Perceived Income Inequality and Corruption

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Abstract

The theories linking income inequality to corruption are numerous, yet economists mostly fail to support them with empirical evidence. In this thesis, we argue that the primary reason why empirical studies find no significant link between income inequality and corruption is the conceptual difference between income inequality and its perception. Corruption in the public sector is the result of an interaction between two agents: a public official and a private individual. A public official considers several different factors when he decides to engage in corruption. If income inequality is theorized to be one of those factors, it is essential to consider that agents are subject to a veil of ignorance, especially in matters relating to the distribution of income. Public officials do not have perfect information on the distribution of income; but rather rely on their own perceptions drawn from a sub-sample of the population. These perceptions are formed by experiences over time with the limited information that the economic agents possess. Recent studies on the subject demonstrate that systematic biases exist in individuals' perceptions of inequality. Failures to address these biases, might be contributing to a lack in substantive evidence that would otherwise be able to link income inequality to corruption. This thesis develops a new conceptual and economic framework to shed light on to the relationship between perceptions of inequality and corruption. We explore the answers of our research questions using three main methods: Regression analyses, a laboratory experiment and a country-case study in Turkey including interviews with public officials. While the results of the regression analysis do not provide evidence to suggest that a rise in actual income inequality corresponds with higher levels of corruption, our results do however support the hypothesis that there is a strong link between perceived nationwide inequality and forms of corruption. Our experimental design allows us to investigate the ways in which subjects' behaviours change when initial endowment inequality differs between treatments in a bribery game. We observe the impact of inequality to subjects' decisions through its effect on perceptions. The economic model is built upon several assumptions, such as the public officials' lack of comprehensive information on incomes of others, and their inequity aversion. We administer a country-case study in Turkey to examine whether these assumptions are realistic and valid. Data we gather from the interviews, as well as existing surveys, enable us to shed more light into the differences between measured and perceived inequality.

Dedication

To my beloved parents Türkan and Rifat Baymul.

Bana her zaman destek olan Annem ve Babam için..

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List of Concepts

There are several conceptual terms developed and frequently used in this thesis. We will go over these terms in detail, however, their definitions are given here for the convenience of the reader.

Distributional perceptions: Distributional perceptions are the estimations made by an individual on the distribution of income in a given society.

Tolerance for inequality: The maximum level of inequality in a society that is tolerable by an individual.

Aversion to inequity: Dislike of unfairness

Aversion to inequality: Dislike of inequalities.

Aversion to perceived inequality: The dislike of perceived inequality in the society due to the difference between distributional perceptions and tolerance for inequality of an individual.

Chapter 1

Introduction

> A public official represents the state. In many other countries, they are paid much more than others. But in our country, because we only work 40 hours a week and because some political leaders encourage bribery and corruption by saying "My bureaucrats know their business", we are given lower wages. The inequality and unfairness in the distribution of income forces one to profit from other actions. It forces one to engage in corruption and to take bribes.
>
> **Respondent 11, Female in 30s, Kadıköy, Istanbul**

Respondent 11 is one of the interviewees who kindly took part in the mixed methods study we conducted in Turkey, in our quest to investigate how public officials perceive inequality in the fifth chapter of this thesis. Due to her position in the Municipality of Kadıköy in Istanbul, she frequently encounters and interacts with people in need of social assistance in her district. Her response above, given to the question of whether she receives a fair wage, not only exposes her dissatisfaction towards her income, but also sheds light on one of the consequences of income inequality: Corruption.

In 2013, the World Bank announced its ambitious "twin" goals: Ending extreme poverty and promoting shared prosperity [1]. That same year, the President of the

[1] `http://www.worldbank.org/en/news/feature/2013/04/17/ending_extreme_poverty_and_promoting_shared_prosperity`

World Bank, Jim Yong Kim, declared corruption as the "public enemy number one" in developing countries [2]. Corruption imposes large costs on firms and the government, decreases economic growth, reduces capital stock and hinders the government's ability to correct negative externalities (Mauro, 1995; Lambsdorff, 2006; Olken and Pande, 2011). It is a direct obstacle to the World Bank's goal of ending extreme poverty. On the other hand, promoting shared prosperity is only possible through reductions in economic inequality. Hence, income inequality and corruption have been two issues that dominated the economic and political discourse in recent years. In this thesis, we make a serious contribution to a broad debate, and explore the mechanics behind the relationship between income inequality and corruption.

Much like Respondent 11, we take the position that there is necessarily a conceptual link between corruption and distributive justice, and hence a theoretical link between inequality of income and corruption. Olson (1963) argues that high income inequality could become a destabilizing force, and lead to political instability and corruption. According to the equity theory developed by Adams (1963), people in social exchange expect a fair reward based on individual contribution. If they perceive the reward as unfair they may try to restore fairness through illegal activities (Cowherd and Levine, 1992). Income inequality will also lead to corruption in the richer end of the scale. Glaeser et al. (2003) argue that as inequality rises, the rich, who have more to lose, might use their resources to buy political power and influence, both legally and illegally. Hence, income inequality tends to increase the incentive to engage in illegal rent-seeking activities.

Despite these theoretical intuitions, most econometric studies find no significant relationship between inequality and corruption. Jong-Sung and Khagram (2005) argue that insignificant results are caused by the potential biases associated with measurement error, omitted variables and reverse causality, and conclude that with an instrumental variable approach, it can be demonstrated that higher income in-

[2] http://www.worldbank.org/en/news/press-release/2013/12/19/corruption-developing-countries-world-bank-group-president-kim

equality does indeed lead to higher corruption. Thus, according to the authors, the lack of significant results appears only to be a methodological issue. However, in this thesis, we argue that the primary reason why empirical studies fail to establish a relationship between income inequality and corruption lies in the conceptual difference between measured (or actual) income inequality and its perception.

One first needs to define corruption to study whether inequality is one of the determinants of corruption. According to Joseph Nye, a distinguished political scientist:

> Corruption is behaviour which deviates from the formal duties of a public role because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private-regarding influence.
> **Nye (1967, p.419)**

Corruption is a phenomenon subject to a wide range of interpretations. Heidenheimer (1970) classifies the various objective definitions of corruption, offered by social scientists into three categories. Nye's (1967) definition, cited above, belongs to Heidenheimer's first category; one which is centred around the public office and its abuse of public authority. The second category focuses on market interactions involving the a civil servant's efforts to maximize personal profit through acts of corruption. The final category of objective definitions, according to Heidenheimer (1970), arises from the concept of public interest. Friedrich (1966), argues that corruption exists when the power holder takes action that favours the briber against the interests of the public.

Public office centred definitions, Nye's (1967) being best known, are widely used in the literature, yet they are also heavily criticized. The most striking argument against this class of definitions comes from Rose-Ackerman (1978, p.9): "One does not condemn a Jew for bribing his way out of a concentration camp." This criticism is based on the notion that public office centred definitions fail to take into account

the public opinion on the specific act (Kurer, 2005). All definitions of corruption are subject to many other factors including the time period, culture and historical background. Defining corruption subjectively, based on public opinion, is also futile. Scott (1972) introduces the idea, yet immediately discards it, since an agreement involving the wider public is unlikely, and the decision maker's opinion on what constitutes corruption in case of a disagreement might not reflect the public opinion (Kurer, 2005).

The objective norms defining corruption will also differ between developing nations and Western societies (Bayley, 1966). While the concept of corruption is universally understood; classifications of corrupt and non-corrupt acts vary over time and between different societies. Kurer (2005) argues that the reason for this paradox lies in corruption's relativist nature resulting from the lack of a universal concept of distributional justice: A state should treat equally those who deserve equally. The ambiguity in classification arises because "who deserves equally", or rather when discrimination is justified, depends on the time period and society (Kurer, 2005).

In order to pursue the aims of this thesis, it is necessary to focus on the monetary gain of a public official through extorting bribes. Therefore, we will define corruption as: "The abuse of public office and statute of an agent in order to maximize utility through illegal acts of bribery from a client, favouritism and misappropriation". Integrating the public office and market-oriented definitions, the definition above excludes any interactions between private entities that might be considered corrupt if violations of public interest or opinion occur.

Corruption in the public sector is the result of an interaction between two economic agents: a public official and a private individual. Public officials take into account several different factors when they decide to engage in corruption. If income inequality is theorized to be one of those factors, it is essential to take notice of the fact that agents are subject to a veil of ignorance, especially in matters relating to the distribution of income. Public officials do not have perfect information on

the distribution of income; but rather rely on their own perceptions drawn from a sub-sample of the population. These perceptions are formed by experiences over time with the limited information that the economic agents possess. There are two country-specific studies researching how distribution is perceived in society. Norton and Ariely (2011) conduct a survey that demonstrates the incongruity between perceived inequality in the US and actual distribution. In a recent paper, Cruces et al. (2013) use a survey conducted in Greater Buenos Aires to examine how individuals form their perceptions of inequality and how those perceptions affect their preferences for redistribution. Both studies demonstrate that systematic biases exist in individuals' perceptions of inequality. Failure to address these biases might be contributing to a lack of supporting evidence to theories linking income inequality to corruption. Therefore, our research employs several different methods focusing on the perceptions of inequality rather than the conventional aggregate measures.

Inequality is the state of an unequal distribution in income or wealth. It may be justified and fair if there are differences in performance. However, if the rewards are distributed unequally for identical tasks, inequality generates inequities and it may be perceived as unfair by an individual making value judgements about the resulting distribution of income or wealth. Individuals react differently, and sometimes may even react violently, to inequities. Negative reactions to perceived unfairness are not unique to humans. In a famous experiment, Brosnan and De Waal (2003) give grapes to capuchin monkeys if they successfully complete a simple task. However, when one of the two monkeys participating in the experiment is given a cucumber, while the other receives a grape, the one that receives the lesser pay (cucumber) gets frustrated and reacts negatively. Monkeys have a sense of fairness much like humans.

Social scientists have also turned to experimental methods to understand human behaviour when they experience inequality and inequity. Fairness considerations have been studied in the dictator games played by two subjects, where the first

mover (the dictator) decides how to divide an amount of money between themselves and the second player. The second player cannot influence the dictator's decision and has to accept it. As there is no incentive for the first mover to give anything at all to the other player, a homo-economicus would always keep the entire amount for themselves. However, most "dictators" in experiments choose to give something to the other player and many divide the money equally. In a meta analysis of the dictator game experiments conducted over 25 years, Engel (2011) finds that only 36% of the subjects kept everything for themselves, 17% split the amount equally and 5% chose to give the entire amount to the other player. This suggests that considerations of fairness have a direct effect on people's decision making.

According to Fehr and Schmidt (1999), this unexpected behaviour occurs because at least a fraction of the people are inequity averse. Inequity aversion is the dislike of unfair outcomes. Those who are averse to inequity may even prefer to lose material payoff to move to more equitable distributions (Fehr and Schmidt, 1999). The experimental games show that people make moral judgments and take fairness into account when they decide on how to distribute a given endowment. In this regard, we expect fairness and inequity aversion to play a role in people's attitudes and preferences towards income inequality in society.

In today's modern capitalist system, some level of income inequality is expected, and generally accepted as the norm. Hence, individuals may tolerate unequal distributions of income to some degree. However, their tolerance level might depend on certain social and individual characteristics. For instance, Hirschman and Rothschild (1973) argue that tolerance of inequality varies throughout the different stages of economic development. During the initial stages of development, where income gaps widen rapidly, societal tolerance might be high, however, it decreases as individuals expect incomes to be distributed more evenly once development reaches a certain threshold (Hirschman and Rothschild, 1973).

Our aim in this thesis is to explore the relationship between income inequality, its

perception, people's aversion and tolerance of inequality and corruption. We will address this relationship by answering the following research questions:

Research Question 1: Is corruption higher in countries where the income gaps between the rich and the poor are larger?

Our primary goal in this thesis is to investigate how and why income inequality would have an impact on corruption levels in given countries. As we have previously explained, despite numerous theoretical attempts, empirical studies mostly fail to find a robust and significant economic relationship between the two. Unlike existing literature on the subject, we will examine how the decision making processes of public officials are influenced by their perceptions of income inequality. Our intuition can be put simply: According to Akerlof and Yellen (1990), workers compare their own wage to the wages of their colleagues, and reduce their efforts if they perceive it to be unfair. Given that public officials may have the opportunity to extort bribes, we assume that inequality averse public officials will engage in corruption in order to compensate for differences in income instead of reducing their efforts.

Research Question 2: Do the public officials' perceptions of societal income distribution affect their willingness to engage in corruption?

Individual perceptions of income inequality are often biased and therefore different from actual income inequality. We propose that the reason most empirical studies fail to establish a significant link between inequality and corruption is that this perception-based difference has not been taken into account. Our theory incorporates the role of perceptions into the economic framework.

Research Question 3: Does overall corruption decline as individuals get more intolerant of income inequality?

Inequality aversion may motivate public officials to extort bribes; however, intolerance of inequality, or rather the dislike of income gaps between an individual and

those that are poorer, may also encourage the public official not to take bribes. Individuals in different societies might have different opinions about income inequality depending on a society's historic and economic background, ruling regime, national ideology and culture. These differences might affect how widespread corruption is in a country.

Research Question 4: What is the income reference group of a public official?

Akerloff and Yellen's (1990) fair wage theory assumes that workers compare their own wages to those of their colleagues. Public wages are usually set transparently by the government, with individual differences depending on bureaucratic hierarchy. Those in the same rank would theoretically be paid the same wage and adjustments are done collectively. Hence, it would be unnecessary for a public official to compare their own income with their co-workers'. Instead, we assume that they make comparisons with the rest of the country, as they interact with many citizens from different income groups during their workday.

Research Question 5: How do public officials perceive income inequality?

Perceptions of inequality might be biased and differ from reality. However, as public officials interact with high numbers of individuals from different income groups, it is possible that their estimations of the income distribution might be more accurate than estimations made by others.

To our knowledge, this research is the first to incorporate inequity aversion and perceived inequality in an economic model of corruption. We explore the answers of our research questions using three main methods. Firstly, we investigate available cross-country and micro data to run regressions. Secondly, we test our model by designing a laboratory experiment. Finally, we conduct interviews with public officials to enhance the external validity of our theoretical model and empirical results.

The thesis consists of six chapters. Following this introduction, Chapter 2 explores

the link between measured income inequality and corruption using cross-country data. Empirical support on the causal relation between measured income inequality and corruption is unsatisfactory. Upon thoroughly reviewing the existing literature on inequality and corruption, we first replicate the results of the most influential paper written on the subject so far by Jong-Sung and Khagram (2005), with updated data, while underlining several methodological issues. We then proceed to estimate a dynamic panel data model of income inequality on corruption with System GMM regressions. We do not find empirical evidence to suggest that a rise in actual income inequality corresponds to higher corruption in countries.

Chapter 3 focuses on the perceptions of and attitudes towards income inequality, and how these perceptions relate to corruption. At the start of the chapter, we further elaborate on the various concepts regarding perceptions. Drawing upon our conceptual framework, we build an economic model in which an inequity averse public official solicits bribes in order to maximize their utility. Once we present our model, we advance to testing the hypotheses emerging from the model itself by carrying out regressions analyses using available datasets on perceptions. The results support our hypothesis that perceived inequality is strongly correlated with corruption in countries.

All three concepts we study in this thesis, including actual income inequality, perceived inequality and corruption, are difficult to measure. In fact, due to the illegality of corruption, we do not have data on actual corruption, and thus can only rely on survey data from experts and business people in a given country. In order to overcome methodological issues tied to the survey data, we use supplementary data which is collected through conducting laboratory experiments. Our experimental design, that we present in Chapter 4, allows us to investigate how the subjects' behaviours change when initial endowment inequality differs between treatments in a bribery game. We find more evidence on the impact of inequality on subjects' decisions through its effect on perceptions.

The economic model we present in Chapter 3 is built upon several key assumptions, such as the public officials' lack of correct information on incomes of others, and their inequity aversion. In order to examine whether these assumptions are realistic and valid, we administer a country-case study in Turkey, where we interviewed public officials. Data we gather from the interviews, as well as existing surveys, enable us to shed more light into the differences between measured and perceived inequality. As assumed, Turkish public officials have incorrect estimations of the distribution of income in Turkey.

The final chapter concludes this thesis by going over the findings emerging from the diverse set of studies we conducted throughout the thesis. We also highlight the theoretical and methodological implications of our research in the conclusion, and develop various policy suggestions.

Lastly, we would like to state that parts of this research, including the conceptual and theoretical framework, results of the regression analyses in Chapters 2 and 3, and the results of the laboratory experiment in Chapter 4 have been submitted by the author himself to be published as a policy paper to the Global Relations Forum, a think-tank based in Turkey, under their Young Scholars programme. The policy paper is scheduled to be published by the the summer of 2017.

Chapter 2

Income Inequality and Corruption as a Dynamic Panel Data Model

2.1 Introduction

In the final days of April 2014, Pope Francis tweeted to his millions of followers a rather controversial statement: "Inequality is the root of all social evil". That same month, the English translation of Thomas Piketty's colossal book on wealth inequality – "Capital in the 21st Century" hit the shelves and became an international best seller. Just at the start of the year after, President Obama promoted his budget that focused on specifically combating the growing income inequality in the US. Inequality has gathered immense attention from all around the world since the beginning of the decade, it has led to protests and social movements, and became one of the most debated issues in the economic and political world.

In their influential book "The Spirit Level", Wilkinson and Pickett (2010) demonstrated that high levels of income inequality correlated strongly with many aspects of our social life that negatively impacts the prosperity of countries. From epidemic obesity to violence, income inequality slowly but surely made its mark as the root of

many, if not all, social evils in today's world. One of those social evils that inequality is theorized to cause is corruption. Corruption is detrimental to economic development (Ades and Di Tella, 1999; La Porta et al., 1999; Treisman, 2000; Damania et al., 2004). Unfortunately, according to Transparency International's Corruption Perception Index, it is also rampant in countries where sustainable economic growth is needed the most. Policy makers typically choose to tackle corruption through institutional reform, privatization or increasing public oversight through transparency actions; yet, these widely recommended improvements to bureaucratic quality do not seem to produce successful outcomes towards reducing corruption (Persson et al., 2013). Reducing income inequality is a policy tool that is not often discussed as a way to fight corruption. Nevertheless, various economic theories that we will review in the next section, argue that higher income inequality is one of the determinants of corruption.

In this chapter, we are going to examine in detail, the causal relation between measured income inequality and corruption. The research question we pursue is "Does measured income inequality foster corruption?". Even though this question has already been widely addressed, a clear consensus on the links between inequality and corruption has to be formed. We contribute to the existing literature by analysing the link in a dynamic setting across countries over a time period of 30 years. To our knowledge, a panel data study on inequality and corruption to this extent has not been conducted before.

We continue the chapter by reviewing the existing theoretical and empirical literature on income inequality and corruption. We then move on to introducing our methodology and data. Our empirical benchmark is the results obtained in the prominent study in the field by Jong-Sung and Khagram (2005). Therefore, before presenting the estimates obtained from our dynamic models, we replicated their regressions using updated data.

2.2 Literature Review on Income Inequality and Corruption: Theories and Empirical Results

Given that income inequality and corruption are two concepts that are particularly important in the context of development, the depth of the economic literature on how inequality relates to corruption is disappointingly shallow. Only a handful of theories explain the causal link between inequality and corruption, and these theories primarily centre around conflicts of interest between the rich and the poor.

In countries where the disparity of wealth between the rich and the poor is very large, the rich can use their wealth to illegally obtain influence over political and judicial mechanisms in order to maintain their status (Scott, 1972; Glaeser et al., 2003; Jong-Sung and Khagram, 2005). A more equal distribution of wealth creates a politically strong middle class to fight the injustice of influence, and enables the victims of corruption to take countervailing actions against the corrupt and reduce its effects in the society (Scott, 1972; Alam, 1995). Glaeser et al. (2003) construct a three-stage model in which they trace how inequality can lead to subversion of justice through bribery by the rich and powerful. This is a model of state capture by the elite, and as Hellman et al. (2003) point out, such explanations centred on state capture is related to inequality of influence rather than income. Despite being closely related to the inequality of wealth, the extent of influence provided by wealth depends on the political specifications of the country at stake (Hellman and Kaufmann, 2004). In Dabla-Norris and Wade (2002), instead of participating in productive activities, wealthy agents try to avoid the appropriation of their resources by rent-seekers by becoming rent-seekers themselves. Dutta and Mishra (2013) indicate that these models implicitly assume that the rich are more corrupt than others without enough supportive evidence.

Based on the theory that the rift between rich and the poor cultivates a corrupt

environment, a number of studies test the effects of income inequality on corruption. Husted (1999) is one of the first economists to include income inequality as a potential determinant of corruption in a cross-country regression analysis. The author examines the effects of national wealth, income distribution, government size and several cultural variables, on the level of perceived corruption in a sample of 44 countries. He conducts Ordinary Least Squares (OLS) multiple regression analysis using values from Transparency International's Corruption Perception Index published in 1996. Husted (1999) finds that both income distribution and government size have insignificant impact on corruption. His results demonstrate a strong negative effect of national wealth, measured by the gross national product per capita, and positive effects of three cultural variables (masculinity, uncertainty avoidance and power distance [1]) on corruption.

Like Husted's (1999) analysis, several other studies investigate the determinants of corruption and include Gini coefficients measuring income inequality as one of the explanatory variables [2]. While Park (2003) finds no significant link between inequality and corruption, Paldam (2002) argues that higher inequality may increase the temptation to make illicit gains and conducts cross-sectional regression analysis. However, while he finds that income inequality does lead to higher corruption, this result is not robust since the coefficient loses its significance once basic controls are introduced.

Jong-Sung and Khagram (2005) critique the empirical findings of Husted (1999) and Paldam (2002). The authors suggest that the reason many empirical studies failed to show the causal effect of income inequality on corruption, was their failure to address the potential biases associated with measurement errors, omitted variables

[1] Power distance refers to "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (Hofstede, 1991, p. 28). According to Husted (1999), paternalism, providing favours in exchange for loyalty, flourishes in high power distance countries and creates a favourable environment for corruption.

[2] Gini coefficient is the most common measures of income inequality. If all incomes are equally distributed, Gini gets a value of zero, while if only one person receives the entire income, Gini becomes one, the highest value possible. Economists frequently multiply the coefficient by 100 and give percentage values.

and reverse causality. Using the mature cohort size (ratio of the population of 40 to 59 year olds to the population of 15 to 69 year olds) as an instrumental variable for income inequality, Jong-Sung and Khagram (2005) demonstrate, through Two-staged Least Squares (2SLS) regressions, that income inequality is likely to be a significant determinant of corruption, and that its effect is greater in democratic countries.

Easterly (2007) uses a different instrument for inequality and examines its impact on different institutions necessary for development, one of which is "freedom from corruption". His choice of instrument for inequality, which was originally suggested by Engerman and Sokoloff (1997), is the exogenous suitability of land for wheat versus sugarcane. Engerman and Sokorloff's (1997) hypothesis is that sugarcane production features economics of scale and slave labour, and thus contributes to high structural income inequality; while wheat is a commodity grown in family farms and thus assists in creating a large middle class. Easterly (2007) first tests the relevance of the instrument with the average Gini values of given countries in a period of 38 years (1960-1998) and then conducts IV regressions. The results demonstrate that high income inequality increases the corruption measure in a sample of 114 countries. However, basic control variables are not included in this specific regression.

In his book titled "Corruption, Inequality and the Rule of Law" Uslaner (2008) states that inequality, measured by the Gini coefficient, is very strongly related to all the determinants of corruption, and therefore, including it in statistical models would not produce satisfactory results. He shows that even though there is no direct link between inequality and corruption, there is an indirect link which is based on "generalized" and "particularized" trust in society. Uslaner defines "generalized" trust as the belief that many others are part of your moral community, and states that it is the backbone of a well-ordered society. On the other hand, he suggests that "corruption thrives on particularized trust, when people only trust their own kind and mistrusts strangers" (Uslaner, 2008, p.49). Inequality further separates

the groups and makes people wary of the separation's existence, exacerbating particularized trust and corruption.

A common feature, and most likely a methodological shortcoming, of the empirical studies that include measured income inequality as a potential determinant of corruption in regressions on the premise that large disparities of wealth might cause corruption, is that they use the concepts of income and wealth inequality interchangeably. However, there is evidence that global household wealth is more concentrated than income. Thus wealth inequality is in fact significantly different and greater than income inequality (Davies et al., 2009, 2011).

The theories reviewed so far furthermore fail to take into account the decision process of the civil servant who considers taking a bribe. If corruption is to be examined as an interaction between an agent (public officer) and a client (citizen), then theories based on the inequality of wealth and influence only and insufficiently focus on the client's capability and opportunity to be corrupt. A second set of theories links differences between public and private sector wages to corruption, while emphasizing the corruptibility of the agent. According to the equity theory developed by Adams (1963), people in social exchange expect to be rewarded in proportion to the level of individual contribution. If they perceive the reward as unfair they may engage in undesirable activities in order to compensate and restore fairness (Cowherd and Levine, 1992). Becker and Stigler (1974) assume that law enforcers (civil servants) maximize their expected income, and that corrupt behaviour leads to job loss, meaning that higher wages create an incentive to be less corrupt.

Van Rijckeghem and Weder (2001) econometrically test Becker's theory finding find that even though a wage-corruption trade-off exists, according to the cross-country regressions on 31 developing economies, the salary necessary to crowd out corruption would be unrealistically high. They interpret this result as only weak evidence for the fair wage theory. Their regressions with country-fixed effects do not confirm a relationship either. Using panel data from the US states over 25 years, Alt and

Lassen (2008) show that both higher inequality and government wages higher than private sector wages, reduced corruption in the US. However, the authors assume that an official who is convicted of corruption will only be able to find employment in the private sector with a lower salary than their previous position in the public sector. This decrease in the expected present value of discounted lifetime earnings reduces the motivation to engage in corruption. Thus, higher wage inequality would mean lower lifetime earnings and less corruption.

The assumptions made about the future employability of the corrupt officials, might be applicable to cases in developed countries, where the extent of corruption is lower compared to developing nations. However, in some developing countries where corruption is widespread and culturally accepted, the conviction of corruption does not necessarily mean lower lifetime earnings. In fact, it might not even lead to unemployment. Alt and Lassen (2008) also use the number of convictions as a measure of corruption. This would be problematic in a cross-country setting, as the number of convictions would be biased if the judiciary system itself is corrupt; or rather if corrupt acts are not detected and never punished. Therefore, Alt and Lassen's (2008) results might not hold in other countries and cannot be generalized.

The relationship between income inequality and corruption is very likely to be simultaneous. Corruption may promote unequal distribution of wealth and privileges, threaten existing advantages through distortions, and can thus facilitate the preservation of income inequality (Johnston, 1989). According to Gupta et al. (2002) corruption might worsen the inequality of income distribution through various channels: Corruption can lead to tax evasion favouring the wealthy, it can reduce the tax base and it can divert social programs to the benefit of the wealthy, instead of funding policies aimed at reducing inequality. The authors argue that in a corrupt environment, the rich would use their wealth to influence the government into drafting policies and creating programs favourable to them, which would further lead to an increase in existing inequalities. Through regressions, the authors demonstrate

that as the corruption index worsens by one standard deviation, the Gini coefficient increases by 11 points. Using the analytical framework developed in Murphy et al. (1993), Li et al. (2000) show that corruption affects inequality in an inverted U-shape and explains a large proportion of the Gini differences between developing and industrialized countries[3].

In view of all that has been mentioned so far, it is apparent that much uncertainty still remains on the relationship between measured income inequality and corruption. Existing theories guide us through the questions of how disparities in wealth or public and private sector wages should affect corruption, yet they fail to provide an explicit answer as to whether income inequality causes corruption. Additionally, non-robust empirical evidence, potentially due to methodological concerns that arise when income inequality measures are used in cross-country regression analyses, leads to a lack of general consensus on the subject.

[3]Li et al. (2000) use Deininger and Squire's (1996) dataset of Gini coefficients as their measure of income inequality. The DS database has been regarded as the most comprehensive database of income inequality before the World Income Inequality Database (WIID) of the UNU-WIDER was published in September 2000. Both WIID and DS include Gini coefficients with different definitions of income (i.e. Gross income, net income, Gini based on expenditures, etc...). Therefore, data needs to be adjusted before it's used in cross-country research. Li et al. (2000) and many other researchers employed the methodology recommended by Deininger and Squire (1996). For example, differences between income and expenditure based Gini's are adjusted by increasing the latter by 6.6, the average difference observed. This approach is quite simplistic and causes problems in empirical results. For instance, the difference between gross and net Gini values in a given country and year depends heavily on redistribution policies and cannot be held constant for all observations (Solt, 2009).

2.3 A Panel Study of Measured Income Inequality and Corruption

Our aim in this chapter is to explore whether growing disparities in income foster corruption. The review of existing empirical literature revealed that most studies failed to demonstrate a significant link between the two phenomena. In addressing this research question, Jong-Sung and Khagram (2005) (henceforth referred to as JSK) argue that methodological concerns regarding measurement errors in the inequality data, and the simultaneous causality between inequality and corruption, might produce biased estimates in regression models, leading to insignificant results. The authors employ an instrumental variable approach to overcome the methodological issues and conclude that there is a powerful link between income inequality measured by Gini and corruption.

In this section, we conduct our own analysis to investigate the existence of a causal relationship between measured income inequality and corruption. In doing so, we first replicate the JSK, while underlining and addressing several issues we find methodologically troublesome in their influential paper. We then proceed to present results emerging from our dynamic model of income inequality and corruption.

2.3.1 Methodology

The economic theory, as previously reviewed, revealed that the relationship between income inequality and corruption is likely to be simultaneous. While large disparities in income motivate the rich into giving bribes to secure their status and make the poor susceptible to bribe extension, corruption may also further increase these disparities through an unequal appropriation of wealth (Jong-Sung and Khagram, 2005). Therefore, OLS results would be biased both due to measurement errors in the income inequality data and reverse causality. JSK employ an instrumental

variable (IV) approach in order to overcome these methodological concerns. Their choice of instrument for measured income inequality is the "mature cohort size" relative to adult population, calculated by the share of individuals between the ages of 40 to 59 in a population aged between 15 to 69 years old, as theorized by Higgins and Williamson (1999) and used in Leigh (2006). According to Higgins and Williamson (1999), large mature working age cohorts lead to less income inequality since fat cohorts tend to earn relatively low wages. "When [these] fat cohorts lie in the middle of the age-earnings curve where life-cycle income is highest, this labour market glut lowers income in the middle, thus tending to flatten the age-earnings curve. Earnings inequality is moderated" (Higgins and Williamson, 1999, p.2). Their empirical results do show a stable relationship between mature cohort size and aggregate measures of inequality. However, the theoretical mechanism is based on the assumption that "cohort size effects reflect the competitive market-clearing equilibrium, driven by imperfect substitutability in production between workers of different experience levels" (Higgins and Williamson, 1999, p.4). The authors indicate that this assumption is not testable, yet they argue that the causal mechanism does not need to play a role in the validity of the empirical results as long as the total income accumulated by a cohort rises less than the proportionate rise in cohort size.

The theory also links mature cohort size to inequality of earnings, whereas Gini is usually calculated from the household or individual incomes. Higgins and Williamson (1999) argue that even though they are unable to address these shortcomings, their relative importance is minimal since empirical results demonstrate that mature cohort size is a significant predictor of measured income inequality. There is indeed a high correlation between the two variables, making the mature cohort size is a relevant instrument [4]. Nevertheless, an instrument also has to be exogenous in the regression equation. Hence, mature cohort size should not have any other partial effect on corruption once income inequality and other omitted variables are controlled for, and it should be uncorrelated with the omitted variables (Wooldridge, 2009).

[4]The correlation coefficient is -0.72 according to JSK.

The exogeneity of mature cohort size is debatable. In fact, the JSK paper states the main argument against its exogeneity themselves. "[T]he mature cohort (individuals 40 to 59 years of age) may have more opportunity for corruption and be more prone to corruption." (Jong-Sung and Khagram, 2005, p.143). In order to support the exogeneity of this instrument, the authors conduct an OLS regression of justification of bribery on age and other control variables using data from World Values Survey. The results show a negative and significant relationship between the two, however, as the regression coefficient of the variable indicating the impact of mature age on justification of bribery is very small, the authors dismiss its significance in support of the exogeneity of the instrument. A second regression of perception of corruption on mature age, also indicates that the extent of corruption individuals perceive is age independent.

Unlike JSK, we are of the opinion that the fact that mature age does have a significant, albeit small impact on the justification of bribery in the World Values Survey data, raises some concerns about its exogeneity. The survey involves more than 40,000 observations and small coefficient estimates due to the increased noise in a data sample of this size is a common econometric occurrence. Unfortunately, economic literature does not offer further instruments that measure variation over time across countries. One way to overcome this issue is to find instruments within the panel set of the data itself. The dynamic panel data estimator named System GMM, developed by Arellano and Bover (1995) and Blundell and Bond (1998), enables the inclusion of lagged values of independent variables to be used as relevant instruments. System GMM also allows for the inclusion of the lagged dependent variable as one of the right hand side variables. This is important given the persistent nature of corruption, especially of its perception. If one assumes that perceptions are formed over time, previous levels of perceived corruption in a given society should have an important effect on the current level that has to be controlled for. An increase in perceived corruption over time may also increase actual corruption (and therefore its perception), as people draw on corruption's pervasiveness in order to justify their

own corrupt behaviour (Rose-Ackerman, 2001). Therefore, because System GMM allows for endogenous regressors, including the lagged dependent variable, and does not assume good instruments are available outside the immediate dataset, it will be the preferred method of estimation in this analysis (Roodman, 2009*a*).

In order to test our hypothesis, we need to estimate the coefficients of the following model:

$$Corruption_{it} = \alpha Corruption_{it-1} + \beta_{Gini} Gini_{it} + \beta X_{it} + \epsilon_{it} \tag{2.1}$$

$$\epsilon_{it} = a_i + u_{it} \tag{2.2}$$

Our control variables will include countries' economic development, democratic freedom, the rule of law, international trade, the abundance of natural resources and the size of the government. While the JSK paper chooses to control for the legal origin of countries, we control for the rule of law, which could be interpreted as the quality and strength of the legal system. Our intuition is simple: The origin of legal systems can have an impact on a country's overall tolerance of corruption. However, the time-invariant component of the rule of law, namely legal origins, will be absorbed into the country-specific fixed effect. What should be controlled are the time-variant effects of the legal system and popular observance of the law. For instance, if citizens do not adhere by the legal code, or if the legal code does not have enough deterrence power, legal impact on corruption might differ in countries with the same legal origin.

Equation 2.1 implies that the lagged dependent variable is present in the model. Its existence causes OLS, fixed effects and first difference estimations to be biased and inconsistent (Roodman, 2009*a*). System GMM differences the instruments to make them exogenous to the fixed effects. The first differenced lag of the instrumenting variable can be a valid instrument for the lagged variable itself as long as it is not correlated with the time-invariant error term. If,

$$E[\Delta w_{it-1} a_i] = 0 \tag{2.3}$$

for any instrumenting variable w, for all i and t, then Δw_{it-1} is a valid instrument for w_{it-1} when u_{it} are not serially correlated, since $\Delta w_{it-1} = w_{it-1} - w_{it-2}$ and,

$$E[\Delta w_{it-1}\epsilon_{it}] = E[\Delta w_{it-1}a_i] + E[\Delta w_{it-1}u_{it}] - E[\Delta w_{it-2}u_{it}] = 0 \tag{2.4}$$

The Sargan/Hansen tests for the joint validity of the instruments and tests for autocorrelation in the error term u_{it} are required after conducting System GMM estimations. The results of both tests will be reported in the following section along with the estimations and their specifications[5].

Assumption 2.3 is derived from an initial condition in Blundell and Bond (1998), which assumes that in an autoregressive model without controls (Equation 2.5), conditioned on the fixed-effects, the dependent variable should converge over time with the long-run equilibrium where the fixed-effects and the autoregressive decay cancel each other out. In order for Assumption 2.3 to hold, Equation 2.6 is required:

$$Corruption_{it} = \alpha Corruption_{it-1} + a_i + u_{it} \tag{2.5}$$

$$E[(Corruption_{i1} - \frac{a_i}{1-\alpha})a_i] = 0 \tag{2.6}$$

Equation 2.6 means that once other independent variables are controlled for, countries with rapidly increasing levels of corruption are not systematically closer or farther from their steady states than countries with corruption levels increasing slowly over time (Roodman, 2009*a*). However, given that the economic relationship between corruption and the control variables (economic development, income inequality, trade etc.) has been present in countries for decades, if not centuries, all countries should have already converged close enough to their steady states, making the initial condition assumption negligible (Blundell and Bond, 2000).

System GMM allows us to estimate a dynamic model of corruption, while address-

[5]For more information and detailed discussion on the System GMM estimations see Blundell and Bond (1998) and Roodman (2009*a*).

ing endogeneity issues due to simultaneous causality. We are also able to test our hypothesis in the short-run, instead of solely treating the association between inequality and corruption as a long-run relationship. The aggregation of income disparities over time can be interpreted as differences in the accumulation of wealth. As previously noted, wealth and income inequalities differ both conceptually and statistically. Since our economic framework is focused on income inequalities rather than wealth, we maintain that empirical analyses should also be geared towards detecting short-run economic links between income inequality and corruption. However, as we will explain in the next section, data on the distribution of income in most countries is not always published annually. In order to obtain a relatively balanced panel dataset, we have decided to set each time period, t, in our model to five years. Hence, average values over a period of five years for each variable will be utilized in our regressions.

2.3.2 Data

Choice of data used in order to conduct regression analysis is especially important for indices of income inequality and corruption, as they are both subject to conceptual concerns and measurement errors. In this subsection, we explore and scrutinize available datasets before delving into data analysis.

2.3.2.1 Income Inequality Data

Generating the representative distribution of a country's income is an arduous task. It is commonly measured by the Gini coefficient, which takes the value of zero if income is equally distributed between every individual in the society, and 1 if the entirety of the income is held only by one individual. The Gini coefficients are calculated through the data collected in household surveys. However, the survey questions, the choice between measuring consumption or income, their definitions,

the target population and the reference units usually differ in household surveys produced by different statistical offices across countries and time. Therefore, it is possible that Gini values, for two different countries in the same period of time, might not be making measurements for the same concepts; and thus, would not be comparable. Similarly, two different Gini values might be reported for the same country and time period.

Researchers typically overcome this issue of non-comparability through two different methods (Atkinson and Brandolini, 2001). The most typical method is to adjust for differences in definitions and units by introducing dummy variables in regressions. For example, if one had a set of Gini values with three different income definitions (Net income, gross income and consumption), all Gini values would be pooled and dummy variables for each different income definition, apart from the reference, would be included in regressions, assuming that the difference in inequalities between different definitions are simple intercept shifts, constant over time and across countries. Alternatively, as employed by JSK, Gini values can first be adjusted by using dummy variables, and adjusted Gini's can be used in subsequent regressions. Despite the fact that the adjustment method is commonly utilized in empirical research, it is rather simplistic and non-satisfactory, as differences in income concepts, such as net and gross income, relate to government fiscal policies, tax rates and demographic factors that vary across countries and time (Atkinson and Brandolini, 2001, 2009). A second approach suggested by Atkinson and Brandolini (2001) is to decide on an income definition and only include observations that match the selected definition. However, this approach may limit the sample of countries and thus the scope of the analysis, therefore we choose to follow JSK and adjust Gini values prior to our analysis.

Another important concern, regarding the use of income inequality data is the measurement error associated with it. The quality of the data varies between observations. Secondary datasets such as UNU-WIDER's World Income Inequality

Database (WIID) do record the quality of the data; however, even these quality rankings might be incorrect. On the other hand, if only the highest quality data is used, results might be biased due to the fact that countries with the highest quality data tend to be the developed countries. JSK address this issue by averaging the data in a 25-year period in OLS regressions, as well as later employing an instrumental variable approach. By averaging the data, the authors reduce measurement error, yet they also view the relationship between income inequality and corruption as a long-term structural phenomenon. In their OLS and IV regressions, independent variables, including income inequality, are averaged between the period of 1971 and 1996, while the dependent variable, corruption, is averaged between 1996 and 2002 [6].

The preferred secondary dataset of income inequality is the latest version UNU-WIDER's WIID v3.3. WIID reports all characteristics of the data, including the income definition used, area and population coverage, the reference unit, the original data source and its quality, making it easier to focus on a set of data criteria. WIID contains 6854 observations from 175 countries between 1867 and 2012. Unlike Frederick Solt's (2009) Standardized World Income Inequality Database (SWIID), a recently published dataset that is getting increasing attention from empirical researchers, WIID does not contain adjusted values. SWIID claims to correct for measurement errors and missing data, while standardizing all available Gini values for a long period of time using multiple imputation techniques. Even though SWIID promises an exciting quick fix for all known issues regarding inequality data, the methodology of the imputations is not clear and Jenkins (2014) recommends the use of WIID over SWIID until the latter is subject to more academic scrutiny.

In order to adjust the coefficients, income definitions in the dataset were grouped into three categories: Net income, gross income and consumption. Observations were dropped if their income definition did not include sufficient information, or if

[6] Except for the independent variables "democracy", which is averaged for the period between 1972 and 1996, "percentage of Protestants" and "legal origin" dummies, which are not averaged.

the original survey did not cover the majority of the population. Dummy variables were created for gross income, consumption and person-based Gini values, as the reference category is household net income based Gini. Pooled OLS with the three categorical dummy variables, the country dummies and the five year averaged period dummies was conducted in the final stage to obtain the adjustment coefficients[7]. The adjustment for the income inequality data is as follows:

$$AdjustedGini = Gini + 0.018 * Consumption - 0.055 * GrossIncome + 0.024 * Person$$

This adjustment is in line with the data and with the theory, as consumption inequality tends to be lower than net income inequality, and gross income inequality is higher due to the distributional effect of taxes and transfers. Our adjustment implies that, with all else being equal, gross income Gini is 5.5 points higher than Gini after taxes and transfers, while consumption Gini is 1.8 points lower. Similarly, when Gini's are person-based, they are 2.4 points lower than the household based observations. Adjusted Gini's were later averaged according to their year groups. The adjustment process generates 587 observations for 151 countries between the year groups 1985 and 2010.

2.3.2.2 Corruption Data

Much like income inequality, our main variable of interest, the use of the data for the dependent variable, corruption, requires great caution. The most commonly used corruption indicator in empirical research is the Corruption Perception Index (CPI) published annually since 1995 by Transparency International (TI). However, due to a variation of methodology between years in CPI, we prefer to use the International Country Risk Guide's (ICRG) corruption index published by the Political Risk Services Group (PRS).

[7]Period dummies are centred on mid-decades and start from 1985. For example, the period dummy for 1985 covers the years between 1983 and 1987.

CPI, defines corruption as the abuse of public power for private gain and measures the extent of corruption perceived to exist in a country by using at least three different survey results. Despite its popularity in research, the use of CPI in regression analysis has many limitations. As its name indicates, the data measures the perception of corruption and not corruption itself. Hence, the opinions of the respondents may be biased and may not be based on actual knowledge (Treisman, 2007). Another issue limiting its use, comes from the methodology used for its normalization. TI constructed the index using different methods in different time periods (Seldadyo and de Haan, 2006). In 1995, CPI was constructed by taking simple averages of different surveys after transforming them into the same scale. Between 1996 and 2001, simple means were taken to standardize different observations into a common scale. In 2002, TI introduced a matching percentile and Beta transformation, which was useful for combining sources with different distributions, yet it resulted in the loss of information (Saisana and Saltelli, 2012). In 2012, TI switched back to taking simple averages of standardized scores for simplicity and to allow time for comparisons (Saisana and Saltelli, 2012). These methodological changes cause the Corruption Perception Index to be an inconsistent time series, making it problematic to use in panel regressions (Seldadyo and de Haan, 2006).

A second index focused on measuring corruption, is the World Bank's Control of Corruption Index (CCI). Like CPI, CCI is constructed by aggregating survey data for a large set of countries. Even though its methodology is more consistent over time, compared to CPI, CCI also covers a limited time period (1996-2013). A wider period is more appropriate for five year averaged panel regressions, making ICRG the preferred choice of secondary data on corruption for this research. ICRG measures the perceived level of corruption in a panel of almost 150 countries since 1984, while controlling for financial corruption, such as bribes from licences and tax assessments, as well as nepotism, excessive patronage, secret party funding and suspiciously close ties between politics and business. Scores range between zero and six, where countries perceived to be less corrupt receive higher scores. However, data is subtracted

from six so that a larger value in the index indicates higher corruption. ICRG data is based on the opinions of "experts" employed by PRS. Like CPI and CCI, it carries the risk of representing biased opinions. However, researches have argued that high correlations between different indices demonstrate their validity. The ICRG is also highly correlated across years, suggesting that if there are errors in measurement, they should be exceptions, and therefore, uncorrelated with true corruption and thus should not bias the results (Fréchette, 2006). Also, as the polls are conducted by a single organization, it would be easier to assume that the respondents would have a common set of standards, making a cross-country comparison more efficient. Due to the benefits of ICRG and its extended time horizon, this data set will be preferred over CPI and CCI in the panel data regressions.

All of the subjective measures discussed above are ordinal indices, and even though researchers have treated these measures as cardinal, their limitations should be kept in mind when used in quantitative research (Svensson, 2005). There are some cardinal indices available such as the Business Environment and the Enterprise Performance Survey of the World Bank or the International Crime Victim Survey of the UN, however these surveys offer data from a limited number of countries over a short time span and they are not suitable for panel research. One can attain the number of convictions in corruption cases in different countries. Apart from the small sample size, misreporting is a common problem, particularly in surveys with direct questions (Svensson, 2005). Use of conviction data is also problematic as it only accounts for cases that have been charged and brought before court. Number of convictions might also vary with the legal code or the impartiality of the judiciary system, making comparisons between countries difficult.

The illegality of corruption makes collecting actual data almost impossible. The lack of actual data limits our analysis to data based on subjective measures of corruption. All subjective measures have weaknesses when it comes to measuring realities, since these measures are generated through survey questions, of either citizens or

experts; and methodological errors in survey design might lead to vague questions. A poorly designed survey question might not be able to capture the intended extent of corruption. The use of the ICRG dataset, reduces the risk of biases that can be caused by misinterpretation. PRS, the private firm that publishes the dataset, employs country analysts whose opinions form the basis of the ICRG Corruption Index. According to their website, the same research design and methodology that has been applied since the initiation of the ICRG dataset. Hence, presuming the country analysts adhere to the same methodological guidelines for each country, a continuity over time and across countries is established. Nevertheless, a lack of information exists on the credentials of the PRS analysts, and whether their subjective assessments correctly capture the extent of corruption in countries. Despite the methodological concerns, the lack of data on actual corruption requires us to use subjective data, and hence we implicitly assume that the perceived data accurately reflects the reality.

2.3.2.3 Data of Control Variables

Rule of Law: Data for the rule of law is taken from the PRS Group's ICRG Law and Order dataset. The strength and impartiality of the legal system, as well as the popular observance of the law is taken into account by country experts in order to give the country a score between one (weak rule law) and six (strong rule of law). This variable is not used by JSK. Instead, the authors chose to include time invariant dummy variables for countries' different legal origins in order to capture institutional quality. As institutional quality might vary overtime, especially in developing countries, and country fixed effects we control for capture all the variation that JSK's legal origin dummies do, we have chosen to utilise rule of law as a proxy for institutional quality. Corruption should decrease as the rule of law improves within and between countries. It is important to note here that the *Rule of Law* variable originates from the same data source as the dependent variable, and scores

reflect the opinions of the same country experts.

Democratic Freedom: Following JSK, the political rights score of Freedom House's Freedom in The World dataset is used to control for democracy and freedom. A high political rights score means that the country is free and democratic. A negative causation between corruption and freedom is expected.

Data for the remaining control variables are all retrieved from the World Bank's World Development Indicators.

Economic Development: Measured by the natural logarithm of the per capita Gross Domestic Product in constant 2005 US$, it is expected to have a negative impact on corruption.

Trade: The *Trade* variable controls for a country's openness to trade and is measured by natural logarithm of the sum of imports and exports of goods and services as a share of the gross domestic product.

Natural Resources: This variable is included to control for the economic dependency on natural resources and is measured by the share of fuel, ore and metal exports in total merchandise exports.

Government Size: The economic size of the government is measured by the share of the general government final consumption expenditure in the country's total gross domestic product.

In order to conduct a thorough analysis of the possible economic relationship between income inequality and corruption, we will first re-estimate the JSK 2SLS model using updated data. Additional control variables included in JSK estimations are:

Mature Cohort Size: The instrument for income inequality is mature cohort size, defined as the ratio of the population aged between 40 and 59 to the population aged

between 15 and 69. Data is taken from the United Nations Population Prospects Dataset.

Legal Origin: Scandinavian Commercial Code (reference category), British Common Law, French Commercial Code, Communist/Socialist Laws and German Commercial Code distinctions were determined in La Porta et al. (1999).

Federalism: The federalism variable is the sum of five binary values found in World Bank's Database of Political Institutions (Beck et al., 2001). Binary values depict the existence of autonomous regions, the local elections of municipalities and provincial governments, the local authority over taxation and the local constituencies of senators.

Ethnolinguistic Fractionalization: Found in Alesina et al. (2003), this variable indicates the value of a country's ethnic and linguistic fractionalization.

Protestant: The percentage of the Protestant population in a country in 1980 (La Porta et al., 1999).

2.3.3 Results and Discussion

Having decided upon the choice of data on corruption, income inequality and other control variables, we now proceed to our regression analysis. Since we are investigating the existence of a causal link between income inequality and corruption based on the theories we previously reviewed, our main hypothesis is identical to the first hypothesis of JSK:

Hypothesis: Greater income inequality is associated with higher levels of corruption.

We test this hypothesis by employing two different econometric models. First, we replicate the results following the methodology used by JSK, while underlining the

gaps in their research design. We do so by using more recent data, in order to lay out the empirical basis for our System GMM models.

