.016264 (0.3563)	---	---	---
Redundant Fixed Effect Test	F	---	89.016265 (0.0000)***	0.803985 (0.6970)	78.023625 (0.0000)***
	Chi-sq.	---	2205.303336 (0.0000)***	---	2263.271706 (0.0000)***

Source: Own elaboration.