2.3.3.1 Replicating the JSK

We start our analysis by re-estimating JSK's model by using updated data with a wider time span. Our dependent variable is corruption, measured by the World Bank in their Control of Corruption Index averaged over 2006 and 2012. We instrument the adjusted Gini coefficient in countries averaged over the period of 1971-2006 by the mature cohort size variable over the same period. The results of the 2SLS estimations given in Table 2.1 confirm those of the JSK paper. Greater income inequality seems to be associated with higher levels of corruption. This association survives the inclusion of other controls, but only when we control for the socialist legal origin dummy variable. Results no longer support the main hypothesis when we add the rule of law measure into the model (Table 2.2). Controlling for the rule of law, while excluding the socialist legal origin dummy leads to an unexpected negative coefficient on Gini, indicating that an increase in inequality corresponds to a decrease in corruption. We will investigate the possible reason for such a relationship later in this section. Inclusion of the legal origin dummy renders inequality insignificant [8]. Coefficient estimates from these 2SLS regressions indicate the need to control for the rule of law. Origin of the legal code, specifically if it is of socialist origin, may have an impact on the tolerance of corruption in the country. However, it is also important to control for the quality and deterrence of the laws, as well as how well they are observed and obeyed in the country.

The loss of significance of the inequality variable in the 2SLS model when the rule of law is controlled for, weakens JSK's conclusion. Cross-country analysis also implicitly views the relationship between inequality and corruption as a structural and long

[8]Socialist legal origin dummy also loses its significance when other legal origin dummies are included.

Table 2.1: JSK Replication (Dependent variable: Corruption [CCI])

	I	**II**	**III**	**IV**
	2SLS	**2SLS**	**2SLS**	**2SLS**
Income	8.63***	0.78	5.08***	4.41***
Inequality	(7.26)	(0.95)	(3.50)	(3.35)
Economic		-0.50***	-0.36***	-0.25***
Development		(-12.75)	(-6.45)	(-4.10)
Socialist			1.02***	0.46
Legal			(4.63)	(1.13)
British				-0.40
Legal				(-0.96)
French				-0.33
Legal				(-0.72)
German				-0.29
Legal				(-0.70)
Democracy				-0.08**
				(-2.14)
Federalism				0.01
				(0.41)
Natural				0.46**
Resources				(2.21)
Trade				-0.09
				(-0.94)
Ethnolinguistic				0.06
Fractionalization				(0.26)
Protestant				-1.22***
				(-2.99)
Observations	147	145	145	119

Dependent variable is World Bank's Control of Corruption Index averaged over the years 2006 and 2012. Legal origin dummy variables are included. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

run phenomenon. Through the 2SLS regressions, we have actually tested whether average income inequality between 1971 and 2006 was associated with corruption after 2006. Let us now investigate the existence of a causality between inequality and corruption between different countries and over time, in a panel data set. As

Table 2.2: JSK Replication with Rule of Law (Dependent variable: Corruption [CCI])

	I	**II**	**III**	**IV**
	2SLS	**2SLS**	**2SLS**	**2SLS**
Income	1.75	-1.32	-2.03**	1.27
Inequality	(1.54)	(-1.53)	(-2.16)	(1.02)
Rule of	-0.59***	-0.42***	-0.40***	-0.33***
Law	(-7.90)	(-6.15)	(-5.62)	(-5.03)
Economic		-0.34***	-0.21***	-0.14***
Development		(-7.51)	(-3.55)	(-2.62)
Democracy			-0.11***	-0.11***
			(-2.84)	(-3.16)
Federalism			0.00	0.01
			(0.12)	(0.28)
Natural			0.39*	0.31*
Resources			(1.93)	(1.76)
Trade			-0.01	-0.10
			(-0.09)	(-1.10)
Ethnolinguistic			0.21	0.15
Fractionalization			(0.89)	(0.76)
Protestant			-0.97***	-0.83***
			(-4.21)	(-4.09)
Socialist				0.66***
Legal				(4.07)
Observations	122	120	107	107

Dependent variable is World Bank's Control of Corruption Index averaged over the years 2006 and 2012. z-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

the ICRG data covers a wider time frame, we first need to exchange the ICRG Corruption Index with the World Bank's Control of Corruption Index, making it the new measure of the dependent variable. Taking five-year averages for each variable which are not constant over time leaves us with a panel dataset of 456 observations from 113 countries from 1985 to 2010.

Results in Table 2.3 show that we fail to reject the null hypothesis that inequality has no effect on corruption when time invariant unobservables are controlled for in the

Table 2.3: Panel Estimations of the JSK model (Dependent variable: Corruption [ICRG])

	I	**II**	**III**	**IV**	**V**
	OLS	**FE**	**RE**	**2SLS FE**	**2SLS RE**
Income	1.86***	-0.54	1.13*	4.38	-0.35
Inequality	(3.59)	(-0.62)	(1.79)	(0.38)	(-0.06)
Economic	-0.36***	0.11	-0.32***	-0.11	-0.35***
Development	(-8.88)	(0.52)	(-5.57)	(-0.19)	(-2.79)
Democracy	-0.06**	-0.08*	-0.07**	-0.08*	-0.07*
	(-2.18)	(-1.76)	(-2.18)	(-1.70)	(-1.91)
Federalism	-0.05**	-0.08	-0.07**	-0.11	-0.07**
	(-2.35)	(-1.41)	(-2.21)	(-1.28)	(-2.25)
Natural	0.38**	0.75	0.46*	0.80	0.50*
Resources	(2.22)	(1.48)	(1.94)	(1.47)	(1.75)
Trade	-0.16**	0.12	-0.10	-0.02	-0.10
	(-2.05)	(-0.63)	(-0.91)	(-0.06)	(-0.79)
Socialist	0.18		0.75		0.88
Legal	(0.58)		(1.46)		(1.15)
British	(-0.24)		0.40		0.64
Legal	(-0.84)		(0.82)		(0.56)
French	(-0.15)		0.52		0.81
Legal	(-0.46)		(0.97)		(0.61)
German	-0.03		0.44		0.59
Legal	(-0.11)		(0.86)		(0.73)
Ethnolinguistic	-0.29		-0.26		-0.21
Fractionalization	(-1.49)		(-0.82)		(-0.57)
Protestant	-1.82***		-1.24**		-1.06
	(-6.03)		(-2.55)		(-1.22)
Observations	456	456	456	456	456

Dependent variable is ICRG's Corruption Index. Legal origin dummy variables are included. t and z-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

fixed effects estimations in Columns II and IV. Similarly, we find that instrumenting the Gini coefficient with mature cohort size no longer produces significant results. It is possible that either mature cohort size is not a valid instrument for income inequality, or that we might still be suffering from omitted variable bias, due to the

exclusion of the lagged dependent variable. In order to address these issues, we will proceed to test our hypothesis through System GMM regressions.

2.3.3.2 Dynamic Model of Inequality and Corruption

Due to the lack of an appropriate instrument for income inequality and for the inclusion of the lagged dependent variable in the regression, the use of a dynamic panel data estimator is requires. When estimating dynamic models, Pooled OLS and Fixed Effects (FE) regressions can be used to perform a preliminary analysis. Table 2.4 shows the results of these regressions. Due to its endogeneity, the coefficient estimate for the lagged dependent variable has an upward bias in the OLS and a downward (Nickell) bias in the FE regressions (Roodman 2009b). Therefore, the true value of the coefficient of the lagged dependent variable lies somewhere between the two estimates in I and II.

The result of the System GMM estimation of the dynamic model including all the control variables, are presented in the third column of Table 2.4. System GMM can be conducted with numerous different specifications, therefore the misuse of those specifications can lead to erroneous conclusions. For this reason, all specification choices, the number of instruments and the test results are included in the table. Following, Roodman (2009b), orthogonal deviations are used in all regressions, as the panel is unbalanced. Arellano-Bond tests for autocorrelation in first differences are the first tests to be conducted. This is because the second lags of endogenous variables are valid instruments only if the error term u_{it} does not have serial correlation. We should reject AR(1) and fail to reject AR(2) serial correlation in first differences, if instruments are appropriate. The second test is the Hansen J test for overidentification, which tests whether all or a subset of instruments (with Differences in Hansen tests) are exogenous. A high p-value indicates that our instruments are exogenous; however, despite the fact that the Hansen test is robust to heteroskedasticity and autocorrelation, it is weakened by too many instruments.

Table 2.4: Pooled OLS, FE and System GMM Results (Dependent variable: Corruption [ICRG])

	I	**II**	**III**
	OLS	**FE**	**System GMM**
$Corruption_{t-1}$	0.65***	0.31***	0.55***
	(18.05)	(5.31)	(6.19)
Income	-0.26	-0.83	-1.89**
Inequality	(-0.63)	(-0.77)	(-2.03)
Economic	-0.02	0.34	-0.08
Development	(-0.48)	(1.05)	(-1.09)
Rule of	-0.18***	-0.22***	-0.26***
Law	(-4.90)	(-3.50)	(-3.98)
lnTrade	0.02	0.26	0.28
	(0.30)	(1.09)	(1.61)
Natural	0.04	0.49	0.14
Resources	(0.29)	(0.72)	(0.48)
Government	-0.67	-0.26	-0.54
Size	(-0.91)	(-0.12)	(-0.28)
Democracy	-0.056**	-0.03	-0.09**
	(-2.21)	(-0.58)	(-2.08)
Observations	341	341	341
No of Instruments			94
Arellano-Bond test (p-value)			
AR(1)			0.00
AR(2)			0.11
Hansen test (p-value)			0.29
Differences-in-Hansen (p values)			
All System GMM instruments			0.44
Instruments based on			0.81
lagged dependent only			

Dependent variable is ICRG's Corruption Index. t-values and z-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

A p-value that is very close to one is a sign of instrument proliferation, which might lead to the overfitting of endogenous variables, and hence the number of instruments should be reduced (Roodman, 2009*b*).

We instrument the lagged dependent variable with its third and further lags, while only using second and third lags for other independent variables, generating 94 instruments in our System GMM estimation in Table 2.4. We obtain satisfactory test results both for Arellano-Bond and Hansen J tests. As expected, the coefficient of the lagged dependent variable is in the approximate bounds set by the OLS and Fixed Effect estimations in Columns I and II. *Income Inequality*, *Rule of Law* and *Democracy* enter the equation significantly. Improvements in the rule of law and democratic freedom decrease perceived levels of corruption as expected. On the other hand, *Income Inequality* carries a negative sign, indicating that a single standard deviation increase in inequality in our sample (9.4%) reduces perceived corruption by 0.18 in the six-point scale (3%). This result is directly contradictory to JSK's (2005) conclusion that supports the conventional economic theory' s hypothesis. However, it also suggests that existing theories misinterpreted the fundamental mechanism of causality between inequality and corruption. This unexpected result will be further investigated following our robustness checks.

Table 2.5 displays the estimations of the System GMM regressions, in which variables were omitted from the model one by one in order to test the robustness of the results. *Income Inequality* remains negative and significant in most regressions. A positive and insignificant coefficient is obtained in the last column when we remove the rule of law from the regressions. However, low Hansen p-values seem to indicate a possible endogeneity in the instruments and the overall validity of the results needs to be questioned. Overall, we observe the negative impact of inequality on corruption in the System GMM regressions to be persistent.

Figure 2.1 displays the correlation between corruption and income inequality in countries with both above average and below average levels of rule of law. It is evident that a positive correlation between the two variables exists when rule of law is higher. It is possible that the effect of inequality on corruption might vary across countries with different institutional settings and quality. In order to investigate this,

Table 2.5: System GMM Results (Dependent variable: Corruption [ICRG])

	I	**II**	**III**	**IV**	**V**	**VI**	**VII**
	SYS	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**
$Corruption_{t-1}$	0.54***	0.53***	0.54***	0.55***	0.52***	0.83***	0.65***
	(7.55)	(6.86)	(8.01)	(7.29)	(7.70)	(7.12)	(9.14)
Income	-2.88**	-3.52***	-2.64**	-2.24**	-2.97***	-0.05	-0.38
Inequality	(-3.08)	(-3.00)	(-2.02)	(-2.03)	(-3.08)	(-0.04)	(-0.42)
Rule of	-0.39***	-0.42***	-0.39***	-0.42***	-0.44***		
Law	(-4.76)	(-5.11)	(-5.30)	(-5.93)	(-6.12)		
Democracy	-0.09	0.14*	-0.11	-0.06			-0.07
	(-1.27)	(-1.72)	(-1.59)	(-0.79)			(-1.15)
Trade	0.41**	0.34	0.26				0.33*
	(2.17)	(1.46)	(1.34)				(1.75)
Economic	-0.04	-0.01					-0.18**
Development	(-0.43)	(-0.07)					(-2.52)
Government	-0.43						1.41
Size	(-0.15)						(0.79)
Natural							0.37
Resources							(1.39)
Observations	349	351	353	354	356	356	341
No of Instruments	67	67	58	49	40	30	85
Arellano-Bond test							
(p-value)							
AR(1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR(2)	0.11	0.12	0.11	0.12	0.13	0.07	0.14
Hansen test (p-value)	0.67	0.34	0.29	0.27	0.64	0.14	0.32
Differences-in-Hansen							
(p values)							
All System GMM inst.	0.73	0.54	0.53	0.52	0.23	0.27	0.84
Instruments based on	0.59	0.47	0.63	0.24	0.32	0.36	0.79
lagged dependent only							

Dependent variable is ICRG's Corruption Index. All regressions are two-step System GMM, including period dummies (not reported). t-statistics clustered by country and incorporating Windmeijer (2005) correction are in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

Figure 2.1: Corruption-Inequality Correlation

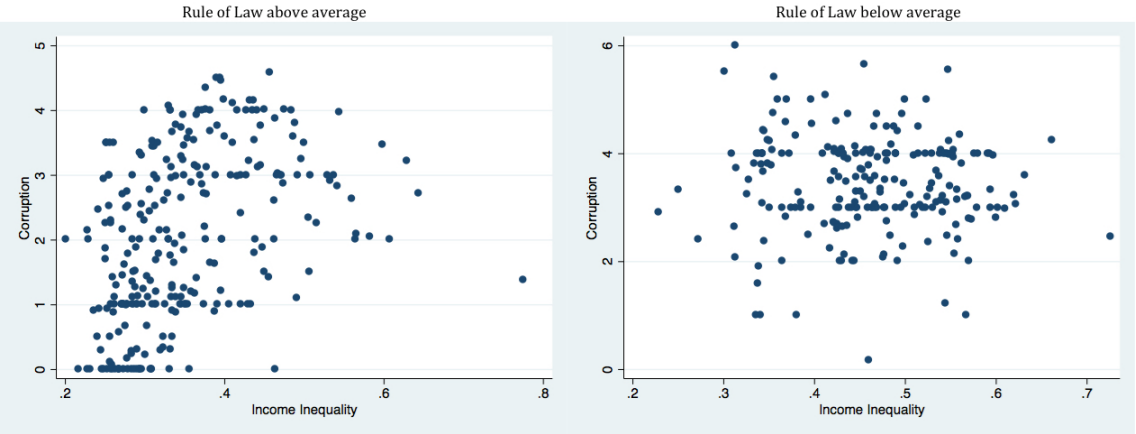


Table 2.6 includes the interaction variable between *Income Inequality* and the *Rule of Law* in pooled OLS, fixed effects and System GMM regressions. The interaction term enters both OLS regressions and the first System GMM regression significantly with a positive coefficient. The slope of income inequality with different degrees of rule of law for all estimations are given in Table 2.7. We observe that even though income inequality does not have a significant impact on corruption in countries with average or higher rule of law, countries with weak rule of law experience lower corruption when inequality increases. A 10% rise in inequality leads to a 5.6% decrease in the perceived corruption scale in countries with weak rule of law, while it corresponds to a 10% reduction in perceived corruption when the rule of law scale equals one in the System GMM regressions including all control variables[9].

In order to check the robustness of the results, we repeat the regressions using different measures of corruption and rule of law. World Bank's World Governance Indicators (WGI) include data on corruption and law across countries since 1996. Columns I and II in Table 2.8 display the results of the OLS and System GMM regressions from two year averages of all variables between 1996 and 2012. In the third column, we conduct the System GMM with the corruption measure from WGI and

[9]Very High Rule of Law indicates the country has the maximum score of 6 in the Rule of Law index. High and Low Rule of Law both represent values one standard deviation higher or lower than the average respectively. Very Low corresponds to when the country scores one. The minimum value of Rule of Law in the sample is 0.25.

Table 2.6: Inequality and Law Interaction (Dependent variable: Corruption [ICRG])

	I	**II**	**III**	**IV**
	OLS	**FE**	**SYS**	**SYS**
$Corruption_{t-1}$	0.62***	0.30***	0.50***	0.52***
	(17.02)	(5.28)	(7.08)	(5.93)
Income	-3.44***	-4.17*	-6.66*	-5.94**
Inequality (Gini)	(-3.10)	(-1.80)	(-1.78)	(-1.98)
Rule of	-0.55***	-0.58**	-0.95**	-0.80**
Law	(-4.37)	(-2.58)	(-2.27)	(-2.22)
Gini*Law	0.89***	0.93*	1.49	0.86
	(3.07)	(1.75)	(1.48)	(0.94)
Economic	0.004	0.36	0.00	
Development	(0.13)	(1.21)	(0.02)	
Trade	0.02	0.21	0.19	
	(0.45)	(0.79)	(0.84)	
Natural	0.03	0.61	0.15	
Resources	(0.24)	(0.94)	(0.33)	
Government	-0.16	0.05 4	1.15	
Size	(-0.22)	(0.02)	(0.49)	
Democracy	-0.059**	-0.03	-0.11	
	(-2.35)	(-0.70)	(-1.35)	
Observations	341	341	341	356
No of Instruments			87	46
Arellano-Bond test				
(p-value)				
AR(1)			0.00	0.00
AR(2)			0.13	0.17
Hansen test (p-value)			0.70	0.79
Differences-in-Hansen				
(p values)				
All System GMM inst.			0.89	0.91
Instruments based on				0.38
lagged dependent only				

Dependent variable is ICRG's Corruption Index. OLS and Two-step System GMM regressions include period dummies (not reported). t-statistics clustered by country and incorporating Windmeijer (2005) correction for System GMM are in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

Table 2.7: Slope of Income Inequality on different levels of Rule of Law

Rule of Law	**OLS I**	**FE II**	**SYS III**	**SYS IV**
Very High (6)	1.88**	1.40	2.30	-0.77
	(2.34)	(0.94)	(0.90)	(0.29)
High (5.44)	1.38**	0.88	1.46	-1.24
	(2.07)	(0.68)	(0.72)	(-0.57)
Average (4.0)	0.13	-0.42	-0.64	-2.46
	(0.32)	(-0.42)	(-0.67)	(-2.35)
Low (2.62)	-1.11**	-1.73	-2.74**	-3.66***
	(-2.28)	(-1.42)	(-2.08)	(-4.25)
Very Low (1)	-2.55***	-3.24*	-5.17*	-4.87**
	(-3.01)	(-1.75)	(-1.87)	(-2.54)

z-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

rule of law measure from ICRG to ensure complete independence between the two variables. Results are similar to those in Table 2.6 and suggest that higher income inequality reduces corruption in countries with weak rule of law. We also obtain similar results when potential outliers are removed from the original regression in the fifth column of Table 2.6. Our regression results display that the effect of income inequality on corruption is insignificant until the rule of law falls below a certain threshold. This phenomenon has not yet been explained by existing economic theory. One possible explanation for this unexpected improvement on corruption due to high inequality could lie in the relationship between inequality and violence. Corrupt agents' utility may decrease with the amount of the fine that they might face if caught. Hence, larger fines may reduce corruption. In countries with strong rule of law and institutions, legal boundaries are set for public officials, and it is common to be punished for corrupt actions; either through fines or prison sentences. However, these rather predictable boundaries may not apply in highly unequal countries with a weak rule of law. Social and income inequalities foster crime and violence, and are highly correlated with homicide rates both in urban areas and across countries (Krahn et al., 1986; Kelly, 2000; Fajnzlber et al., 2002). Given that corrupt public officials will likely deal with clandestine individuals and organizations, a threat of

Table 2.8: Inequality and Law Interaction - World Bank Indicators (Dependent variable: Corruption [ICRG])

	I	**II**	**III**
	OLS	**SYS**	**SYS**
$Corruption_{t-1}$		0.53***	0.75***
(WGI)		(3.82)	(14.58)
Income	-3.24***	-2.85*	-2.44*
Inequality	(-4.20)	(-1.94)	(-1.89)
Rule of Law	-1.43***	-0.74***	
(WGI)	(-12.28)	(-3.05)	
Rule of Law			-0.32***
(ICRG)			(-2.77)
Gini*Law	0.93***	1.00*	0.57**
	(3.15)	(1.81)	(2.03)
Economic	-0.04	-0.16	-0.07
Development	(-1.12)	(-1.27)	(-0.79)
Trade	0.03	0.21	-0.10
	(0.65)	(1.55)	(-0.89)
Natural	-0.18*	0.06	0.23
Resources	(-1.96)	(0.20)	(1.02)
Government	-0.63	0.16	-1.58*
Size	(-1.21)	(0.13)	(-1.71)
Democracy	-0.05**	-0.01	0.01
	(-2.04)	(-0.13)	(0.14)
Observations	642	456	432
No of Instruments		35	97
Arellano-Bond test (p-value)			
AR(1)		0.015	0.001
AR(2)		0.499	0.630
Hansen test (p-value)		0.689	0.457
Differences-in-Hansen (p values)			
All System GMM inst.		0.966	0.363
Instruments based on		0.801	0.986
lagged dependent only			

Dependent variable is ICRG's Corruption Index. Parentheses next to some variables indicate data source. OLS and Two-step System GMM regressions include period dummies (not reported). t-statistics clustered by country and incorporating Windmeijer (2005) correction for System GMM are in parentheses. Lagged values collapsed in Column II to reduce the number of instruments. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

violence from the briber creates uncertainty for the bribee, as their potential "fine" in such a situation might be more severe than financial penalties or imprisonment. If this threat of violence is effective, agents would choose not to be corrupt, reducing the overall level of corruption. For instance, as Fried et al. (2010) discuss, interviews with police officers in Mexico reveal that the police officers think that the wealthy may exact retribution if they ask for bribes, or even write tickets for an illegal action in traffic. Because the Mexican police fear retribution of the rich, they collect their bribes from the poor.

Countries with weak rule of law in our sample are shown in Table 2.9. The average value of the Gini coefficient between these countries is 0.459. Countries on the left are those with Gini values higher than 0.459, while lower values are on the right side of the table [10]. The mean ICRG Corruption score for high and low inequality countries are 3.70 and 3.75 respectively. To our knowledge, no good comparable measures of crime exist. For this reason we have included all available national homicide rates, averaged over time. The category, "Intentional Homicide" includes all instances of unlawful homicide, gang violence and armed-group attacks. However, it excludes situations of armed conflict. While data on homicide rates is far from complete, a preliminary look at the data available suggests that violence is the channel through which rising inequality decreases corruption might be a plausible hypothesis. Homicide rates for countries with a weak rule of law and high inequality averages 33.2 in our sample, while for countries with a weak rule of law and less inequality, it is only 10.2.

2.4 Conclusion

In this chapter, we investigated the hypothesis of the causal link between income inequality and corruption. Various economic theories we cited in the literature review

[10]The average Gini value of high inequality countries with weak rule of law is 0.53 while it is 0.39 for the low inequality countries with weak rule of law.

Table 2.9: Inequality and Violence

High Inequality Countries			Low Inequality Countries		
Country	**Years**	**Homicide**	**Country**	**Years**	**Homicide**
Argentina	2005	5.92	Albania	2000, 2005	10.6
Brazil	2000-2010	23.5	Algeria	1990	
Cameroon	2000		Argentina	2010	5.6
Colombia	1990-2010	52.3	Bangladesh	1985, 1990, 2000, 2005	2.6
Cote D'Ivoire	2010	13.6	Bulgaria	2010	2
Dominican Rep.	2005, 2010	23.5	Cameroon	2005	
Ecuador	2010	16.24	Egypt	1990	16.2
El Salvador	1990, 2005	53.18	El Salvador	2010	59.56
Guatemala	1985, 1990, 2000, 2005	34.20	Ghana	1985, 2000	
Guinea-Bissau	1990		Guinea	2005	
Guyana	1990		Guinea-Bissau	1995	19.64
Haiti	1985, 2000		Guyana	2005	19.60
Honduras	1990, 2000-2010	60.4	India	1985, 1990	
Jamaica	1990, 2000, 2005	44.8	Indonesia	1985, 1990, 2000	1.10
Kenya	2000-2005	3.6	Israel	1990	
Malawi	1985		Jordan	1985	
Mexico	2000, 2010	15.1	Madagascar	2005, 2010	11.1
Niger	1995		Mali	1990	
Nigeria	1990, 2005, 2010	20	Morocco	1985, 1990	
Panama	1990		Mozambique	1995	
Paraguay	2005, 2010	14.8	Nigeria	1985	
Peru	1990		Pakistan	1985, 1990	
Senegal	1990		Peru	1985	
South Africa	1985, 2000, 2010	41.2	Philippines	1985, 1990, 2005	7.28
Tunisia	1985		Somalia	2000	
Zambia	1990		South Korea	1985	
Zimbabwe	1990		Sri Lanka	1985, 1990	

Low-High Inequality benchmark is a Gini value of 0.459. Homicide is the intentional homicides per 100,000 people in the country. Data for homicide is taken from World Bank's World Development Indicators with original source being the UN Office on Drugs and Crime's International Homicide Statistics database.

predict that as disparities in incomes in the society grow, the resulting inequalities also lead to higher levels of corruption. We tested this hypothesis by first replicating the most influential empirical study on the subject, Jong-Sung and Khagram (2005), in order to point out its certain methodological shortcomings. We then proceeded to conduct System GMM regressions on a dynamic setting.

The results of our dynamic econometric model opposed those of Jong-Sung and

Khagram (2005), and displayed an unexpected direction in the correlation between income inequality and corruption, which has never previously been explained by existing theory. We have found that rising income inequality tends to significantly decrease corruption. Further analysis showed that this improvement in corruption exists only in countries with a weak rule of law, while in other countries the relationship between actual income inequality and corruption is insignificant. We have introduced violent crime as a channel through which inequality improves corruption in countries with a weak rule of law. Our intuition is that violence surges in countries with weak rule of law and large inequalities in income, which may add additional costs to being corrupt. However, more research and empirical support are required to test this hypothesis rising from this intuition.

Chapter 3

Theoretical Foundation and Empirical Support on the Linkage between Perceived Income Inequality and Corruption

3.1 Introduction

Various economic theories hypothesize that rising income inequality increases corruption (Jong-Sung and Khagram, 2005). However, most empirical studies, including our own analysis in the previous chapter, fail to establish the significant and positive causal link between income inequality and corruption. Jong-Sung and Khagram (2005) argue that certain methodological issues in the data lead to insignificant empirical results. In addition to the range of methodological issues raised by the authors, we believe that a further reason for the absence of robustness in earlier work stems from the differences between income inequality and its perception. The model that we will present in this chapter allows for the possibility that public officials may

not have perfect information of how the income is distributed. This lack of perfect information generates a conceptual and quantifiable difference between perceived and actual income inequality. As demonstrated by several studies including Norton and Ariely (2011); Cruces et al. (2013); Niehues (2014); Gimpelson and Treisman (2015), individuals greatly misperceive inequality and their place in the distribution. For this reason, we set out to examine the relationship between perceived, not measured (or actual), inequality and corruption.

Each individual may have different distributional perceptions based on their own observations and experience. They are also likely to place themselves closer to the middle of the income distribution, regardless of their actual position (Cruces et al., 2013). Suppose that there are four individuals in a society, two of which are public officials: PO_A and PO_B . They are only certain of their own income. None of the four individuals have perfect information on the incomes of others. However, they do have estimations on what others might be earning based on their observations and experiences. Even though they are not sure of anyone else's income, the two public officials both think that they, as public officials, receive the same income, and they both place themselves in the middle of the income distribution. PO_A estimates that incomes are distributed more unequally in the economy, compared to the estimations of PO_B.

The two public officials have different estimations on the incomes of the other two, and they also have different levels of tolerance for inequality. PO_A can tolerate more inequality, while PO_B has a lower tolerance level, and hence prefers more equality than PO_A. However, both of their tolerance levels are lower than the inequality they estimated themselves. Therefore, they are both averse to the inequality they perceive, meaning the level of inequality they estimate is higher than the level they find tolerable. They both share the view that the richer individual is just too rich, and their incomes should have been closer to that person. We assume that the excessive difference they perceive between themselves and the rich lowers their

utility. This loss of utility is called aversion to disadvantageous inequality (Fehr and Schmidt, 1999). Their aversion to the disadvantageous inequality they perceive motivates both of them to take bribes in order to raise their income and close the perceived income gap between themselves and the rich. They will take more bribes if the inequality they estimate increases.

Moral costs are attached to corrupt acts due to their negative externalities. Corruption may lower a society's productivity, harm uninvolved individuals and may enhance inequalities. Both of the public officials have incentives to be corrupt, however, PO_B's tolerance for inequality was even lower. She desires more equality than PO_A. This desire for equality also raises the moral cost incurred by PO_B, compared to the moral cost incurred by PO_A, as corruption itself may foster inequalities and widen the gap between the public official and the poor. Therefore, although PO_B's low tolerance for inequality generates the motivation to take bribes, that same tolerance also raises the moral cost of corruption. By modelling moral costs as a function of tolerance for inequality, we aim to capture the utility loss from advantageous inequality, as presented in Fehr and Schmidt's (1999) model and supported by experimental evidence.

In this chapter, we investigate the second and the third research questions that we outlined in the introduction of the thesis. Namely, "Do the public officials' perceptions of societal income distribution affect their willingness to engage in corruption?" and "Does overall corruption decline as individuals get more intolerant of income inequality?" We contribute to the existing literature by providing an in depth conceptual framework that sets out extensive definitions of the concepts we use and building a corruption model based on inequity aversion and perceived inequality. We also create a new dataset using data on the international football market that may be used as a proxy for perceived inequality in future studies.

3.2 Literature Review

In his Keynes lecture delivered at the British Academy, Besley (2007) draws attention to the importance of a better understanding of the consequences of imperfect information for the advancement of economic theory. Differences in the available information set between agents may result in inefficient outcomes, especially in the context of political economy. Choices of uninformed voters may lead to policies that are non-beneficial or even detrimental to themselves. Countries where rising inequality is combined with a political choice of regressive taxation, experience the negative consequences of such imperfect information. Biased perceptions of one's own income relative to others can harm the economy as a whole. Consider, for instance, the famous interpretation of the median voter theorem by Meltzer and Richard (1981). According to the authors, the size of a country's government depends on the difference between the mean and the median income. If the difference increases, the median voter would prefer higher redistribution from the rich to the poor. This preference necessitates perfect knowledge of the income distribution, and the median voter's biased perceptions might result in disadvantageous choices.

People's attitudes towards income inequality may also shape the policies created as a result of existing inequality, as well as its perception. As Szirmai (1988) explains, in two countries where distributions of income are similar, if tolerance for inequality is different, the consequences of inequality will also differ. If a society has a low tolerance for inequality, believing that incomes should be distributed more equally, policies may be geared towards equalizing incomes through redistribution; while in the other country with a high societal tolerance for inequality, people may believe that individual performance should be highly rewarded and any such effort to equalize incomes may be rejected.

Aggregation of perceptions and attitudes may help reduce overall biases and help to achieve more efficient policies; however, when inequality's relationship with cor-

ruption is considered, corruption's clandestine and individualistic nature gives more significance to individual perceptions and attitudes of economic agents.

The subject of perceived income distribution and inequality has drawn the attention of economists only recently; and therefore, existing scholarly work is growing but limited. In fact, distinctions between several notions have not yet been clearly drawn. In this section, we will go over the studies on perceived inequality, while distinguishing the different concepts that we will use throughout this thesis.

3.2.1 Biased Distributional Perceptions

Going back to Meltzer and Richard's (1981) interpretation of the median voter theorem, if the median voter underestimates the difference between the mean and median income, they would prefer less redistribution than what is optimum for themselves. This underestimation might happen simply because they do not have perfect information of others' income. They might think that the mean income is much closer to their own; or even worse, they might believe that they earn more than the mean income. Following Harrison and Seidl (1994), we will call estimations of the income distribution in the entire society "distributional perceptions". Note that biased distributional perceptions occur solely because of misinformation, and opinions or attitudes towards income inequality do not affect these perceptions.

The first study to demonstrate the differences between actual and perceived distributions investigate wealth inequality in the United States (Norton and Ariely, 2011). The authors conduct a nationally representative survey and ask respondents their estimated distribution of wealth for each quintile of the population as well as their opinion on how the wealth should be distributed in an ideal society. Norton and Ariely (2011) find that Americans perceive a more equal wealth distribution than its actual level, and that they prefer an even more equal distribution of wealth in their ideal society.

A more comprehensive study on biased perceptions of income distribution was done by Cruces et al. (2013). They argue that, agents may fail to apply Bayes' rule to the subset of information about other's income they receive through media and social interaction. This failure prompts agents to use naive estimations and heuristics that lead to systematic biases in their perceptions of income distribution. For example, if income in a certain reference group is more homogeneous than the total population, agents in that group may underestimate income inequality. In order to test whether these systematic biases exist, Cruces et al. (2013) conduct a representative survey of 1100 households in Greater Buenos Aires, Argentina. The results indicate that 85% of the respondents hold biases regarding their income group. The rich placed themselves lower in the income distribution scale, while the poor overestimated their position. They also find that individuals with broader reference groups (or a larger social circle) have less biases about their own income rank. Lastly, combining an experiment with the survey, they reveal the actual distribution of income to randomly selected respondents, and inform them about their relative position. The authors discover that accurate information causes significant shifts in the redistribution preferences of the respondents, causing those who overestimate their relative position to demand more redistribution (Cruces et al., 2013).

Norton and Ariely (2011) and Cruces et al. (2013) both provide empirical evidence towards the existence of biases on how individuals perceive the income distribution in two large scale country surveys. However, conducting such surveys are not always possible and several other studies on perceptions and attitudes towards inequality rely on available data from one main source: Social Inequality surveys of the International Social Survey Programme (ISSP). Unlike the country surveys aimed specifically at measuring biased perceptions of income distribution, this survey includes rather general questions on perceived inequality, the structure of society and the attitudes towards redistribution. Engelhardt and Wagener (2014) employ the Social Inequality surveys to measure the biased perceptions of income distribution. The authors use the terms perceived income distribution and perceived inequality

interchangeably, and in the following section of this review, we will argue that these two notions should be distinguished from each other. Nevertheless, Engelhardt and Wagener (2014) use the question that asks respondents to place themselves in a top to bottom scale from 10 to one [1]. They compare the aggregate mean and median of these self-placements to the actual difference in 26 OECD countries and find that perceived inequality is always lower than the actual.

3.2.2 Distributional preferences and perceived inequality

We have established that due to a lack of perfect information, the median voter might erroneously perceive their own position in the income rank, or incorrectly estimate the difference between their income and the mean. Now let us assume that there are two agents, A and B, situated at the median and that they both have perfect information of the income distribution. These two agents only differ in how they subjectively evaluate this distribution. A finds the difference between their income and the mean too large, while B considers the same difference normal and acceptable. We can say that with all else being equal, these two agents' subjective evaluations of inequality are different. Harrison and Seidl (1994) call such differences "distributional preferences".

When we remove the assumption of perfect information and ask a simple question to determine agent A and B's perception of income inequality (such as "Is income inequality in this country high?"), their answers will depend on their ideas of what is normatively acceptable from a social justice point of view, and whether their observations correspond to these ideas (Sen et al., 2000). Therefore, we define perceived inequality as a function of biased distributional perceptions due to the lack of perfect information, and distributional preferences.

[1]The question does not specify whether these groups are separated according to income, yet authors assume that these groups are divided by their income with one being the poorest 10% of the society and 10 being the richest. Respondents also do not make any judgments on the existing inequality (Niehues, 2014)

Cross-country studies investigating perceived income inequality rely on using two different questions from ISSP's Social Inequality survey[2]. Using these questions, Niehues (2014), compared perceived inequality with actual income distributions in 24 countries and found no relationship between the two. Building upon Niehues' (2014) work, Gimpelson and Treisman (2015) show that people greatly misperceive income inequality and their position in the income distribution. In addition, their results indicate that the demand for redistribution and societal conflict between the rich and the poor correlates with perceived inequality rather than actual inequality.

Now that we have reviewed the literature on perceptions and biased estimations of inequality, we will move on to creating our conceptual framework, while building upon the existing definitions.

3.3 Conceptual Framework

In the Oxford Dictionary of Economics, the definition of income inequality is simply given as the differences in income between individuals or families, or between different groups, areas, or countries (Black et al., 2012). Income is distributed unevenly in the economy. However, in most countries, incomes are taxed and used for the creation of public goods and redistributed through transfers. Therefore, pre-tax income of an individual or a household may differ greatly from their after tax income. Ultimately, the focus of most economic research is the differences in income after taxes and transfers, commonly referred to as disposable or net income. Information on individual and household incomes are collected in surveys and censuses usually conducted by national statistics agencies. Data collected are later used to calculate various inequality measures, the most popular being the Gini coefficient, which summarises the extent to which the actual distribution of income deviates from perfect

[2]The structure and limitations of these two questions will be analysed later in this chapter.

equality [3]. Assuming that the data reflects how incomes are distributed in a society with or without some corrections, Gini coefficients may be calculated to measure the actual net income inequality in the entire country.

Evidently, in order to calculate the actual net income inequality, one needs to know how much income other individuals in the population, or a representative sample of the population, receive. Economists who regularly follow statistical updates on the income distribution may possess this information; however, most individuals in the population are not informed about the actual distribution of incomes in the population. In fact, even the economists only have access to the information of the previous year at best. Therefore, at any given time, individuals can only have estimations on the incomes of others and how they are distributed, based on historical data or their own observations. As we established in our literature review, these estimations are very likely to be biased and incorrect.

In a given distribution of income, actual or estimated, people may have different opinions on how equal that distribution is. A Brazilian tourist who grew up in a society with large gaps between incomes may be of the opinion that citizens of London live in a satisfactorily equal society, while a Swedish tourist may be appalled at the degree of inequality between incomes and wealth in London. Similarly, two Londoners might have different opinions on the level of income inequality in their city. Our opinions on the existing distribution of income are formed by our own experiences, observations and values, such as our interpretations of fairness and distributional justice. Therefore, evaluations of a given set of endowments are likely to differ between individuals. Some might be more intolerant of inequality than others.

The concepts of actual and estimated net income inequality rely on information

[3]Gini coefficient is a statistical measure of inequality, which depicts perfect equality with zero, and perfect inequality, where one person in a society receives the entire income while the rest receives nothing, with one. Gini coefficients are sometimes reported as a scale between zero and one hundred.

about incomes, whether perfect or incomplete; while, distributional preference is completely subjective. We define perceived income inequality as a combination of both the estimated (or actual) income inequality and the tolerance for inequality. For example, a very basic method of asking how one perceives income inequality in Oxford would be to ask "Do you agree with the statement that there is too much income inequality in Oxford?" In order to answer this question, the respondent first has to estimate the distribution of income in Oxford. Unless the respondent is an economist working specifically on the income inequality in Oxford, it is likely that their estimations would be biased. Once they estimate the distribution, then they have to evaluate these estimates to determine how much inequality that distribution reflects. The thought process might be more straightforward, and the response could be a simple yes or no, but in order to answer the question, the respondent needs some information on the incomes of the residents of Oxford and an opinion on whether the resulting inequality is too much.

Imagine two respondents who are familiar with measures of income inequality. Respondent A estimates that the Gini coefficient for Oxford to be around 0.35 and thinks that this distribution is very unequal, and thus answers "Yes, there is too much income inequality in Oxford." On the other hand, Respondent B's estimate of income inequality in Oxford is a Gini coefficient of 0.40, an estimate that is technically more unequal than A's estimation. However, Respondent B does not believe that this degree of inequality is too much and thus answers "No" to the same question. Despite the fact that Respondent B estimated a more uneven distribution of income in Oxford, their subjective perception of inequality in the city was lower. In this case, Respondent B is more tolerant of inequality than Respondent A.

Suppose that Respondent A and Respondent B are dictators in the experimental sense and they can influence distribution of income. Their inequality preferences would impact how income is redistributed in their countries. Respondent A could set tax policies that would transfer incomes from the rich, including herself, to the

poor. Meanwhile, Respondent B, being more tolerant of inequality, could issue an order to transfer most, if not all, incomes to herself. According to the rational choice theory Respondent B is a rational agent, maximizing their own monetary gain and thus utility. Contrarily, Respondent A seems to make irrational choices, letting go of their own income for the benefit of others. However, economic experiments such as the previously discussed dictator games have shown us that when people are given the opportunity, most people behave more like Respondent A than Respondent B.

Fairness considerations and inequity aversion play a role on distributive choices. Individuals may get to vote on redistributive policies in democratic countries, but unless they are dictators, they do not have the power to redistribute incomes by themselves. However, if they perceive their wage as unfair they may engage in undesirable activities to compensate and restore fairness (Cowherd and Levine, 1992). Akerlof and Yellen (1990) shows that workers may reduce their effort if they are not compensated fairly compared to their reference group. Unlike workers in the private sector, public officials can increase their income through illicit gains by taking bribes. Therefore, we can assume that the public official's inequality aversion, or their desire to equalize the incomes between themselves and the rich could motivate them to extort bribes.

Lastly, we are going to introduce the concept of social equity preference. In Fehr and Schmidt's (1999) famous model of inequity aversion, aversion is self-centred, meaning individuals are only interested in their own income relative to others. They disregard the inequity that may exist between other people. In an experimental setup, self-centred aversion would be valid, as subjects, who mostly tend to be university students, are likely to come from relatively closer income groups, compared to the income differences in the rest of the society. They also have the capability to distribute the income themselves. However, individual tolerance levels out of an experimental economics laboratory, might not be self-centred. Consider two individuals with same incomes and intolerance for inequality. Even though they might

prefer to reduce existing inequalities to the same degree, their motivations might be different. While one's motivation could be to equalize the income between herself and the rich, the other, who has a higher social equity preference, could desire to close the gap between the poor, excluding herself, and the rich.

Once the differences between the concepts we use are established, the first question that has to be answered becomes whether these estimations of income distributions are biased. Two large scale empirical studies conducted in the US and Argentina suggest that they are. In a nationally representative sample of 5522 individuals, Norton and Ariely (2011) asked respondents to estimate the percentage of wealth each quintile in the economy holds and how much they should have in an ideal world. According to their results, Americans estimated that the richest 20% of the country had 59% of the total wealth, and they believed that in an ideal world, this amount should have been closer to 32%. However, at the time of the survey, the top quintile in the US actually held 84% of the wealth. Similarly, the estimated wealth for the poorest 20% of the country was around 5%, while the actual wealth owned by that quintile was only 0.1%. These results demonstrate that Americans significantly underestimated the inequality in their country. In a more recent article published in the Journal of Public Economics, Cruces et al. (2013) conclude that systematic biases exist in perceptions of one's own rank. Using data from the Survey on Distributional Perceptions and Redistribution conducted in Greater Buenos Aires, the authors find that a significant portion of poorer individuals overestimate their position in the overall income scale, while richer individuals tend to underestimate. Respondents with friends from different income groups are less biased and these biases are significantly correlated with the respondent's relevant position within the reference group. The authors argue that agents with biased perceptions will obtain naive estimates of income characteristics of the population.

Having established the concepts we will utilize in the rest of this thesis, in the next section we present our economic model based on these concepts. Our aim is to

explore how an inequity averse public official's behaviour would alter in line with the perceived inequality.

3.3.1 Economic Framework

Suppose that an individual public official receives a constant wage of $\bar{w}$. They do not have any other actual information on the incomes of others in the economy.

Let D_i be the distribution of income in the economy estimated by that public official, or distributional perception. We are going to suppose that distributional perceptions correspond to the Gini coefficients and D_i takes a value between 0 and 1, with 0 depicting that the public official estimates that incomes are distributed equally in the entire society.

We define tolerance for inequality as the maximum level of inequality that is considered to be tolerable by an individual. Similar to estimated distributions, tolerance for inequality, T, also corresponds to Gini coefficients. If $T_i = 0$, then the individual is completely intolerant of inequality and wants everyone to receive equal amounts of income.

Aversion to perceived inequality of the public official, P_i, is:

$$P_i = \frac{D_i}{T_i} \tag{3.1}$$

where $0 \leq D_i \leq 1$ and $0 \leq T_i \leq 1$. When $P_i > 1$, the estimated level of inequality is higher than the public official's level of tolerance, hence they are averse to perceived inequality.

Let us assume that an inequality averse public official wants to equalize incomes between themselves and those they perceive to be richer by taking a bribe in the amount B_i. Since the only actual information they have is their own income, they

weigh their own wage with their aversion to perceived inequality. As the gap between their distributional perception and tolerance widens, their estimate for the income of the rich increases.

$$B_i = max[(P_i - 1)\bar{w}, 0] \tag{3.2}$$

where $P_i\bar{w}$ is the perceived average income of the richer individuals by the public official. In this case, the public official takes bribes only if they are averse to the perceived disadvantageous inequality. Their aversion to disadvantageous inequality, meaning the loss of utility caused by earning less income than those who are richer, motivates the public official to take bribes. The amount of bribes taken increases with their aversion.

Corrupt acts impose negative externalities on the rest of the society, and these externalities are likely to attach a moral cost to the decision of the public official. In order to incorporate the moral cost in the model, we are going to make two additional assumptions. First, we assume the moral cost increases with the amount of the bribe, as larger bribes might have larger negative externalities on the rest of the society. Finally, we assume that those who are more intolerant of inequality incur higher moral costs. This assumption is reasonable if the agent considers the inequality increasing impact of corruption. Those who are less tolerant of inequality can incur higher costs to their utility because of the inequality they cause through corruption. The bribe function transforms to:

$$B_i = max[(P_i - 1)\bar{w}, 0] - \frac{B_i}{T_i^{\alpha}} \tag{3.3}$$

where $\alpha > 0$ and $\frac{B_i}{T_i^{\alpha}}$ is the moral cost. α is the parameter capturing the social equity preference of the public official. In order to explain its significance, let us go back to our conceptual definitions. We defined tolerance for inequality as the maximum level of inequality acceptable by an individual. Suppose a public official's

tolerance levels are below their distributional perceptions, and hence they are averse to the inequality they perceive. They prefer less inequality; however, they may want less inequality solely for selfish reasons, such as closing the disadvantageous income gap, or for reasons based on social fairness, such as reducing poverty by closing the income gaps. We assume that individuals with an alpha parameter greater than one have a high preference for social equity, with a desire to equalize incomes to reduce poverty. On the other hand, individuals with an alpha parameter less than one have a lower preference for social equity and hence, their desire to equalize incomes spawn from a selfish motive -i.e. getting richer to move closer to the top end of the income scale. When the social equity parameter is above one, those who are extremely intolerant will not take any bribes to avoid increasing the income gap between themselves and the poor.

Substituting $\frac{D_i}{T_i}$ for P_i and rearranging the equation leaves us with:

$$B_i = max(\bar{w} * \frac{D_i - T_i}{T_i}, 0) * \frac{T_i^\alpha}{1 + T_i^\alpha} \tag{3.4}$$

The public official is assumed to take bribes only when their aversion to perceived inequality is greater than 1.

$$B_i = \begin{cases} \bar{w} * \frac{(D_i - T_i) * T_i^{\alpha-1}}{1+T_i^\alpha}, & \text{if } P_i > 1 \\ 0, & \text{if } P_i \leq 1 \end{cases} \tag{3.5}$$

Hence, keeping tolerance constant, higher perceived inequality leads to more bribery.

Let s_i be the bribe expressed as the share of the public wage, when the public official is averse to perceived inequality:

$$s_i = \frac{B_i}{\bar{w}} = \frac{(D_i - T_i) * T_i^{\alpha-1}}{1 + T_i^\alpha} \tag{3.6}$$

Figure 3.1: Corruption when $\alpha = 0.5$

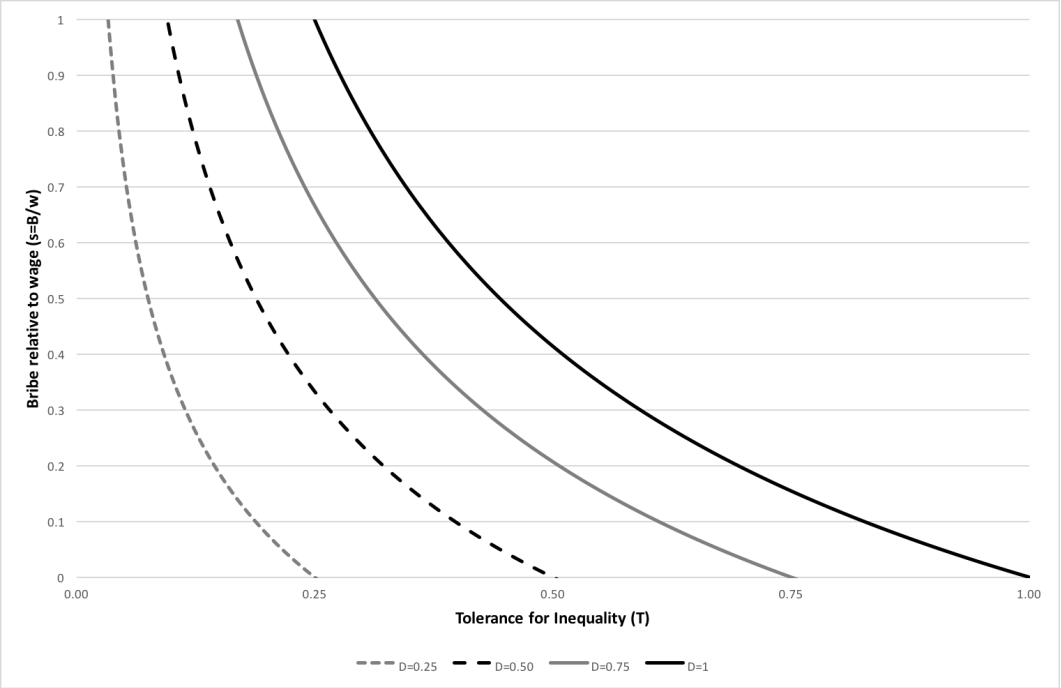


Figure 3.2: Corruption when $\alpha = 2$

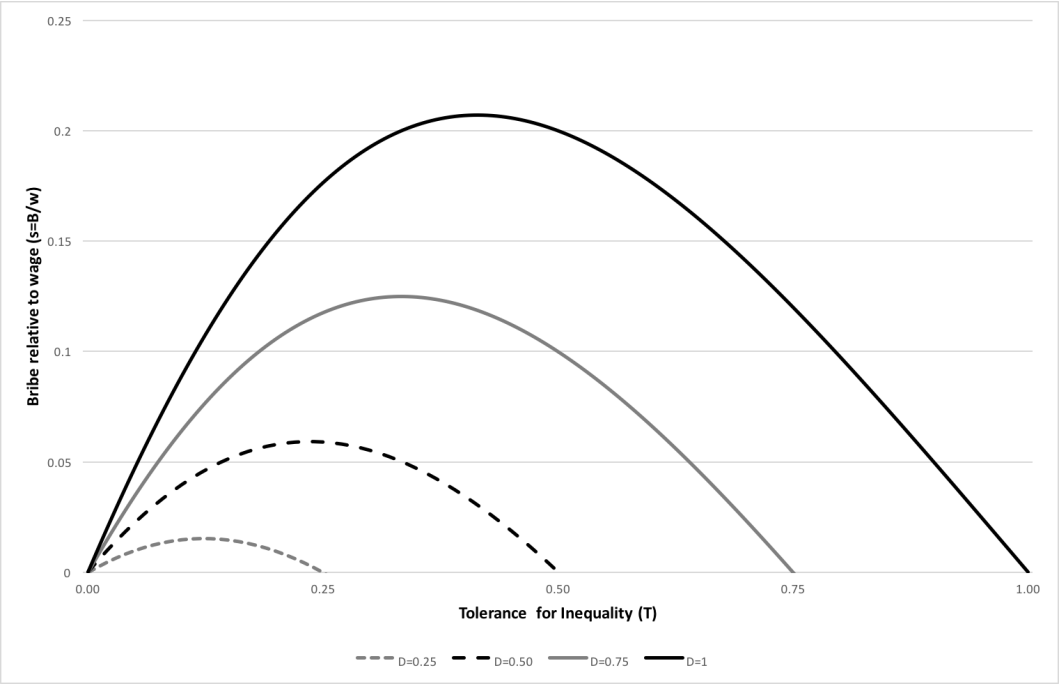
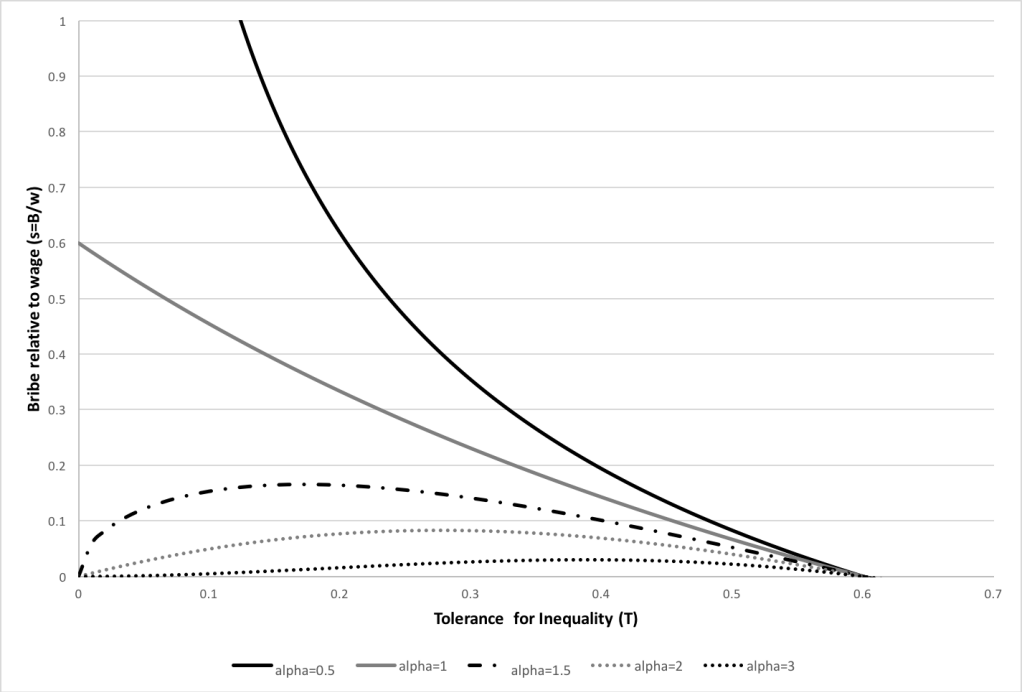


Figure 3.3: Corruption in Different Social Inequity Parameters



Distributional perception, D_i equals 0.60.

The bribery function in the case where the social equity parameter, α, of the public official is lower than 1 is illustrated in Figure 3.1. When the social inequity parameter is less than one, bribes decrease when tolerance for inequality rises. The public official will cease to take bribes if they are no longer averse to the inequality they perceive, when $T_i = D_i$. The function is no longer monotonically decreasing when the social inequity parameter is raised above one (Figure 3.2). Individuals who are completely intolerant of inequality will incur very high moral costs that will reduce the amount of bribes taken to 0. Similarly, as tolerance level rises and gets closer to the level of inequality in the estimated distribution, the public official will be less averse to perceived inequality between themselves and the rich, thus lowering the incentive to be corrupt. There exists a value for the difference between D_i and T_i that maximizes the optimal bribe relative to wage. The maximum point is the solution to the first order condition:

$$\frac{\partial s_i}{\partial T_i} = -\frac{T_i^{\alpha-2}[D_i T_i^{\alpha} + \alpha T_i + (1-\alpha)D_i]}{(1+T_i^{\alpha})^2} = 0 \tag{3.7}$$

In the case where $\alpha = 2$, those whose tolerance equals the optimum value, T^* will be the most corrupt:

$$T_i^* = \frac{\sqrt{D_i^2 + 1} - 1}{D_i} = 0 \tag{3.8}$$

By constructing a model based on perceived inequalities rather than actual inequality, we have allowed for the possibilities that estimations of income distributions might be biased and incorrect, and that inequalities might not lead to corrupt actions due to individual tolerances for inequality.

Two main hypotheses arise from this model:

Hypothesis 1: Individuals with complete tolerance or complete intolerance for inequality will be less corrupt than others.

Hypothesis 2: Corruption increases as individuals estimate higher inequalities in their distributional perceptions.

In the next two sections, we are going to test these two hypotheses individually through regression analyses by using secondary datasets. Our aim is to thoroughly investigate the validity of our model with existing data before moving onto collecting our own data through an experimental study in the next chapter of this thesis.

3.4 Tolerance for Estimated Inequalities and Justification of Bribery

3.4.1 Methodology

The first hypothesis of our model is that a non-linear relationship exists between individual tolerances for inequality and corruption. According to our model, public officials who are tolerant of the inequality they estimate in the society, will see no

reason to take bribes. While less tolerance for inequality increases the incentive to be corrupt; it also raises the moral cost, as corruption itself would lead to unfair gains and might itself foster inequality.

Going back to Equation 3.3:

$$B_i = max[(P_i - 1)\bar{w}, 0] - \frac{B_i}{T_i^{\alpha}}$$

$B_i > 0$ if and only if $P_i > 1$. For P_i to be greater than 1, D_i should be greater than T_i. When P_i is greater than 1, the public official is averse to perceived inequality and will take bribes if the monetary gain is higher than the moral cost of taking a bribe. Hence, if $P_i > 1$, taking bribes is justifiable when:

$$\bar{w}\frac{D_i - T_i}{T_i} > \frac{B_i}{T_i^{\alpha}} \tag{3.9}$$

We expect some of the people in a given society to have social equity parameters, α, higher than one, meaning tolerance for inequality for some people will not be solely self-centred. Therefore, as those individuals get closer to being completely intolerant of inequality (as T_i gets closer to zero), taking bribes would not be justifiable due to high moral costs, even if they perceive high inequality.

Decision making process of a potentially corrupt individual can be separated into two parts. First, the individual decides whether or not the estimated distribution of income is greater than their tolerance level. Therefore, those who are more tolerant of inequality should have a lower probability of being corrupt, as it gets more likely that their tolerance level is above their estimated distributions. If they do perceive inequality greater than one, then they might justify to be corrupt as long as the moral cost they incur from being corrupt is less than their monetary gain. Lower individual tolerance for inequality corresponds to higher moral costs, thus we also expect those with low tolerances for be less likely to be corrupt.

We can test our first main hypothesis, which was the non-linearity of the relationship

between tolerance for inequality and corruption, and that public officials who are completely intolerant of inequalities or completely tolerant of the existing estimated inequality are less corrupt than others, by estimating the probability of being corrupt conditional on tolerance for inequality.

Being corrupt or not is a binary choice. Let that choice variable be y, and $y = 1$ if an individual is corrupt and $y = 0$ if not. We also approximate the social equity parameter as two. We are interested in the response probability:

$$P(y = 1|T, T^2, \mathbf{x}) \tag{3.10}$$

where T is the tolerance for inequality and $\mathbf{x}$ are other control variables. If we assume that the response probability is linear in a set of parameters, then we can estimate the equation by OLS. Under the zero conditional mean assumption, the linear probability model (LPM) is:

$$P(y = 1|T, T^2, \mathbf{x}) = \beta_0 + \beta_T T + \beta_{T^2} T^2 + \beta \mathbf{x} \tag{3.11}$$

Even though certain methodological issues such as heteroskedasticity of the error terms can easily be corrected in the linear probability model, unless all the predicted probabilities fall between zero and one, OLS will be biased and inconsistent (Horrace and Oaxaca, 2006). Hence, the use of a nonlinear binary response model can be more appropriate:

$$P(y = 1|T, T^2, \mathbf{x}) = G(\beta_0 + \beta_T T + \beta_{T^2} T^2 + \beta \mathbf{x}) \tag{3.12}$$

Function G can either be the cumulative distribution function for a standard logistic random variable (Logit Model) or the standard normal cumulative function (Probit Model). Both Logit and Probit models can be estimated by maximum likelihood estimation (MLE). Under the correct likelihood function, MLE is consistent, asymptotically efficient and asymptotically normal. However, heteroskedasticity of

the error terms indicates an incorrect likelihood function, which leads to inconsistent estimators of the β parameters.

One way to overcome this inconsistency is to use the Heteroskedastic Probit Model (HetProbit). Derived by Harvey (1976), in HetProbit, the variance of the normal cumulative function is allowed to vary as a function of the independent variables. The probability of success function transforms into:

$$P(y = 1|T) = G[\frac{\beta_0 + \beta_T T + \beta_{T^2} T^2 + \beta \mathbf{x}}{exp(z_j \gamma)}] \tag{3.13}$$

where z_j is the multiplicative function of the independent variables that the variance is now based on.

If our hypothesis is correct, we expect a concave relationship between individual tolerance for inequality and corruption. Hence, we should fail to reject the null hypotheses:

$H_{1.0}$: $\beta_T > 0$

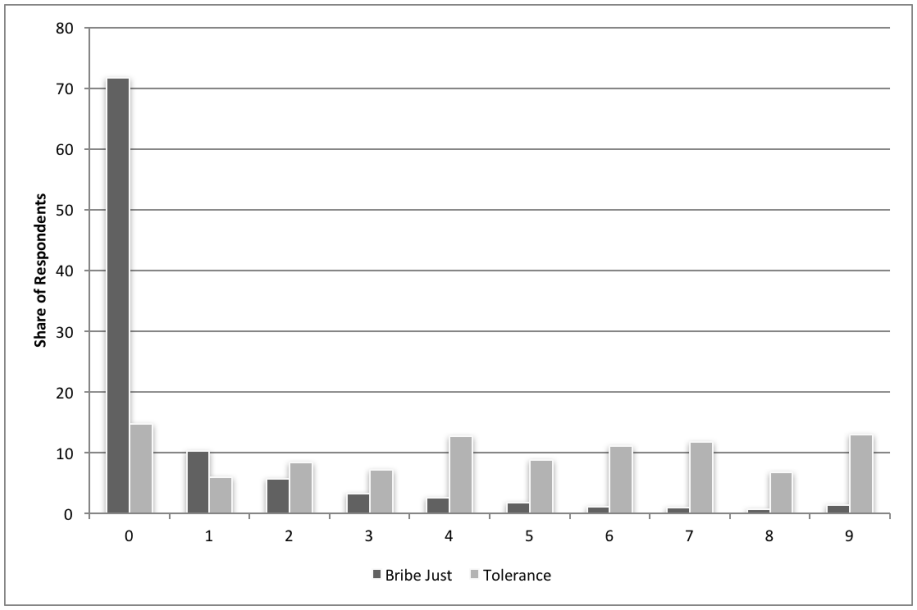
$H_{2.0}$: $\beta_{T^2} < 0$

In order to test these two hypotheses against their alternatives, we are going to use data from the World Values Survey, which we will be exploring in the next section.

3.4.2 Data

The WVS project started in 1981 and consists of nationally representative surveys in over 100 countries using a common questionnaire to understand people's values, beliefs and attitudes in different social matters. The sixth and the latest wave of surveys was published in 2014. Two questions in the WVS datasets are of particular interest to this research. The first question asks the respondent whether or not accepting a bribe in the course of someone's duties is justifiable. Possible answers

Figure 3.4: Distributions of the responses to survey questions



range between "1-Never justifiable" and "10-Always justifiable". After subtracting one from the responses to equate zero to "Never Justifiable", a look at the distribution of responses reveal that more than 70% of the respondents never find bribery justifiable, while the majority of the remaining find it justifiable only in the lowest degree, indicated by a score of one (Figure 3.4). We transform the responses given to this question into a binary response variable, taking the value of zero when an individual never justifies bribery and one when an individual justifies bribery, albeit in varying levels. This binary response variable will constitute our dependent variable that we label as *Bribe Dummy*. Evidently, justifying bribery does not necessarily mean being corrupt; however, for the purposes of testing our model, we are of the opinion that bribe justification is a satisfactory dependent variable for two reasons. First, measuring how corrupt an individual, is almost impossible as corruption exists under a cloak of secrecy. Second, since we are interested in how tolerance for inequality impacts the incentive to be corrupt through perceived inequality and the moral cost corruption is associated with, corruption will only be justified if one benefits in utility from being corrupt. If the moral cost is too high, or perceived inequality is low, bribery would not be justified.

The tolerance for inequality is the maximum level of inequality that can be tolerated

by an individual without a loss in utility. This concept is difficult to measure in a survey. In order to elicit individual tolerance levels, respondents could be asked to distribute an income of 100 between five different income groups, in a way that would reflect their ideal distribution of income. For instance, individuals who are completely intolerant would allocate equal shares to each income group. Unfortunately, WVS does not include such a question, and, to our knowledge, neither does any other survey that can used to investigate the relationship between corruption and tolerance for inequality.

Despite the lack of an optimum survey question to measure tolerance levels, respondents of the WVS answered a similar question that can help us gauge their tolerance for inequality. WVS asks whether incomes should be made more equal or that the society needs larger income differences as incentives. The respondents decide on a score between one and ten, one being in complete agreement with the first statement (more equal distribution), and ten supporting more inequality. Distribution of the answers after subtracting one to equate zero to "Incomes should be made more equal" are shown in 3.4. If we assume that answers are given are not conditional on the level of perceived or actual income inequality, answers to this question can be interpreted as a measure of tolerance for inequality. This could be a strong assumption. Because of the use of the words "more" and "larger", both statements implicitly require a benchmark which could be the level of perceived inequality. Therefore, the question can be interpreted as similar to the question of "Is inequality too much in this society", which would correspond to our definition for "aversion to perceived inequality". In such a case, we would expect a distribution of responses, where complete agreement to either of the the two statements is significantly more frequent than the rest of the possible choices. However, 3.4 displays a relatively uniform distribution of responses.

The quasi-uniform distribution of responses to the question on whether incomes should be made more equal, or that the society needs larger income differences

as incentives, enable us to interpret the question as a measure of tolerance for inequality. Individuals who are completely intolerant of inequality would be in complete agreement with the statement "incomes should be made more equal" in any given distribution of income. For this reason, we can assume that respondents who do not completely agree with the statement are tolerant of inequality in varying degrees.

Certain other variables might also affect an individual's attitude to corruption. For example, someone who is exposed to more bribery in their daily life might find it more justifiable because of their previous experiences (Mocan, 2008). This exposure may depend on age, marital status, working in the public sector, income, gender and education. Mocan (2008) argues that highly educated people that belong to a high-income group of working age are more likely to be asked for a bribe by a government official. Males might be more exposed to corruption, as more of them join the labour force than females, especially in developing countries. Religious beliefs might also shape attitudes towards corruption through its effect on moral values. Individual confidence in institutions is likely to be related to self-justification of corruption. If one does not have confidence in institutions, they may be more inclined to resort to bribery and self-justify it as a necessary act. Therefore, individual trust in the justice system will also be controlled in the regressions.

Only the latest two waves, the fifth (2009) and the sixth (2014), of the WVS contain all the variables listed above. Combining the two waves of surveys results in a dataset of 160,792 observations in a sample of 78 countries, listed in the Appendix A. An individual's attitudes towards corruption and income inequality are likely to depend on the level of corruption and income inequality in one's own country, as well as other macroeconomic variables. In order to remedy possible endogeneity issues caused by these country-fixed effects, country dummies will be added to each regression model. A dummy variable for the sixth wave of surveys is also included to control for other possible effects occurring due to the passage of time between the two surveys.

Table 3.1: Variables of Interest in World Values Survey

Variable	**Observations**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Bribe Dummy	155704	0.283	0.451	0	1
Tolerance	155215	4.57	2.97	0	9
Male	160684	0.478	0.5	0	1
Working Age	160420	0.800	0.4	0	1
Married	160318	0.637	0.48	0	1
Income	151102	4.714	2.21	1	10
High School	159535	0.585	0.49	0	1
Religious	153475	0.689	0.46	0	1
Justice Conf	146784	2.569	0.93	1	4
Public Sector	160792	0.191	0.393	0	1

Table 3.1 shows the number of observations, means, standard deviations, minimum and maximum values for the variables of interest in the analysis. The values for *Tolerance* have been reduced by one, in order to correspond the value 0 with respondents who are completely intolerant of inequality.

Respondents are considered as married if they declared their marital status as "Married" or "Living together as married" in the survey. *Working Age*, is a binary variable, taking the value of one if the respondent is between the ages of 22 and 65. *Income* variable is their self-placement of their household income on a scale of one to ten (lowest to highest decile). The positioning of income on a scale enables capturing the effect of one's relative income compared to the rest of the society. *High School* is a binary variable for completion of secondary education. *Religious* takes the value of one if an individual characterized themselves as religious people regardless of the practiced religion. *Justice Conf* shows respondent's confidence level for justice system in a scale ranging from one to four. The last variable, *Public Sector*, indicates whether the respondent works in the public sector.

3.4.3 Regression Results

Coefficient estimates from the LPM, Logit, Probit and HetProbit regressions can be found in Table 3.2. The dependent variable in all models is the justification of bribery (*Bribe Dummy*). Country dummies are included in each model. We will commence our analysis by interpreting the LPM results in Column I.

OLS estimates with error terms robust to heteroskedasticity from the linear probability model in the first column suggest that tolerance for inequality has a positive impact on the probability of justifying bribery, which is marginally decreasing as tolerance increases, in support of our hypothesis. Other control variables also have significant impacts on this probability. Male respondents are more likely to justify bribery, much like those are in the working age and those who place themselves higher on the income scale. On the other hand, the probability of justifying bribery is lower in respondents who are married, who graduated from high school, who have higher confidence in the justice system, who are more religious and who work in the public sector.

The linear probability model has its methodological limitations, as the predicted probabilities are not constrained in the unit interval. As shown by Horrace and Oaxaca (2006), OLS estimates are biased and inconsistent unless the predicted probabilities are between zero and one. In our model, only 244 predictions (0.19% of the total sample) are out of boundaries, signalling that bias and inconsistency might not be serious affecting our coefficient estimates. Nevertheless, Logit and Probit models are estimated by the maximum likelihood estimator to overcome such issues. The results of these regressions are given in Columns II and III. Signs and significance of all the estimated coefficients are very close to the LPM estimations. Once again we fail to reject our null hypotheses. Despite having almost similar log likelihoods, the Probit model seems to produce a slightly better fit, as indicated by an increase in the likelihood.

Table 3.2: Regression Results (Dependent variable: Justification of Bribery)

	I	**II**	**III**	**IV**	**V**	**VI**
	LPM	**Logit**	**Probit**	**Probit**	**HetProbit**	**HetProbit**
Tolerance	0.064***	0.353***	0.209***	0.213***	0.171***	0.207***
	(44.70)	(42.40)	(42.78)	(19.32)	(5.30)	(3.98)
Tolerance	-0.007***	-0.040***	-0.024***	-0.024***	-0.020***	-0.025***
Squared	(-47.22)	(-45.01)	(-45.33)	(-20.29)	(-5.81)	(-4.06)
Male	0.022***	0.116***	0.070***	0.071***	0.038***	0.009
	(8.88)	(8.80)	(8.91)	(3.85)	(3.30)	(0.34)
Working Age	0.014***	0.078***	0.048***	0.102***	0.004	0.051
	(4.43)	(4.48)	(4.60)	(4.09)	(0.27)	(1.35)
Married	-0.034***	-0.181***	-0.109***	-0.070***	-0.057***	-0.052
	(-12.58)	(-12.57)	(-12.68)	(-3.57)	(-3.13)	(-1.57)
Income	0.008***	0.041***	0.024***	0.011**	0.026***	0.019*
	(12.66)	(12.72)	(12.54)	(2.47)	(4.89)	(1.76)
High school	-0.011***	-0.055***	-0.033***	-0.087***	-0.023	-0.044
	(-3.73)	(-3.63)	(—3.68)	(-3.77)	(-0.84)	(-0.76)
Justice	-0.004***	-0.020***	-0.013***	-0.003	-0.002	0.006
Confidence	(-2.63)	(-2.57)	(-2.81)	(-0.29)	(-0.18)	(0.39)
Religious	-0.024***	-0.134***	-0.082***	-0.069***	0.001	0.013
	(-8.09)	(-8.39)	(-8.63)	(-3.27)	(0.02)	(0.30)
Public	-0.035***	-0.193***	-0.113***		-0.089***	
Sector	(-11.25)	(-10.88)	(-10.89)		(-3.53)	
Observations	125775	125775	125775	26159	125775	26159
$(Pseudo)R^2$	0.10	0.09	0.09	0.09		
Log (pseudo)Likelihood		-69536	-69535	-13630	-69486	-13614
Prediction Success	72.74%	72.73%	72.73%	75.41%	72.83%	72.68%

Dependent variable is Justification of Bribery. Associated t and z values are in parentheses. *, **, ***: Significant in 10, 5 and 1% respectively.

Our coefficient estimations in Columns I to III are calculated from the data of the entire sample, which includes the public officials as well as those who work in the private sector and those who are not employed. Since, working in the public sector significantly enters our regressions and reduces the likeliness to justify bribery, it could be argued that results may vary in a sample consisting solely of public sector workers. Hence, we have chosen to run our models in such a sample. Coefficient estimates are given in Column IV and result do not suggest a significant deviation from the full sample.

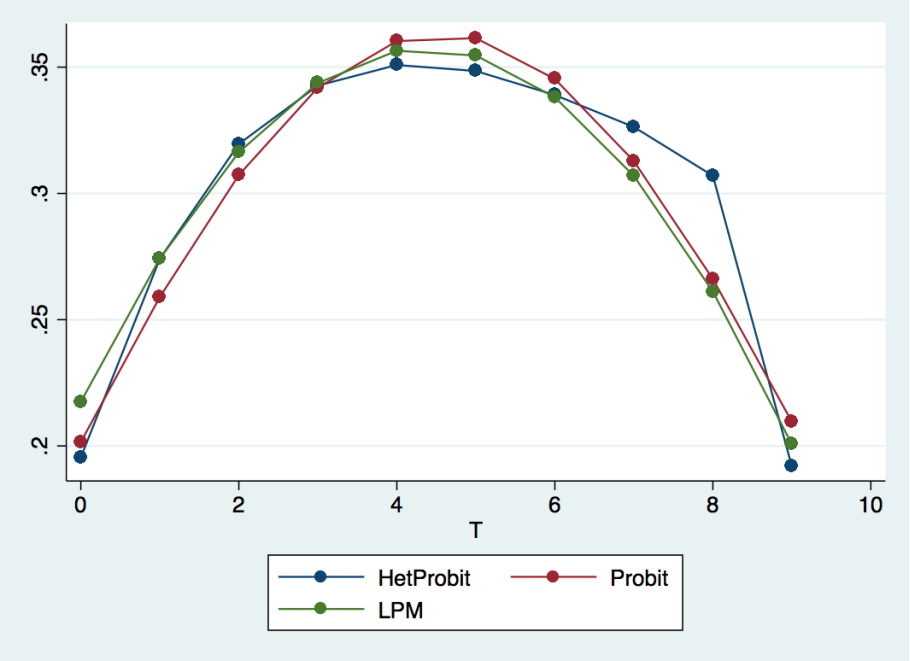
As previously mentioned in the methodological discussion, the presence of het-

Table 3.3: Marginal Effects for Logit, Probit and HetProbit Estimations

	II	**III**	**IV**	**V**	**VI**
	Logit	**Probit**	**Probit**	**HetProbit**	**HetProbit**
Tolerance=0	0.056***	0.059***	0.053***	0.061***	0.050***
	(60.11)	(56.70)	(26.81)	(10.90)	(6.71)
Tolerance=1	0.051***	0.052***	0.049***	0.054***	0.049***
	(46.21)	(45.36)	(20.88)	(14.19)	(10.32)
Tolerance=2	0.040***	0.039***	0.038***	0.040***	0.040***
	(38.74)	38.96	(17.73)	(12.27)	(11.25)
Tolerance=3	0.025***	0.023***	0.023***	0.023***	0.024***
	(30.47)	(31.00)	(14.16)	(8.39)	(6.90)
Tolerance=4	0.007***	0.007***	0.007***	0.005***	0.005
	(11.37)	(11.73)	(5.73)	(2.79)	(1.63)
Tolerance=5	-0.011***	-0.011***	-0.010***	-0.012***	-0.013***
	(-18.57)	(-18.66)	(-7.81)	(-7.08)	(-4.08)
Tolerance=6	-0.029***	-0.028***	-0.026***	-0.028***	-0.029***
	(-34.13)	(-34.49)	(-14.98)	(-10.83)	(-8.08)
Tolerance=7	-0.044***	-0.043***	-0.040***	-0.042***	-0.039***
	(-41.30)	(-41.27)	(-18.22)	(-12.28)	(-9.74)
Tolerance=8	-0.053***	-0.054***	-0.050***	-0.051***	-0.042***
	(-49.30)	(-47.93)	(-21.58)	(-11.70)	(-7.63)
Tolerance=9	-0.056***	-0.059***	-0.053***	-0.054***	-0.039***
	(-66.12)	(-61.53)	(-28.52)	(-9.19)	(-5.02)
Male	0.026***	0.026***	0.025***	0.023***	0.020**
	(8.80)	(8.91)	(3.85)	(5.87)	(2.54)
Working Age	0.018***	0.018***	0.036***	0.014**	0.034***
	(4.48)	(4.60)	(4.09)	(2.43)	(3.14)
Married	-0.041***	-0.040***	-0.025***	-0.036***	-0.024***
	(-12.57)	(-12.68)	(-3.57)	(-7.17)	(-3.02)
Income	0.009***	0.009***	0.004**	0.010***	0.005
	(12.74)	(12.55)	(2.47)	(5.96)	(1.54)
High school	-0.013***	-0.012***	-0.031***	-0.011	-0.028*
	(-3.63)	(-3.68)	(-3.77)	(-1.56)	(-1.91)
Justice	-0.005***	-0.005***	-0.001	-0.003	0
Confidence	(-2.57)	(-2.81)	(-0.29)	(-0.83)	(0)
Religious	-0.031***	-0.031***	-0.023***	-0.020*	-0.018
	(-8.39)	(-8.63)	(-3.27)	(-1.81)	(-1.51)
Public	-0.044***	-0.042***		-0.041***	
Sector	(-10.89)	(-10.89)		(-5.54)	

Marginal effects for Tolerance are calculated at different values, conditional on other covariates equal to their mean values. Marginal effects for independent variables apart from Tolerance are all computed at the mean values. Associated z values are in parentheses. *, **, ***: Significant in 10, 5 and 1% respectively.

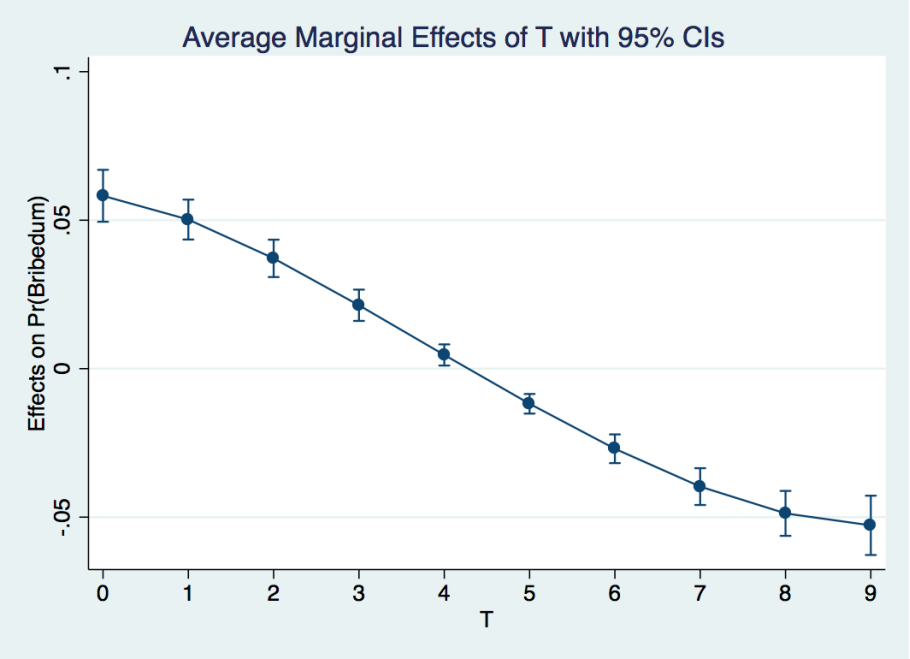
Figure 3.5: Change in Predicted Probabilities of Justifying Bribery



eroskedastic error terms might lead to inconsistent Logit and Probit estimates. The HetProbit estimates in Column V from the entire sample and Column VI from the limited sample of public sector workers, allow for heteroskedasticty in error terms and produce consistent results. Even though some of the control variables lose their significance, signs of the β coefficients of tolerance for inequality and tolerance squared do not change and they are still significant in the 1% level.

Marginal effects for all control variables in Logit, Probit and HetProbit estimates in Columns II to VI are displayed in Table 3.3. Apart from Tolerance, all control variables are evaluated at their mean values. In addition, how predicted probabilities of justifying corruption vary with tolerance for inequality in the full sample LPM, Probit and HetProbit models are shown in Figure 3.5. Predicted probabilities conditional on tolerance is very similar in all the models. The probability of successfully predicting the outcome is also almost identical, with a success rate around 72.7%. As the HetProbit model has a higher likelihood than the Probit model, we prefer estimates in Column V, and Figure 3.6 displays the effect of the full sample HetProbit.

Figure 3.6: Marginal Effect of an Increase in Tolerance in the HetProbit Model



The marginal effect of a one level increase in the tolerance for inequality on our dependent variable is similar in all the three models. As tolerance levels rise from intolerant ($T = 0$) to more tolerant of inequality, the probability of justifying corruption increases. According to the HetProbit model, an individual who is intolerant of inequality has a 20% probability of justifying bribery, while this probability increases to 35% as tolerance levels rise. However, once an individual reaches a tolerance level of 4.4, the probability starts to decrease, with individuals who are completely intolerant and tolerant of inequality having almost the same probability of justifying corruption with all else being equal.

This quadratic relationship between tolerance for inequality and corruption is in exact accordance with our theoretical model when the social inequity parameter is greater than one. We theorized that individuals will only be corrupt if their estimated distribution of income is more unequal than the level they can tolerate. As they get more tolerant of inequality, it is less likely that the inequality they estimate falls below their tolerance threshold. On the other hand, if they are averse to perceive inequality, they are incentivized to be corrupt and equalize incomes between themselves and the rich. However, as those individuals who are less tolerant

of inequality incur higher moral costs associated with corruption, the monetary utility gain from being corrupt gets less likely to be higher than the utility loss caused by moral costs, reducing their probability to justify corruption.

Despite having dealt with heteroskedasticty that may lead to potential inconsistencies in the binary response models, omitted variable bias and simultaneous causation are still a methodological issue that could lead to producing inconsistent results in binary dependent model regressions. Let us first investigate issues connected to the omitted variable bias. In our model, the estimated distribution of income is another variable that is theorized to determine the probability of corruption. However, we are unable to observe individual estimations in our dataset. Wooldridge (2010) explains that as long as the omitted variable is independent of the included independent variables, the direction of the partial effects of the estimated coefficients would be correct, meaning that if we assume that and individual's distributional perception (D_i) is independent of their tolerance for inequality, the predicted quadratic relationship between tolerance and corruption would still be valid. This assumption was also required to interpret the question asked in the WVS as a measure of tolerance for inequality. Such an assumption might be strong and in order to test it, we will need to conduct an analysis with data where we can observe both variables, and we will do so in the next section.

Potential simultaneous causation between the dependent variable, justification of bribery, and tolerance for inequality constitutes a more serious issue. As we do not have any variables that can be used to instrument tolerance for inequality, we are unable to test potential endogeneity of tolerance. Therefore, our results are only unbiased if we assume that justification of bribery is a consequence of tolerance for inequality and not vice versa. Corruption can widen income gaps between individuals, but we do not believe that such a causality exists in micro-level subjective opinions of corruption and tolerance for inequality. It is possible that an individual who justifies corruption can also perceive higher inequality; however, as

long as estimated distributions of income is independent of tolerance levels, opinions on corruption should not impact subjective preferences on the distribution of income.

According to our regression results, we observe a nonlinear relationship between individual tolerance for inequality and justification of corruption amongst the 160 thousand people from 78 different countries surveyed in the fifth and sixth waves of the WVS. This is in line with our hypothesis that as long as some people's tolerance for inequality is not self-centred, those who are completely tolerant and intolerant will be less likely to justify corruption. Predicted possibility for justification of bribery reaches maximum levels when tolerance levels are close to the mean.

3.5 Perceived Income Inequality and Corruption Across Countries

In the previous section we investigated how corruption may vary in different levels of tolerance for inequality and tested the first main hypothesis of our model. However, we have done so without controlling for distributional perceptions, or the level of estimated inequality by an individual. In fact, we have assumed that the impact of individual tolerance to the probability of justifying bribery is independent of the distributional perceptions. This could be problematic as an individual's tolerance level can be a function of their distributional perception or vice-versa. In this section we will investigate whether such a dependence between tolerances and distributional perceptions exists, while testing the second main hypothesis arising from our model.

3.5.1 Methodology

We previously expressed our model as:

$$B_i = \begin{cases} \bar{w} * \frac{(D_i - T_i) * T_i^{\alpha-1}}{1+T_i^{\alpha}}, & \text{if } P_i > 1 \\ 0, & \text{if } P_i \leq 1 \end{cases} \tag{3.14}$$

where B_i is the bribes taken by the public official, D_i is their distributional perception (or their estimation of the distribution of income) and T_i is their tolerance for inequality. P_i is aversion to perceived inequality, defined as:

$$P_i = \frac{D_i}{T_i} \tag{3.15}$$

With all else being equal, a higher D_i leads to higher B_i as long as $P_i > 0$. Aggregation of the utility functions of individuals in a country enables us to combine another dataset with the WVS previously utilized to test our second hypothesis, which was that as estimated inequality in distributional perceptions rises, higher corruption levels are observed.

If B_i is the corruption level in country i we can estimate the following linear model with OLS:

$$B_i = \alpha_0 + \beta_D D_i + \beta_T T_i + \beta X + e_i \tag{3.16}$$

Similarly, the model below can be estimated to investigate how corruption varies in countries with different aversions to perceived inequalities:

$$B_i = \alpha_0 + \beta_P P_i + \beta X + e_i \tag{3.17}$$

If our hypothesis regarding the distributional perceptions is correct we should fail to reject the null hypothesis $H_0 : \beta_D > 0$ against the alternative $H_a : \beta_D \leq 0$. If T_i is one of the control variables in Equation 3.17, we also expect a failure to

reject $H_0 : \beta_P > 0$ as aversion to perceived inequality increases with distributional perceptions when tolerance for inequality is constant.

3.5.2 Data

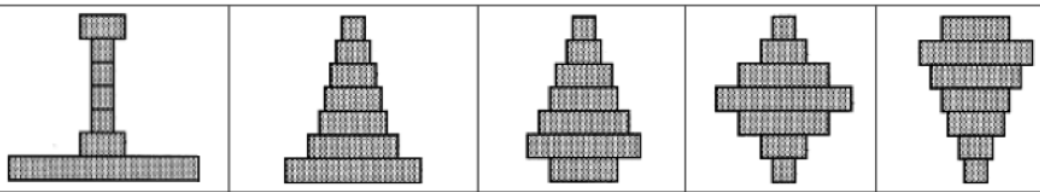
Data on perceived inequality itself is scarce. To our knowledge, the only source that provides such information is the Social Inequality surveys conducted by the International Social Survey Programme (ISSP). Over the span of 22 years, the ISSP published the results of four Social Inequality surveys, with the latest taking place in 2009. Social Inequality IV has the largest sample of all with 55238 respondents from 40 different countries [4]. Micro data taken from this survey is used to calculate weighted country averages.

The variable depicting aversion to perceived inequality is generated from the responses of the question: "To what extend do you agree for the following statement? - Differences in income in respondent's country are too large." Possible answers are: 1- Strongly Disagree, 2- Disagree, 3- Neither Agree nor Disagree, 4- Agree, 5- Strongly Agree. Niehues (2014) refers to this question as "evaluation of income differences". We are of the opinion that this question satisfactorily captures the notion of aversion to perceived inequality previously defined as a combination of both distributional perceptions and tolerance for inequality. In order to answer this question, the respondent would have to both map out the distribution of income, subject to available information, and then evaluate the inequality of this distribution based on their tolerance level. Inclusion of the adverb "too" particularly emphasizes this evaluation, as well as the possible aversion. Nevertheless, wording and the structure of the possible answers to this question are problematic. One way to analyse the responses is to attain a numerical value to each answer and treat it as an ordered categorical variable. However, it can be argued that the difference between the answers "agree" and "strongly agree" is unclear, and thus both should

[4] These countries are listed in the Appendix B

Figure 3.7: Distributional Perception Diagrams

Q14. These five diagrams show different types of society. Please read the descriptions and look at the diagrams and decide which you think best describes <country> ..



Type A	Type B	Type C	Type D	Type E
A small elite at the top, very few people in the middle and the great mass of people at the bottom.	A society like a pyramid with a small elite at the top, more people in the middle, and most at the bottom.	A pyramid except that just a few people are at the bottom.	A society with most people in the middle.	Many people near the top, and only a few near the bottom.

be treated equally. Another approach would be to turn the responses into binary dummies, taking the value of one when respondents agree or strongly agree with the statement, and zero otherwise. We will employ both these approaches in our methodology.

The fourteenth question of the survey, where respondents are asked to choose between five different visual diagrams, addresses the estimated distributions from high to low inequality. The question and the diagrams are shown in Figure 3.7. The question does not specifically ask respondents' opinions on the distribution of income, but rather how the society is structured between the elite and the rest of the people. The term "elite" is not defined and there is no clarity on whether these diagrams reflect inequality of social power, wealth or income. Despite this ambiguity, both Niehues (2014) and Gimpelson and Treisman (2015) measure perceived inequality through the responses given in this question. Gimpelson and Treisman (2015) justify this choice by arguing prior questions in the survey focused on earnings and pay, and thus respondents would interpret these diagrams as income distributions. In our view, the use of the word "elite" suggests that the question focuses on the disparities of wealth rather than income. Nevertheless, we will use it as a measure to capture distributional perceptions of income, D_i, in the society.

Quantifying the diagrams in Figure 3.7 is also problematic. At first glance, the first diagram, Type A, stands out as the most unequal one. However, the difference between the rest of the diagrams are less striking. Due to the order of the diagrams, one might think that the most equal society between the five choices is depicted in the fifth diagram, Type E. However, Type D could easily be interpreted as a more equal society. In fact, assuming each bar represents a different income class with equal gaps Gimpelson and Treisman (2015) calculates Gini coefficients for each diagram using the area of the bars. According to the authors, Gini coefficients for Diagrams A to E are respectively 0.42, 0.35, 0.30, 0.20 and 0.21, hence Diagram E represents a slightly more unequal society than D. It is possible that respondents who chose Type A, might have a much more unequal society in mind than of a society with Gini coefficient of 0.42; nevertheless, we are going to follow Gimpelson and Treisman (2015) and use their reported Gini coefficients for each of these diagrams in our analysis. This variable will be named *Distributional Perception*.

The other main variable of interest is the tolerance for inequality that we calculate from the responses of the World Values Surveys (WVS). The construction of this variable was given in detail in the previous section of this chapter. Other control variables are the per capita gross domestic product (GDP) of countries, the share of natural resource in total merchandise exports, government consumption and trade in the GDP and the rule of law. GDP and natural resource data is taken from World Bank's WDI and the rule of law data is from the ICRG dataset. We also control for Gini values to make sure the impact of perceived inequality is not through actual income inequality's effect to corruption. UNU-WIDER's World Income Inequality Dataset is our source for the Gini coefficients. Finally, data for our dependent model, corruption, comes from Transparency International's Corruption Perception Index (CPI) in 2009. In CPI, the data is inverted so that the highest level of corruption is indicated by ten.

The statistical description of all the variables of interest are displayed in Table 3.4.

Table 3.4: Variables of Interest

Variable	**Observations**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Corruption	40	3.98	2.20	0.6	8.1
Aversion to Per. Ineq.	40	4.20	0.35	3.27	4.74
Agreement Rate	40	0.84	0.12	0.51	0.97
Distributional Perception	40	32.70	3.72	24.51	39.13
Gini	40	33.05	7.89	23.7	59.40
Trade	40	0.75	0.30	0.24	1.46
Natural Resources	40	0.18	0.22	0	0.97
Government Size	40	0.19	0.04	0.10	0.28
GDP pc	40	27767	12058	5184	60179
Rule of Law	40	4.63	1.11	1.49	4.92
Tolerance	38	3.32	0.83	1.49	4.92

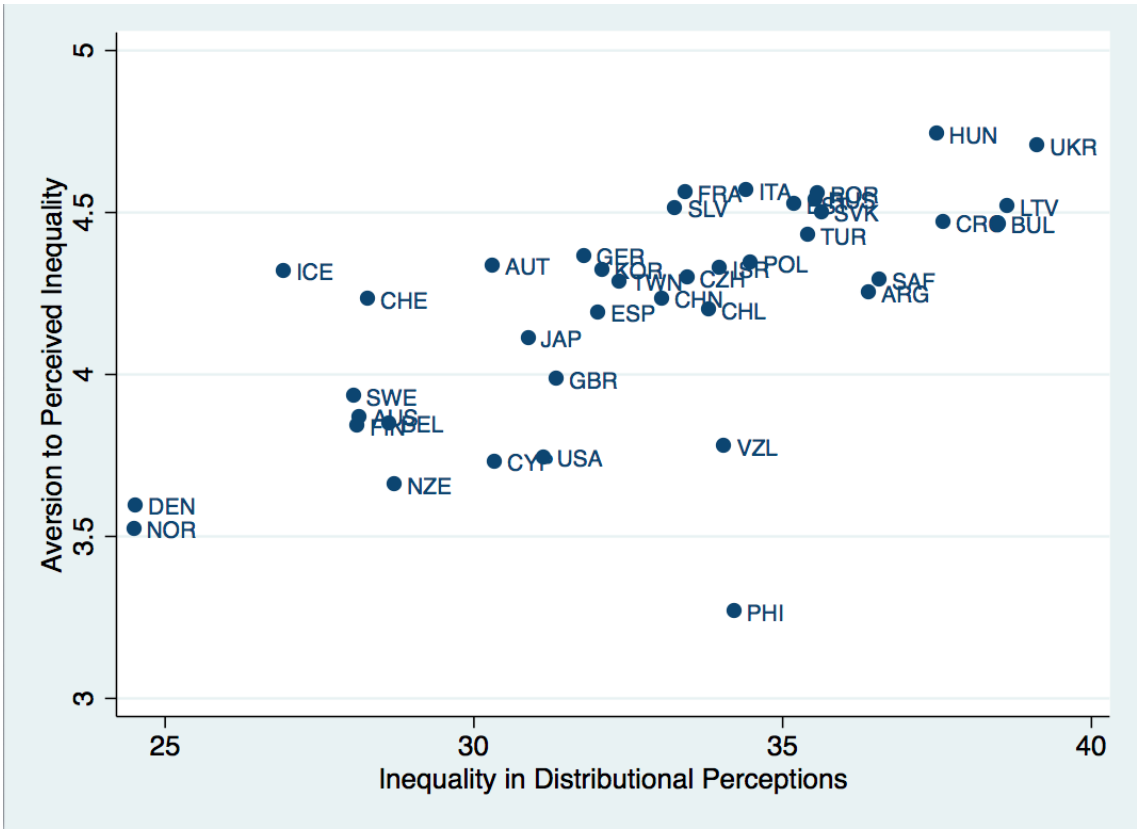
Table 3.5: Correlation Matrix

Var	**Cor**	**PI**	**AR**	**DP**	**Gini**	**Trade**	**NR**	**Gov**	**GDP**	**Law**	**T**
Cor.	1										
Per. In.	0.45	1									
Agr. Rate	0.47	0.97	1								
Dis. Per.	0.84	0.69	0.67	1							
Gini	0.41	-0.03	0.09	0.36	1						
Trade	-0.02	0.24	0.19	0.06	-0.50	1					
Nat. Res.	-0.03	-0.12	-0.09	-0.13	0.24	-0.20	1				
Gov. Size	-0.42	0.01	-0.10	-0.31	-0.53	0.19	0.03	1			
GDPpc	-0.81	-0.38	-0.41	-0.81	-0.56	-0.03	0.10	0.36	1		
Law	-0.78	-0.28	-0.32	-0.74	-0.52	0.02	0.00	0.46	0.72	1	
Tolerance	0.31	-0.15	-0.17	0.10	0.13	-0.14	0.06	0.04	-0.18	-0.23	1

The variable *Agreement Rate* is the aggregation of the dummy variable depicting whether a respondent agrees or strongly agrees with the perceived inequality statement in the ISSP survey. Weighted averages of tolerance for inequality variables from the WVS surveys for each country produce a mean of 3.32 in the entire sample, with minimum and maximum values being 1.49 and 4.92. Going back to the results of the previous section, those two values correspond to the left hand side

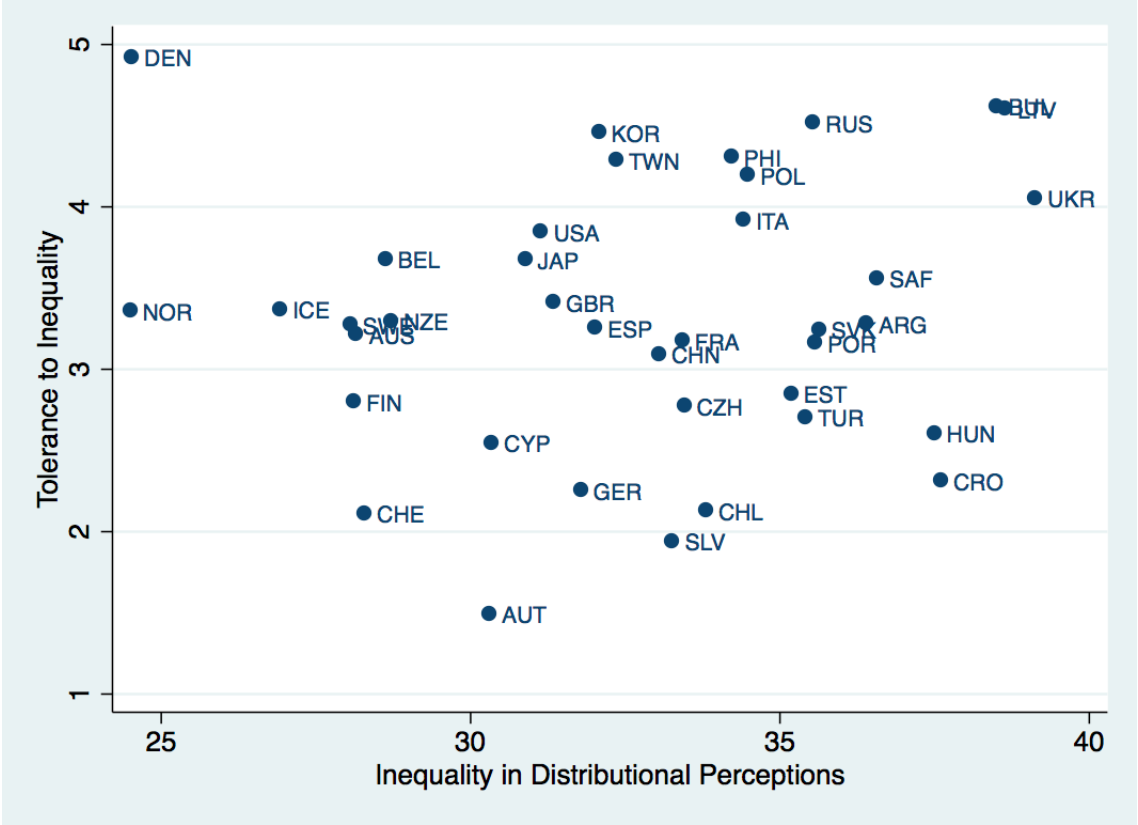
of the concave predicted probability function conditioned on tolerance. Hence, we expect to observe more corruption in countries with higher tolerance levels in our sample, as the moral cost to corruption reduces with tolerance. A remark should also be made on the similarity between the means of the Distributional Perception variable and the Gini, possibly indicating a strong correlation between aggregate estimations of the income distribution and the actual income inequality. However, as we see in Table 3.5, the correlation coefficient between the two variables (DP and Gini) is only 0.36.

Figure 3.8: Aversion to Perceived Inequality vs Distributional Perceptions



Figures 3.8 and 3.9 display aversion to perceived inequality (P_i) and tolerance (T_i) in the sample of countries plotted against distributional perception (D_i). Eastern European countries have higher inequalities in their estimated distributions and higher aversion to perceived inequality, with Ukraine being the country with the highest inequality in estimated distributions. On the other end of the scale, Scandinavian countries and Philippines have the lowest aversion to perceived inequality. While

Figure 3.9: Tolerance vs Distributional Perceptions



having the second most equal estimated distribution of income, Denmark also has the highest tolerance for inequality among the countries in our sample.

Figure 3.9 shows no immediate dependence between tolerance for inequality and distributional perceptions in countries. The correlation coefficient between two variables is only 0.10. A simple linear regression between the two variables does not exhibit any significance, neither do adding control variables such as per capita GDP and actual Gini. Therefore, we are fairly certain that the two variables are independent of each other, hence our assumption required to obtain consistent Probit estimates in the previous section was valid.

Table 3.6: Distributional Perception and Tolerance (Dependent variable: Corruption [CPI])

	I	II	III	IV	V	VI	VII	VIII
Distributional	0.32***	0.32***	0.26***	0.26***	0.29***	0.27***	0.28***	0.28***
Perception	(5.05)	(5.33)	(3.75)	(4.02)	(4.24)	(4.21)	(4.13)	(4.21)
Economic	-1.48***	-2.09***	-1.15**	-1.76***	-1.07**	-1.62***	-1.62***	-1.62***
Development	(-3.10)	(-4.10)	(-2.43)	(-3.48)	(-2.26)	(-3.18)	(-3.13)	(-3.19)
Natural	1.59**	1.84**	0.82	1.09	0.50	1.07	1.07	1.08
Resources	(2.06)	(2.52)	(1.00)	(1.42)	(0.58)	(1.26)	(1.24)	(1.28)
Government	-5.14	-8.20*	-2.16	-5.19	-4.44	-7.41	-7.59	-7.74*
Size	(-1.13)	(-1.84)	(-0.46)	(-1.18)	(-0.98)	(-1.65)	(-1.61)	(-1.71)
Trade	-0.17	-1.06	-0.18	-1.03	0.03	-0.78	-0.76	-0.75
	(-0.29)	(-1.62)	(-0.32)	(-1.66)	(0.06)	(-1.24)	(-1.16)	(-1.18)
Gini		-0.08**		-0.08**		-0.07**	-0.07**	-7.53**
		(-2.45)		(-2.47)		(-2.22)	(-2.19)	(-2.25)
Rule of			-0.54**	-0.51**	-0.28	-0.37	-0.37	-0.36
Law			(-2.18)	(-2.22)	(-0.99)	(-1.39)	(-1.32)	(-1.34)
Tolerance					0.44**	0.39*	0.61	
					(2.12)	(2.02)	(0.45)	
Tolerance							-0.03	
Squared							(-0.16)	
log(Tolerance)								1.20*
								(-1.98)
No of obs.	40	40	40	40	38	38	38	38
Adjusted R	0.77	0.80	0.80	0.82	0.80	0.82	0.82	0.82

OLS regressions with corruption as the dependent variable. t-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

3.5.3 Results

The results of the OLS regressions examining whether a causal relationship between distributional perceptions, tolerance and corruption are given in Table 3.6. Coefficient estimates of the *Distributional Perception* are positive and significant in every column. It survives inclusion of the actual Gini coefficient, meaning that the effect of distributional perceptions does not come from actual income inequality's impact on corruption. In fact, confirming the results from our previous analyses, we find that actual income inequality and corruption are negatively linked to each other across countries. Countries with higher Gini coefficients seem to experience lower corruption. Controlling for tolerance for inequality does not significantly alter Dis-

tributional Perception's coefficient estimates either. *Tolerance* enters the regression positively and significantly. We do not observe a quadratic relationship between tolerance and corruption, as the average tolerances for inequality in the countries in our sample are lower than the level where a marginal increase in the tolerance level corresponds to a decrease in justification of bribery according to our regression analyses in the previous section. We do, however, observe the possible non-linearity of a logarithmic form of the *Tolerance* variable in Column VIII, with the estimate being significant in the 10% level. Breusch-Pagan and Shapiro-Wilk tests were conducted for each regression and no evidence for heteroskedasticity or non-normality has been found.

These results strongly support our second main hypothesis and suggests that as inequality in the estimated distributions rises in countries, they experience more corruption. All else being equal, a 1 percentage point increase in the Distributional Perception variable, transformed into Gini coefficients, corresponds to an approximate 0.3-point increase in the Corruption Perception Index, meaning a 4.5-point difference in corruption between the two countries with highest (Ukraine) and lowest (Norway) distributional perceptions in our sample.

OLS regressions examining whether a causal relationship between aversion to perceived inequality and corruption are given in Table 3.7. In Columns I to IV, our main variable of interest is *Aversion to Per. Ineq.* measured by quantifying the responses given to the statement of "Differences in income in respondent's country are too large". In the last four columns, we use the total percentage of respondents who have agreed or strongly agreed to the statement as an independent variable, labelled by *Agreement Rate*. We observe a positive and significant impact of aversion to perceived inequality with both measures, demonstrating that high perceived inequality corresponds to high corruption across countries. Keeping the rest of the variables constant, a 1-point rise in *Aversion to Per. Ineq.* is associated with corruption that is 1.81 points higher in the CPI (Column IV). Similarly, corruption would be 0.54

Table 3.7: Perceived Inequality (Dependent variable: Corruption [CPI])

	I	II	III	IV	V	VI	VII	VIII
Aversion to	1.54***	1.58***	1.79***	1.81**				
Per. Ineq.	(2.96)	(3.24)	(3.63)	(3.63)				
Agreement					4.07**	4.61***	5.38**	5.44***
Rate					(2.70)	(3.33)	(3.88)	(3.89)
Economic	-1.79***	-2.42***	-2.31***	-2.32***	-1.80***	-2.52***	-2.43***	-2.45***
Development	(-3.90)	(-4.83)	(-4.68)	(-4.70)	(-3.86)	(-5.08)	(-5.07)	(-5.09)
Natural	0.42	0.72	0.82	0.84	0.33	0.72	0.87	0.89
Resources	(0.49)	(0.90)	(0.93)	(0.95)	(0.38)	(0.91)	(1.00)	(1.02)
Trade	-0.41	-1.32*	-1.12	-1.08	-0.35	-1.43**	-1.24*	-1.22*
	(-0.69)	(-1.95)	(-1.67)	(-1.62)	(-0.58)	(-2.12)	(-1.89)	(-1.84)
Government	-2.00	-5.28	-8.21	-8.60*	-0.40	-4.19	-7.27	-7.68
Size	(-0.41)	(-1.12)	(-1.73)	(-1.79)	(-0.08)	(-0.90)	(-1.57)	(-1.65)
Rule of	-0.85***	-0.82***	-0.71***	-0.70**	-0.88***	-0.83***	-0.71***	-0.70***
Law	(-3.60)	(-3.70)	(-2.78)	(-2.72)	(-3.66)	(-3.81)	(-2.88)	(-2.81)
Gini		-0.08**	-0.08**	-0.08**		-0.09***	-0.10***	-0.10***
		(-2.42)	(-2.34)	(-2.37)		(-2.79)	(-2.91)	
Tolerance			0.44**				0.45**	
			(2.11)				(2.21)	
log(Tolerance)				1.35**				1.40**
				(2.08)				(2.20)
No of observations	40	40	38	38	40	40	38	38
Adjusted R	0.77	0.80	0.80	0.80	0.76	0.80	0.81	0.81

OLS regressions with corruption as the dependent variable. t-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

points higher in a country if *Agreement Rate* were to rise by 10%.

Among the other control variables, economic development measured by the natural logarithm of GDP per capita of countries and the rule of law have the most significant causal effect on corruption. Countries who are richer and countries who have a better rule of law experience lower corruption as expected. Once again, actual income inequality has an adverse relationship with corruption, opposing existing economic theories.

Overall, we find evidence of the relationship between perceived inequality and corruption across countries. Despite reassuring results of our hypothesis that as inequality in distribution perception rises, more corruption is observed in countries,

it is possible that we suffer from endogeneity of our independent variable due to simultaneous causation. It can be argued that in high levels of corruption in countries might affect how inequality as perceived, as individuals could assume that inequality is increasing because of corruption. In order to correct for any biases that might arise from endogeneity, we require an instrument for perceived inequality. In the next section, we are going to suggest a possible instrument and commence empirical work on its creation.

3.6 Football Inequality Index

Throughout this chapter, we have argued that people might have imperfect information on incomes of others, and how those incomes are distributed. We have also reviewed several studies demonstrating the biases in people's distributional perceptions. Perceptions and attitudes on inequality matter when looking for macroeconomic relationships caused by microeconomic decisions; however, data on perceived inequality is limited. The fourth wave of the Social Inequality survey published by the ISSP only covers 40 countries, most of which are developed nations. The relatively small sample size and lack of time variance in the data creates methodological obstacles when one's aim is to conduct regressions to test hypotheses. It is also possible that perceived inequality as an independent variable can be endogenous, as in our regressions of corruption on perceived inequality in the previous section. One way to overcome this issue is to find a variable that can be used as a proxy and instrument for inequality in distributional perceptions if necessary.

In this section, we are going to introduce a possible instrument for distributional perceptions, which we call the "Football Inequality Index". Our intuition is simple: The ratio of the average market value of a football team in a country's main division and the per capita gross domestic product of that country can be an indicator of how

inequality is perceived [5]. In order to construct such an index, we will also control for the popularity of football in a country and the international market power of the league. The aim of this section is not to offer a finalized index, but to lay the groundwork for a future, more comprehensive dataset that provides cross-country information on perceptions of inequality in a wide timescale.

3.6.1 Theoretical Reasoning

Football is considered to be the most popular sport in the world (Giulianotti, 2012). The best football players become global celebrities, they star in commercials promoting all kinds of consumer goods and how they live their lives tends to fill the pages of tabloid papers. Rumours of what they are worth to other teams are the subject of newspaper headlines, especially during the European transfer window. Their contract details might even be public information if the football club is listed in a stock market. Football players are high earners, sometimes in the top 1% of the income distributions of a country, and with the public attention they receive, their lifestyle and estimated earnings may be considered as one of the factors shaping public perception of income inequality. Hence, the ratio between their estimated income and the average income in a country can be a proxy for perceived inequality.

Evidently, not all football players receive compensation that places them among the highest paid individuals in a country. First of all, we are interested in footballers that are competing in the highest division of each national football federation. However, federations have different regulations regarding how many players a team can register. Some federations might allow teams to register an unlimited number of players, with young players who do not earn high incomes filling the majority of squads, while others may put a limit on the number, usually varying between 25 and 30. Unlike international stars, salaries of young footballers might be very low, and their income is unlikely to shape the public perception of inequality. Hence,

[5] By "football" we refer to association football.

instead of the average income of footballers, we will focus the average income of the entire squad, with a football team competing in the highest division being our unit of analysis.

Once we divide the total amount a team pays its players by the average national income they are competing in, we can have a measure of distributional perceptions. However, certain factors that impact the incomes of the footballers should be taken into account. For instance, one would expect the more talented players to be paid more; yet these players might all be playing in the same national leagues that are considered to be the best in the world, such as the English Premier League, Spanish La Liga or the German Bundesliga. Since these leagues generate more revenues than other minor leagues, such as the Turkish Super League, they attract better players and the difference of incomes might cause less perceived inequality if the public consider the high compensation of better players as fair.

Revenues in football are largely generated by the sale of domestic and international TV broadcasting rights of matches, as well as attendance and merchandise sales. Football teams would generate higher revenues in countries where the sport is more popular, increasing domestic demand for viewing the games, and where the country and the teams are successful in international organisations, creating global demand and higher broadcasting revenues. Also, having more foreign players in the league would also increase international demand.

Suppose that the average football player earns ten times more than an average person in both Germany and Turkey. Football is very popular in both countries. Germany is the winner of the most recent World Cup (2014), and as of March 2016, the German national team is at the fourth place in the FIFA rankings, while two German teams are in the top ten most successful teams in the UEFA. On the other hand, the Turkish national team is ranked 20th in the world and the most successful Turkish team is at the 31st place of the UEFA ranking. We are of the opinion that with all else being equal, even though the average player earns ten times more

than an average person in both countries, German league generates more revenue internationally and perceived inequality formed by footballers' incomes should be higher in Turkey, since the public would regard such an income difference more fair and deserved in Germany, because of the success of the players.

3.6.2 Data and Methodology

Certain information is needed to construct an index that reflects the perceptions of inequality shaped by the pay gap between footballers and an average individual. First of all, we need to know how much footballers make. Despite the fact that, contract details of some players are available to the public; in most cases the conditions of the contract and the annual pay are undisclosed. What is available, however, is the estimated market value of football players, teams and the entire league. This information is published on a German website that is the primary source of such information, called Transfermarkt. Transfermarkt estimates the market values through information provided by registered users and experts. These estimations are highly correlated with actual values of the players when such information is available and their data has been used in other empirical studies (Franck and Nüesch, 2011; Bryson et al., 2013).

Being interested in how earning differences between the football players and the average individual shape public perception of inequality, we need the information that affects these perceptions rather than the actual earnings. Therefore, even if the market evaluations of Transfermarkt are incorrect, since this data is the only available public database and many news outlets utilize their dataset, market value estimations can be used to create an index for perceptions. We also assume that players receive the amount they are estimated to be valued. Even though that is not the case, as long as these market values form a proportionate estimation of their actual contract, meaning players that are valued higher earn more in their contracts, a proxy based on market values for perceived inequality should be valid.

Once we obtain data on the average market value in US dollars of a team in the highest division of a football association, we divide that value with the GDP per capita in current US dollars of that country, taken from the World Development Indicators, published by the World Bank. As we have previously suggested, certain other factors that would determine a player's salary, such as the popularity of the sport, international success and the number of foreign players. Number of foreign players in a league can also be found in the Transfermarkt dataset. We use the share of football players in a country's total population in 2005 to control for domestic popularity of football. This data is available as a result of FIFA's "Big Count" survey in 2006 [6]. Finally, we use the points each country's national teams had in FIFA rankings in December 2009 and 2014 to measure their international success [7].

Using data explained above when it is available, we calculate the Football Inequality Index (FII) for each country and year with the equation below:

$$FII = \log\left\{\frac{\text{Market Value per Team}}{\text{GDP per capita} * \text{Popularity} * \text{FIFA Points} * \text{Share of Foreign Players}}\right\}$$

The FII includes 446 observations from 68 countries. The index goes to as early as 2005 for 13 countries. The mean value is 4.2, with 0 and 8.6 being the minimum and maximum values, for Luxembourg in 2014 and India in 2014 respectively.

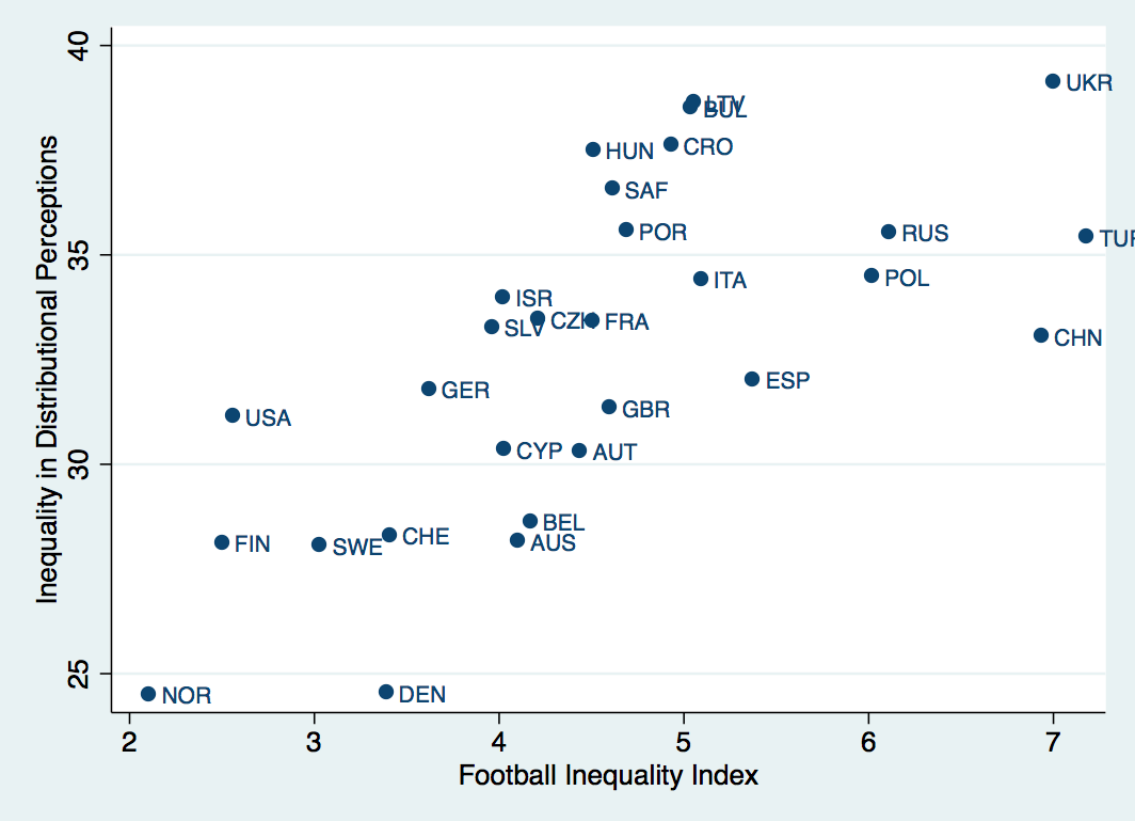
In order to test the validity of our index in reflecting perceived inequality, we have obtained the correlation coefficients between the FII and the distributional perception and perceived inequality measures taken from the ISSP's Social Inequality IV Survey. There are 29 countries included in the survey that also has FII values averaged between 2005 and 2009. The correlation coefficient between FII and perceived inequality measure 0.62 and it is 0.67 between FII and the distributional perception measure. Results of the OLS regressions of FII on these two measures can be found

[6] http://www.fifa.com/worldfootball/bigcount/registeredplayers.html

[7] We assume that the GDP per capita and popularity of football in England and Scotland are equal to the values given for the United Kingdom. We obtain the FII value of the United Kingdom by averaging the values obtained for England and Scotland

in Table 3.8. The two measures each relate to the FII positively and significantly, providing evidence to the validity of our Football Inequality Index. A scatter plot of inequality in distributional perceptions and the FII is also given in Figure 3.10 and clearly displays the positive correlation.

Figure 3.10: Distributional Perceptions vs Football Inequality Index



3.6.3 Football Inequality Index: Results and Limitations

In this section, we are going to explore the Football Inequality Index, and how inequality is perceived in the 68 countries that we have data. However, before doing so, let us first examine the gap between an average player and average person between 2010 and 2014, shown in Figure 3.11. Numbers in this figure is obtained by dividing the market value of each league by the number of players in that league and the GDP per capita of the country. Several interesting results emerge. First of all, the average value of a football player in Luxembourg is half of the GDP

Table 3.8: Regression Results (Dependent Variable: Football Inequality Index)

	I	**II**
Perceived	2.61***	
Inequality	(4.08)	
Distributional		1.64***
Perception		(4.63)
Constant	-7.36**	-0.25*
	(-2.71)	(-1.74)
Observations	29	29
Adjusted R^2	0.36	0.42

OLS regressions with Football Inequality Index as the dependent variable. t-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

per capita. There is almost no income gap between footballers in Iceland and the average person. We find Ukraine at the other end of the scale, with the value of an average footballer being almost 400 times more than the GDP per capita. Russia, Turkey and Spain follow Ukraine, where players' values are 170 to 183 times the per capita GDP. The mean value of the average football player was 43 times the GDP per capita in our sample.

Distribution of the colours in the map change once we portray the Football Inequality Index (FII) instead of the simple income gap between an average footballer and the average person in a country. India has the highest FII value, followed by Georgia. Ukraine, which had the highest gap, has the third highest FII value. Germany, where players are paid 91 times the per capita GDP, has a relatively low FII value of 2.8, equal to Malta, where players receive only 1.7 times the per capita GDP. Spain, which has the fourth highest income gap with an average player receiving 170 times per capita GDP, has the 22nd highest FII value.

We have previously demonstrated the high positive correlation between the FII and the distributional perception and the perceived inequality measures from the Social Inequality IV Survey. The 29 countries that we have data in both FII and the Social Inequality IV Survey are listed in Table 3.9. The columns in the table

Figure 3.11: Income Gap between Average Player and Person: 2010-2014

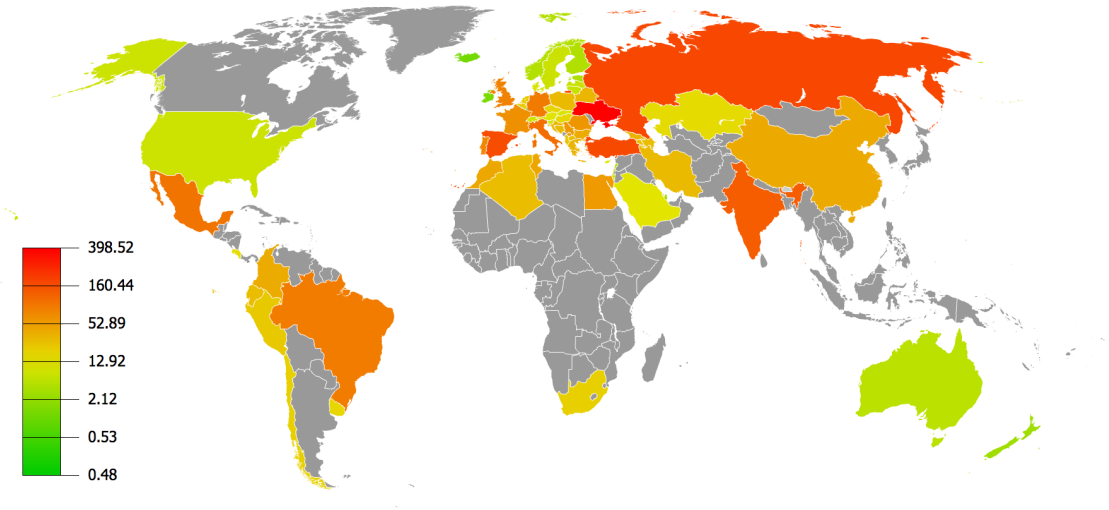
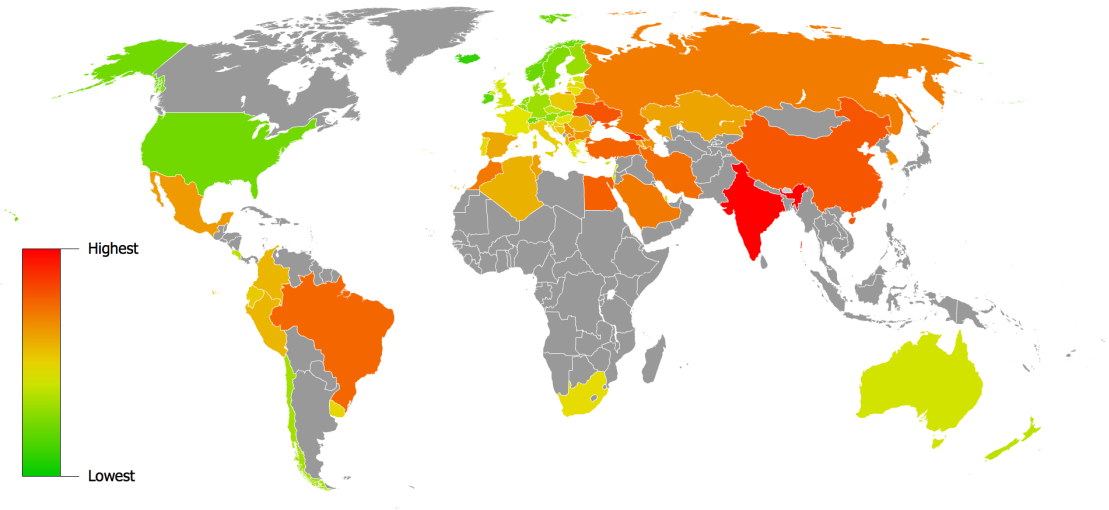


Figure 3.12: Football Inequality Index: 2010-2014



show their comparative ranks in the FII, perceived inequality measure, distributional perception measure and actual inequality respectively, with the first ranking given to the country with the lowest value of the variable.

Norway is country with the lowest FII value, as well as being the country with the least perceived inequality, and the most equal distributional perception. United States arise as being the country with the fourth lowest perceived inequality, despite the fact that actual income inequality is one of the highest in the sample. Our Football Inequality Index captures this biased view and places US in the third

Table 3.9: FII, Perception Measures and Gini Rankings

Country	FII	Aversion to Per. Inequality	Distributional Per.	Gini Rank
Norway	1	1	1	2
Finland	2	5	3	5
United States	3	4	10	26
Sweden	4	8	5	6
Switzerland	5	11	4	15
Denmark	6	2	2	4
Australia	7	7	6	21
Israel	8	15	18	24
Slovenia	9	22	14	1
Germany	10	18	12	11
Austria	11	16	9	8
Cyprus	12	3	8	12
Czech Republic	13	14	17	3
Belgium	14	6	7	9
Latvia	15	23	27	25
Croatia	16	21	26	10
United Kingdom	17	9	11	20
Portugal	18	25	22	22
South Africa	19	13	24	29
France	20	26	16	13
Hungary	21	29	25	7
Bulgaria	22	20	28	19
Italy	23	27	20	17
Spain	24	10	13	18
Poland	25	17	19	16
Russian Federation	26	24	23	23
Ukraine	27	28	29	14
China	28	12	15	28
Turkey	29	19	21	27

Higher ranking corresponds to lower perceived or actual inequality

spot. The most equal country in the sample is Slovenia, even though respondents in the Social Inequality survey perceive existing inequalities to be high. It is placed 9th in our FII ranking. While actual inequality in Hungary is also relatively low, perceptions differ from actual levels of inequality, so does the FII. Similarly, even though Ukraine has a relatively low Gini coefficient, Ukrainians perceive high levels of inequality and the country has a high FII value.

Let us first use the Football Inequality Index as an instrument for inequality in distributional perceptions. All available data in the FII is averaged over the years 2005 and 2014 to increase our sample size. FII is used as an instrument for the Gini values of distributional perceptions for countries in 2009. Our aim is to find whether a causal relationship exists between corruption and inequality in perceived distributions. The equation we'd like to estimate is:

$$B_i = \alpha_0 + \beta_D D_i + \beta_T T_i + \beta X + e_i \tag{3.18}$$

However, as we suspect that D_i is endogenous, we instrument it by F_i which is the Football Inequality Index value for country i. First stage and reduced form equations are respectively:

$$D_i = \alpha_0 + \theta_F F_i + \beta_T T_i + \beta X + n_i \tag{3.19}$$

$$B_i = \alpha_0 + \lambda_F F_i + \beta_T T_i + \beta X + v_i \tag{3.20}$$

where T_i is the mean tolerance for inequality in countries. The set of independent variables does not include economic development measured by the natural logarithm of GDP per capita as it is already controlled for in the Football Inequality Index. Hausman test confirms that D_i is endogenous. 2SLS results are displayed in Table 3.10.

Table 3.10: FII as an Instrument for Distributional Perceptions (Dependent Variable: Corruption [ICRG]

	I	**II**	**III**
Distributional	0.39***	0.60***	0.97***
Perception	(7.47)	(7.48)	(2.83)
Tolerance		0.39	0.57
		(1.47)	(1.17)
Natural			2.90
Resources			(1.34)
Government			-2.94
Size			(-0.25)
Trade			-0.09
			(-0.08)
Rule of			1.75
Law			(1.32)
Gini			-0.30
			(-0.40)
Observations	33	32	32

2SLS regressions with ICRG's Corruption Index used as the dependent variable. t-values in parentheses. Small sample statistics are given. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

Using the FII as an instrument for distributional perceptions reduces the sample size to 32 in the full model. Although not shown here, we reject the null hypothesis for under-identification and weak-identification tests in each regression. However, results suggest that as inequality in distributional perceptions rise in a country, so does corruption. The coefficient estimate for D_i is higher than OLS estimates in the previous section. Other control variables lose their significance. However, this is mostly due to the sample size change, as six countries included in the sample of the analysis in the previous section are now missing.

Despite the smaller sample size, we are of the opinion that the FII produces consistent coefficient estimates when used as an instrument for distributional perceptions. Similarly, its use as a proxy for perceived inequality also possible. Given that data for perceived inequality is scarce, using the FII as a proxy variable for perceived inequality would greatly improve the sample size in regression analyses. For instance, when we use the FII as a proxy for perceived inequality and run OLS, fixed and random effects regressions, where dependent variable is corruption, we obtain a sample of 388 observations, compared to the small sample size of 40 in our regressions in the previous section. The coefficient estimates of these regressions are displayed in Table 3.11.

The Football Inequality Index is proposed as an alternative to existing perceived inequality measures. Data on perceptions are limited, fortunately valuations in sports are more common and easily attainable, despite having the possibility of measurement errors. One major limitation of using the FII as a proxy or instrument for perceived inequality is that in countries where football is less popular, the impact of footballer wages on shaping inequality perceptions could be insignificant. For instance, wages of ice hockey players in Canada, where ice hockey is a more popular sport than football, can provide a better measurement for perceptions. Similar judgements can be made for basketball, baseball or American football in the US. A more exhaustive index can be prepared, in which average value of the teams of the

Table 3.11: Regression Results - Dependent Variable: Corruption [ICRG]

	I	**II**	**III**
	OLS	FE	RE
Football	0.43***	0.04	0.10***
Index	(7.45)	(1.04)	(3.02)
Trade	0.62***	-0.39**	-0.21*
	(2.98)	(-2.38)	(-1.73)
Natural	0.62**	0.10	0.21
Resource	(2.19)	(0.26)	(0.79)
Government	-2.43	-5.61***	-6.52***
Size	(-0.99)	(-3.85)	(-5.29)
Rule of	-0.45***	-0.28***	-0.39***
Law	(-4.80)	(-3.35)	(-6.18)
Observations	388	388	388
R^2	0.72	0.50	0.59

OLS, Fixed Effects and Random Effects regressions with ICRG's Corruption Index used as the dependent variable. t-values in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

most popular sport in countries is the benchmark, instead of gathering data only for football. We believe that such a dataset could prove very useful, and building it would a fruitful research project in the future. Meanwhile, all values from the Football Inequality Index can be found in the Appendix C of this thesis.

3.7 Conclusion

In this chapter, we presented our model that established income inequality's link to corruption through perceptions formed by the public officials and their tolerances for inequality. Regressions that we conducted provided further supporting empirical evidence to both of our hypotheses. The binary dependent variable regressions we ran in Section 3 confirmed that individuals who are either intolerant or completely tolerant of inequality were less likely to justify bribery than others. Subsequently, the cross-country regressions conducted in Section 4, demonstrated that perceived

inequality significantly and positively correlated with corruption. Furthermore, in order to enable future researchers to control for perceived inequality, we laid the groundwork for a possible proxy. This proxy, named the Football Inequality Index, assumes that the difference between the average salary of a football player and the average national income might have a strong effect on the formation of perceptions of inequality because of the sport's global popularity.

Chapter 4

Income Inequality and Corruption in the Laboratory: An Experimental Approach

4.1 Introduction

Does income inequality foster corruption? In the previous chapters, we have discussed the various factors one needs to consider in order to investigate this seemingly straightforward question. First of all, a definition of corruption should be established. There is no universally recognized list of corrupt behaviour. An act that is considered corrupt in one society, such as nepotism of political lobbying, can be acceptable in another. Even if the definition of corruption is established to be used in economic research, there is a further key methodological issue that needs to be considered:: How can we measure corruption? Corruption is clandestine by nature. The most common measures of corruption are the perception indices created by surveying country experts on the matter, or averaging multiple survey results. However, the reliability and unbiasedness of these opinions are debatable.

Can we really compare two countries and conclude that Country A is more corrupt than Country B solely based on the perceptions of experts? When a piece of new information exposes a corruption scandal in a country, has the country became more corrupt over a year, or were the experts erroneous in their measurements prior to discovering the scandal? Unfortunately, with the difficulty, or rather the ethical impossibility, of measuring true levels of corruption in a field experiment, data on perceived corruption is the only available data for an economist researching the causes and consequences of corruption.

The clandestine nature of corruption also implies asymmetric information between the parties involved, a risk of getting caught and punished, as well as a potential harm to a third party or the rest of society. For these reasons, a "market" of corruption governed by institutional macroeconomic settings is unrealistic. Corrupt exchanges, especially petty corruption that is rampant in many developing nations, only involve two economic agents, one of which is a public official. Economic studies aiming to find whether corruption increases with income inequality, generally do so by conducting regressions of perceived corruption measures on actual income inequality, measured by the Gini coefficient. In the previous chapter we have argued that, even if income inequality is one of the factors decision makers in a corrupt exchange take into consideration, it is likely that agents will make incorrect estimations on actual levels of inequality. They form their decisions based on their own personal perceptions of inequality, and studies have shown us that subjective evaluations of inequality tend to be biased and incorrect.

Therefore, in order to correctly answer the question of "does income inequality foster corruption," a researcher has to be able to measure the extent of true corruption according to a universally accepted definition, and make sure that individuals have unbiased information on how incomes are distributed in their society. While these two factors are impractical for macroeconomic analysis, they are observable through laboratory experiments. In this chapter we develop an economic experiment in order

to test the impact of these two factors

Laboratory experiments enable us to simulate an economic environment and observe how different treatments can alter a participant's behaviour.In order to test whether or not income inequality fosters corruption, we designed an experiment where subjects play an ultimatum game framed as a bribe exchange in two different treatments. We have divided the experiment into two treaments. One represents a state with high inequality and the other represents a state with low inequality. This means that each player starts the game with a different endowment. Throughout the game, the players are aware of how the money is being distributed. We are interested in detecting a significant change in overall corruption caused by varying distributions of initial endowments. Simply put, with all else being equal, if subjects are more prone to demanding bribes or accepting to pay them in the high inequality treatment than the low inequality treatment, our conclusion would be that corruption increases with actual income inequality.

In addition to controlling for changing inequality, we also elicit subjects' tolerance for inequality, and quantify this as a control variable in our analysis. To our knowledge, there has never been an experiment of this kind, which separates actual inequality from a subject's tolerance for inequality, in order to investigate their impact on corruption.

In the following section of this chapter, we are going to review existing literature on experimental research on corruption and inequality. While doing so, we also intend to introduce the reader to basic concepts and methodology of experimental economics set in laboratories, as this is not a common approach in international development studies. Once we go over related research, we will introduce our experimental design and model, before moving on to analysing the data we obtained from our experiment.

4.2 Literature Review

The use of laboratory experiments is a relatively new approach in economic analysis. Laboratory experiments are seldom practiced in the field of development economics and many researchers are sceptical, or simply not sufficiently informed, on their methodological value. Concerns are often raised about their internal and external validity. Therefore, our first priority in this section is to give a brief overview of the field of experimental economics and address some of the common concerns associated with experiments.

After our general survey of the field, we will go into more detail on the previous experimental studies that focus on corruption. Several aspects of the experimental design, such as framing the experiment with certain wording and the concept of risk are of particular importance in corruption games, and examining how other researchers approached these issues will be beneficial in our own design.

The final part of our literature review will cover experiments on inequality and fairness. Drawing upon their models and methodologies, we are going to proceed to construct a new model based on Fehr and Schmidt (1999) and design our own experiment to test our hypotheses.

4.2.1 Induced Value Theory and Experimental Validity

Experimental economics and the use of laboratory experiments enable researchers to create their own economic environments and control many features that might even be unobservable in the real world. These controlled experiments allow us to study how economic agents behave in certain situations with various institutional rules, analyse the impact of changes in the variables of interest and test our hypotheses with a scientific approach. Examining subjects' behaviour upon changes in the experiment might bring psychological experiments into mind; however, experimental

economics and experimental psychology differ greatly in several aspects, with the most important being the incentivization of the subjects through reward mediums during the experiment in order to render innate characteristics irrelevant (Cassar and Friedman, 2004). This incentivization, usually through monetary rewards, is the application of Vernon Smith's (1976) induced value theory.

According to Smith (1976) induced value theory, in order to achieve control in an experiment, a reward structure that satisfies three conditions could be used to induce prescribed monetary value on subjects' actions, rendering their innate characteristics irrelevant. Once control is achieved, one can then proceed to testing hypotheses of a model, mostly developed through casual observation of an economic process. Based on Smith's (1982) work, Friedman and Sunder (1994) list the three conditions required for the induce value theory as non-satiation, salience and dominance.

Non-satiation (Monotonicity) condition states that the subjects should prefer more of the reward to less. This condition is easily satisfied when the reward medium is domestic currency. Between two costless options, identical in every way except monetary outcomes, subjects are assumed to prefer the one with higher monetary returns. Salience requires that the amount of rewards depends on the subject's actions in an institutional setting with clear rules and the subject is fully aware of the setting and the rules. Dominance means that changes in a subject's utility should mostly depend on the reward given accordingly to their actions and other components in the utility function should be negligible [1]. Friedman and Sunder (1994) point out that this condition is the most problematic as other components in a subject's utility function might not even be observable in most cases. Subjects might be affected by other subjects' actions, their reactions after the experiment or experimenter's goals. They might alter their decisions in order not to seem greedy by their peers, or behave in a way that they assume the experimenter wants. For instance, through an experimental design to isolate the effect of social fears on

[1] For further detail on the three conditions and mathematical illustrations see Friedman and Sunder (1994:12-14).

subjects' decisions, Koch and Normann (2008) find that half of the giving in dictator games are results of external factors such as experimenter observability or regard by other subjects.

Once these conditions are met, the experimenter can identify the causes of the changes in subjects' behaviours. Most psychological experiments only offer a flat fee for participation. The participation fee satisfies neither the monotonicity nor the salience condition by itself. Application of the induced value theory is not the sole difference between economic and psychological experiments. Deception of subjects, a method often used in psychology, is almost always avoided in experimental economics. Economists argue that if subjects believe that they are being deceived, they might be motivated by their psychological reactions rather than monetary rewards, and thus the experimental data would be invalid (Davis and Holt, 1993). Moreover, a single study deceiving the participants may influence the decisions of the entire subject pool in an institution and threatens the integrity of other research projects. Therefore, experimental economists display utmost care to establish trust between themselves and the subjects of the experiments.

An experimental design where the reward system is monotonic, salient and dominant and where institutional rules are clear and understood, permits the researcher to successfully identify a cause and effect relationship. However, the strong internal validity of the experiment usually comes at the expense of its external validity, as economists are more interested in causality in the real world rather than laboratory conditions specifically geared towards testing a single hypothesis (Guala, 2005). While artificiality and simplicity of the design will improve internal validity, produce robust and replicable results, it also harms external validity (Schram, 2005). Therefore, generalizability of experimental results produced in the laboratory due to weak external validity has been a common concern among those sceptical to the place of experiments in economics.

Some economists are of the opinion that the trade off between internal and external

validity is of no importance as the aim of experiments is primarily to test theories and internal validity shall not be compromised in order to achieve external validity. For example, Plott (1982) argues that markets constructed in experiments are real markets with real people taking decisions, and thus general theories that are expected to work should also work in laboratory environments, which are simplistic special cases. Thus, experiments should be used in conjunction with theories and they do not need to perfectly resemble real world settings. Similarly, Smith (1982) explains that a controlled microeconomic experiment only necessitates monotonicity, salience, dominance and privacy if one is interested in testing hypotheses derived from theories. Nevertheless, he states that experiments should satisfy the parallelism precept, that is the applicability of propositions that have been tested in the laboratory to real world microeconomies where similar conditions hold with all else being equal, if the aim is to generalize results to other environments.

How can parallelism be established in a laboratory experiment? Loewenstein (1999) discusses the significance of context. The author points out that all forms of thinking and problem solving is context dependent. The results of an abstract experiment might differ from an experiment with the same institutional rules in a real world context. Loewenstein (1999) indicates that external validity enhances when the experimental context is similar to those in which economic agents actually operate. However, Cassar and Friedman (2004) reminds that neither mimicking a formal model, nor replicating real world is advisable when designing an experiment. Instead, the authors advise that the researcher should design an experiment that is best suitable for the specific research question at hand.

Finally, when generalizability of laboratory experiments is being questioned, another concern commonly raised is the use of university students as subjects. Economic laboratories in universities usually have a subject pool consisting of students interested in participating in experiments. A call for participants is circulated among these students usually a few days before the experiment. Students sign up for their

preferred sessions, and those who show up on time on the day of the experiment are allowed to participate. It might be argued that generalizable causal inferences cannot be made from data gathered through actions of these students who are likely to have different common characteristics than actual market agents and dismiss the laboratory experiments' external validity. For example, Rosenthal et al. (2009) conclude that participants who volunteer for behavioural experiments are mostly punctual college students and more likely to have better educational qualifications, better employment status, higher need for social approval and higher intelligence than those who do not volunteer. However, apart from their low opportunity cost, these characteristics could actually make them preferable for economic experiments as most games tend to have rather complicated procedures and tasks that require focus and perhaps higher than average mental ability (Friedman and Sunder, 1994). Nevertheless, biases that might occur due to the use of student subjects depend on the research questions and the design of the experiment. Luckily, there are two studies that compare results between the laboratory and the field in corruption research, which sheds some light on potential biases. We will go over these two studies in the next section.

4.2.2 Laboratory Experiments on Corruption

Abbink (2006) sets out three main purposes of experimental methods in relation to economics of corruption. First, the laboratory provides an environment that is effectively controllable, allowing us to test the behavioural assumptions that economic models are based on. Second, they can be a substitute for field experiments, which are often unavailable in corruption research. Lastly, if data is available, experiments can be strongly complimentary to other methodological approaches, which is what we tried to accomplish in this thesis.

One of the first and perhaps the most influential laboratory experiments on corruption was designed and conducted by Abbink et al. (2002). They develop a reciprocity

game into a two-player sequential bribery game. The first mover, in the role of a potential bribe giver, decides on whether or not to transfer an amount of money (bribe) to the second mover, who is the public official. The first mover's aim is to try and influence the public official's decision in the second stage of the game. If the bribe giver chooses to transfer money to the public official, the bribe giver also needs to pay a small transfer fee, representing the initiation cost of a corrupt action. When the public official receives a bribe, they can choose to either accept or reject it. Whatever the decision of the public official is, in the second stage, they are asked to choose between two final outcomes. One of the two outcomes is clearly much more profitable for the bribe giver: They receive 56 experimental credits while the public official receives 30. However, the public official has a slight preference for the other outcome as both players receive 36 credits.

With these institutional settings in the experimental design above (from now onwards referred to as "AIR") being the control treatment, Abbink et al. (2002) aim to isolate three characteristics of corruption that they deem essential. These are the reciprocal relationship between briber and the bribe, the negative externality that the harmful activity inflicts on the public and the punishment when the act is detected. In order to implement negative externalities, in a second treatment, the authors modify the game so that every other subject participating in the experiment is inflicted monetary damage whenever the public official chooses the outcome favourable to the bribe giver. In the final treatment, a risk component of "sudden death" meaning the termination of the game for the players who get caught in a corrupt act with a probability of 8.6% is added to the control treatment. Abbink et al. (2002) find that the negative externality has no effect on the corrupt acts of the players while the possibility of punishment significantly reduces both the average bribe and the average frequency of bribery.

Several other studies adjust AIR to test different hypotheses regarding corruption. For instance, Rivas (2013) investigates the gender effects on corruption. In the first

two sessions of the experiment, both genders participate, one acting as the firm and the other as the public official. In the next two sessions only the subjects belonging to the same gender are assigned to the roles. While the author finds no significant difference between the genders on the probability of offering a bribe, she observes that women tend to offer lower amounts. After accepting a bribe, women in the role of the public official also tend to engage in a reciprocal action less frequently than men. Rivas (2013) concludes that men are more corrupt than women and higher number of women in bureaucratic positions can reduce corruption.

Of these studies based on AIR, three set out to test hypotheses that relate to our research question. Abbink (2005) uses a modified version of AIR to test the hypothesis that poorly paid public officials are more corrupt because they feel unfairly paid and thus regard accepting bribes as a legitimate action. In the game, the choice of Y harms other "workers" who are not present in the game, instead of other pairs. These workers are either paid lower or substantially higher than the public official in different treatments. Despite the hypotheses that the public official would be more reluctant to harm the lower paid workers than the higher paid ones, the data does not support this argument. He concludes that increasing the salaries of public officials would not reduce corruption because of fairness considerations. Contradictory to these results, in a four stage principal – agent – client experiment based on AIR, Jacquemet (2005) finds that if the principal (a subject in the role of the government who sets the wage of the public official) chooses a higher wage for the agent, the agent is less prone to corruptibility. Lastly, building upon AIR, Van Veldhuizen (2013) test the hypothesis that increasing wages of public officials should reduce their corruptibility. Her results support the hypothesis. In a repeated game with no corruption framing, subjects who were public officials accepted 80% of the proposed offers in the low-wage treatment, while the acceptance rate was only 44% in the high-wage treatment. It is essential to note, for future comparison with our experiment, that in Van Veldhuizen (2013), public officials' payoffs are equal to those of the clients in the low-wage treatment. Increasing public officials' wages

creates inequality in the second treatment. Nevertheless, one cannot conclude that a rise in inequality increases corruption, as public officials' decisions are most likely to be influenced by the income effect rather than payoff inequality. Public officials' wages should be held constant while modifying the payoff distribution in order to observe the impact of inequality on corruption.

Van Veldhuizen (2013) chooses not to frame the experiment and refrains from using corruption related terminology such as a public official and bribe. Does calling an amount of money given to a player to receive influential treatment a "gift" or a "transfer" change the way subjects behave? Lambsdorff and Frank (2010) test the impact of framing in laboratory experiments on corruption. In their experiments, subjects in the role of business people may frame their payments to the public officials either as a gift or a bribe. They find that subjects prefer to use the term gift as it is less offensive; however, they demand reciprocity from the other side if they use the term bribe. The authors state that this difference should also be observed out of the laboratory.

Barr and Serra (2009) also build their own experimental framework by designing a one shot ultimatum game to analyse the effect of framing and negative externalities on corrupt behaviour. They find that corruption reduces when negative externalities are greater, but unlike Lambsdorff and Frank (2010), they reach the conclusion that different framing does not have a significant effect. Based on the same design, Barr and Serra (2010) later investigate how cultural differences affect corruption in an experiment conducted in Oxford. The game is played in five groups of three students, representing a briber, a public official and the rest of the society. If the public official accepts the bribe, the payoff for both the briber and the official increases, while the rest of the society is harmed. Their conclusion is that undergraduate students from more corrupt countries as measured by the Corruption Perception Index are more inclined to engage in corrupt acts, however, this does not hold for graduate students. The authors argue that the difference might be the result of more time

spent by graduate students in Britain.

Cameron et al. (2005) form a three stage and three player reciprocity game to investigate cultural differences towards corruption. First, a firm can offer a bribe to a public official. If the public official accepts it, the outcome most favourable to the firm is automatically implemented but the citizen's payoff is reduced. In the last stage, the citizen can pay an amount P on punishment that reduces the official's payoff by 3P. The equilibrium of the rational citizen would be not to punish, yet previous experiments on other contexts find that humans are willing to sacrifice money in order to punish wrong behaviour. The experiment is conducted in four different countries: Australia, Singapore, India and Indonesia but no significant differences in attitudes were found.

Corruption has negative externalities on the rest of the society. For instance, it can reduce investments and impede economic growth (Lambsdorff, 2006). In order to capture these properties of corruption, a mechanism has to be implemented in the experiment. Existing literature provides three main examples. In AIR, each corrupt act reduces payoffs of every player. However, Lambsdorff and Frank (2010) argue that this externality may not be strongly felt by subjects as it extends to other potentially corrupt players. If subjects expect others to be corrupt, they might justify their own corrupt actions through this external effect. In Barr and Serra (2009), the authors reflect the economic harm on on one third of the participating subjects, who assume the role of the "rest of the society" and are negatively affected from the corrupt dealings of the subjects who are in the roles of public officials and a private citizens. This approach can successfully capture the negative externality of the bribe; however, hiring subjects that do not generate independent observations to simply invoke sentiments in two other players is costlier than reducing payoffs for each player. Lambsdorff and Frank (2010) suggest a third approach that was previously implemented in Eckel and Grossman (1996), where the experimenter sets a donation pool to be given to a charity at the end of the experimental session. Sub-

jects are informed that each corrupt act reduces a specific amount from this pool. The amount remaining in the pool is donated to a well-known charity. Van Veldhuizen (2013) argues against using a fixed charity and lets subjects select their own preferred charities, as it is probable that some subjects do not have a particular connection to the given charity. Instead, she employs the method of randomly choosing the charity that would receive the remaining amount in the donation pool after the experiment. We employ a similar approach in our own design.

As we have previously mentioned, the external validity of laboratory experiments might be questioned when subjects are university students. Armantier and Boly (2008) compare a lab experiment with students from Canada and a field experiment by employing non-student participants who are unaware of the experiment in Burkina Faso. The game is essentially between a candidate who types a text and receives a payoff that decreases with the number of spelling mistakes and a grader who spell-checks the texts. The candidate can offer a bribe to the grader to influence the number of errors found. Their results demonstrate interesting similarities between the participants' corrupt behaviour and do not imply any significant differences between field and lab experiments once other individual characteristics are controlled for in the model. They maintain the view that corruption can be studied in the lab as behaviours of students in a laboratory and non-students in a field experiment, who were unaware that they were subjects of an experiment, are not significantly different from each other. On the other hand, Alatas et al. (2009) report contradictory results in a similar study. They conduct experiments based on Cameron et al. (2005) with two different subject pools. The first pool consists of Indonesian students, while the second only includes Indonesian public servants. Their results imply that the public officials were significantly less likely to engage in corruption than the students, indicating subject pool effects. They explain that more experience with corruption seen in the public officials make them less tolerant of bribery. However, despite their utmost care on anonymity, given that the public officials were aware that they were part of an experiment on bribery, they

might act with caution because of a lack of trust to the experimenter and alter their behaviours.

Our review of literature reveals that even though the use of experiments on corruption research is less than two decades old, studies employing this approach provide us with valuable insight on individuals' behaviour regarding corruption, as well as how to design an experiment to shed more light on the subject. The choices of framing and the method of capturing negative externalities of corruption are of particular importance when designing a bribery experiment. We will incorporate existing ideas on corruption games with those of inequality experiments, which we will review in the next section, in order to build an experiment that will enable us to test our hypotheses.

4.2.3 Laboratory Experiments on Income Inequality

In their very famous and hilarious to watch experiment published in *Nature*, Brosnan and De Waal (2003) found out that monkeys who are given lesser value rewards (a slice of cucumber instead of a grape) for performing the same simple task refuse to participate in the experiment and displayed their frustration by throwing the cucumbers back at the experimenter [2]. Humans, much like the capuchin monkeys in the experiment, can be inequity averse, and this aversion may lead to choices that are considered "irrational" in conventional economic theories. Therefore, most studies focusing on inequality explore the place of fairness considerations and inequity aversion in economic choices.

Laboratory evidence of inequity aversion is most clearly observed when the results of ultimatum and dictator games are analysed. In an ultimatum game a proposer divides a reward between themselves and the responder. The responder then decides whether to accept the decision made by the proposer and receive whatever was

[2]The reader can watch an excerpt of the experiment from a TED talk given by Frans de Waal on Youtube: https://www.youtube.com/watch?v=meiU6TxysCg

given to them, or rejects it so that neither player receives any shares. A homo-economicus proposer would divide the reward so that they offer only the minimum positive amount to the proposer, since a homo-economicus responder would accept any shares. However, experimental results show us that, median ultimatum offers are around 40 to 50 % of the reward (Camerer, 2003). Evidently, proposers might be afraid of rejection if the responder sees the split as unfair, and hence offer higher rewards than the minimum possible. However, we also see offers more than the minimum (around 20%) in dictator games, where responders do not have a chance to reject the decision of the proposers. These results indicate that proposers may be inequity averse, and dislike making unfair decisions.

Inequity averse behaviour of the subjects has been modelled in 2 influential papers, Fehr and Schmidt (1999) and Bolton and Ockenfels (2000), to incorporate such behaviours to the rational choice theory. In Fehr and Schmidt (1999), an individual compares their own income with others. As a result of relative comparison of one's own income with others, the individual may dislike an outcome if they are receiving less than someone else (aversion to disadvantageous inequality) and they may also dislike receiving more than others (aversion to advantageous inequality). In Bolton and Ockenfels (2000), the individual compares their own income with the average income of the group, instead of relative comparisons. Comparing with the average can be more intuitive when subjects do not hold perfect information on how incomes are distributed. However, in our experimental design which we will introduce in the next section, subjects have perfect information on the distribution, and the average income does not change even though inequality varies between treatments. Hence, we prefer to adjust the Fehr and Schmidt model to conduct our analysis.

Our experiment will be a modified and framed ultimatum game, therefore it will involve decision making processes influenced by inequity aversion. However, we are ultimately interested in how change in inequality itself impacts corruption. To our knowledge, there are only a handful of experiments aimed to investigate inequality's

effect on other economic or behavioural phenomena. Sadrieh and Verbon (2006) design a dynamic public good game played between 3 subjects in every treatment to explore whether inequality impedes economic growth. The distribution of initial endowments differs in each treatment. Subjects are given three choices: They may sabotage the economic outcome for everyone, solely maximize their own payoff or co-operate and increase the economic outcome for the entire group. High cooperation corresponds to economic growth in this setting. Authors discover that change in inequality has no effect on the subject's decisions to cooperate. However, in the extreme inequality treatment, where Gini equals 0.50, they observe that even though cooperation is unaffected, poor players sabotage the outcome less compared to the low inequality treatment. According to their interviews with subjects after the experiment, the subjects did not want to "make a bad situation even worse", and they were aware of the need for "social truce" (Sadrieh and Verbon, 2006). In another public good game with unequal distribution of fixed payments given to the subjects, Anderson et al. (2008) find that inequality reduces contributions made by the subjects, but only when distribution information is publicly displayed.

The fair wage theory of Akerlof and Yellen (1990) suggest that workers compare their own income with their co-workers and they will reduce effort if they do not perceive their wage as fair. Charness and Kuhn (2007) and Bartling and von Siemens (2011) both set out to test this hypothesis with experimental evidence. In Charness and Kuhn (2007), a principal decides on the wages of two subjects in the role of workers whose productivity differ. While they find that individual wages contribute greatly to the workers' efforts, no significant impact of the co-worker's wages on effort is detected. Bartling and von Siemens (2011) argues that, the fact that workers differ in productivity in Charness and Kuhn (2007) might justify wage differences and design an experiment to address this issue. Nevertheless, their results do not differ from those of Charness and Kuhn (2007) and find no evidence of wage inequality's effect on individual effort.

We conclude our literature review on laboratory experiments here. Income inequality's impact on human behaviour in a framed environment has not been studied widely, and we hope to contribute to the existing knowledge with our experimental design that we unravel in the next section.

4.3 Methodology

4.3.1 Experimental Design

Corruption exists in different forms and scales. An ordinary citizen might offer a small bribe to hasten the process of renewing their passport, a police officer may demand a bribe from a speeding driver to let go of the potential fine, or the representative of a large firm might be interested in influencing the decision of a public official to win a large government contract. Whether it's "grease money" to speed up the bureaucratic mechanism or a grand bribe to influence political decisions, corrupt acts share certain characteristics. Abbink et al.'s (2002) influential experiment is designed to distinguish the effects of the three essential characteristics of corruption: Reciprocity, its negative external effects and the underlying risk. In a corrupt exchange, both parties potentially benefit from the proposed exchange; however, only the bribe taker has the power to enforce the favourable outcome for the bribe giver. Therefore, "[t]he exchange of favours must rely on trust and reciprocity between the briber and bribee" (Abbink et al. 2002, p.430). Corruption also exists at the expense of others and the negative externalities associated with corruption are numerous [3]. Lastly, corrupt acts are usually punished if detected, hence, it is a risky choice. The bribe giver and taker need to take these consequences into consideration when they make their decisions.

Corruption's negative externalities are especially relevant to the discipline of devel-

[3]See Ades and Tella (1996); Tanzi (1998); Dreher and Herzfeld (2005) for the economic consequences of corruption.

opment economics. In fact, according to our economic model that was extensively analysed in Chapter 3 the moral cost of corruption is caused by the harm done to the rest of the society. In their milestone book "Experimental Methods: A Primer for Economists" Friedman and Sunder (1994) argue that it is futile to pursue absolute realism and replicate the complexities of the field in a laboratory, much like it is futile to replicate the precise assumptions of the model. The authors compellingly, postulate that the goals of a laboratory experiment should be "to find a design that offers the best opportunity to learn something useful and to answer the questions that motivate [the] research" (Friedman and Sunder 1994:10). Hence, we choose to design an experiment that ignores the reciprocity of trust and risk features of corruption, and focus on its damage to society in order to answer our ultimate research question: Does income inequality foster corruption? In doing so, we will also test the validity of our assumption on desired incomes.

Let us first consider a simple ultimatum game where a proposer distributes an amount of money between themselves and a second player. The second player responds to this offer by either agreeing with the proposed distribution and gaining their respective share, or by rejecting the offer, which results in both parties not receiving any positive payoffs. Rejection is inefficient and causes loss of surplus. Acceptance of any distribution in which the responder receives a positive amount leaves them better off than rejection; therefore, the game-theoretic solution of the ultimatum game is that the proposer offers the minimum positive amount to the responder, and keeps the rest of the money for themselves. However, experiments show that the modal and median offers in ultimatum games are usually between 40-50% of the total amount [4].

A corrupt exchange is similar to an ultimatum game. Imagine a scenario where a speeding driver is stopped on the highway by a traffic police officer. The fine for speeding is £300. The police officer offers to let the driver go in exchange for a bribe

[4]See Chapter 2 of Camerer (2003) for a detailed review of the results.

of £200. If accepted, the police officer who is the first mover, will receive £200, while the driver will be £100 better off than paying the full fine of £300. A third party, which in this case is the state, has lost £300. The state's loss may increase even more if the driver kept their license thanks to this bribe, and ended up injuring or killing a pedestrian.

The main research question in this thesis is to examine how income inequality and its perception impact corruption. Consider the previous example. If the hypothesis that corruption increases with income inequality is correct, and the police officer only has a single opportunity to demand a bribe, we would expect them to demand a higher amount in a more unequal society. If they have multiple opportunities, the number of demands should increase with inequality. However, we have also established that the police officer's perception of inequality could differ from actual income inequality. Their estimation on how income in the society might be incorrect, and once the officer estimates the distribution, their intolerance for inequality determines their perception.

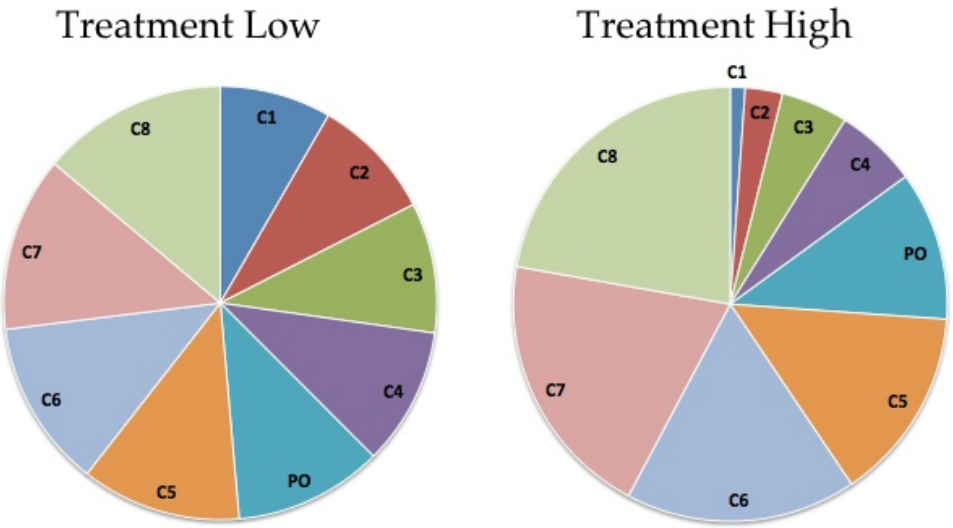
We designed an experiment that will allow us to determine how changes in the income distribution and individual intolerance for inequality influence a player's decision making process on an ultimatum game framed as a corrupt exchange. A bribe demand from a public official can be considered as an ultimatum where a citizen (which we will refer to as a client) either accepts to pay the bribe or rejects without bargaining. However, there are moral costs to corruption, which occurs because of the negative externalities associated with it.

A version of the ultimatum game with negative externalities was designed by Barr and Serra (2009) to identify the effects of negative externalities and framing in corruption experiments. In their experiment, "third parties" consisted of 5 subjects (one third of the entire group) assuming the role of "other members of the society", and all external damage has been imposed on them. As previously explained in the literature review, this approach is costlier as it requires paying for subjects who do

Table 4.1: Endowments of the Clients in Both Treatments

Role	Treatment Low	Treatment High
C	1500	200
C	1650	500
C	1750	900
C	1850	1100
PO	2000	2000
C	2150	2600
C	2250	3100
C	2350	3600
C	2500	4000
Average	2000	2000
Gini	6.3	26.3

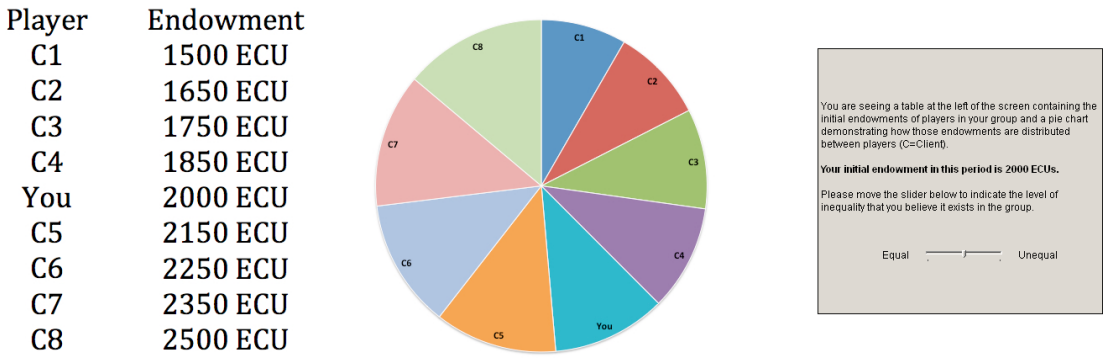
Figure 4.1: Visual Distribution of Endowments



not produce independent observations themselves. Following Eckel and Grossman (1996), Lambsdorff and Frank (2010) suggest promising to donate an amount to a third-party charity. This amount reduces every time a bribe has been accepted. According to the authors, the reduction of the donation pool might invoke sentiments of altruism and capture the societal loss caused by corruption. We employ the same mechanism and set a donation pool for a charity, which is reduced with every surplus successfully generated by the players.

In our bribery experiment, subjects play the ultimatum game with negative external-

Figure 4.2: Information Screen in Treatment Low



Player	Endowment
C1	1500 ECU
C2	1650 ECU
C3	1750 ECU
C4	1850 ECU
You	2000 ECU
C5	2150 ECU
C6	2250 ECU
C7	2350 ECU
C8	2500 ECU

The textbox reads: "You are seeing a table at the left of the screen containing the initial endowments of players in your group and a pie chart showing how those endowments are distributed between players (C: Client). **Your initial endowment this period is 2000 ECU.** Please move the slider below to indicate the level of inequality that you believe it exists in the group."

ities in groups of 16 players. Each group consists of eight public officials (proposers) and eight clients (responders). Every public official has an initial endowment of 2000 ECU (Experimental Currency Unit), while the amounts clients are endowed with differ from each other and between treatments. In Treatment Low, endowments of the clients are distributed more equally than Treatment High (Table 4.1). Average endowment is equal to 2000 ECU in both treatments, and thus they only differ in their distributional inequality. All players experience both treatments. The subjects are informed that a donation pool of 15000 ECU is established per group to be given to a charity at the end of the game. They are asked to choose between three politically neutral charities before the game starts. The most popular choice receives the remaining amount in the donation pool at the end of the game.

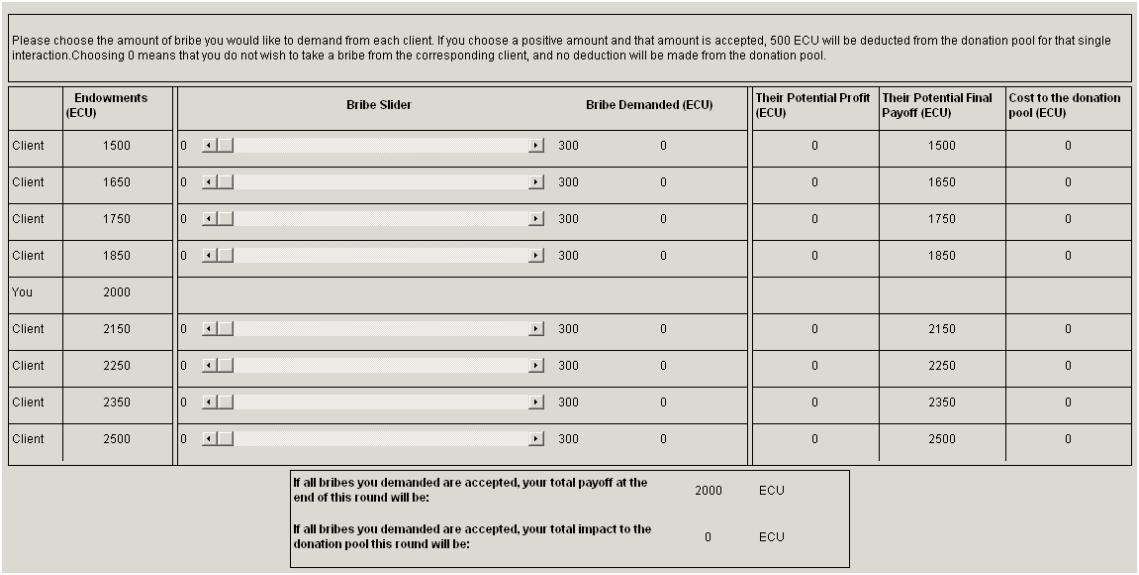
In the first stage, players' endowments are revealed to each other in a table as well as a pie chart demonstrating the distribution of endowments in the group. It is important to note here that both the table of endowments (Table 4.1) and the pie chart (Figure 4.1) that subjects observe only include one representative public official, while there are eight in every group. Keeping in mind that all public officials receive the same initial endowment of 2000 ECUs at the beginning of a period, if one calculates Gini values based only on the nine values revealed on the screen inequality would be higher than their actual values in both treatments. However, as

the calculated Gini values are not given to subjects, we have chosen to include only a representative public official's endowment in the endowment tables and graphs to emphasize the change in distribution between treatments. Before the first decision stage, subjects are also asked to move a slider to determine how equal they consider the current distribution (Figure 4.2). We interpret their responses as their intolerance for inequality given the actual distribution.

After the information screen, every public official decides how much of the 300 ECU surplus they will allocate to themselves as a bribe from each of the eight clients in their group. They can demand a maximum amount of 299 ECUs from each individual client and demanding the minimum amount of 0 ECU means that the public official is not asking a bribe from that client. The public official decides on a bribe from each client simultaneously in the same screen. An example screen is shown in Figure 4.3. If the public official decides to take an amount of X for themselves in one of the eight interactions they can potentially demand bribes, the client they interact with will receive 300-X ECU's if they accept the bribe demand of X. It is easy to see this setting as an ultimatum game framed as a bribe exchange. In an unframed ultimatum game, the first mover (public official) takes an amount of X from the total surplus of 300, and offers the rest, 300-X, to the second mover (the client). In our experiment, we frame this interaction so that the public official demands an amount of X from the client, in order to remove 300 ECUs from the donation pool and give it to the client. However, to enhance the effect of the moral cost and make the corrupt decision more inefficient for the economy; even though, the players share a surplus of 300 ECUs, an amount of 500 ECU's is actually removed from the donation pool. Whatever the public official's decision is, they are informed of:

- Their potential profit and final payoff if the offers are accepted by the clients
- The client's potential profit and payoff as a result of their own interaction

Figure 4.3: Decision Stage of the Public Official in Treatment Low



Please choose the amount of bribe you would like to demand from each client. If you choose a positive amount and that amount is accepted, 500 ECU will be deducted from the donation pool for that single interaction.Choosing 0 means that you do not wish to take a bribe from the corresponding client, and no deduction will be made from the donation pool.

	Endowments (ECU)	Bribe Slider	Bribe Demanded (ECU)	Their Potential Profit (ECU)	Their Potential Final Payoff (ECU)	Cost to the donation pool (ECU)
Client	1500	0 300	0	0	1500	0
Client	1650	0 300	0	0	1650	0
Client	1750	0 300	0	0	1750	0
Client	1850	0 300	0	0	1850	0
You	2000					
Client	2150	0 300	0	0	2150	0
Client	2250	0 300	0	0	2250	0
Client	2350	0 300	0	0	2350	0
Client	2500	0 300	0	0	2500	0

If all bribes you demanded are accepted, your total payoff at the end of this round will be: 2000 ECU

If all bribes you demanded are accepted, your total impact to the donation pool this round will be: 0 ECU

- The potential deduction from the donation pool

Once all the public officials in the group finalize their decisions, each client receives offers from the eight public officials. The clients are also informed about potential payoffs and costs to the donation pool. They either accept or reject the proposed offers individually. If a bribe is given in exchange for a favourable outcome, 500 ECU is removed from the donation pool automatically in exchange for the surplus of 300 ECU created between the players. Hence, despite the fact that both players profit from corruption, it reduces efficiency for the whole economy. Payoffs of the round are not revealed to public officials in order not to influence their decision in the upcoming treatment. Clients, on the other hand know their exact payoffs as their own decisions determine the outcome. The final amount remaining in the donation pool is not shared with the subjects either. Public officials are also not informed about the final decisions of the clients regarding their offer. The second treatment commences after all clients in the group finalize their decisions. After players complete both treatments, they are given a questionnaire. Finally, one of the two rounds is chosen randomly to determine the payment to subjects and the donation to be made to the charity. Randomization is done by the experimental software. By randomly choosing one of the rounds for payment, we aim to negate

the wealth effects, as subjects who accumulated some capital in the first treatment may choose to alter their behaviour and make decisions that may not reveal their true preferences (Croson, 2005).

If actual income inequality increases corruption, we would expect those subjects in the role of public officials to demand higher shares of the 300 ECUs in the high inequality treatment, demand higher number of bribes thus inflicting a higher potential damage on the donation pool, or both.

Our experiment is a within-subject design, allowing us to analyse the change in subjects' behaviour when their perception of inequality is altered. We are especially interested in how the total amount of bribe demanded by the public official varies between treatments. According to the theory outlined in the previous chapter, the amount of bribes demanded is a function of income inequality. When other explanatory variables are controlled for, we should observe an increase in demanded bribes when a subject moves to Treatment High from Treatment Low, or decrease in demanded bribes from Treatment High to Treatment Low. Within subject designs offer highly improved statistical power, making correctly rejecting a null hypothesis more likely, however they might suffer from spurious effects due to the order of the treatments (Charness et al., 2012). For example, in our design when distribution of endowments is moved from a relatively equal state to the unequal one, the "poor" clients who initially start with less than the group average lose money in the second treatment. In this case, their decision to agree to pay a bribe might not just relate to their endowment, but also to the negative attitudes associated with the loss during the transition. Counterbalancing is used to overcome this issue in experiments. The term counterbalancing refers to the technique of changing the order that groups experience treatments for half of the sample. Hence, while one experimental session starts in Treatment Low and moves to High in the second period, the next experimental session starts in Treatment High and observes a reduction in inequality as they advance to the second period. Counterbalancing eliminates any spurious rela-

tionships that might be caused by the order of the treatments. Counterbalancing also enables us to analyse the statistical significance of the mean difference between the two groups, on observing higher inequality than the other, in their first rounds.

The choice of wording and presentation of the game can influence the decisions of the players. For example, the negative connotations attached to the word "bribe" may have a negative impact on the amount of bribes demanded or accepted as opposed to a more positive or neutral choice of wording, such as "gift". We refrained from using a neutral frame in order to improve the external validity of the experiment. We believe such framing was necessary, considering that we decided to exclude an important feature of corruption, the probability of getting caught and being punished. Several studies have already examined the effect of uncertainty, risk and punishment on corruption and found that both higher degrees of uncertainties on getting caught and increased penalties if caught reduce corrupt decisions (Abbink et al., 2002; Berninghaus et al., 2013). Implementing a detection mechanism would most likely have a negative impact on the amount of bribes demanded and accepted without providing us information on inequality's effect on corruption. It would also require us to model and control risk aversion for each subject, complicating the analysis and potentially causing identification issues. Therefore, we prefer to remove stochastic features from our corruption experiment, weakening its external validity, yet allowing us to focus on our main research question. One potential concern due to framing is that the concept of corruption and negative connotations attached to it might differ between societies, and thus individuals from different countries could potentially behave in a significantly different manner due to the framing effect. However, as we conduct this experiment in Istanbul Bilgi University in Turkish, cultural differences in attitudes towards corruption should not bias the results of the experiment.

4.3.2 Model

In one of the most influential papers of the experimental economics field, Fehr and Schmidt (1999) models this persistent outcome in relation to individuals' preferences for equity and fairness. We will employ this model with a slight modification to examine the effect of inequality on corruption. We augment Fehr and Schmidt (1999) model by adding another term to measure moral cost due to negative externalities associated with corruption and allowing for exogenous initial endowments. In our model, negative connotations are attached to the decision of generating a surplus to be divided between two players. For instance, consider a case where two players divide an amount of money (surplus) that actually belongs to a third party between themselves. This surplus does offer an increase in utility due to monetary gains, while also conferring a moral cost because of the decision to extort this surplus.

Fehr and Schmidt's (1999) original model is stated below:

$$U_i(x) = x_i - \frac{\alpha_i}{n-1}\sum_{j\neq i}\max\{x_j - x_i, 0\} - \frac{\beta_i}{n-1}\sum_{j\neq i}\max\{x_i - x_j, 0\} \tag{4.1}$$

Utility of the Player i, rises with their payoff, x_i. However, if averse to inequity, utility losses may arise from receiving less payoff than Player j (aversion to disadvantageous inequality), and also from receiving more than Player j (aversion to advantageous inequality).

In order to customize this model to our experiment, suppose $n = 3$, and one of the three players is a public official, with an initial endowment of $\bar{w}$. The other two players commence the game with w_R and w_P respectively, and $w_R > \bar{w} > w_P$.

In a regular ultimatum game an exogenous stake is given to the proposer to divide between themselves and another player. If an agreement is not reached, the potential surplus is destroyed and neither parties gain from the interaction. Public

official (PO) is the proposer, and will decide how the surplus will be divided in two interactions with the other two players. The proposer has an option to refrain from creating a surplus. Let us assume that a potential surplus, S, equal to 300 if proposer chooses to be corrupt and demands a positive share of s from the surplus and offers 300-s to the responder.

$$S = \begin{cases} 300, & \text{if } 0 < s < 300 \\ 0, & \text{if } s = 0 \end{cases} \tag{4.2}$$

The proposer, PO, has the option not to demand a share of the surplus, $s = 0$, in which case the surplus is not generated and no moral cost is incurred upon the players. PO's final payoff consists of the shares of the surplus they receive and their initial endowment, $\bar{w}$.

Public official's utility is:

$$\begin{aligned} U_{PO}(s_P, s_R) =& \bar{w} + s_P + s_R - \frac{\alpha_{PO}}{2} \max[w_R + 300 - s_R - (\bar{w} + s_P + s_R), 0] \\ & - \frac{\beta_{PO}}{2} \max[\bar{w} + s_P + s_R - (w_P + 300 - s_P), 0] \end{aligned} \tag{4.3}$$

where, s_P is the share of the surplus demanded from the poor and s_R is the share of the surplus demanded from the rich. The α_{PO} and β_{PO} parameters indicate how averse the PO is to relative self-centred inequities. Fehr and Schmidt (1999) assume that $\alpha \geq \beta$ and $1 > \beta \geq 0$. Therefore; players always suffer more from having less than others compared to having more. Since β is always less than one, they also disregard the possibility that individuals would give up their own income to reduce the gap between themselves and the poor. We are only going to assume $\alpha > 0$ and $\beta \geq 0$ instead of restricting the model to an α parameter that is always greater or equal to β. In order to explain why, we need to make the distinction between aversion to inequity and intolerance for inequality. In this thesis, we define

tolerance for inequality as the highest level of inequality in the society acceptable by an individual without a loss in utility. If someone is completely intolerant of inequality, they desire all incomes to be equal. Suppose in our model:

$$w_R - \bar{w} = \bar{w} - w_P > 600$$

With this initial distribution of endowments, a public official that is intolerant of inequality would decide to take the maximum share possible for themselves in their interaction with the rich, and give the maximum share possible to the poor in order to reduce existing inequality. This is possible if:

$$\frac{\partial U_{PO}(s_P, s_R)}{\partial s_R} > 0$$

$$\frac{\partial U_{PO}(s_P, s_R)}{\partial s_P} < 0$$

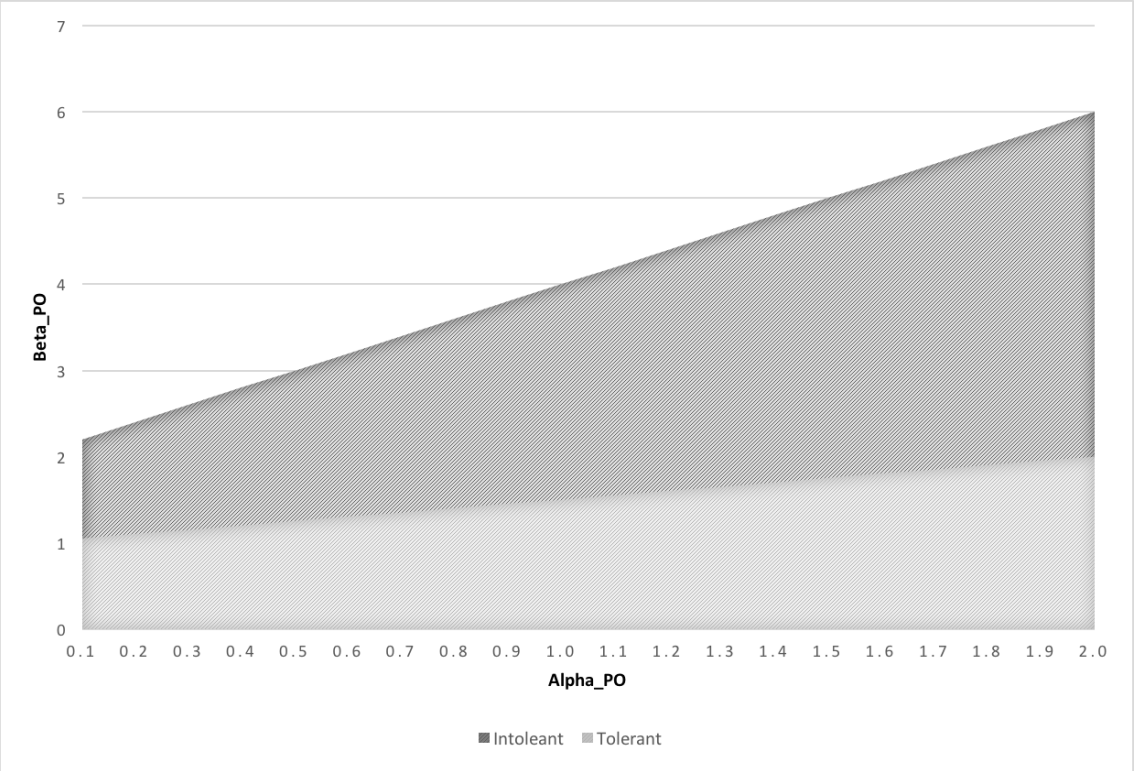
Hence, if a public official is intolerant of inequality, β_{PO} has to be in the following range:

$$(n-1) + 2\alpha_{PO} > \beta_{PO} > 1 + \frac{\alpha_{PO}}{n-1}$$

Whether or not a public official is tolerant depending on the *alpha* and *beta* parameters is displayed in Figure 4.4. If the PO's ratio of aversion parameters falls in the area shaded in black, they are intolerant of inequality. A public official who is completely intolerant of inequality must have a β parameter that is greater than α.

We can define the aversion to advantageous inequality parameter, β, as a function

Figure 4.4: PO's Aversion Parameters Ratio for Tolerance for Inequality



of tolerance for inequality defined as I(T):

$$\begin{aligned} U_{PO}(s_P, s_R, T) =& \bar{w} + s_P + s_R - \frac{\alpha_{PO}}{2}[w_R + 300 - s_R - (\bar{w} + s_P + s_R)] \\ & - \frac{I(T_{PO})}{2}[\bar{w} + s_P + s_R - (w_P + 300 - s_P)] \end{aligned} \tag{4.4}$$

where T_{PO} is the tolerance level of the public official, $1 \geq T \geq 0$ and $\frac{\partial I(T)}{\partial T} < 0$. As the tolerance for inequality rises, the public official gives less importance to the income difference between themselves and the poor, therefore their aversion to advantageous inequality decreases.

In the previous chapter, we assumed that individuals who are less tolerant of inequality might incur a higher moral cost due to the social inequality they create through corruption. In our game, those who are less tolerant could be less willing to damage the donation pool, and "steal" from the charities. With the moral cost,

when both $s_P, s_R > 0$, utility of the public official becomes:

$$\begin{aligned} U_{PO}(s_P, s_R, T) =& \bar{w} + s_P + s_R - \frac{\alpha_{PO}}{2}[w_R + 300 - s_R - (\bar{w} + s_P + s_R)] \\ & - \frac{I(T_{PO})}{2}[\bar{w} + s_P + s_R - (w_P + 300 - s_P)] - 2\gamma(1 - T_{PO}) \end{aligned} \tag{4.5}$$

The moral cost, γ, is multiplied by two to reflect that it is incurred twice if both parties in a single interaction agree to the split proposed by the public official. We assume that a linear relationship exists between tolerance and the moral cost, where in our model in the previous chapter, there was a non-linear relationship. This is due to the fact that in our game public officials are aware of the exact amount of monetary damage done to third parties, where in the previous model, damage to the third parties was estimated by the amount of bribery itself. If no share is demanded from either the rich or the poor player, PO's utility will be:

$$U_{PO}(0, 0, T) = \bar{w} - \frac{\alpha_{PO}}{2}(w_R - \bar{w}) - \frac{I(T_{PO})}{2}(\bar{w} - w_P) \tag{4.6}$$

While all players know each other's initial endowment, they do not receive information on the share demanded by the PO from other players. Hence, their utility is a function of only the share of the surplus demanded from them. If the richer player's tolerance is low enough, they would accept to give the maximum share to the public official when asked. The rich player's utility function if corrupt becomes:

$$\begin{aligned} U_R(s_R, T) =& w_R + 300 - s_R - \frac{I(T_R)}{2}[w_R + 300 - s_R - (\bar{w} + s_R)] \\ & - \frac{I(T_R)}{2}[w_R + 300 - s_R - w_P] - \gamma(1 - T_R) \end{aligned} \tag{4.7}$$

The poor player's utility function if corrupt is:

$$\begin{aligned} U_P(s_P, T) =& w_P + 300 - s_P - \frac{\alpha_P}{2}[(\bar{w} + s_P) - w_P + 300 - s_P] \\ & - \frac{\alpha_P}{2}[w_R - w_P + 300 - s_P] - \gamma(1 - T_P) \end{aligned} \tag{4.8}$$

Fehr and Schmidt (1999) analyse the possible strategies of the proposer in an ultimatum game when initial endowments are equal and $\gamma = 0$. As the proposed share of the surplus may alter the rank between two players, the proposer has to take the values of the parameters α_i and β_i for the responder into consideration. The authors prove that in such a case, an equal divide is always accepted and the probability of acceptance is decreasing in s. Very high demands of s will most likely be rejected and a threshold of acceptance for s which is a function of α_i exists. Thus, in perfect equality and no moral cost, proposers divide the share equally for guaranteed acceptance.

In our model with unequal initial endowments and a moral cost, public official has an option not to commence an interaction to avoid the moral cost. PO will demand a share from the rich and offer the rich player $300 - s_R$ if:

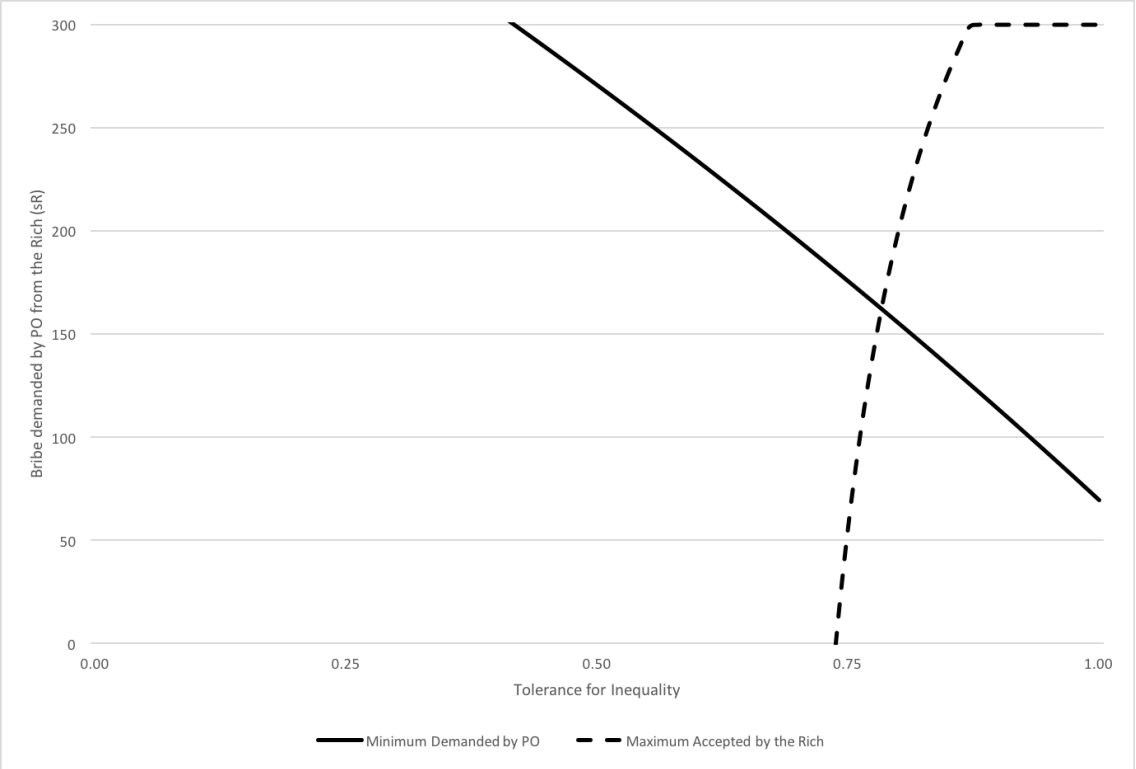
$$s_R > \frac{\gamma(1 - T_{PO}) + 150\alpha_{PO}}{1 + \alpha\frac{I(T_{PO})}{2}}$$

In response, any s_R will only be accepted by the rich player if their aversion to advantageous inequality, $I(T_R)$, is higher than $\frac{2}{3}$. If tolerance of the rich player is higher than the level indicated, the maximum amount of s_R that will be accepted by them is:

$$s_R < \frac{300(1 - \beta_R) - \gamma(1 - T_R)}{1 - \frac{3}{2}I(T_R)}$$

In order to visualize the minimum amount demanded by the public official in different tolerance levels, and the maximum amount acceptable by the richer individ-

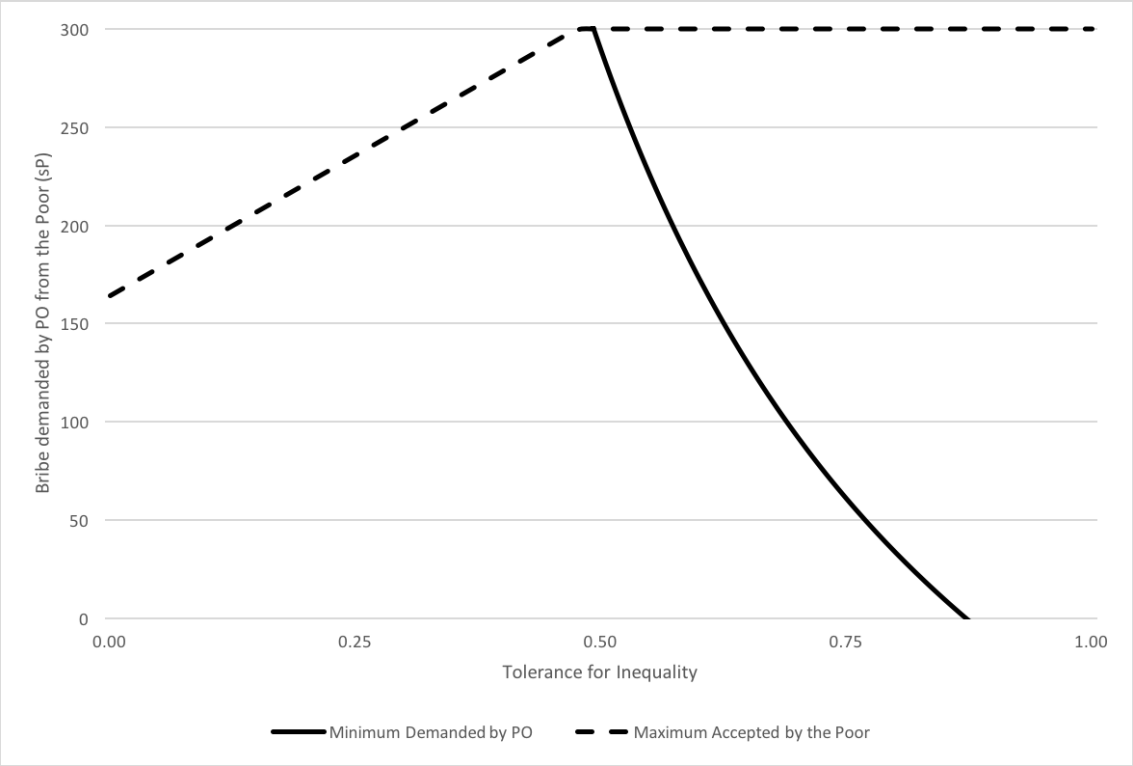
Figure 4.5: Minimum Bribe Demanded by the PO and Maximum Bribe Accepted by the Rich (S_R)



ual, we will assume that $\alpha = 0.5$ for every individual and $\gamma = 500$, which is the amount reduced from the donation pool if corruption occurs. We also assume that $I(T) = 1.3 - T$. Hence, the PO is intolerant of inequality when $T < 0.05$, while the rich individual is intolerant if $T < \frac{19}{30}$. Figure 4.5 displays how minimum and maximum values for S_R differ when tolerance varies. In this case, public officials who are more tolerant than a certain level will start demanding s_R, and the minimum amount required to offset the utility loss from the moral cost incurred due to corruption will be less in more tolerant PO's. Similarly, richer individuals who are more tolerant of inequality would accept higher demands of s_R. If the PO estimates equal tolerance levels across individuals, only those PO's tolerant enough will be corrupt, as others will expect their minimum demands to be rejected.

On the other hand, the minimum share of the surplus demanded by the public official from the poorer individual and the maximum share accepted differ from the

Figure 4.6: Minimum Bribe Demanded by the PO and Maximum Bribe Accepted by the Poor (S_P)



minimum and maximum s_R values:

$$s_P > \frac{\gamma(1 - T_{PO}) - 150 * I(T_{PO})}{1 + \frac{\alpha_{PO}}{2} - I(T_{PO})}$$

The maximum amount accepted by the poor is:

$$s_P < \frac{300 + 300\alpha_P - \gamma(1 - T_P)}{1 + \frac{3}{2}\alpha_P}$$

Assuming the same α, γ values and the I(T) function, minimum demands by the PO from the poor and maximum acceptable s_P is displayed in Figure 4.6. Poor individuals who are more tolerant of inequality will accept to give even higher shares to the PO, and if they are tolerant enough, they are going to accept and demand.

At this point, it is important to recognize that according to this model, the initial difference between endowments will not be taken into account by the subjects. What

matters for the decision making process is the tolerance for inequality, rather than inequality itself.

We can derive certain hypotheses on how the public official, the rich and the poor subjects are expected to behave:

Hypothesis 1: Initial income inequality should not have an impact on the decisions of the subjects in the roles of the public official and the client, hence overall corruption.

Hypothesis 2: Subjects who are more tolerant will be more likely to be corrupt than those less tolerant.

These two hypotheses will be tested using the data we have gathered in our experimental sessions.

4.3.3 Experimental Procedure

We conducted the experiments in Turkish at the Bilgi Economics Lab of Istanbul (BELIS) of Bilgi University. 128 subjects were recruited among students of Bilgi University using the Online Recruitment System for Economic Experiments developed by Greiner (2015). The first four sessions, with 16 subjects in each, took place on different days in a time span of six days in May 2015, while the remaining four sessions were conducted on 18th of May 2016. Subjects played the experimental game in separate booths to ensure that they cannot see the screens of other players. All subjects played both treatments. The game was coded in the widely used z-Tree platform [5].

Students who participated in the experiment studied a variety of courses in the university. The two most common courses studied in the sample were Law and Economics studied by 19 students each. Bilgi University is a private institution

[5]See Fischbacher (2007) for documentation on z-Tree.

that offers scholarships to academically successful students. In our sample, 51 had full scholarships and 60 had half of their tuition fees covered. Genders were almost equally distributed, with 65 of the participants being male students and 63 being female.

All subjects of each session were asked to read an information sheet before they entered the laboratory. The information sheet was written in Turkish and contained general information about the experiment, how their data will be used and contact details of the researcher and the University of Oxford Ethics Committee if required. Once all the 16 subjects completed reading the information sheet, they were randomly assigned a computer. Instructions of the game in Turkish and a consent form were distributed to each booth prior to their entry. These instructions were also shown in the screen, while being read aloud by an instructor. After each subject finished reading the instructions, they were given a short quiz on the screen to gauge their understanding of the rules and mechanics of the game. The subjects were only allowed to proceed once they answered all the quiz questions correctly. The quiz was followed by a poll to determine the most popular charity between three options: TEMA (The Turkish Foundation for Reforestation), LOSEV (Foundation for Children with Leukaemia) and Red Crescent. The game commenced after the subjects chose their preferred charity. Here, we need to note that Turkish citizens do not have a strong tendency to donate to charities. According to the World Giving Index 2014 published by the Charities Aid Foundation, Turkey ranked 112th out of the 135 countries across the globe in terms of donations to charities. Hence, corruption's negative externality on charities in the experimental design might be a weaker deterrent for our sample compared to the samples in previous studies that have employed this method. On the other hand; one of the charities listed, LOSEV, was involved in a dispute with the Ministry of Health shortly before the experiments took place. The Ministry of Health ordered TV stations to stop broadcasting LOSEV's advertisements calling for donations to help build a children's hospital. This caused relatively strong reactions from the public and potentially increased validity

of the negative externality in our design. In fact, LOSEV was chosen as the most popular charity in all eight sessions and received the total amount of remaining donations, equalling to 325 TL (£79.50).

The randomly assigned roles and initial endowments were revealed to the subjects, as well as endowments of other players in the laboratory, once the game commenced. The distribution of endowments was presented in a coloured pie chart. Subjects stated opinion on the current distribution by moving a slider. The experiment started the first period with the high income inequality treatment in two of the four sessions and the low income inequality treatment in the other two. First, the public officials were asked to make their decisions, followed by the clients. Subjects proceeded to play the remaining treatment in the second period and no feedback about the decisions of the other players and the results were given between the two periods. All outcomes were only revealed after both the public officials and the clients completed their actions in the second period. One of the two periods was randomly chosen after the game ended and subjects were paid their earnings in that period. The chosen charity also received donations for that period only.

Each session took about 50 minutes in total including the questionnaire subjects filled in after the experiment before collecting their payments. Subjects received an average of 24.2 Turkish Liras (TL) in addition to their 5 TL show up fee. At the time of the experiment, 10 TL equalled to £2.4. Hence, average earning of the subjects was £7. In comparison, the monthly minimum wage net of taxes in Turkey was 1300 TL, which can be converted to an hourly minimum wage of 7.2 TL (£1.7).

4.3.4 Data and Variables

The experimental game provides us with data on the amount of bribes demanded by each public official from each client in different treatments and how clients responded to those demands. However, several other variables are also controlled for and

included in the regression analyses.

Inequality: Inequality, is the treatment identifier, which is a binary variable that takes the value of one in periods where subjects played the game in Treatment High, where within group inequality is higher.

Tolerance for inequality: In our game, each subject knows the initial endowment given to other players in the group, removing the veil of ignorance that exists in a real economy due to lack of information on individual income. However, despite the fact that endowments, and hence the initial distribution, are transparent, each subject's opinion on how equal the distribution might differ. For example, one subject might find a distribution of endowments with a calculated Gini coefficient of 30 satisfactorily equal, while another might deem it to be unequal. We control for these differences in subjective judgments of inequality by asking the subjects to move a slider to indicate how equal they find the current distribution in the group. The variable *Tolerance* gets a minimum value of zero if the slider is moved to the far left side corresponding to the word "Unequal" and a maximum value of 100 if it's moved to the opposite side next to the word "Equal".

The rest of the variables were collected through a questionnaire survey given to the subjects after the game ended.

The questionnaire included questions on the subject's gender (*Female*), mothers' education (*Mother*), whether at least one of their parents are public officials (*POParent*) and the percentage of scholarship they receive from the university to cover their tuition fees (*Scholarship*). Table 4.2 shows the descriptive statistics for the variables explained above. Subjects who have been randomly allocated to public official and client roles had relatively similar demographic characters. One slight difference is that 14 out of 64 subjects (22%) who were public officials had at least one parent who worked as a public official, while this ratio was 19 out of 64 for the clients (30%). According to the Turkish State Personnel Department, as of January 2015,

Table 4.2: Descriptive Statistics

	P. Officials	Clients
Tolerance		
Treatment High	10.5	17.8
	(12.82)	(24.78)
Treatment Low	43.6	41.2
	(28.81)	(28.35)
Male	31	32
Female	33	32
Scholarship		
0%	6	8
25%	4	0
50%	27	29
100%	27	27
Mother's Education		
Primary	18	19
Middle	8	9
High	21	14
Higher	17	22
PO Parents		
Yes	14	19
No	50	45
No. of Observations	64	64

Standard deviations in parentheses under the mean values.

there are around 3.2 million public sector workers which is roughly equal to 11.3% of the total labour force [6].

4.3.5 Methodology of Analysis: Public Officials' Decisions

4.3.5.1 Between Groups Analysis

Even though the within subjects design of the experiment grants us a higher statistical power and a stronger internal validity, it also causes concerns regarding the set up of the experiment, which is commonly referred to as the experimenter effect (Zizzo, 2010; Charness et al., 2012). For example, subjects may be anchored to prior information, or behave in a way that they believe the experimenter wants them to behave. In our case, the starting order of the treatments, from high to low inequality, or low to high, might alter decisions of the subjects. Changing the order of treatments in different sessions to identify the within subject treatment effect might overcome this problem if biases are assumed to cancel each other out (Charness et al., 2012). We have no reason to suspect that counterbalancing fails to resolve any experimenter effects in our design; however, in order to ensure robustness of our results, we employ both approaches of analysis.

There are 64 subjects, of which 32 are public officials, who played the experimental game in the low inequality treatment in the first period. The remaining 64 started the game in the high inequality treatment. Therefore, the demanded bribes by the public officials in the first period of the game can be compared to estimate the causal effect of the change in initial distribution of endowments. In order to do so, let us assume that $Y_i(1)$ is the demanded bribes by individual i in high inequality treatment (*Inequality=1*), while $Y_i(0)$ is the same individual's bribe demand in low

[6] Statistics on the number of public sector workers can be found on Turkish State Personnel Department's website (http://www.dpb.gov.tr/). Total labour force number is taken from TurkStat (www.tuik.gov.tr).

inequality (*Inequality=0*). The average treatment effect becomes:

$$\tau_{ate} = E[Y(1) - Y(0)] \tag{4.9}$$

Since both groups only experience one treatment in one period, $Y_i(1) - Y_i(0)$ is not observable. Therefore, several assumptions are needed to estimate the average treatment effect (Wooldridge, 2010). First, we assume that the treatment of an individual does not affect the outcome of another individual. As the decisions of public officials in the game do not affect those of others in anyway, this assumption should hold in our experimental design. We also need to assume that conditional on all other covariates that we will denote by $\mathbf{X}$, including those that are time-invariant, the outcome pairs should be independent of the treatment:

$$(Y(0), Y(1)) \perp Inequality \mid \mathbf{X} \tag{4.10}$$

Wooldridge (2010) shows that the assumption above, which is called unconfoundedness assumption, is violated if $\mathbf{X}$ includes variables that might themselves be affected from the treatment, and hence warns against using post-treatment variables apart from those that are demographic. Unconfoundedness is not testable as we only observe a single outcome.

Finally, we need to assume that for any combination of covariates in the population, subjects have a chance to be placed in either of the treatment groups. For all $\mathbf{x}$ in the support of χ of $\mathbf{X}$:

$$0 < P(Inequality = 1 \mid \mathbf{X}) < 1 \tag{4.11}$$

This assumption states that the probability of starting in the high or low inequality treatment for a subject is never equal to zero or one. Random allocation of treat-

ments to the session groups in our design ensured that each subject had a chance of starting in both treatments.

With these assumptions set, following Wooldridge (2010), we define the average treatment effect conditional on $\mathbf{x}$ as:

$$\tau(\mathbf{x}) = E(Y(1) - Y(0) \mid \mathbf{X} = \mathbf{x}) = \mu_1(\mathbf{x}) - \mu_0(\mathbf{x}) \tag{4.12}$$

where $\mu_g \equiv E[Y(g) \mid \mathbf{X} = \mathbf{x})$ and $g = 0, 1$.

$$m_0(\mathbf{X}) = E(Y \mid \mathbf{X}, Inequality = 0) \tag{4.13}$$

$$m_1(\mathbf{X}) = E(Y \mid \mathbf{X}, Inequality = 1) \tag{4.14}$$

Under Assumption 4.11, Equations 4.13 and 4.14 are nonparametrically identified on χ as we assumed the availability of a random sample (Y,$\mathbf{X}$, Inequality), and therefore $m_0(\mathbf{X})$ and $m_1(\mathbf{X})$ are always estimable. With the unconfoundedness assumption:

$$m_0(\mathbf{X}) = \mu_0\mathbf{X} \tag{4.15}$$

$$m_1(\mathbf{X}) = \mu_1\mathbf{X} \tag{4.16}$$

Therefore, a consistent estimator of the average treatment effect in our sample, consisting of 64 observations, becomes:

$$\tau_{ate} = \frac{\sum_{i=1}^{64}[\hat{m}_1(\mathbf{x}_i) - \hat{m}_0(\mathbf{x}_i)]}{64} \tag{4.17}$$

When functions $\hat{m}_1(\mathbf{x})$ and $\hat{m}_2(\mathbf{x})$ are linear, then the linear regression estimate of τ_{ate} is:

$$\hat{\tau}_{ate} = (\hat{\alpha}_1 - \hat{\alpha}_0) + \overline{\mathbf{X}}(\hat{\beta}_1 - \hat{\beta}_0) \tag{4.18}$$

with $\overline{\mathbf{X}}$ being the row vector of sample averages.

4.3.5.2 Within Subjects Analysis

We will also employ regression analyses in order to evaluate the impact of the treatment and control variables. As each subject plays the game for two periods but in different treatments each, we can conduct panel data regressions. We are interested in estimating the coefficients in the following model:

$$Corruption_{it} = \alpha_0 + \beta_I Inequality_{it} + \beta_T Tolerance_{it} + \beta X_{it} + e_{it} \tag{4.19}$$

where t is the period and t=1,2. The dependent variable can be measured by either the total amount of bribes demanded by the public official, or the total number of bribe demands made. In both cases, $Corruption_{it}$ is very likely to be cornered at zero, with a significant number of subjects not demanding any bribes. Hence, Tobit estimations are required to obtain unbiased results.

The parametric estimation of a fixed effects Tobit model is statistically impossible (Honoré, 1992). Therefore, we limit our analysis to Tobit estimations with random effects. Subjects are assigned to roles and starting treatments randomly. As long as the sequence for treatments, meaning whether one starts the game in low or high inequality treatment, has no effect on the dependent variable, random effects estimations should be unbiased. Therefore, the sequence of treatments will be included as a control variable in each regression.

4.3.6 Methodology of Analysis: Clients' Decisions

The second movers of our experimental game, clients, responds to the splits of the surpluses made by public officials. They can either accept to give a positive share

of the surplus demanded by the PO, and damage the donation pool, or reject the demand. Our aim is to estimate how likely a client is to accept the split, conditional on certain covariates such as the level of inequality in the treatment, the share of the surplus left to the client, the client's initial endowment and their tolerance for inequality.

Clients are only able to make a decision, if the public official has demanded a share of the surplus, and hence initiated a potentially corrupt interaction. Clients may also make up to eight different decisions per period. A client may have no bribe demands in one or both treatments. Therefore, we are going to treat each demand independently and estimate the impact of each covariate on the response probability by Probit:

$$P(Accept = 1|\mathbf{X}) \tag{4.20}$$

The covariates $\mathbf{X}$ include inequality treatment, initial endowment, tolerance for inequality, gender, mother's education and scholarship of the subject, the potential profit offered to the subject in the particular interaction and the total potential profit offered to the subject in that period, the sequence of the treatments and whether the subject has a parent who is a public official.

4.4 Results

We now proceed to analysing the data we have obtained in the eight sessions of experiments we conducted in Istanbul Bilgi University, using students as subjects in the roles of public officials and clients. Due to our design, we were able to collect data from 1024 observations. In the following two subsections, we present the results emerging from our analysis. In order to facilitate comprehension of the large amount of data we obtained, we chose to divide these subsections in a way that first underlines the results and then guides the reader to the stated conclusions.

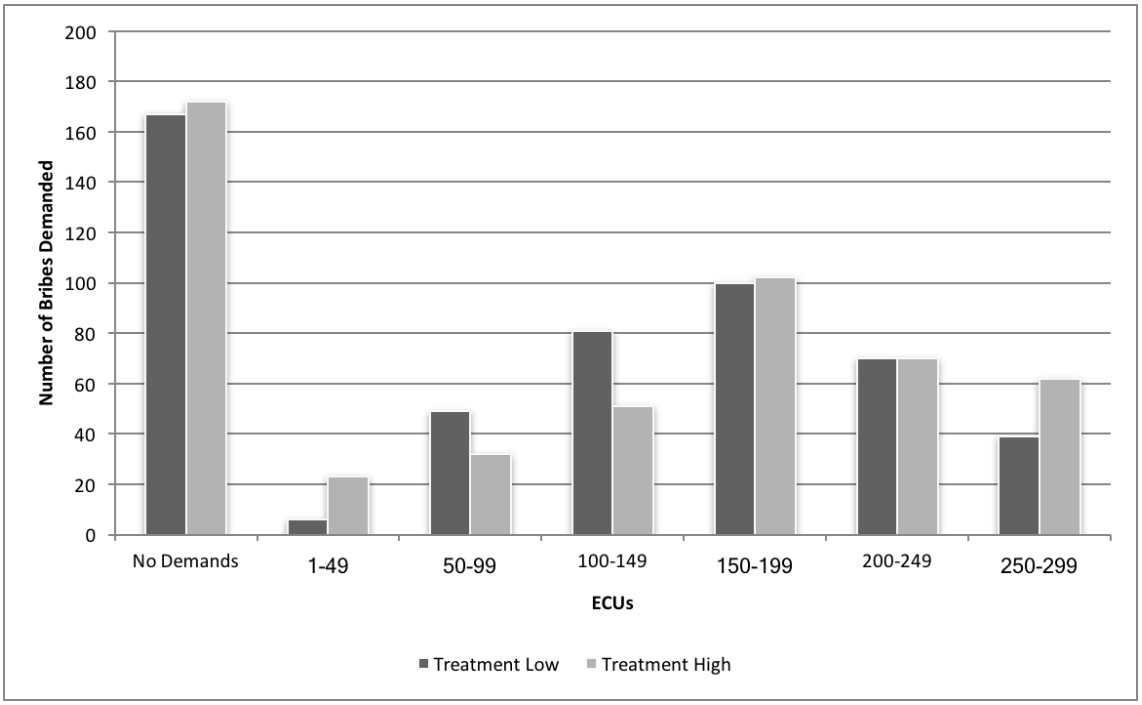
4.4.1 Analysis of Public Officials' Decisions

Result 1: *Equal splits were rejected more often than in traditional ultimatum games.* Out of the total 1024 interactions that took place in eight sessions between the subjects in the role of public officials and the clients, the public officials demanded bribes in 685 occasions. The top five most frequent demands were 100 ECUs, 150 ECUs, 200 ECUs, 250 ECUs and 299 ECUs (maximum amount). Table 4.3 displays how the bribe demands were distributed between clients and their rate of acceptance. The most common offer was an equal split, mostly demanded from clients relatively poorer than public officials. In a normal ultimatum game, rejection of equal splits are very low according to Camerer's (2003) compilation of ultimatum game results. However, only 54% of these demands were accepted, possibly because of the moral cost of corruption associated with the negative externality on the donation pool and the unequal distribution of initial endowments. The second most common demand, 200 ECUs (two to one split), was accepted one third of the time. Public officials demanded 100 ECUs, and left double as the total surplus to the client, mostly from the poorest client in the game, while bribe demands more than 200 ECUs were made to richer clients.

Table 4.3: Frequency of Bribe Demands per Client Group

Demand	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**Total**	**Accepted**
No Demand	57	54	51	51	39	36	27	24	339	
1 to 99	18	15	13	12	14	15	12	11	110	79%
100	11	4	6	3	3	2	1	0	30	83%
101 to 149	7	15	12	12	11	12	16	17	102	70%
150	14	16	18	16	13	11	13	13	114	54%
151 to 199	7	10	8	12	15	13	12	11	88	55%
200	8	7	13	10	14	16	15	18	101	34%
201 to 249	1	1	0	3	4	8	13	9	39	21%
250	1	2	3	4	6	6	9	8	39	21%
251 to 298	2	2	2	2	4	4	3	7	26	42%
299	2	2	2	3	5	5	7	10	36	14%

Figure 4.7: Frequency of Bribes Demanded per Amount Range



Maximum total number of bribes in each period can be 512. "No Bribes" columns indicate the instances where POs chose not to demand bribes, and hence refused to extract from the donation pool, allocating nothing extra to both themselves and the clients.

The frequency of bribes demanded in each treatment is shown in Figure 4.7. Each pair of columns depict the number of demands made by the public officials between the indicated range. Notice that the number of bribes demanded including and above 250 ECUs increases sharply in the high inequality treatment. Similarly, a drop in the 50-149 range is apparent, as more public officials decided to divide the split more favourably to themselves by demanding higher shares when the initial endowment inequality was greater.

Result 2: *Number of bribe demands from the rich clients were higher than the number of demands from the poor.*

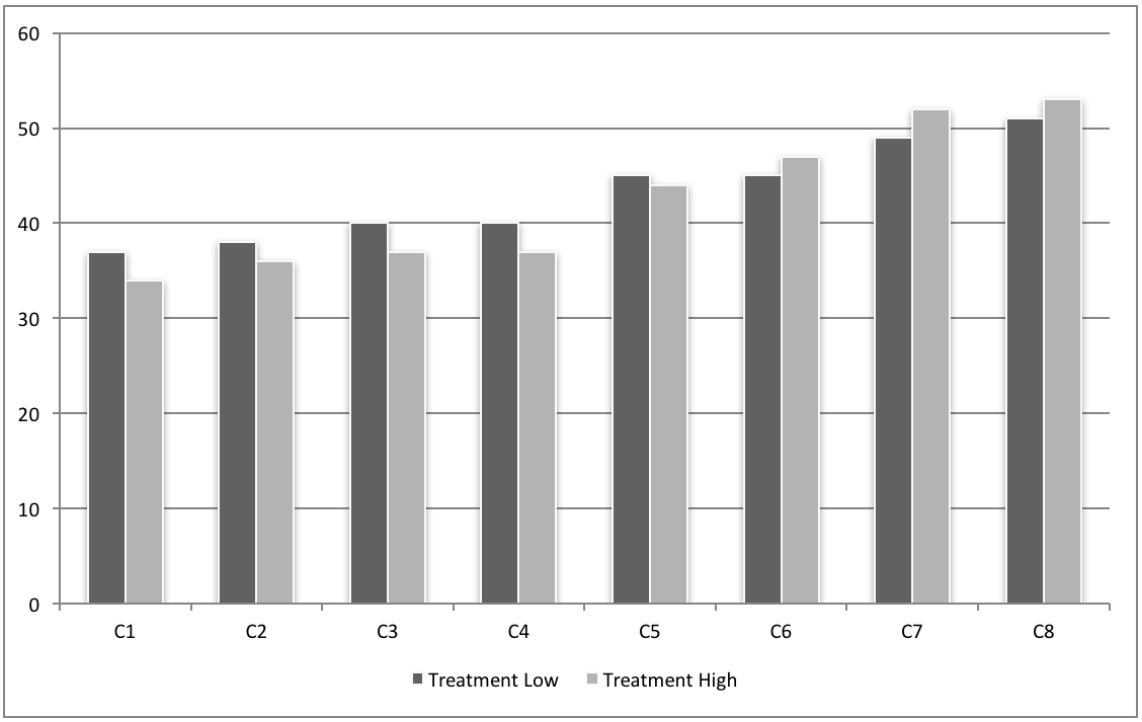
The public officials did not receive any signals on how the clients might react to their demands before the game. They did not receive any feedback from the clients after all decisions have been made in the first treatment of the game either. Hence, their choices are independent from those of the clients, and certain patterns can be identifiable in the data when these choices are aggregated. Figure 4.8 shows the total number of bribes demanded from each client group. Each client group consists

of eight subjects in the role of clients. C1 is the group of eight clients that were given the lowest endowments in each session and C8 is the group of the richest clients. Their initial endowments in the two treatments can be found in Table 4.4. There are eight subjects in the role of public officials in each session, who start the treatments with 2000 ECUs. Their initial endowment is higher than what is given to Clients 1 to 4, and lower than the initial endowments of Clients 5 to 8. Each of these eight public officials can demand an amount of X ECUs individually from the 8 clients in their session (C1 through C8) in both treatments. Hence, each client can receive up to eight bribe demands in each treatment. With eight sessions in total, when we take the clients who received the same initial endowment as a single group, each group can receive a maximum of 64 bribe demands. However, as public officials may choose not to demand bribes, columns in Figure 4.8 corresponds to the total number of bribe demands (X) actually received by the labelled client group. Keeping in mind that for each bribe demand of X ECUs accepted by the clients, they receive 300-X ECUs as profit, we can in fact consider a bribe demand from a public official as an opportunity for the client. Therefore, in Figure 4.8, we notice that the public officials have given clients who are initially poorer than themselves fewer opportunities to profit from bribery. Number of bribes demanded from relatively poorer clients stay similar in both treatments, while we see that numbers demanded from clients richer than the public official rises with inequality.

Result 3: *Public officials demanded higher bribes from the richer clients.*

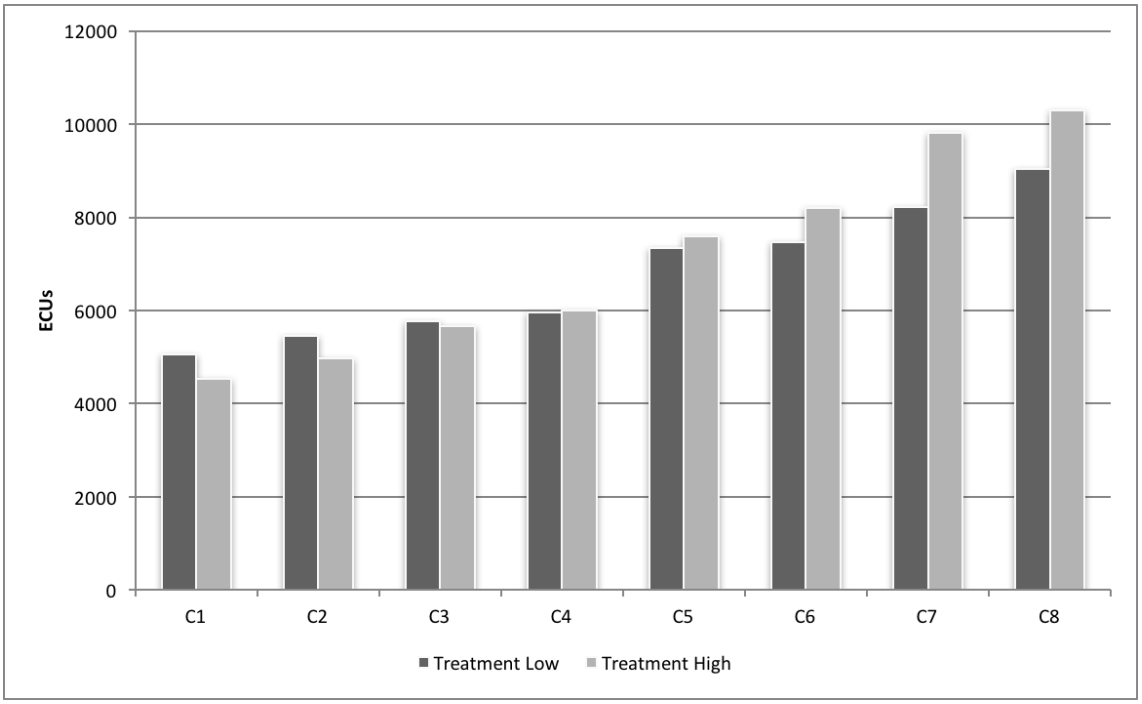
Figure 4.9 shows the total amount of bribes demanded from each client group. We observe that the public officials demanded more bribes in total from the richer clients. In Treatment High, where endowment inequality was higher, public official demands from the rich clients were higher compared to Treatment Low. On the other hand, demands from the poor were higher in Treatment Low. We obtain the average bribe demands from each client group when we divide the total amount of bribes into the number of bribe demands. Figure 4.10 displays the average bribes demanded from each client group. Average bribes demanded from clients are closer

Figure 4.8: Total Number of Bribes Demanded from Each Client Group



Maximum total number of bribes that can be demanded from a group of clients in each treatment is 64.

Figure 4.9: Total Amount of Bribes Demanded from Each Client



Maximum total amount that be demanded by a single PO is 299 ECU. Maximum total amount that can be demanded from a group of clients in each treatment is 19136 ECU.

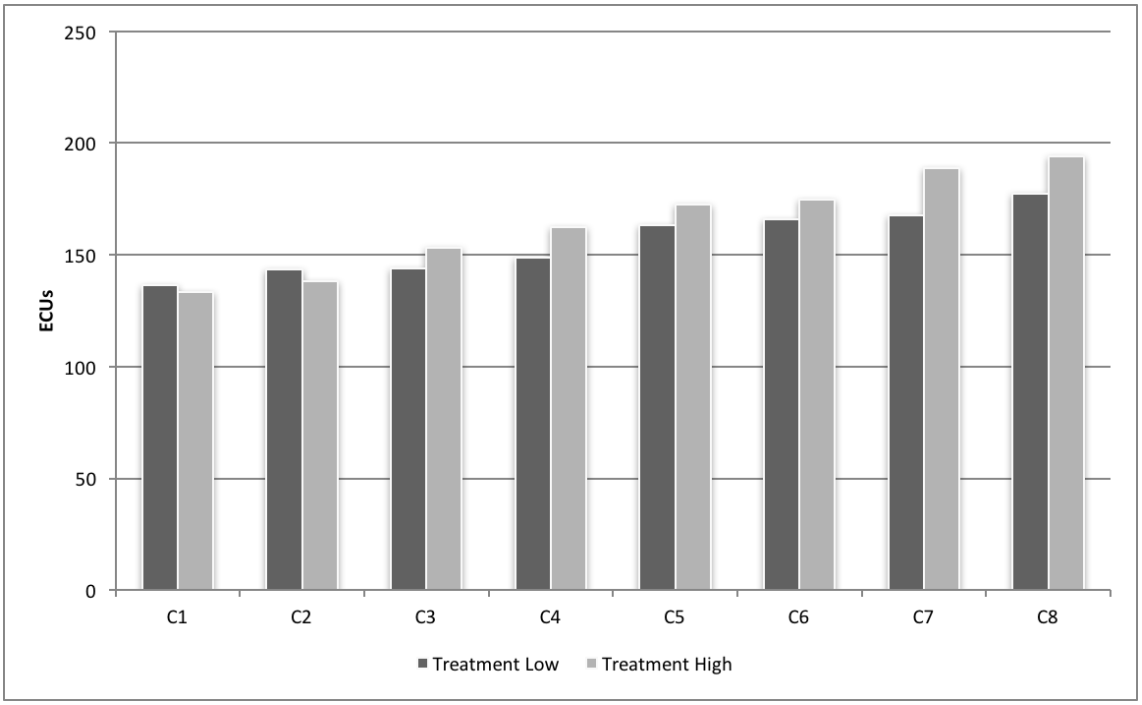
Table 4.4: Endowments of the Client Groups

Role	Treatment Low	Treatment High
C1	1500	200
C2	1650	500
C3	1750	900
C4	1850	1100
C5	2150	2600
C6	2250	3100
C7	2350	3600
C8	2500	4000

to each other when inequality is lower compared to the high inequality treatment, with the difference between the highest and lowest average, which are the average bribes demanded from the poorest and richest clients, being 41 ECUs. However, in the high inequality treatment, we see that the variance of average bribes demanded from clients is higher and the difference between highest and lowest average increases to 61. Nevertheless, when interacting with rich clients, public officials, on average, demanded bribes that are much lower than the bribes that would equalize the final payments between themselves and the rich. This is a result which contradicts the predictions of Fehr and Schmidt's (1999) original model.

Since each demand of X provides an opportunity to earn 300-X ECUs for the clients, we can also calculate the total potential profits offered to them (Figure 4.11). When inequality is lower, difference between lowest and highest potential profits offered remains in a range of 550 ECUs between all the client groups; however, we observe more variation in total potential profits in the high inequality treatment. We previously indicated that studies consistently find the first movers in an ultimatum game with equal initial endowments offer the responders between 40 and 50% of the total surplus. Average offers of the potential profits in the low inequality treatment were comparable to a conventional ultimatum game with the highest average offer

Figure 4.10: Average Bribe Demanded from Each Client



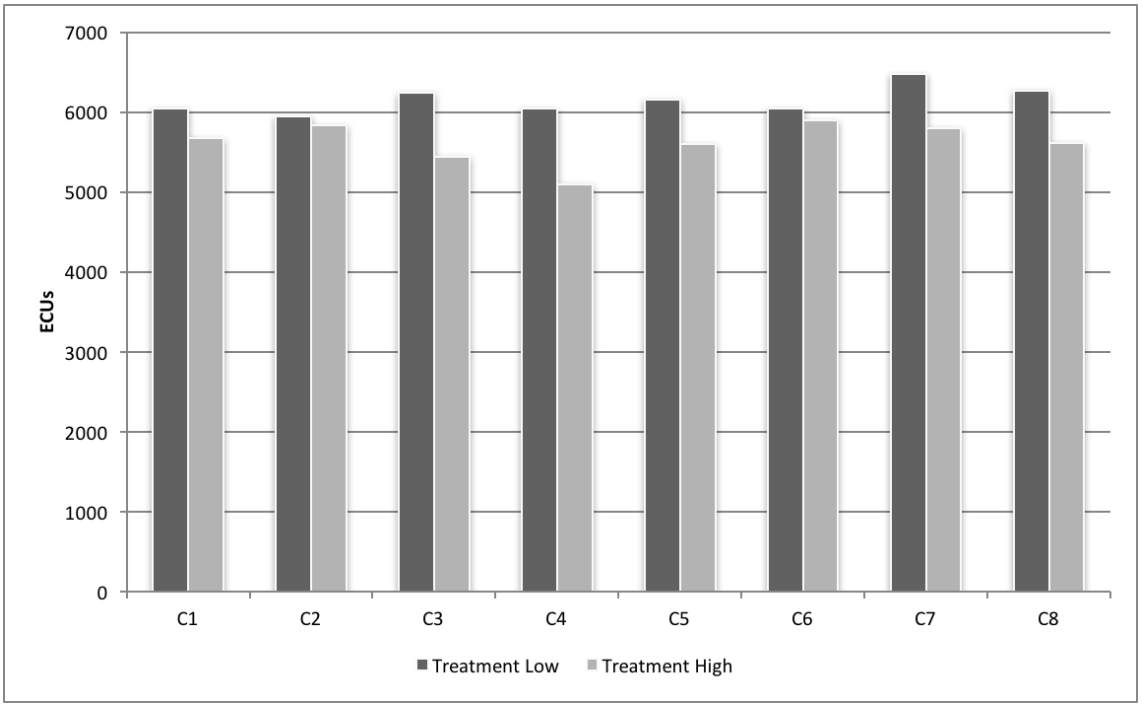
Maximum total amount that can be demanded from a client by a single PO is 299 ECU.

being 54% to C1 and the lowest being 40.1% to C8. Once disparities between initial endowments increased in the high inequality treatment, public officials demanded larger bribes and hence offered less profits to the rich clients. In Treatment high, the average share of the potential surplus left to the poorest clients was 56%, while the average profits offered to the richest clients were only 35% of the total surplus of 300 ECUs.

Result 4: *No significant impact of the inequality treatment on bribery is detected by comparing simple means.*

Previous graphs do not provide us with any clear information about our main hypothesis regarding the decisions of the public officials, which is that the total amount of bribes demanded (otherwise referred to as desired income) should increase as inequality rises. Figure 4.12 shows total bribes demanded by each public official in the low and high inequality treatments. 11 out of 64 subjects in the role of public officials refused to demand any bribes from clients in the low inequality treatment, while this number decreases to ten when inequality increases. The rest demanded

Figure 4.11: Total Potential Profits Offered to Each Client



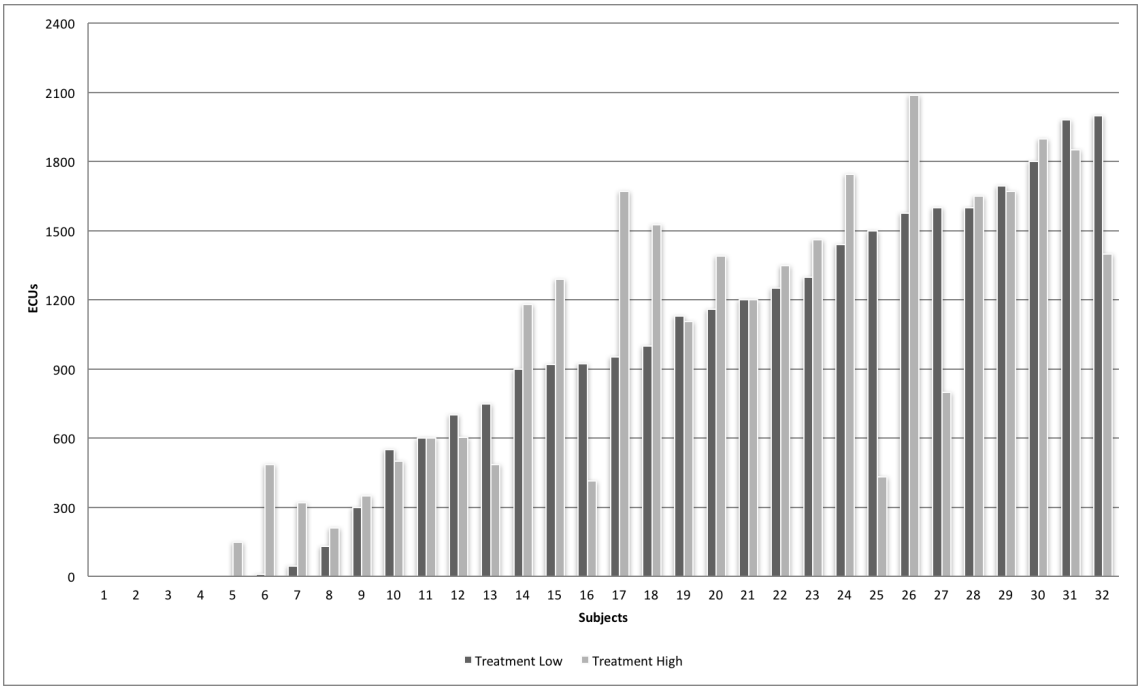
Maximum total amount that can be offered to a client by a single PO is 299 ECU. Total potential profits offered are the amount clients would have received in addition to their initial endowments if they accepted all deals proposed by the POs. Maximum total amount that can be offered to a group of clients in each treatment is 19136 ECU.

bribes in both treatments. No effect regarding the difference in inequality is apparent in this graph either. In fact, the difference between average desired incomes in the two treatments are very small. The average desired income when inequality is high is 2891 ECUs while it is only 2848 ECUs in other treatment. Hence, when we compare simple means without controlling for other variables potentially affecting public officials' decisions, we do not observe a significant effect of our treatment (the change in inequality), on the amount of bribes demanded.

Result 5: *We observe a significant and increasing impact of the inequality treatment on corruption when we control for tolerance for inequality.*

Regression adjusted average treatment effect results are displayed in Table 4.5. Only data gathered in the first periods of each session is used to compare the averages in two treatments. The top row shows the average effect of the treatment variable. Without additional controls, treatment itself, that is playing the game in high or low inequality distributions, do not significantly alter public official's decisions on the total amount of the bribes demanded (Column I). However, once we condition

Figure 4.12: Total Demands of Each Public Official



Maximum amount of bribes that can be demanded by a PO in each period is 2392.

the treatment on how tolerant of inequality the subjects were, we see a significant and positive impact of the treatment (Column II). Estimate of the effect of tolerance on the total amount of the bribe demanded by the public officials is only significant in the high inequality treatment. With the full set of controls included in the regressions in Column IV, increase in inequality lead to an average increase of 391 ECU between the total bribe demands of the officials.

What do these results tell us about the impact of inequality and tolerance for inequality on the public officials' decision making process? As hypothesized, the regression adjusted treatment effects indicate that a rise in inequality by itself did not alter the decisions of the subjects in the role of public officials. Despite being an interesting result that confirms the hypotheses of the common theory, the impact of the change in inequality is questionable as it is only significant when conditioned on tolerance. We will come back to the interpretation of this result in the discussion of this chapter.

Result 6: *Public officials that were more tolerant of inequality demanded more*

Table 4.5: Average Treatment Effects: Dependent variable- Amount of Bribes Demanded

	I	II	III	IV
High Inequality	75.81	423.99**	110.72	390.78**
(Treatment)	(0.47)	(2.49)	(0.68)	(2.27)
Treatment Low				
Tolerance		4.89		4.35
		(1.25)		(1.08)
Female			-263.81	-232.74
			(-1.53)	(-1.45)
Scholarship			2.52	1.88
			(0.83)	(0.68)
Mother			56.71	53.56
			(0.66)	(0.64)
POparent			238.19	276.45
			(1.20)	(1.46)
Treatment High				
Tolerance		23.45***		19.64**
		(3.52)		(2.19)
Female			-421.37*	-154.21
			(-1.65)	(-0.50)
Scholarship			-3.09	-1.81
			(-0.94)	(0.57)
Mother			-97.36	-80.13
			(-0.81)	(-0.76)
POparent			-353.02	-163.85
			(-1.33)	(-0.51
Obs.	64	64	64	64

Regression adjusted average treatment effects of High Inequality are reported, conditional on averaged values of the covariates that are listed in Treatment Low and Treatment High sub-tables. Coefficient estimates for the regression adjustments are given in the sub-tables. Associated z values are in parentheses. *, **, ***: Significant in 10, 5 and 1% respectively.

bribes.

Result 7: *Female subjects in the role of public officials demanded less bribes than male subjects.*

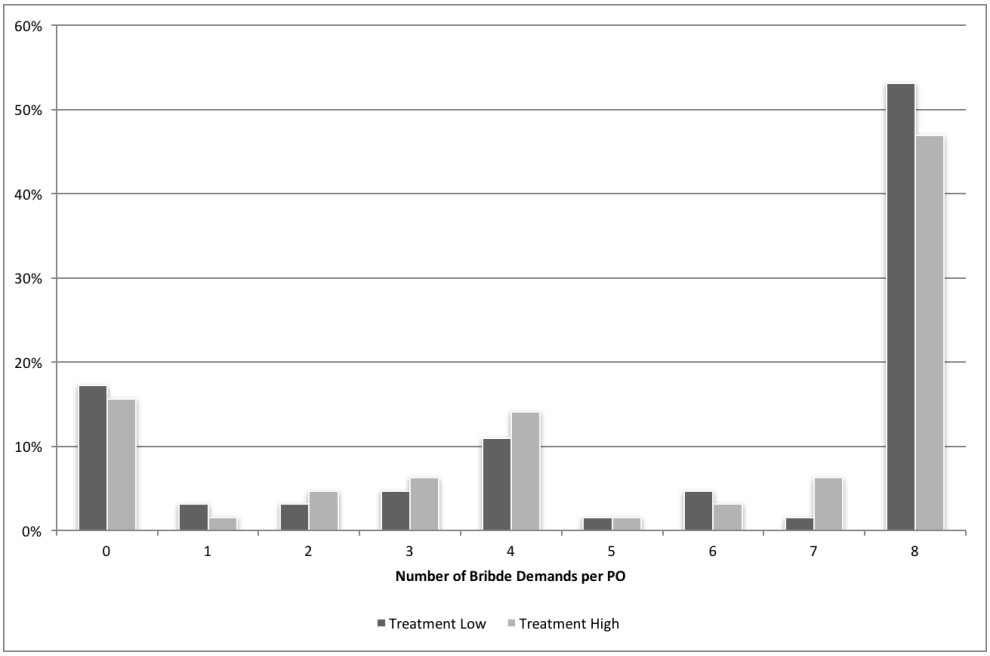
Results of the Tobit regressions with random effects in Table 4.6 confirm the findings

Table 4.6: TOBIT Results - Public officials

	I	**II**	**III**	**IV**	**V**	**VI**
	Amount Demanded	**Amount Demanded**	**Amount Demanded**	**Number of Demands**	**Number of Demands**	**Number of Demands**
High inequality	54.76	224.93**		-0.37	1.76**	
(Treatment)	(0.99)	(2.50)		(-0.63)	(1.97)	
Tolerance		5.01**	1.01		0.07***	0.03**
		(2.41)	(0.77)		(3.00)	(2.43)
Female	-414.30**	-383.21**	-406.69**	-6.11***	-5.37***	-5.68***
	(-2.19)	(-2.10)	(-2.17)	(-2.85)	(-2.70)	(-2.76)
Scholarship	-2.05	-2.00	-2.05	-0.04	-0.04	-0.04
	(-0.72)	(-0.73)	(-0.72)	(-1.17)	(-1.19)	(-1.18)
Mother	-9.16	-11.71	-9.70	-0.96	-0.98	-0.97
	(-0.10)	(-0.14)	(-0.11)	(-0.98)	(-1.09)	(-1.03)
POparent	-20.34	27.32	-10.95	1.86	2.28	2.05
	(-0.09)	(0.12)	(-0.05)	(0.71)	(0.94)	(0.82)
Treatment	-16.72	-58.46	-25.47	-1.92	-2.37	-2.16
Sequence	(-0.09)	(-0.33)	(-0.14)	(-0.94)	(-1.24)	(-1.10)
Obs.	128	128	128	128	128	128

Dependent variable for each column is given at the top in bold letters. Treatment Sequence is a binary variable, and equals 1 if the subject starts the game in the high inequality treatment. Coefficient estimates are reported. z-values are given in parentheses. *,**,***: coefficient significant in 10, 5 and 1% significant levels respectively.

Figure 4.13: Histogram - Number of Bribes Demanded by POs in 1 Period



of the between group analysis. Sequence of the treatments is controlled for to make sure that random effects regressions are appropriate. Coefficient estimates for the sequence variable are always insignificant confirming the validity of our methodol-

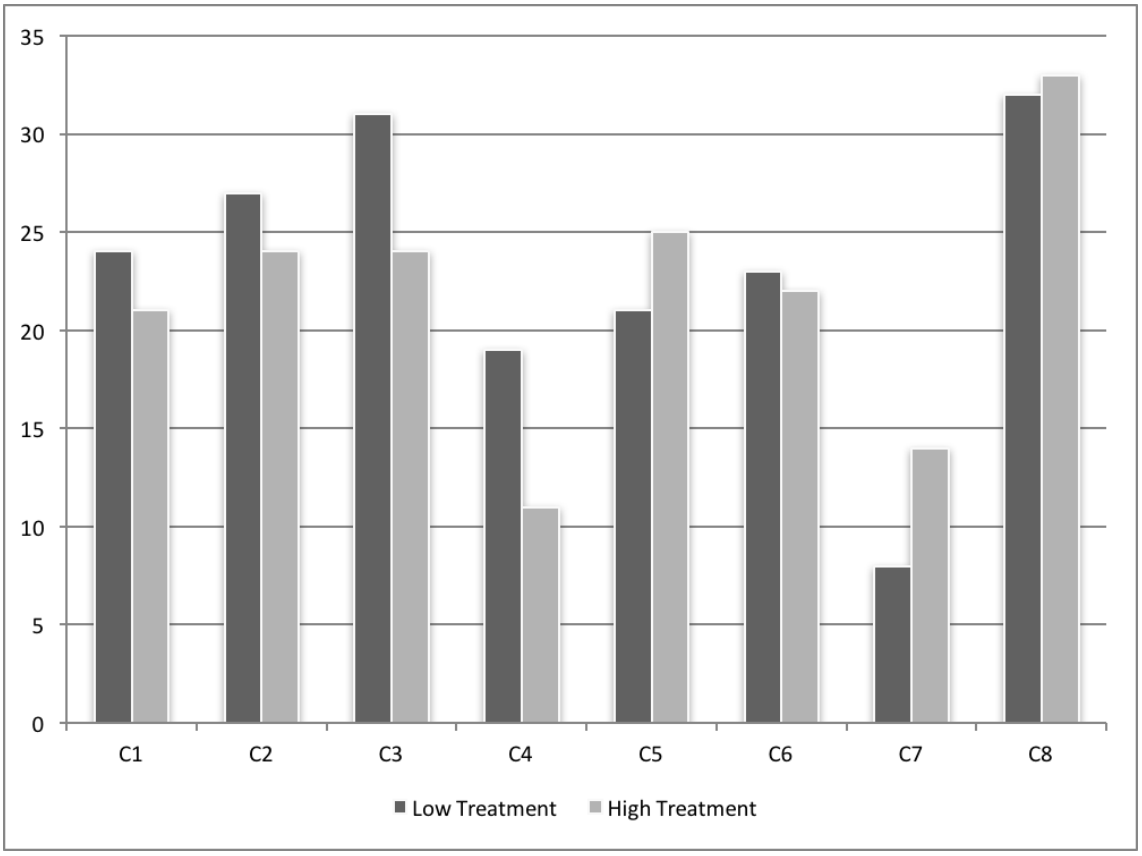
ogy. Dependent variable in the first three columns is the total amount demanded by the public official. When tolerance is not controlled for, a change in inequality has no impact on the desired income. Further, when the high inequality treatment identifier is excluded from the model, tolerance for inequality appears to have no effect on bribe demands. Once we control both the change in inequality and intolerance, we observe significant coefficient estimates. According to the results in the second column, unconditional on whether the public official actually demanded bribes, the marginal effect of inequality at the means of independent variables was 194 ECUs. This is an 9.7% increase on the initial endowment. On the other hand, when inequality and other variable are kept constant, those subjects who deemed the observed distribution of endowments to be more unequal demanded less bribes. Gender of the subjects was also a significant predictor of desired income. In line with previous studies done on the field, female subjects demanded lower bribes.

We obtain similar results for Inequality and Tolerance variables when we employ the number of bribes demanded by each public official in one treatment (Columns IV-VI in Table 4.6). When we control for intolerance, public officials demanded more bribes, i.e., were more willing to decrease the donation pool, when inequality was higher. In line with other results, those who were less tolerant of inequality demanded fewer bribes. Histogram graph of the number of bribes demanded by public officials is shown in Figure 4.13. In 64 of the 128 observations, public officials demanded bribes from all the clients. Regression results suggest that the change in treatments increased the number of demands by 1.76 within subjects when we control for tolerance.

4.4.2 Analysis of Clients' Decisions

Our analysis on the clients' side focuses on how subjects react to individual offers rather than investigating their combined choices in a single period. Unlike public officials, they merely respond to demands they receive and hence their total profit is

Figure 4.14: Number of Bribe Demands Accepted by Clients



conditional on the decisions of the public officials. Clients are not free to offer bribes to increase their profit. Even if they have not yet reached their theoretical desired income, clients might simply reject to pay a bribe because their potential profit from that interaction is lower than the moral cost associated to removing money from the donation pool, or if they believe that the division of surplus is not fair.

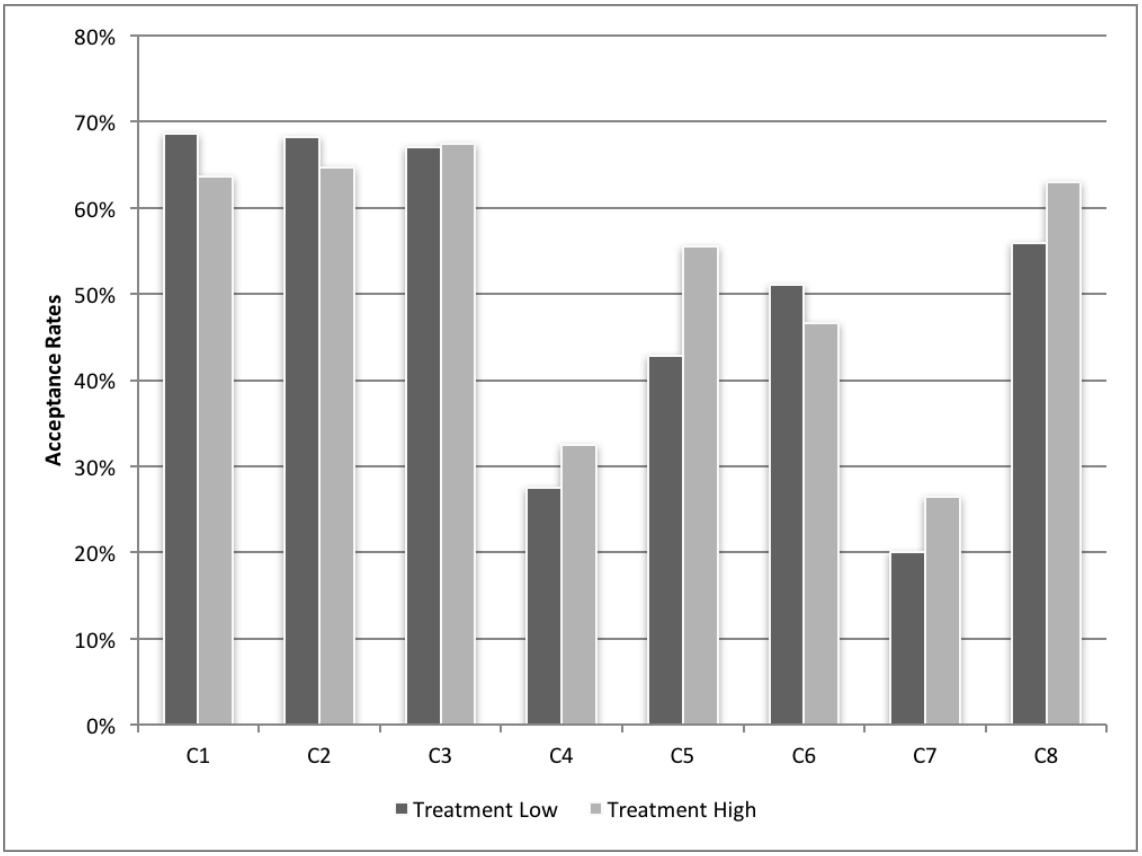
Nevertheless, examining aggregate decisions of the clients would be insightful. A detailed breakdown of positive bribe demands from the public officials and how each client group reacted to those offers are given in Table 4.7. Figures 4.14 and 4.15 display the number and percentage of bribe demands accepted by clients. Once again, each column corresponds to 64 observations in eight sessions. The three clients with the lowest initial endowments accepted more bribes than all others apart from the richest client, despite the fact that they received fewer demands. Number of bribes accepted by Clients 5,7 and 8 rose sharply in the high inequality treatment, most likely due to the increased number of demands from public officials.

Table 4.7: Responses to Demands by Clients

	C1			**C2**		
Demand	Accepted	Rejected	Accept. Rate	Accepted	Rejected	Accept. Rate
1 to 99	15	3	83%	11	4	73%
100	8	3	73%	3	1	75%
101 to 149	3	4	43%	14	1	93%
150	7	7	50%	10	6	63%
151 to 199	4	3	57%	7	3	70%
200	3	5	38%	3	4	43%
201 to 249	1	0	100%	0	1	0%
250	0	1	0%	2	0	100%
251 to 298	2	0	100%	1	1	50%
299	2	0	100%	0	2	0%
	C3			**C4**		
Demand	Accepted	Rejected	Accept. Rate	Accepted	Rejected	Accept. Rate
1 to 99	12	1	93%	8	4	67%
100	5	1	83%	3	0	100%
101 to 149	10	2	83%	6	6	50%
150	12	6	67%	4	12	25%
151 to 199	6	2	75%	6	6	50%
200	N/A	N/A	N/A	2	8	20%
201 to 249	8	5	62%	0	3	0%
250	1	2	33%	0	4	0%
251 to 298	1	1	50%	1	1	50%
299	0	2	0%	0	3	0%
	C5			**C6**		
Demand	Accepted	Rejected	Accept. Rate	Accepted	Rejected	Accept. Rate
1 to 99	13	1	93%	10	5	67%
100	3	0	100%	2	0	100%
101 to 149	8	3	73%	9	3	75%
150	6	7	46%	9	2	82%
151 to 199	8	7	53%	6	7	46%
200	4	10	29%	4	12	25%
201 to 249	0	4	0%	1	7	13%
250	3	3	50%	0	6	0%
251 to 298	1	3	25%	1	3	25%
299	0	5	0%	3	2	60%
	C7			**C8**		
Demand	Accepted	Rejected	Accept. Rate	Accepted	Rejected	Accept. Rate
1 to 99	8	4	67%	10	1	91%
100	1	0	100%	N/A	N/A	N/A
101 to 149	4	12	25%	17	0	100%
150	3	10	23%	11	2	85%
151 to 199	1	11	8%	10	1	91%
200	0	15	0%	10	8	56%
201 to 249	3	10	23%	3	6	33%
250	1	8	11%	1	7	13%
251 to 298	1	2	33%	3	4	43%
299	0	7	0%	0	10	0%

Accepted and Rejected columns display the number of accepted and rejected demands for the given value range. N/A indicates no demands of the corresponding value were made.

Figure 4.15: Percentage of Bribe Demands Accepted by Clients



Even though they received similar number of bribe demands as nearby clients in the income scale, the 16 acceptance rates of the subjects who were in the role of Clients 4 and 7 were particularly low (Figure 4.15). This is a perplexing result, which we were unable to explain theoretically. We have checked for errors in both our coding of the experiment and data transcription, but we have not come across any methodological mistakes. We can solely say that these subjects who were randomly assigned to play Clients 4 and 7 incurred very high moral costs or had very negative attitudes towards corruption.

We can observe the average bribe demands accepted by each client group and the total amount of profit received by them in Figures 4.16 and 4.17. Average bribe demands accepted mostly increase when inequality is higher. The largest gaps between the two treatments are observed in the behaviour of C7. Total profits of the clients were higher when inequality was lower. This is in relation with our previous observation that the number of bribes demanded from clients with low initial endow-

Figure 4.16: Average Bribe Demands Accepted by Clients

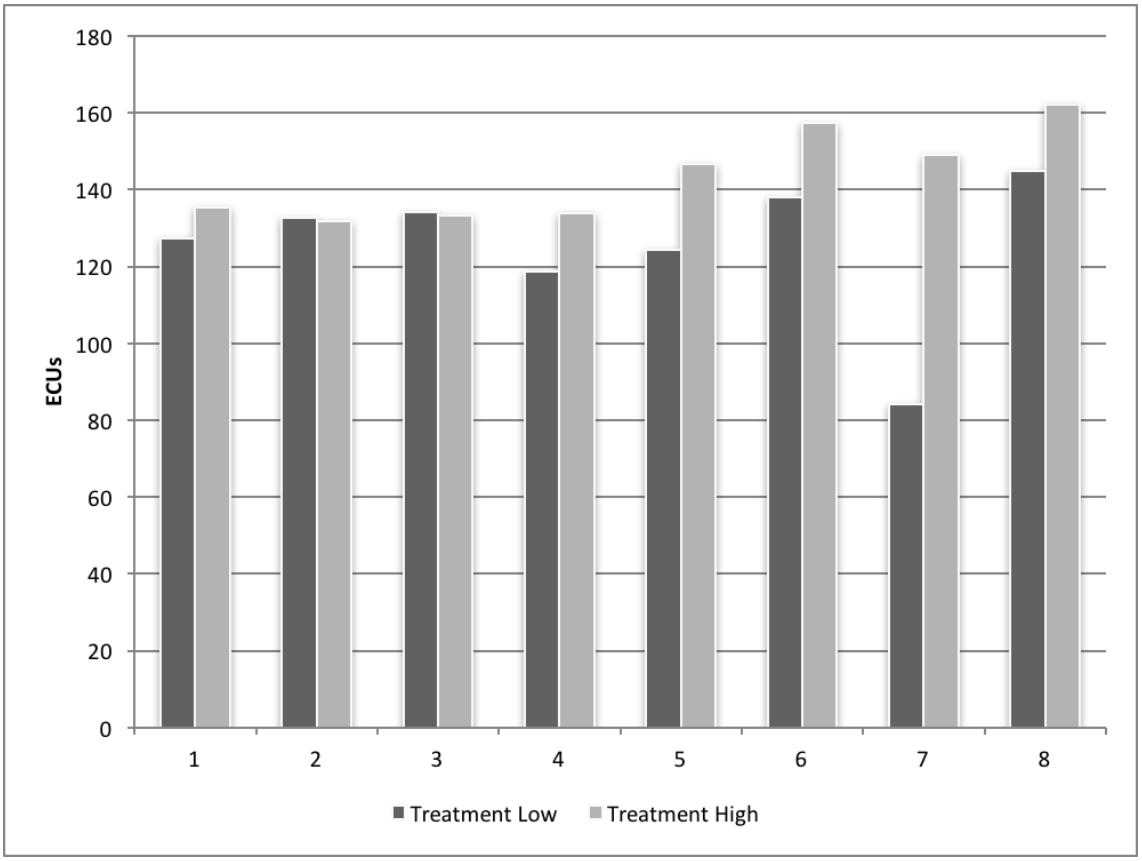
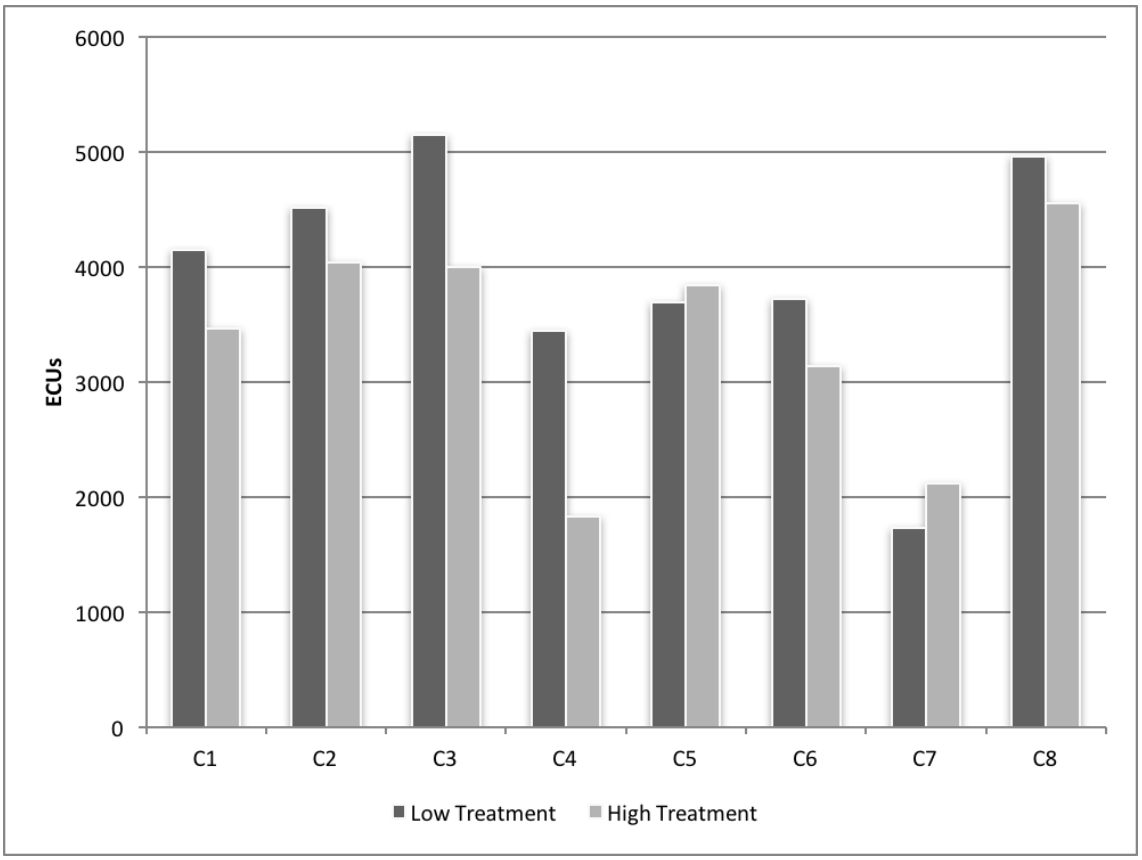
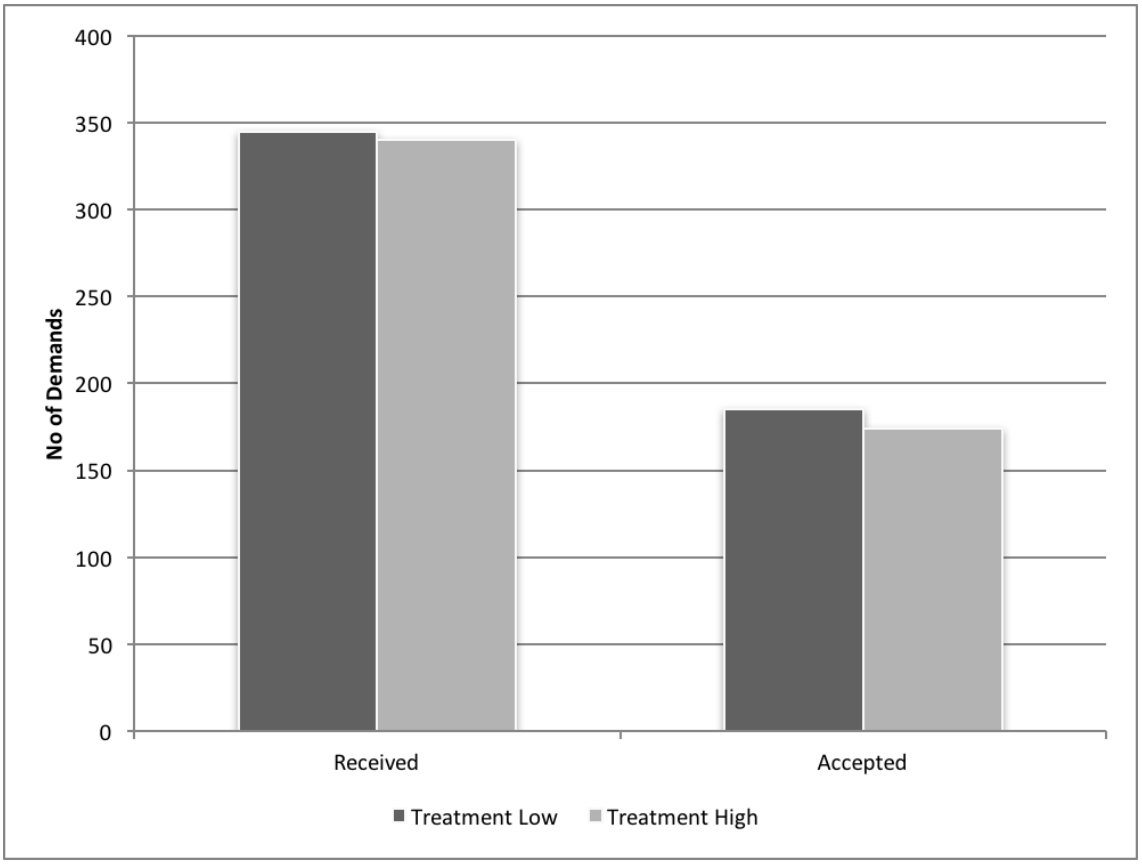


Figure 4.17: Total Profits by Clients



Total profits are the total amounts the client groups received in addition to initial endowments as a result of accepted bribe demands from the POs.

Figure 4.18: Total Number of Bribes Demanded and Accepted by Treatment



ments decreased and the bribes demanded from the richer clients increased when in the high inequality treatment. Lastly, in Figure 4.18, we see the total number of bribes demanded by public officials in each treatment, and the number of accepted offers by clients. Demands reduced to 340 from 345 when inequality was higher, while the number of accepted demands decreased by 6% to 174. Overall, amount of generated surplus was higher in the low inequality treatment and the charities received lower donations. This contradicts the general theory that corruption rises with inequality.

Result 8: *The treatment variable of inequality has opposing effects on the behaviour of the poor and the rich.*

Result 9: *Female subjects in the role of clients are less likely to accept giving bribes.*

Results of the Probit estimations are given in Table 4.8. The binary dependent variable is whether or not a client has accepted the proposed split. Of the total

Table 4.8: Probit Results - Dependent variable: Bribe Demand Acceptance

	I	**II**	**III**	**IV**	**V**	**VI**
	ALL	**POOR**	**RICH**	**ALL**	**POOR**	**RICH**
log(Endowment)	-0.156**	-0.112	1.338***	-0.102	-0.213*	0.940***
	(-2.02)	(-0.83)	(3.58)	(-1.44)	(-1.78)	(2.68)
High Inequality	0.095	-0.357**	0.340**	0.041	-0.312*	0.203
(Treatment)	(0.88)	(-2.09)	(2.08)	(0.40)	(-1.86)	(1.31)
Tolerance	0.004*	-0.007	0.012***			
	(1.90)	(-1.62)	(4.36)			
Potential	0.008***	0.007***	0.010***	0.008***	0.007***	0.010***
profit	(9.02)	(5.00)	(8.16)	(8.95)	(5.03)	(7.87)
Total Pot.	0.0004	-0.0003	0.0004	0.0005	-0.002	0.001**
profit	(1.56)	(-0.85)	(0.92)	(1.88)	(-0.79)	(2.53)
Female	-0.227**	-0.102	-0.471***	-0.237**	-0.116	-0.511***
	(-2.20)	(-0.62)	(-3.01)	(-2.30)	(-0.71)	(-3.34)
Scholarship	0.003**	0.003	0.006***	0.003**	0.003	0.006***
	(2.08)	(1.22)	(2.60)	(2.24)	(1.03)	(2.81)
Mother	0.095**	0.063	0.122*	0.082*	0.087	0.057
	(2.17)	(0.97)	(1.71)	(1.89)	(1.38)	(0.84)
POparent	-0.105	0.142	-0.399**	-0.089	0.122	-0.331
	(-0.89)	(0.81)	(-1.98)	(-0.76)	(0.70)	(-1.20)
Sequence	0.234**	0.600***	-0.044	0.276**	0.541***	0.206
	(1.98)	(3.40)	(-0.22)	(2.37)	(3.15)	(1.10)
Obs.	685	299	386	685	299	386

Associated z values are in parentheses. *, **, ***: Significant in 10, 5 and 1% respectively.

685 bribe demands, 299 have been made to clients who are poorer than the PO. In Column I, where coefficient estimates of the full model with a sample containing all clients is given, we do not observe a significant impact of the treatment (high inequality). While the relationship between tolerance and probability of accepting the bribe demand is positive, it is only significant in the 10% acceptance level. As initial endowments rise subjects become less likely to accept the demands. Increasing the potential profit offered to the client increased the chances of the demand being accepted. On the other hand, the total potential profit offered to each client did

not impact the decision to accept or reject individual demands, indicating that decisions on each single demand were made independent of other demands that the client receives in the same period. Female students were less corrupt. Holding all other independent variables constant, gender had a 9% impact on acceptance rates. Subjects who received higher scholarships were more likely to be corrupt, as were subjects whose mothers were more educated. Unlike the public officials' decisions in the game, sequence of the treatments had a significant impact on the clients' decisions. Probability of accepting the bribe demands and engaging in corruption was 9.3% higher for subjects who started the experiment in the high inequality treatment.

When we separate the sample into two groups to analyse the difference in the decision making process between the subjects who were poorer and richer than the public official in Columns II and III, we observe coefficient estimates that carry opposite signs. Despite the fact that the amount of the initial endowment they received did not affect the poor subjects' decisions; those who received higher initial endowments among the rich subjects were more corrupt. In both groups, subjects were more corrupt as their initial endowments deviated away from the mean value. The treatment also had opposing impacts on the poor and the rich. In the high inequality treatment of the experiment, initial endowments of the poor are less than their endowments in the low inequality treatment; while the rich clients receive higher endowments compared to the low inequality treatment. Since we have controlled for the impact of the initial endowment on the probability of acceptance, the coefficient estimate of the treatment variable captures how the income difference between the poor and the rich clients affect their decisions. The ceteris paribus effect of inequality is 13.5% in the opposite directions for both groups. As the poor get poorer between treatments they become less likely to engage in corruption, while the rich becomes more likely to accept the bribe demands. The significant and positive coefficient estimate of the sequence variable also suggests that poorer subjects who started the experiment in the high inequality treatment and moved to the low inequality in the second period

where their relative incomes increased, were 22% more likely to be corrupt with everything else being equal.

However, this does not indicate a tendency to become more corruptible as one gets richer. Poor clients receive very low initial endowments in the high inequality treatment. Let's call this situation "extreme poverty". Subjects do not know that their initial endowments will change in the subsequent treatment. Those who start the game in the low inequality treatment may be less corrupt when they move into the "extreme poverty" situation, compared to the ones who started the game in "extreme poverty", because they already know that there is a 50-50 chance that they might receive the rewards from the low inequality treatment. However, those who start the game in "extreme poverty" do not know if their initial endowment will change and they might be more prone to accepting bribes in order to maximize their profit. Hence, we see a significant effect of the sequence variable for the poor clients.

The effect of tolerance for inequality also varies between the poor and the rich clients. For the poor, tolerance seems to have no impact on the probability of accepting a bribe demand. According to our model, even the intolerant poor clients would accept an even split, and those who are tolerant would accept all demands. Hence, tolerance not having a significant impact on the decisions of the poor is not surprising as demands are accepted in all tolerance levels in our model. Our model also suggests that rich clients who are more tolerant of inequality should be more likely to accept bribe offers, since those who are intolerant might reject most offers, and regression results support this hypothesis. The difference in acceptance rates between a completely tolerant and intolerant rich client is 48% with everything else being equal. In Columns IV to VI, similar to the results of the public officials' analysis, when intolerance for inequality variable is excluded from the regressions, the treatment variable, high inequality, loses significance.

4.4.3 Discussion

We set out two main hypotheses to be tested before analysing the data. The first hypothesis was that actual income inequality was not taken into account by the subjects when they make their decisions on whether or not to engage in corruption. The second was that even though inequality itself should not matter, tolerance for inequality would enter the decision making process of both the public officials and the clients.

Throughout this thesis, we have made distinctions between the concepts of actual inequality, distributional perceptions and aversion to perceived inequality. Distributional perceptions are the estimations made by an individual on the distribution of income. In our experiment, by providing perfect information on the distribution of income. Hence, theoretically, distributional perceptions of the subjects should be equal to actual endowment inequality at the beginning of each treatment in the game. However, even though, their distributional perceptions were equal in theory, assuming that we have appropriately measured tolerance, subjects still differ in their aversion to (perceived) inequality due to differences in their tolerance for inequality.

In our experiment, the change in inequality by itself, without controlling for tolerance for inequality, did not significantly alter the decisions of public officials on the number or the amount of bribe demanded. Similarly, we have not seen a significant impact of initial endowment inequality on the probability of accepting a bribe for clients when the full sample data is used. However, once we control for tolerance, inequality increased corruption for both the public officials and clients. The ceteris paribus interpretation of our results is that, keeping tolerance constant, an increase in inequality also increases corruption. Therefore, in the context of our experiment, we reject our hypothesis that actual income inequality does not relate to corruption.

As predicted in our model, individual tolerance for inequality has a significant and positive relationship with corruption. In the sample of subjects both in the roles of

public officials and clients, those who were more tolerant of inequality were more corrupt than those who were less tolerant. Therefore, we fail to reject the second main hypothesis of this chapter.

Individuals who are more tolerant of inequality are more corrupt. We have reached this conclusion repeatedly in our analysis. However, this conclusion is subject to certain limitations. First of all, our method on measuring tolerances can be questioned. We measure tolerance for inequality by giving full information to the subject regarding the distribution of initial endowments, and asking the subject to state their opinion on the level of inequality by moving a slide. We believe that between two individuals, the one that considers a given distribution more unequal compared to the other, is less tolerant of inequality. Note that subjects do not receive any monetary reward for stating their opinions on the distribution of endowments. For this reason, it can be argued that we fail to elicit the true level of tolerance.

The question we have to ask ourselves is whether we need monetary rewards to elicit tolerance for inequality. Even though no reward system is implemented to elicit tolerance, the tolerance variable entered our regressions significantly in almost all cases, as hypothesized. Individual perceptions and opinions on inequality is difficult to measure conceptually. If we have failed to elicit these values, and subjects assigned values randomly, we would not observe any significant difference in average values of tolerance between the high and low inequality treatments. However, we do see a large difference in tolerance between treatments for both the public officials and clients.

According to Fehr and Schmidt's (1999) model of inequity aversion, subjects who are inequity averse would try to equalize incomes between themselves and those who are richer by allocating more of the surplus to themselves. In our experiment, we have seen that public officials, on average, demanded bribes that are lower than the amount necessary to minimize the income gap. In our model, this is explained by the moral cost associated to corruption. A subject in the role of a public official might

anticipate rejection of the bribe demand, if the amount received by the richer client is less than the utility loss caused by the reduction in the donation pool. In future research, it would be useful to include an additional treatment in the game, where corruption does not reduce the donation pool. This would allow the researcher to identify the impact of the moral cost.

An interesting conclusion we can derive from our regression analyses is that there are differences in decisions between genders. Female subjects in the role of public officials had lower desired incomes and demanded less bribes. Female clients were also more likely to reject a bribe demand than their male counterparts. A consensus in economic literature has not yet been reached on whether or not women are less prone to corruption. Using micro and macro data, Swamy et al. (2001) argue that higher involvement of women in the parliament and high governmental positions lead to less corruption as they are less likely to condone bribery. By contrast, previous experimental evidence suggests that differences between genders are caused by female subjects' reaction to institutional settings in experiments, such as their higher risk aversion, and not necessarily by their intrinsic honesty or aversion to corruption (Frank et al., 2011). Similarly, we believe that the negative externality setting in our experiment, which is to subtract the amount of donations to the most popular charity, may have a more discouraging effect on female subjects. Women score higher on tests measuring emphatic concern, moral obligation and motivation to help others, while volunteering more of their time to charities Einolf (2011). Interestingly, the only seven subjects who inquired about the charity donations after our experimental sessions were all female. Therefore, it is possible that with all else being equal female subjects incurred a higher moral cost due to corruption's impact on donations in our experimental design.

4.5 Conclusion

In this chapter, we designed a laboratory experiment in order to investigate the link between income inequality and corruption. A laboratory experiment allowed us to overcome certain methodological concerns when measuring corruption that would otherwise arise in a macroeconomic model. We have shown that a change in initial endowment inequality only altered the subjects' decisions, once we controlled for tolerance for inequality. Controlling for tolerance relates the distribution of income to perceived inequality. In this sense, what influenced subjects' decisions to be corrupt was the inequality they perceived, and their tolerance towards it. Our experimental results further emphasized the importance of perceived inequality in the decision making processes of corrupt individuals.

Chapter 5

Perceived Inequality and Fairness in the Public Sector: A Case Study in Turkey

5.1 Introduction

One manifestation of corruption occurs when an inequity averse public official decides to equalize the income difference between themselves and the rich by soliciting bribes. The public official knows their own income, yet does not have perfect information on the income of the rich. Therefore, they need to estimate the income of the rich. Estimations of others' incomes form the basis of perceived inequality and they are likely to be biased. Hence, a casual economic relationship exists between perceived income inequality and corruption.

In the previous three chapters, we attempted to provide empirical evidence to support our argument that inequality causes corruption through individual perceptions and attitudes. Two studies, Norton and Ariely (2011) and Cruces et al. (2013), demonstrated that individuals incorrectly estimate inequality in societies. However,

Figure 5.1: A Neighbourhood in Istanbul

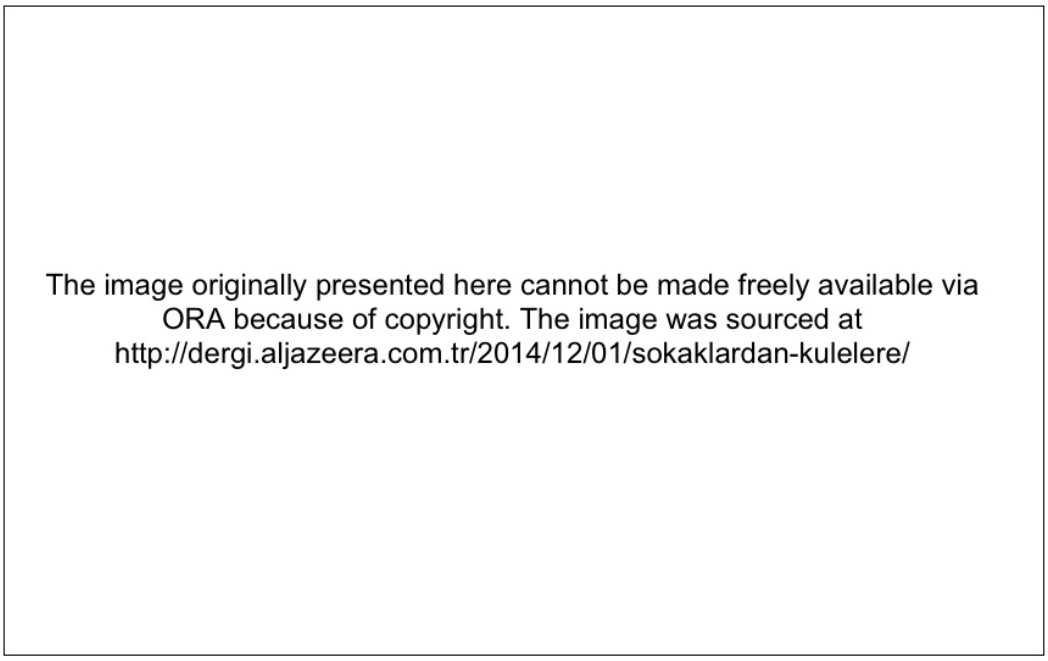


Photo is taken by Saner Sen for Al Jazeera (http://dergi.aljazeera.com.tr/2014/12/01/sokaklardan-kulelere/).

it can be argued that public officials who can solicit bribes may have more interactions with the general public than the individuals who were surveyed in these studies. Therefore they might possess accurate information on others' incomes and can have unbiased estimations of the income distribution based on their own experience.

In this chapter, we aim to explore public officials' perception of and attitudes to income inequality in depth. In order to do so, we conducted interviews with public officials in Turkey, allowing us to better understand how their perceptions of income inequality are formed. Turkish public officials were chosen as the focus of the study for three main reasons. First and foremost, the author of this thesis is Turkish, and has extensive knowledge on the country's socio-economic background. Second, as we will later see in the next section, Turkey is considered a country with high levels of income inequality. Rapid economic growth and urbanization, coupled with a lack of sufficient public social assistance and planning, have made local and regional inequalities more apparent, especially in Istanbul (Figure 5.1). Lastly, corruption is widespread in Turkey. The corruption epidemic has been present in Turkish

society since the Ottoman period, and its existence is so widely accepted that a phrase roughly translating to "Only an idiot (pig) does not steal from the state" has become a common proverb[1].

Turkish society, and its socio-economic characteristics, provide an ideal fieldwork location to investigate our research questions. Unfortunately, the extent of corruption that makes Turkey an alluring fieldwork location, also had an adverse impact on our research itself. Our initial aim was to interview public officials and gather their opinions, not only on income inequality, but also on corruption. However, during the preparation period of this thesis, a sensational corruption scandal emerged in December 2013. Several ministers in the government, President Erdoğan's family members and the CEO of a Turkish state bank allegedly took bribes to by-pass economic sanctions against Iran [2]. The Turkish authorities, led by Erdoğan, dismissed the case and started a campaign to paint the allegations as a conspiracy against the state, organized by a religious cult known as the "Hizmet" movement. Erdoğan's battle with this religious cult peaked in July 2016, when a coup was attempted, allegedly also organized by the "Hizmet" movement. The political tension between these two actors have made investigating the topic of corruption potentially dangerous. For this reason, we have decided to refrain from asking public officials any questions on corruption, and focus instead on matters of income inequality.

A study similar to what we intended to do was previously carried out by Fried et al. (2010) in Mexico City. The authors conducted a field experiment, where four research assistants, two in the role of lower class and two in the role of upper class citizens, differing in their clothes and model of their cars, violate a traffic rule by making an illegal left turn in a street manned by police officers. They have found that assistants in the role of lower class citizens, driving older cars and lower quality clothes, were demanded to pay bribes more frequently, while "upper class" assistants were asked to pay fewer bribes in higher amounts. Fried et al. (2010) later

[1] In Turkish: "Devletin malı deniz, yemeyen keriz (domuz)"
[2] http://www.reuters.com/article/us-turkey-corruption-idUSBREA410NE20140502

interviewed ten police officers to understand the rationale behind the difference in bribe taking. The interviews revealed that police officers extort bribes because they believe they are not paid enough, yet they are less likely to take bribes from, or give a ticket to drivers they perceive as wealthy because they fear potential retribution of the rich and well connected individuals.

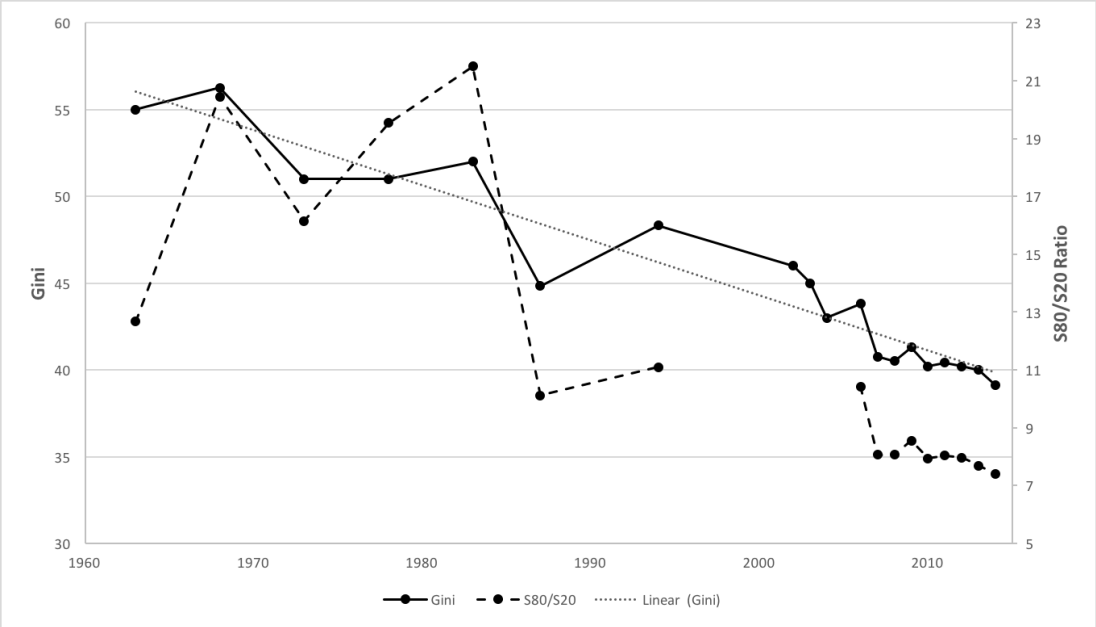
Fried et al. (2010) investigated whether perceived inequality motivates public officials to take bribes in individual interactions. In our model, public officials desire to close the gap between themselves themselves and those they perceive to be more affluent than they are. What we are interested in is not how they perceive the wealth of separate individuals, but rather how they perceive income to be distributed in society as a whole. We expect to find that public officials have biased understandings of societal income distribution, and that these biases will strongly be based on their income, social networks and places of residence. Similarly, Cruces et al. (2013) shows that people incorrectly estimate their place in the income scale by extrapolating their own reference group, meaning two individuals, one living in the skyscraper and the other living in the squatter house in Figure 5.1, might have very different perceptions of inequality.

In what follows, we review the existing literature on income inequality and corruption in Turkey, before discussing available data on perceived inequality and tolerance in the country. We conclude by supplementing our survey data with the results of 21 recorded interviews.

5.2 Income Inequality and Corruption in Turkey: Stylized Facts and Review of Literature

Turkey's economy is characterized by the highly unequal distribution of income. Mukhopadhaya (2004) classifies countries according to their average Gini coefficients

Figure 5.2: Income Inequality in Turkey



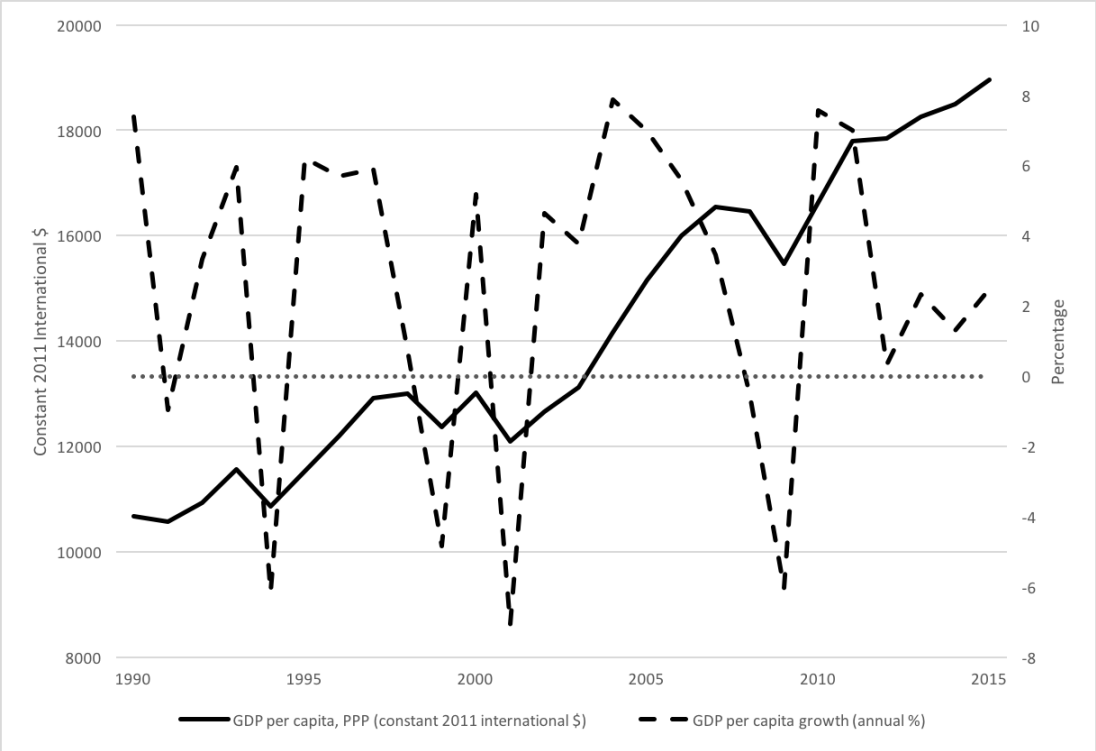
Data source: UNU-WIDER (2015) World Income Inequality Database. S80/S20 is the ratio of the share of income received by the richest 20% to the share received by the poorest 20% in Turkey. Linear (Gini) is a linear trend estimation of the Gini coefficient.

between 1950 and 1999 where Turkey finds its place at the highest rank of the 0.45-0.50 group, having a more equal distribution of income than only a handful of countries. Figure 5.2 displays how income inequality has evolved since 1960s. The Gini coefficient as a measure of disposable income inequality was as high as 0.56 in the 60s, with the ratio of the income of the top 20% to the poorest 20% being higher than 20. Inequality has dropped steadily to lower 0.40s in the following five decades, with the S80/S20 ratio decreasing to seven. However, according to the OECD Income Inequality dataset, despite the rapid reduction in inequality, it still remains the third highest amongst the OECD countries, after Mexico and Chile.

Reduction in income inequality over the last five decades was coupled with high economic growth, as well as an increase in public social expenditure, especially since the 90s (Figures 5.3 and 5.4). GDP per capita in terms of purchasing power parity (PPP) increased over 75% in the last 25 years. Current GDP per capita (PPP) is over $18000 [3]. Despite being much lower than the OECD average, public spending

[3]According to the World Bank, Turkey is an upper middle income country. Average GDP per capita (PPP) in upper middle income countries was $14812 in 2015.

Figure 5.3: Economic Growth in Turkey



Data source: The World Bank (2016) World Development Indicators

Table 5.1: Distribution of Equivalized Household Disposable Income in Turkey in 2014

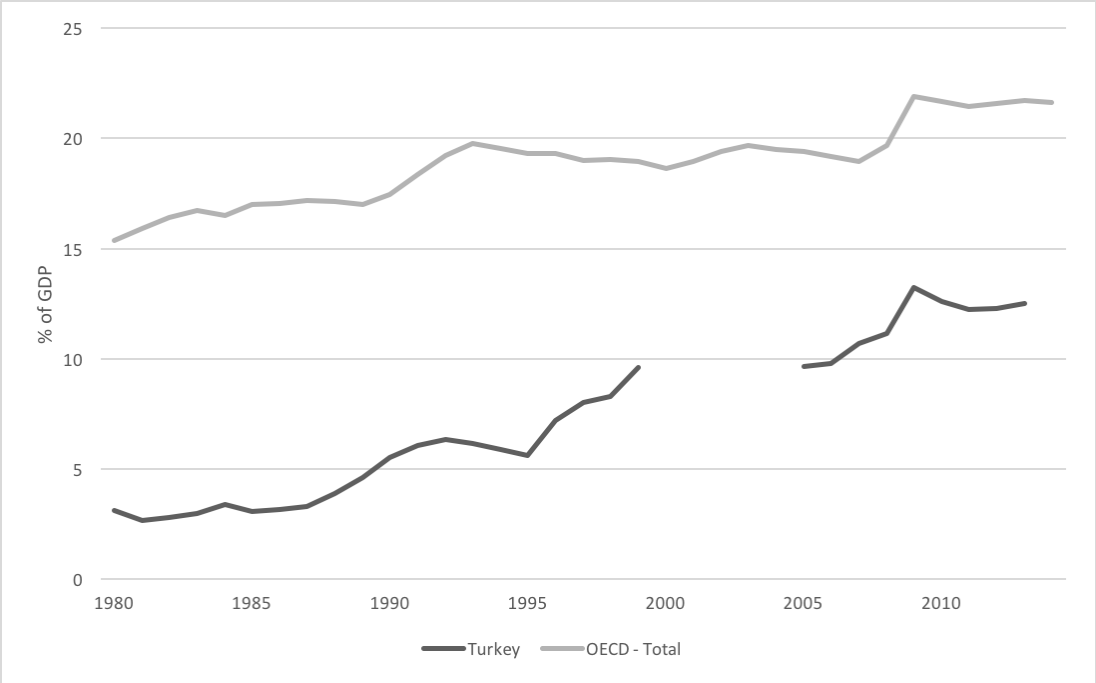
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**
%	2.4	3.8	4.9	5.9	7.0	8.3	9.8	11.9	15.6	30.3
Mean	290	462	595	721	854	1005	1191	1441	1890	3679
Median	302	463	594	720	853	1005	1190	1434	1863	3046

Data source is TurkStat (2016). **D** stands for decile. Mean and Median values are in Turkish Liras per month. Equivalized household disposable income in this survey is calculated by dividing the total household income by the household size equivalized in the OECD measure, which is 1 for the reference person of the household, 0.5 for household members aged 14 and over, 0.3 for household members less than age 14.

in social benefits in Turkey also saw a significant increase over these years. The government spent an amount equivalent to 12.5% of the GDP to social expenditures, more than double of the amount in 1990. Nevertheless, this is 9% less than the OECD average.

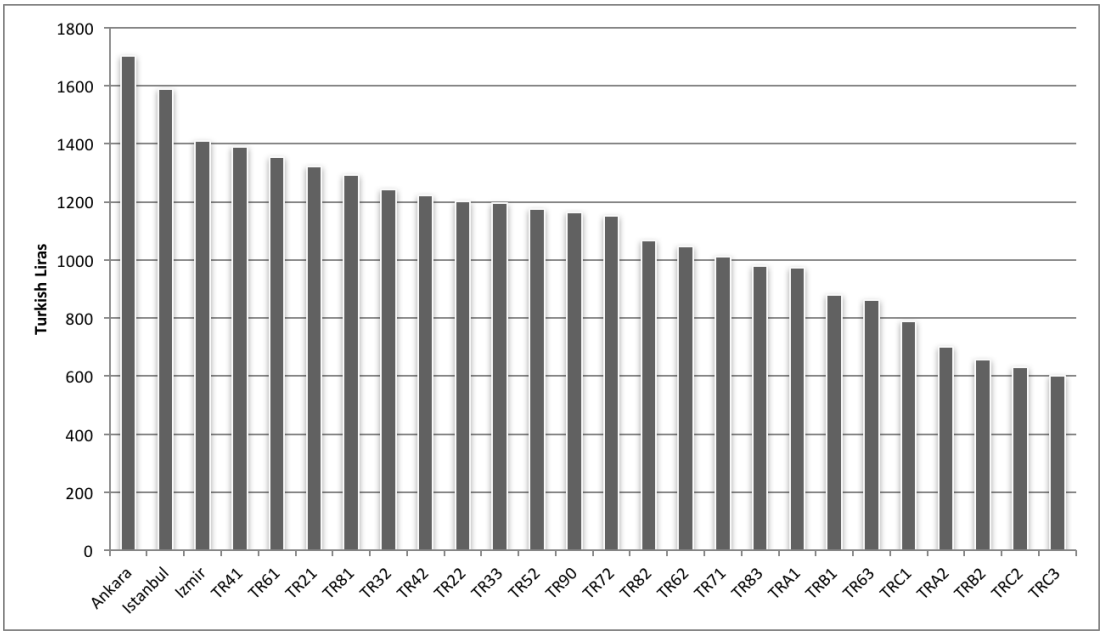
According to the Income and Living Conditions Survey conducted by TurkStat, the national statistics office of Turkey, in 2014, the mean equivalized household disposable income per person in Turkey was 1213TL (Turkish Liras) per month, while the median was 926 TL. Distribution of monthly equivalized household income in

Figure 5.4: Public Social Expenditure in Turkey



Data source: OECD (2016) OECD-Total is the average public social expenditure in all OECD countries.

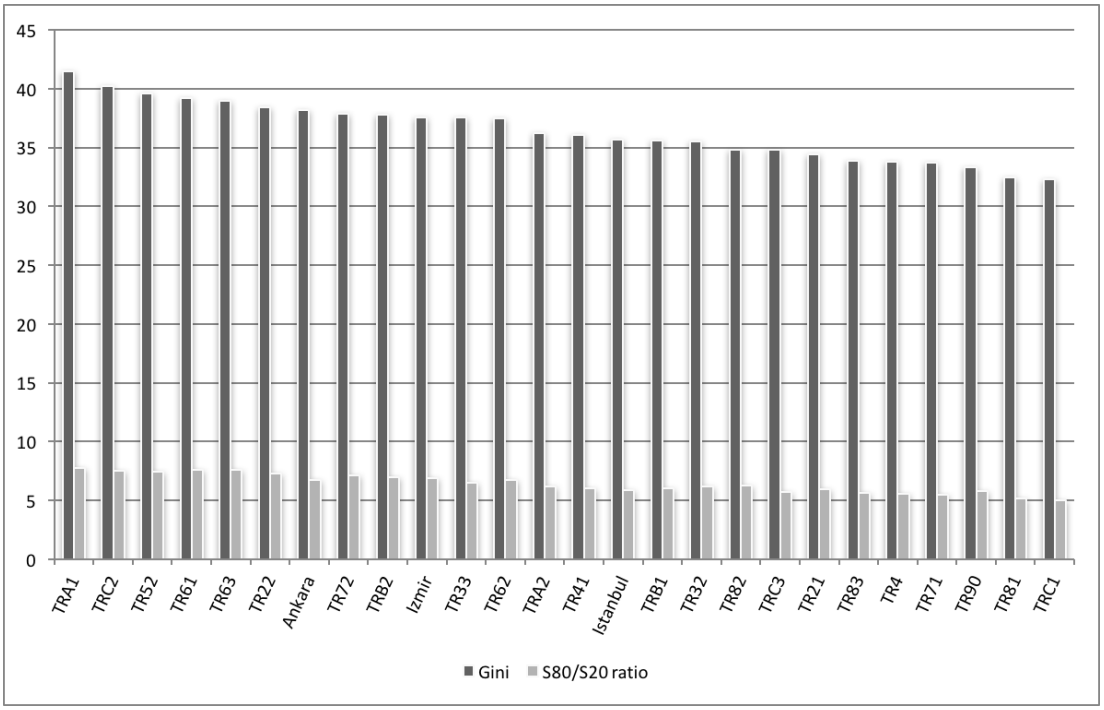
Figure 5.5: Regional Income Levels in Turkey



Data source: TurkStat (2016)

Turkey, can be seen in Table 5.1. In 2014, the richest 10% had a monthly disposable income of 3679 TL per person in average, corresponding to 12.7 times the income of the poorest 10%.

Figure 5.6: Regional Gini Coefficients

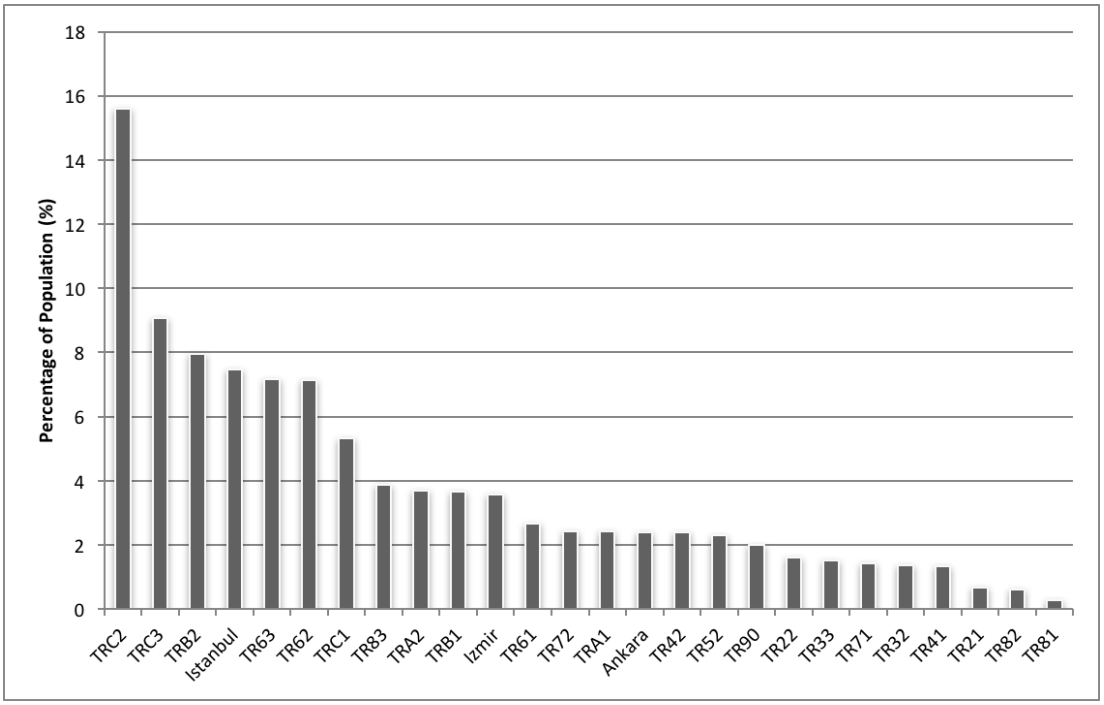


Data source: TurkStat (2016)

TurkStat divides the country into 26 statistical regions with the three largest cities, Istanbul, Ankara and Izmir, being separate regions. The remaining 78 cities are bundled together into groups of two to five, based on their geographic and socio-economic proximity. The mean equivalized household disposable income of each region in 2014 is given in Figure 5.5. The capital city, Ankara, has the highest individual income, followed by Istanbul, which is the largest city in the country with a population around 14 million. Individual disposable income is 2.8 times higher in Ankara than the poorest region. Cities in the four poorest regions with incomes lower than 700 per month, are all located in the Eastern and South-Eastern part of the country, heavily populated by the Kurdish minorities. TurkStat also publishes regional inequality data (Figure 5.6). Despite being the largest city with the high migration and having the second higher individual incomes, Istanbul is not the most unequal city. In fact, it is placed at the lower-middle, with a Gini coefficient of 35.7.

High economic growth over the last 25 years were not very successful on reducing

Figure 5.7: Regional Poverty Rates

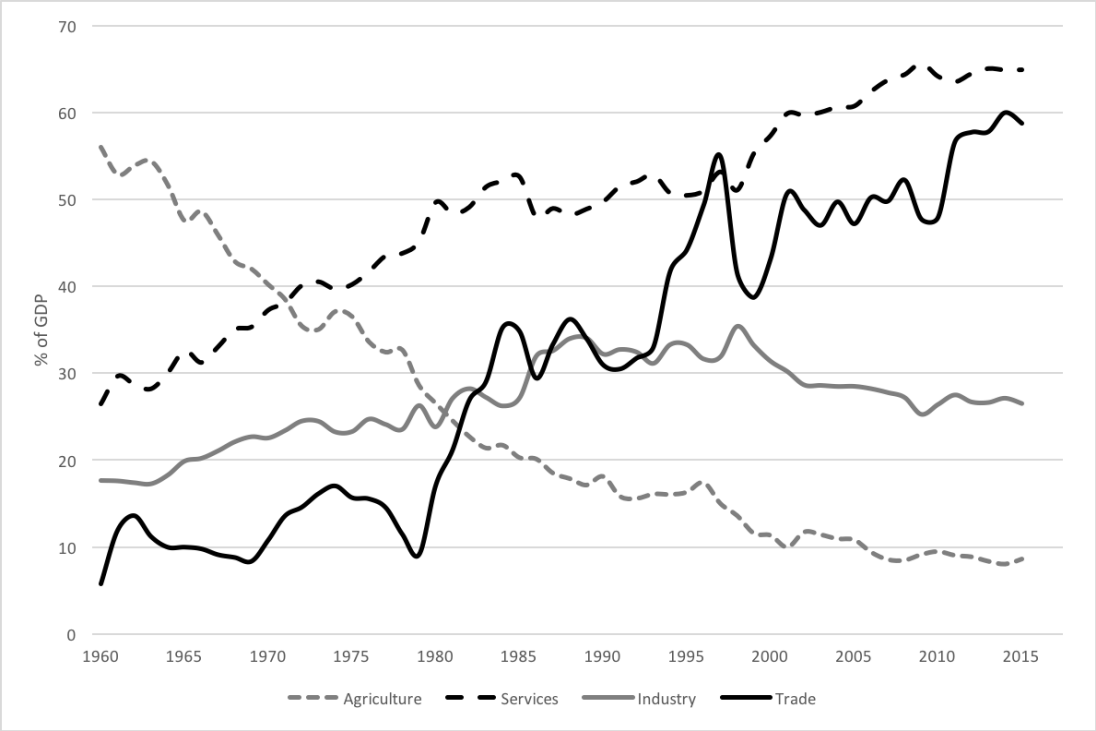


Data source: TurkStat (2016)

poverty in Turkey. In 2014, 13.8% of the population, corresponding to 10.4 million people, received an income below the national poverty line, which is calculated by TurkStat as half of the median income (450 TL in 2014). Figure 5.7 displays the share of people living below the poverty line in each statistical region. Regions in the South East Turkey has the highest poverty rates. Poverty rate in Istanbul is also relatively high, with 7.5% of the city's population receiving less than 50% of the median income.

The Turkish labour market is characterized by the existence of a large informal sector, which reduces potential tax revenues and may contribute to income inequality. According to the International Labour Organization's LABORSTA database, the share of informal employment in non-agricultural activities was 30.1% in 2009. Nearly five million individuals worked informally, without declaring income. OECD report on Turkey in 2014 states that around 50% of the total work force of firms with less than ten employees is working informally (Gonenc et al., 2014). Majority of the labour force works in the service sector, while the value added share of the

Figure 5.8: GDP Sector Composition and Trade in Turkey

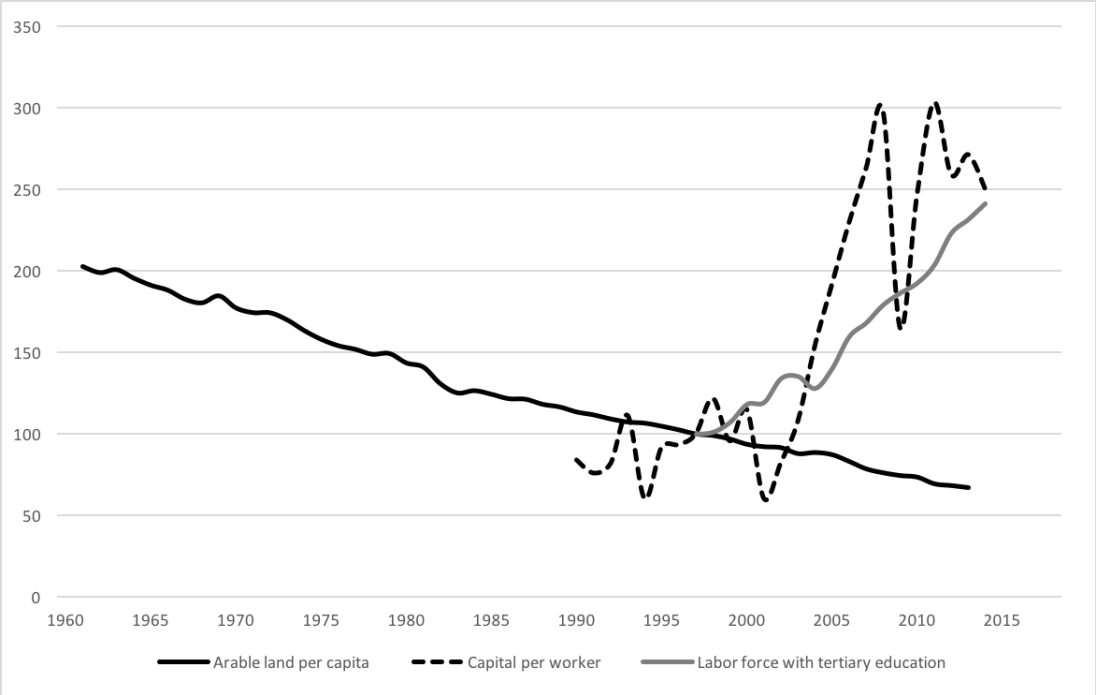


Data source: The World Bank (2016) World Development Indicators

agricultural sector in the GDP has been in steady decline since the 60s (Figure 5.8). Industrialization of the economy was accompanied by trade and financial liberalization in the 80s. The arable land per capita has also decreased by more than 50% in five decades (Figure 5.9). These sectoral and factorial changes in the economy fuelled the rapid urbanization process 5.10.

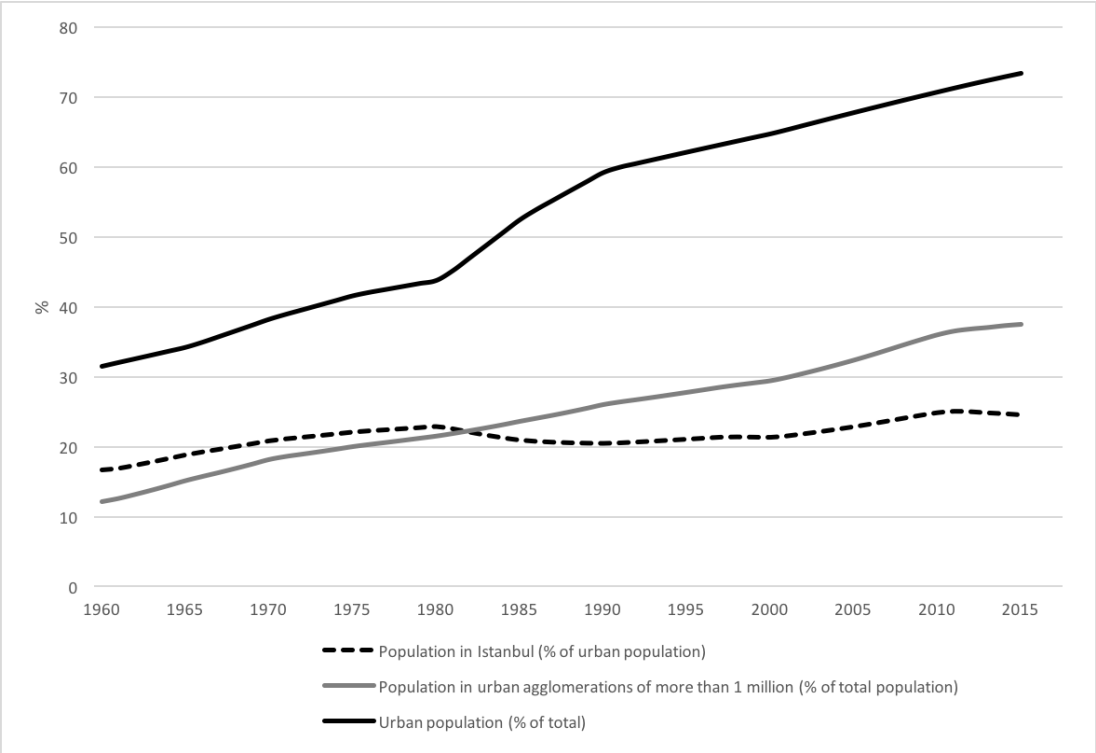
The process of rapid urbanization in Turkey after World War II originated the "gecekondu" phenomenon, which had significant impacts on Turkish economy, politics and society, and transformed the concept of urban life. The lack of adequate urban housing prompted rural migrants arriving to cities to illegally occupy unsettled land and to build a shanty in a very short period of time. These shanties were dubbed "gecekondu", literally meaning "built overnight", appropriately reflecting the speed and stealth of the construction process (Tas and Lightfoot, 2005). Gecekondus significantly helped close the gap between the rich and the in Turkey (Başlevent and Dayoğlu, 2005). In 1972, an estimated population of 2.5 million was living in gecekondus and this estimation reached to 20 million by 1998 (Dicle, 1983;

Figure 5.9: Factor Endowments in Turkey with 1997 as the Base Year (=100)



Data source: The World Bank (2016) World Development Indicators

Figure 5.10: Urbanization in Turkey



Data source: The World Bank (2016) World Development Indicators

Figure 5.11: Law and Order & Bureaucratic Quality in Turkey

Data source: International Country Risk Guide

Leitmann and Baharoglu, 1998). Gecekondus first emerged near industrial zones on public land and were built by communal efforts (Yonder, 1987). However, by the mid-1980s, squatting in the traditional sense was nearly impossible as the informal market became speculative due to high demand and it was commercialized despite being illegal (Baharoğlu, 1996).

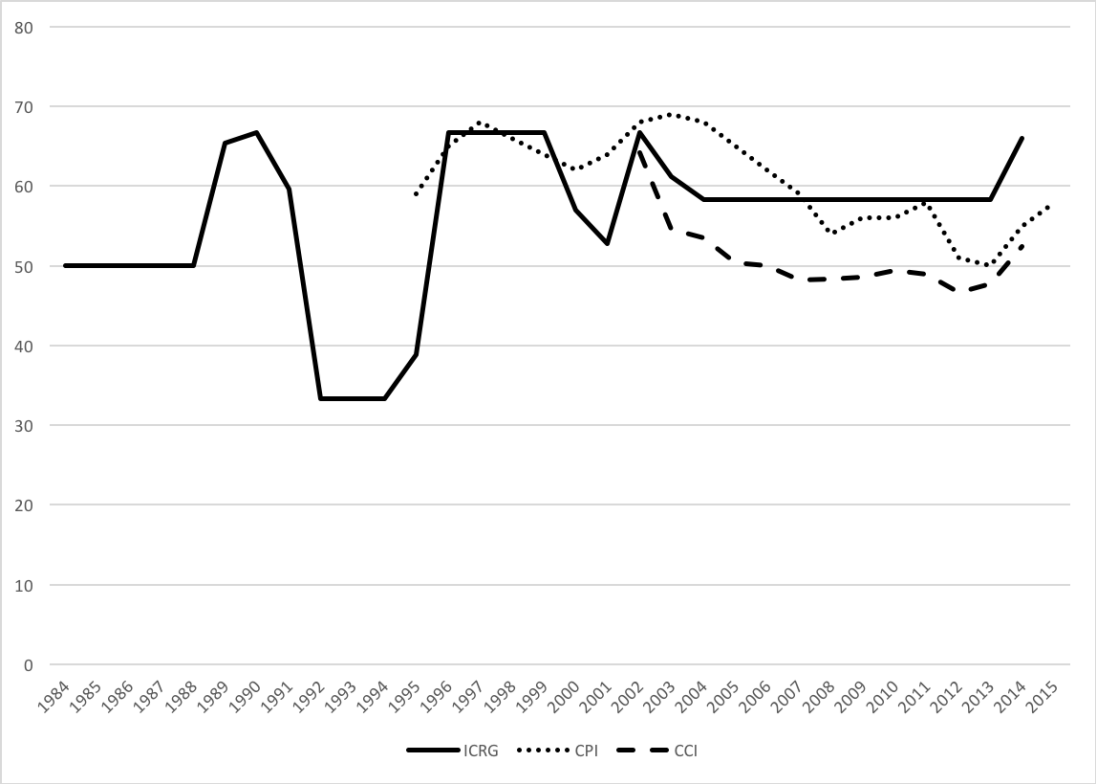
Disregard for building regulations and permits is a clear indicator of the weakness in rule of law in Turkey. Indicator for rule of law and bureaucratic quality normalized to ten is displayed in Figure 5.11. According to PRS Group's country expert surveys, both the rule of law and bureaucratic quality is in mid-levels, with low variation over the past 30 years. Evidently, frequent undermining of the law, and poor bureaucratic quality creates a socio-economic environment that breeds corruption.

Despite the fact that corruption has almost always been highly present in the Turkish state since the Ottoman times, its impact on the economy of the Turkish Republic became more visible after 1983 with the liberalization of the market and the growing media (Altun, 2004). The prime minister of the era, Turgut Özal, "proudly stated:

'My bureaucrats know their business,' a phrase which became the motto for state-sponsored encouragement of bribes and embezzlement" (Baran, 2000, p.135). Özal's successors followed his example. Tansu Çiller and Mesut Yılmaz, leaders of two main centre-right coalition government parties were both investigated for alleged corruption. In fact, Çiller later made a deal with the Islamist Welfare Party for their help in opposing the corruption investigations against her, causing Necmettin Erbakan to be the first Islamist prime minister of Turkey with fewer than 20% of votes in June 1996 (Baran, 2000). State corruption and internal connection to organized crime in Turkey became ever more apparent with the "Susurluk Scandal". A fatal car accident occurred in the town of Susurluk on 3 November 1996, with the involved car carrying a member of Çiller's True Path Party, a former police chief and a Mafia leader sought by INTERPOL.

Public debates started to include the implementation of anti-corruption reforms after Kemal Derviş, the former vice president of the World Bank, was appointed as the minister of state to revive the economy after the 2001 financial crisis (Bedirhanoğlu, 2007). However; the 2002 elections gave way to the rise of the mildly Islamist Justice and Development Party (AKP); and accompanied by Turkey's increasing interest to join the European Union, which was regarded to act as a disciplinary organization to implement necessary reforms, Erdoğan's new party promised to combat corruption. Nevertheless, Bedirhanoğlu (2007) explains that the corruption charges on the government continued, as AKP has been provided a chance to increase its power by transferring wealth from the state to Islamist business groups through privatization and decentralization. Many leading politicians of AKP, including Erdoğan himself, have been accused of corruption (Rubin, 2007). Ever more growing concerns on government corruption and demand for more transparency in public sector contracts were some of the main themes in the recent Gezi Park demonstrations that took place in June 2013 all over Turkey. A new corruption scandal erupted in December 2013, leading to the resignations of 4 cabinet ministers.

Figure 5.12: Corruption in Turkey



All indices are normalized to 100. Higher scores depict higher corruption.

Corruption in Turkey does not only exist at the government level. In his 2004 article, Bryane Michael compares Turkish corruption to other EU candidate countries (Hungary, Latvia, Slovakia and Romania). He uses data from Adaman et al. (2001) study measuring the household view on corruption in Turkey and shows that accepting bribes is widespread among the traffic police, customs officers, tax inspectors, land registry officers and municipality workers. According to Transparency International's (TI) Global Corruption Barometer survey in 2013, 54% of the respondents think corruption in Turkey has increased over the past two years. 89% find corruption to be a problem in the Turkish public sector and 38% believe that the government was ineffective to combat corruption. Political parties, parliament, media and business are considered to be the most corrupt institutions with at least 50% of the respondents feeling they are corrupt or extremely corrupt. Turkey scored 42 out of 100 in TI's Corruption Perception Index (CPI) of 2015, ranking 66th in the world. Even though this score reflects amelioration compared to the results in

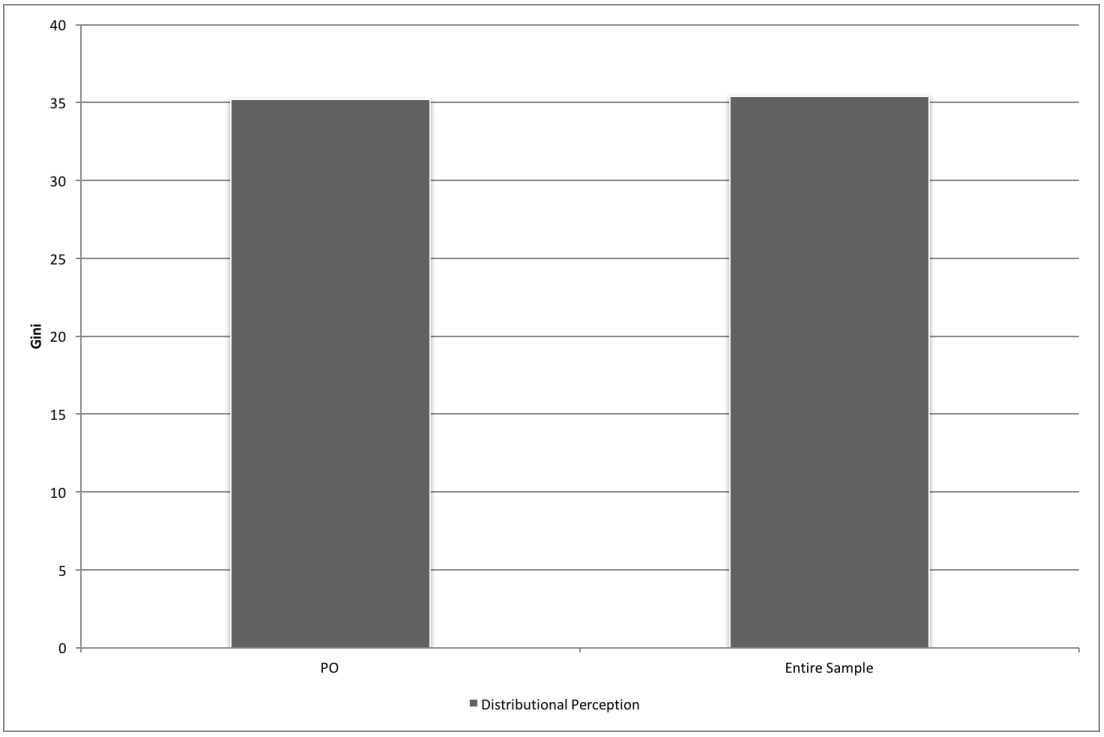
2002 (A score of 3.2 over 10, ranking 64th between 102 countries), it still indicates serious levels of corruption in the public sector. Figure 5.12 shows the evaluation of corruption in Turkey since 1984 from three different corruption indices. All indices have been normalized, with 0 depicting no corruption and 100 highest level of corruption. Turkey experiences above average level of corruption according to the International Country Risk Guide (ICRG) surveys since mid-1990's. Results from CPI are similar to ICRG and indicate high corruption. The Control of Corruption Index (CCI) from the Worldwide Governance Indicators of the World Bank places Turkey barely below average

The unequal distribution of income, high levels of informality in the labour and housing markets and the wide extent of corruption makes Turkey an ideal location to conduct our research. The remainder of this chapter will explore how public officials and the general public perceive income inequality in Turkey, and how the socio-economic and political conditions we have underlined above, shape their opinions.

5.3 Perceived Inequality and Tolerance for Inequality in Turkey

We have previously expressed concern regarding the lack of data on distributional perceptions of income and tolerance for inequality in countries. The handful of studies that choose to enhance the body of limited economic literature, including the second chapter of this thesis, mostly uses the International Social Survey Programme's (ISSP) Social Inequality to analyse between and within country perceptions of inequality. We will also examine data from the latest waves of ISSP and World Values Survey (WVS) to investigate perceptions and opinions on inequality, before presenting the results of our own interviews.

Figure 5.13: Distributional Perceptions



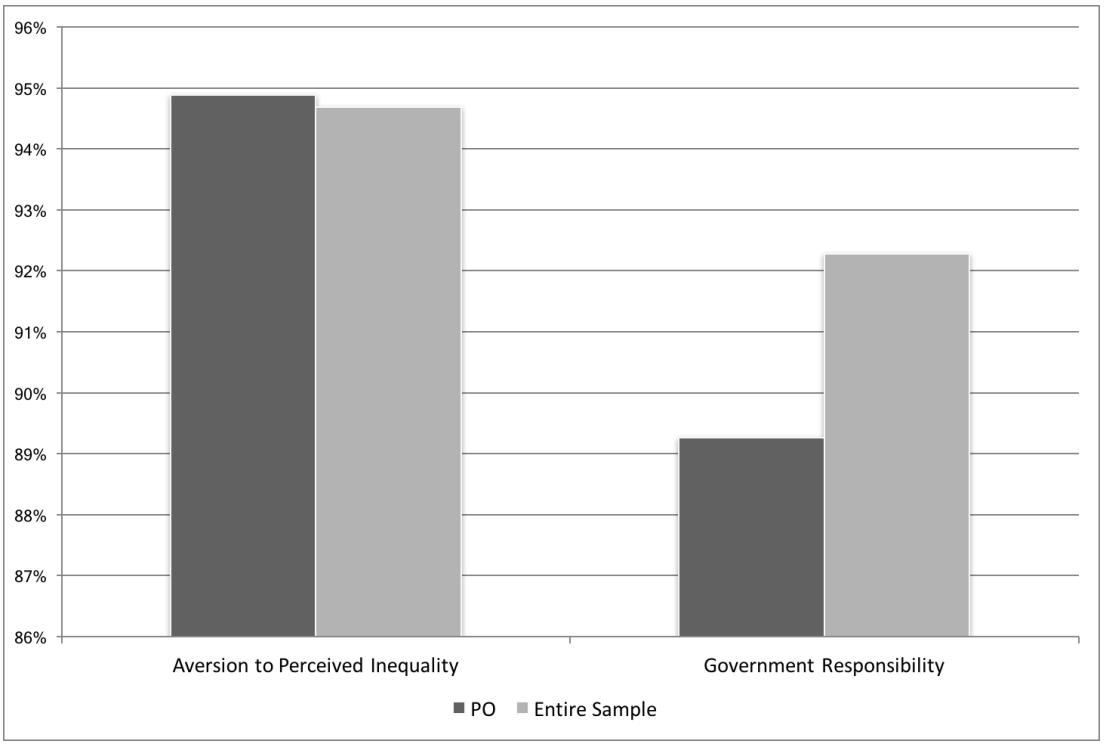
Distributional perceptions are the average of Gini coefficients calculated from the respondents' choice of figures. PO stands for public officials. Entire sample also includes public officials.

5.3.1 Social Inequality Survey

ISSP's Social Inequality IV dataset includes 1569 observations from Turkey. The reference period of the survey is late 2009. The universe of the survey is people aged 18 and older. Multi-stage stratified random sampling was applied to the sampling frame based on the population register of household addresses obtained from the Statistical Institute of Turkey. 52.7% of the respondents were female and 65% resided in urban communities. 11.34% of the respondents stated that they work in public sector. Of those who declared their political party affiliations, 49.9% supported the ruling Justice and Development Party, 20.8% supported the main opposition, Republican People's Party, and 15.2% supported the Nationalist Movement Party. These shares of votes are similar to that of the 2011 general elections, where the three political parties received 49.8%, 26% and 13% of the total votes respectively.

We commence by examining the data with the distributional perceptions in Turkey,

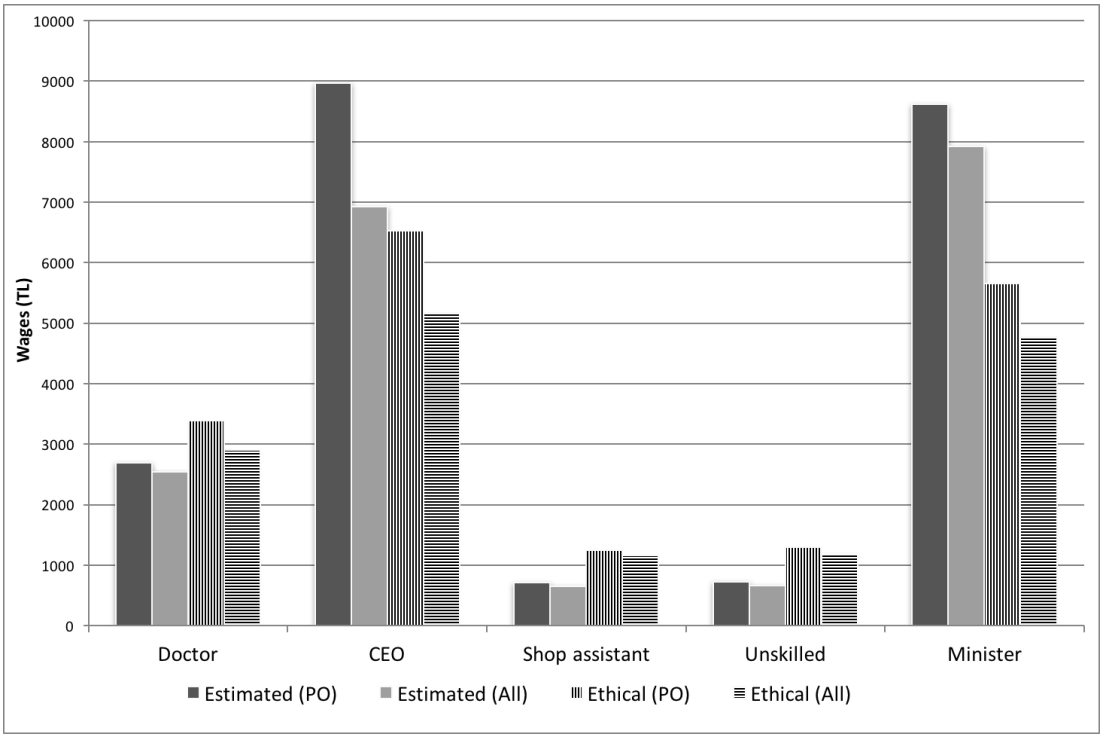
Figure 5.14: Aversion to Perceived Inequality and Government Responsibility in Reducing Inequalities



PO stands for public officials. Entire sample also includes public officials. Aversion to Perceived Inequality is the agreement rate to the statement: "Differences in incomes in Turkey are too large". Government Responsibility is the agreement rate to the statement: "It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes."

comparing public officials' (PO) opinions with the average. The distributional perception variable is obtained following Gimpelson and Treisman (2015) by assigning a Gini value to the distributional figures in the survey questionnaire, as we previously discussed in Chapter 2. The mean estimates of the population sample and the PO's do not differ significantly with both being 35, which corresponds to the second highest option depicting the degree of inequality in the questionnaire (Figure 5.13). We do not observe any significant difference between the two groups in their aversion to perceived inequality either, with around 95% of the sample agreeing to the statement "Differences in incomes in Turkey are too large" (Figure 5.14). However, views of the public official's in Turkey regarding the responsibility of the government in reducing income gaps, differs slightly from the rest of the population as only 89% of PO's think that government should try to reduce inequalities. Responses to these three survey questions reveal that Turkish citizens perceive high inequalities in the society and a large majority is in favour of government intervention to equalize

Figure 5.15: Estimated and Ethical Wage for Different Occupations

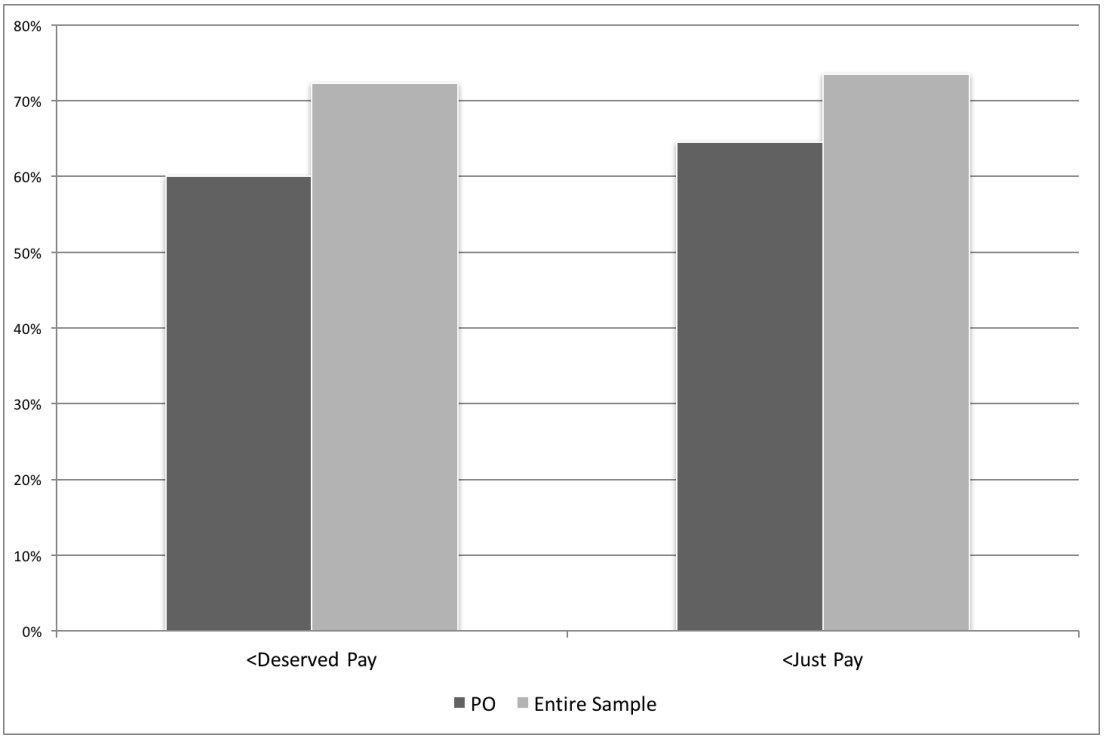


PO stands for public officials. All depicts entire sample. Entire sample also includes public officials.

incomes.

The ISSP also asked respondents to estimate how much a doctor, a CEO of a large national company, a shop assistant, an unskilled worker and a cabinet minister might be actually earning in their jobs. Respondents are also asked how much people working in these occupations should earn. Figure 5.15 display mean response values of PO's and the sample. "Estimated" values are answers to the first question, while "Ethical" values are the responses to how much one *should* be earning. On average, according to the respondents, a shop assistant and an unskilled worker earned almost the same income. If we take the estimated income of the shop assistant, which has the lowest mean, as the base unit, a doctor was estimated to earn 3.9 times the shop assistant, while a CEO and a minister were estimated to earn 10.6 and 12.2 respectively. The Gini value for the distribution of mean estimated incomes for these five occupations is 44.5, which is close to the Gini coefficient of 41.5 for equivalized net income inequality in Turkey in 2009 according to the official TurkStat database.

Figure 5.16: Deserved and Just Pay



PO stands for public officials. Entire sample also includes public officials.

The average wages that respondents think these five occupations should earn differ widely from their estimations of what they actually earn. Respondents are of the opinion that in average, the two low skilled professions should be earning 1.8 times higher than what they are currently earning, while an average doctor's wage should be increased by 15%. On the other hand, respondents think that ministers earn 40% more than they should, and the CEO wages should be reduced by 25%. These results suggest that Turkish citizens believe CEO's should be the highest earners of these five occupations, instead of cabinet ministers, who they think actually earn the most. Incomes of the two low earning occupations should be increased significantly, with the ratio between the lowest paid and the highest being one to four and a half. The Gini coefficient for distribution of the "ethical" wages between these five groups is 30.5.

Another survey question aims to examine whether those in the sample who worked at the time of the survey consider the pay they receive deserved and just (Figure 5.16). Over 70% of those who work think they earn less than they deserve and less

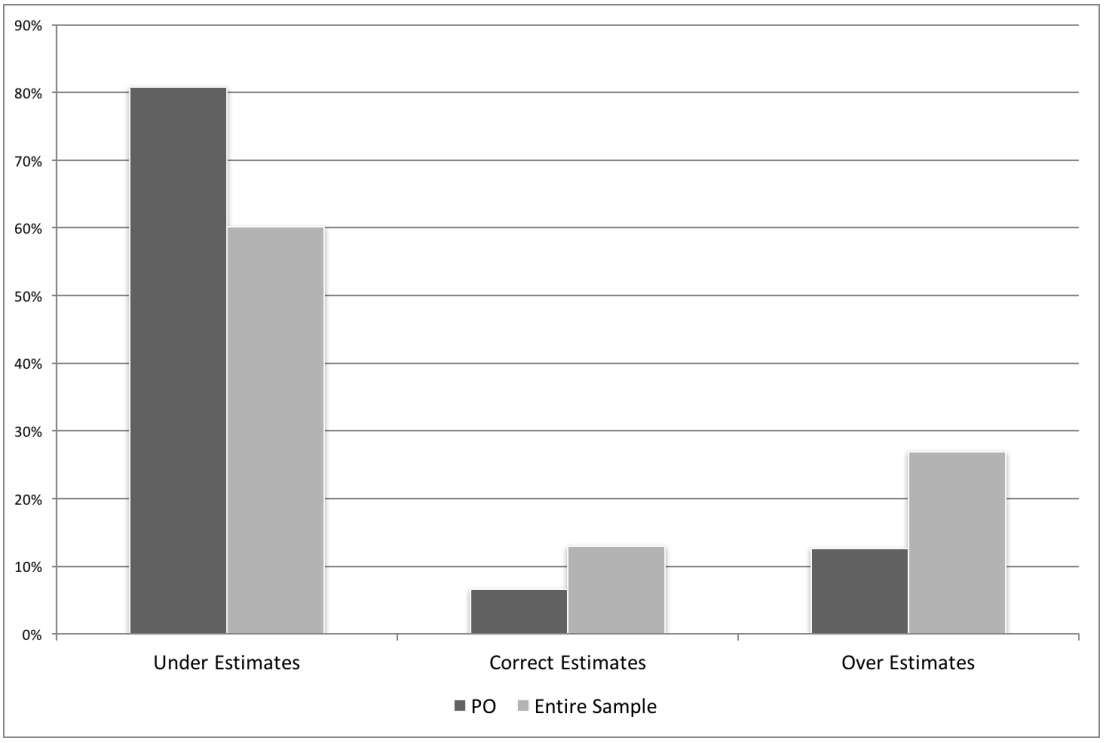
than that is just. However, compared to the 75% of non-public sector workers who do not find their pay as high as they deserve, only 60% of the PO's are of the opinion that they earn less than they deserve. Opinions on whether the pay they receive is just also differ between PO's and the rest of the respondents. These differences in opinions suggest that public officials in Turkey were more content of their wages at the time of the survey than other individuals in the sample.

In the second chapter of this thesis, we highlighted the work of Cruces et al. (2013) to argue that people incorrectly estimate their own place in the income distribution. In their survey conducted in Buenos Aires, the authors asked the respondents to place their own household's income in a scale of incomes in the entire country with the following question: "There are 10 million households in Argentina. Of those 10 million, how many do you think have an income lower than yours?". Unfortunately, such a question is not included in the Social Inequality IV survey. Nevertheless, we have tried to assess whether a respondent is able to correctly estimate his or her position in the income scale of Turkey using a simple method.

ISSP asked the respondents about their monthly family income. Of the 1569 respondents in Turkey, 1272 answered this question. We ranked the values given by these 1272 from lowest to highest and calculated an income range for each decile. For instance, the poorest 10% of those respondents reported a monthly family income between 0-400 Turkish Lira's (TL), while the richest 10%'s income range was 1500 TL per month to 15.000 TL and above. According to TurkStat's official data, the average monthly household disposable income of the bottom 10% in Turkey was 414 TL, compared to the average disposable income of 5403 TL of the top 10%. An income of 1500 TL per month placed an individual in the fifth decile in the actual income distribution rather than the top decile. Hence, it is extremely likely that subjects from all income groups in the Social Inequality IV survey under-reported their incomes and top earners in the society did not respond to the surveys.

We are only interested in a family's rank in the distribution. Hence, despite the

Figure 5.17: Self-placement in the Income Rank



PO stands for public officials. Entire sample also includes public officials.

possible under-reporting we have calculated in which decile each respondent's family income would be placed in the entire sample. Another question in the survey asks: "Some people have a high some others have a low social status in society. Where would you place yourself on a ladder of social status where 1 represents the lowest and 10 the highest social status?". For our purposes, we are going to assume that social status corresponds to income in this question; even though, social status can be interpreted through perspectives other than income, such as education or social influence. When we compare an individual's response to this question and their income rank, we obtain a crude measure of biases in one's own placement in the income distribution.

Based on our calculation of a respondent's rank in the income distribution and their self-placement in the ladder, we consider an individual's estimation of their rank in the income scale correct if both values match. They under estimate their rank if they place themselves in the ladder lower than their income rank based on our calculations, and they over estimate if their self-placement is higher then the

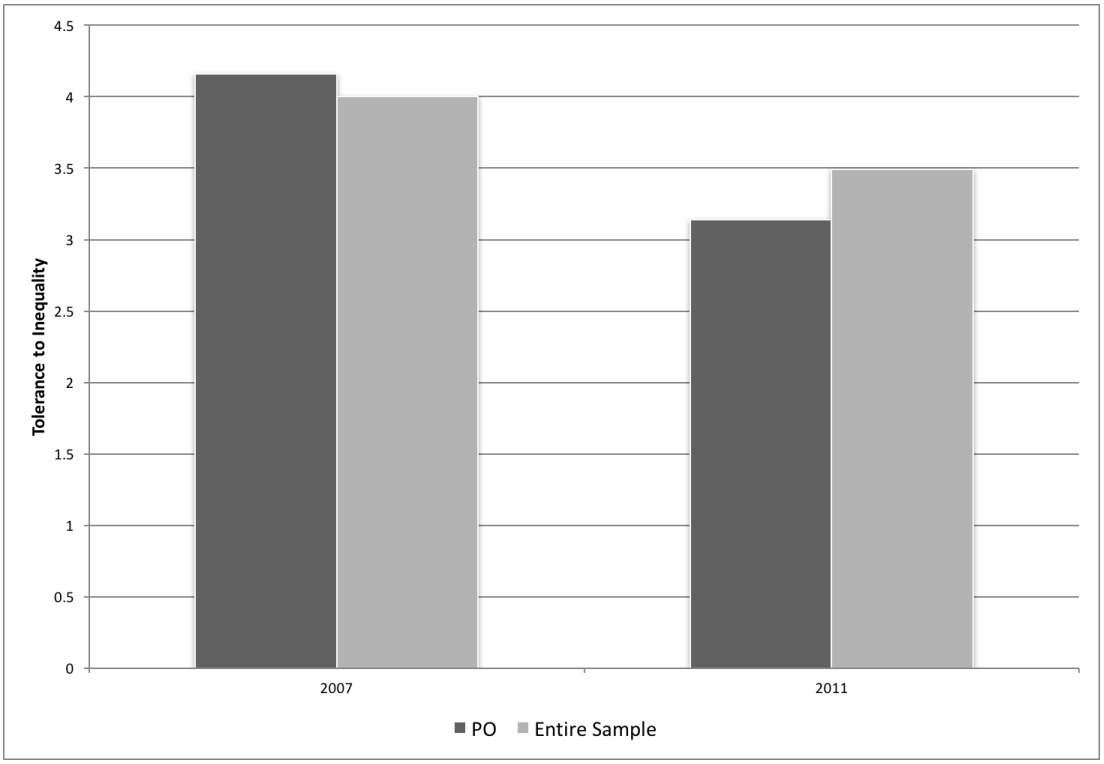
actual income rank. Figure 5.17 displays the percentage of public officials and all respondents, who under estimates, correctly estimates and over estimates their place in the income rank. According to this analysis, majority of the individuals under estimate their own place in the income scale. The ratio of PO's who under estimated their income rank was 24% higher than the rest of the population. Only around 10% of the respondents correctly estimated their rank. This means that public officials receive a relatively higher income than they assume. Evidently, in order for us to make a definitive conclusion, we need to assume that the family income ranks we have calculated correspond to respondents' actual ranks in the society, which is a strong assumption. Nevertheless, data available in the Social Inequality survey suggests that people in Turkey might be under estimating own status in the society based on their incomes. We intent to obtain more evidence to test this claim in our interviews with the public officials in Turkey and we will present the results in this chapter following the secondary data analysis.

5.3.2 World Values Survey

In the third chapter of this thesis, we ran regressions using data from the World Values Survey (WVS) in order to investigate the relationship between individual tolerance for inequality and justification of bribery. In this section, we are going to examine answers from the fifth and sixth wave of the WVS given by respondents residing in Turkey to do a similar analysis with a single country focus.

The fifth and the sixth waves of the WVS respectively include responses from 1346 and 1605 individuals aged 18 and above from Turkey. The fifth wave took place in 2007 and the sixth was in 2011. Multi-stage full probability sampling was employed in both waves. 50.6% of the 2951 individuals surveyed were female. Similar to the PO rate in the Social Inequality Survey, 11% of the respondents work in the public sector.

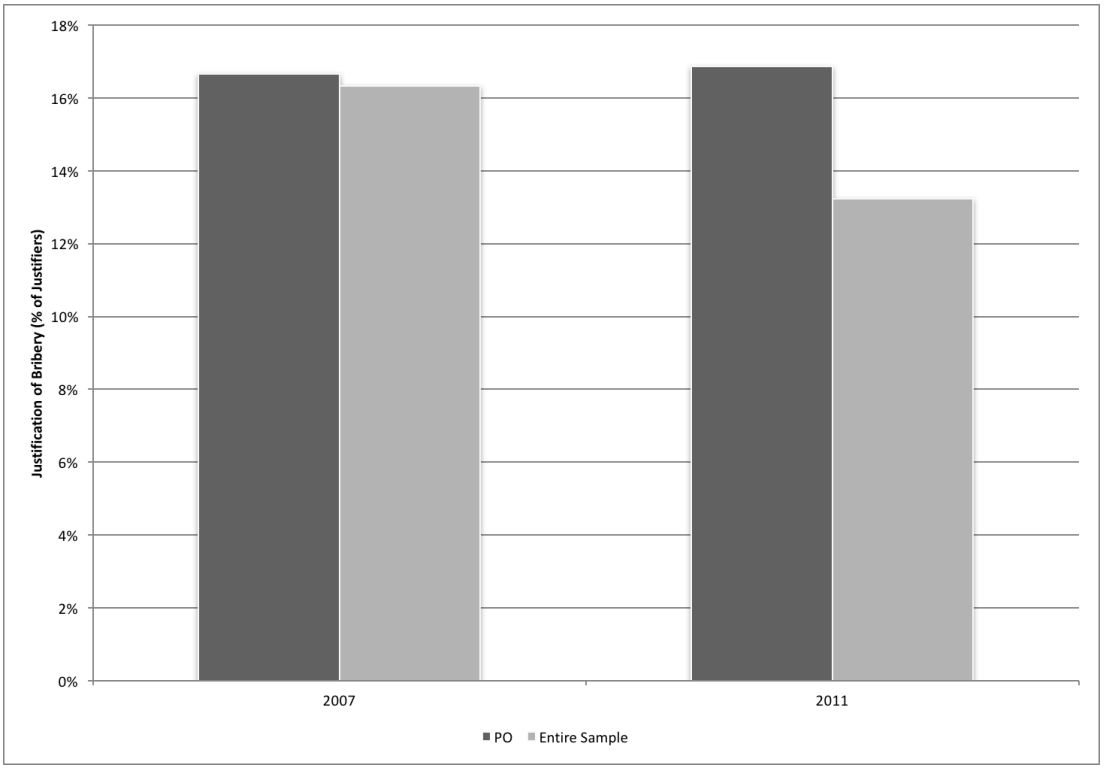
Figure 5.18: Tolerance for Inequality



PO stands for public officials. Entire sample also includes public officials.

Our two variables of interest in the econometric analysis we conducted in the third chapter using the WVS data were tolerance for inequality and justification of bribery. The tolerance for inequality is measured by respondent's self-placement on a scale between zero and ten, with the two extreme values depicting "Incomes should be made more equal" and "We need larger income differences as incentives for individual effort". We subtract these values by one to correspond the first answer to intolerance for inequality, hence the maximum value becomes nine. Figure 5.18 displays the mean tolerance for inequality value in the sample for the two waves. The average tolerance for inequality in the full sample of WVS including observations from every country surveyed was 4.57. We see that individuals living in Turkey have a lower tolerance for inequality compared to the "global" average in both the fifth and the sixth wave (2007 & 2011). The tolerance for inequality in Turkey decreased by over 12% between the two waves. According to the TurkStat data, equivalized net income inequality has not changed in those four years, indicating that tolerances might not be shaped by actual income inequality in the society.

Figure 5.19: Justification of Bribery



PO stands for public officials. Entire sample also includes public officials.

The second variable we are interested in is the ratio of individuals who find bribery justifiable in some or all occasions. The question asked is "Please tell me whether you think someone accepting a bribe in the course of their duties can always be justified, never be justified, or something in between". In the full sample of the WVS, the average "global" value of those who find bribery justifiable (either always or sometimes) was 28%. In comparison, only 16% of the sample in 2007 and 13% in 2011 in Turkey stated that they find bribery as a justifiable action. Interestingly, despite the decrease in country average, we observe that the ratio of public officials who find taking bribes justifiable did not change in the four years of time between the two waves.

Using whether a respondent finds bribery ever justifiable as our dependent variable, we can estimate the change in probability of justifying bribery when the level of tolerance for inequality increases by one unit amongst the respondents in the Turkish WVS surveys with Probit. Formally we will estimate the following model:

$$P(y = 1|T, T^2, \mathbf{x}) = G(\beta_0 + \beta_T T + \beta_{T^2} T^2 + \beta \mathbf{x}) \tag{5.1}$$

with T being tolerance for inequality. This is the same Probit model employed in Chapter 2. Previously, we hypothesized that the relationship between tolerance and corruption to be non-linear, with public official completely intolerant and completely tolerant of inequality not being corrupt due to either the high moral cost or not perceiving inequalities. Hence, once again, we will test the following hypotheses:
H_1: $\beta_T > 0$

H_2: $\beta_{T^2} < 0$

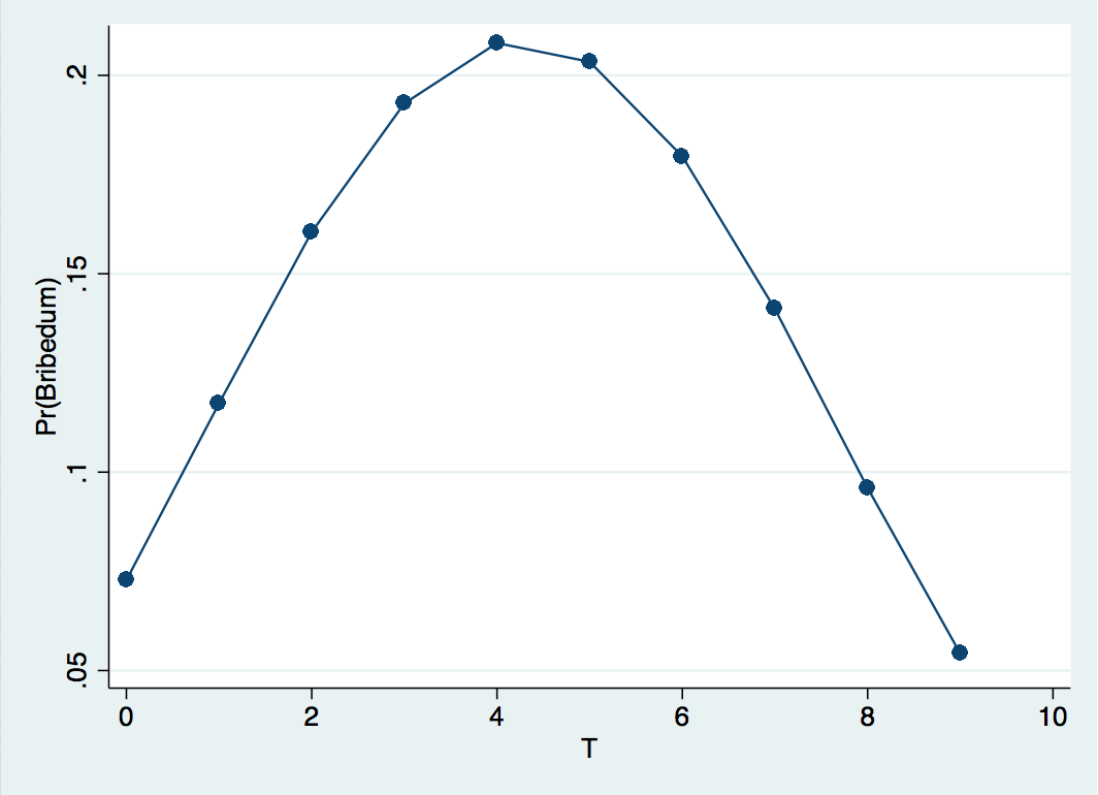
Statistical summaries of the dependent and independent variables are displayed in Table 5.2. The final column in the table gives the mean value of a variable in the full WVS sample consisting of 78 countries, in order to enable the comparison of each variable between Turkey and the full sample. Interesting differences occur in the high school, religious and public sector variables. The respondents in the Turkish WVS survey are slightly less educated compared to the WVS average. Only 52% holds a high school degree. Religion is more prominent in Turkey, with 83% of the respondents defining themselves as a religious person. The ratio of public sector workers in the sample is also 8% less compared to the WVS average.

Results of the Probit regressions are given in Table 5.3. Similar to the results we have obtained in the second chapter using the full WVS sample in the fifth and sixth waves of the survey, we find that tolerance for inequality's impact on the justification of bribery varies with the level of individual tolerance, while if we exclude Tolerance squared, we find no significant impact. A quadratic relationship exists between tolerance and the dependent variable, and we are unable to reject the two hypotheses (**H1** and **H2**). The change in predicted possibility of justifying bribery as computed from the results in Column II is shown in Figure 5.20. Respondents whose tolerance level is slightly above four is almost 15% more likely to find bribery justifiable than

Table 5.2: Variables of Interest in World Values Survey

Variable	Observations	TR Mean	Std. Dev.	Min.	Max.	WVS Mean
Bribe Dummy	2943	0.15	0.35	0	1	0.28
Tolerance	2888	3.73	2.88	0	9	4.57
Male	2951	0.49	0.5	0	1	0.48
Working Age	2951	0.84	0.37	0	1	0.80
Married	2951	0.66	0.47	0	1	0.64
Income	2890	4.63	2.41	1	10	4.71
High School	2951	0.52	0.50	0	1	0.59
Religious	2896	0.83	0.38	0	1	0.69
Justice Conf	2873	2.93	0.95	1	4	2.57
Public Sector	2951	0.11	0.31	0	1	0.19

Figure 5.20: Change in Predicted Probabilities of Justifiying Bribery



those who are completely intolerant or tolerant of inequality.

Confidence to the justice system, being religious and the time period dummy (Wave 6) were the only other independent variable that had a significant impact on the probability of justifying bribery. It is interesting to see that variables that we found

Table 5.3: Regression Results

	I	**II**
	Probit	**Probit**
Tolerance	0.010	0.302***
	(0.95)	(7.48)
Tolerance		-0.035***
Squared		(-7.47)
Male	0.075	0.077
	(1.22)	(1.24)
Working Age	0.070	0.068
	(0.78)	(0.75)
Married	0.016	0.016
	(0.23)	(0.22)
Income	-0.006	-0.016
	(-0.42)	(-1.05)
High school	0.103	0.113
	(1.48)	(1.58)
Justice	-0.070**	-0.071**
Confidence	(-2.18)	(-2.16)
Religious	-0.233***	-0.238***
	(-3.02)	(-3.03)
Public	-0.081	-0.03
Sector	(-0.81)	(-0.36)
Wave 6	-0.140**	-0.178**
	(-2.02)	(-2.55)
Observations	2706	2704
$(Pseudo)R^2$	0.01	0.04
Log Likelihood	-1094	-1064

Dependent variable is Justification of Bribery. Associated z values are in parentheses. *, **, ***: Significant in 10, 5 and 1% respectively.

out to be strongly correlated with justification of bribery in the full sample, which are gender (Male), marital status (Married) and income had no effect on the dependent variable in the Turkish population. We also notice that the public sector worker dummy variable is insignificant, signalling a lack of differences between the views of the public officials and rest of the population.

5.3.3 Discussion

Analyses of the Social Inequality IV and World Values Surveys helped us visualize public perception of inequality and attitudes towards unequal distribution of incomes in Turkey. In this subsection, we are going to summarize the findings taking shape after the secondary data analyses, before proceeding to introduce our own data collection methodology and present our results.

We have seen that a large majority of the people in Turkey perceive very high levels of inequality, despite the steady reduction in income inequality over the past five decades. Tolerance to the perceived levels of inequality is low. Most respondents were of the opinion that incomes should be made more equal. Over 90% of the respondents also believe it is the government's responsibility to equalize incomes. Given the relatively low, yet increasing, rate of public social expenditure, we can presume that Turkish citizens desire more redistribution than current levels.

Social Inequality IV survey shows us that public opinion is in favour of increasing the wages for low skilled employment. Interestingly, increasing the minimum wage was the major election promise of all the major political parties in the most recent November 2015 elections. Subsequently, net minimum wage was raised 30% to 1300 Turkish Liras in the beginning of 2016. Respondents also believe that wages of CEO's and high level government officials should be reduced significantly.

An average person in Turkey is also likely to underestimate their place in the income ranking. Their belief that they are relatively poorer than they actually are goes hand in hand with their opinion that their wage is less than what they deserve and what is just.

Now that we established the public opinion on inequality in Turkey, we proceed to introduce our interview design and study the data we obtained from the interviews we conducted with the public officials in Turkey.

5.4 Interviews with Turkish Public Officials

5.4.1 Interview Methodology

In order to obtain further insight on how public officials perceive inequality, we interviewed 21 public officials in Turkey between December 2015 and May 2016. The term "public official" covers a variety of professions, working under different contract types and bureaucratic levels in the public sector. A public official's opinion on inequality may differ depending on their location and position in the bureaucratic hierarchy. Hence, we have chosen to narrow down our target population to public officials working in municipalities to achieve consistency. There are 30 metropolitan and 51 provincial municipalities in Turkey. Both the metropolitan and provincial municipalities consist of municipality districts. Local governments, including a mayor and a municipality parliament of 9 to 55 members depending on the population of the district or the province, are elected every five years with the latest election taking place in 2014.

We decided to conduct most of our interviews in Istanbul. Istanbul is Turkey's largest city, with nearly 18% of the population of the entire country residing in the metropolitan area. 39 municipality districts are under the umbrella of the metropolitan municipality. The metropolitan municipality and 25 districts are governed by the ruling Justice and Development Party (JDP) , while the remaining 14 districts are governed by the main opposition, Republican People's Party (RPP). JDP is a party positioned in the centre-right of the political spectrum, with emphasis on Islamic conservatism and neo-liberal economic policies. The main opposition party, RPP, holds secular views and mildly socialist economic policies and can be defined as a centre-left political party.

First contact with the public officials was established through sending an e-mail to their official addresses taken from municipality websites. E-mails contained infor-

mation about the research and the principal researcher. Five public officials in the managerial positions each from different district municipalities agreed to be interviewed. On the interview date, interviewees were first asked to sign a consent form. Once the consent form was signed, they were given a questionnaire before the interview commenced. After the interviewee completed the questionnaire, we started to record the audio of the entire interview if consent was obtained to do so. If the interviewee did not give consent for their voice to be recorded, extensive notes were taken instead. Once the interview was completed, the interviewee was asked to refer the principal researcher to other public officials working in the municipality who might be interested in answering our questions. Through this snowball sampling, we were able to interview 15 public officials in Istanbul.

Perceptions of inequality might differ greatly between cities, depending on their urban size and socio-economic development. A public official in Istanbul might perceive great inequalities between the metropolitan districts, while someone from a smaller town in Turkey may be of the opinion that the income distribution is quite equal if they extrapolate their distribution estimation to the entire country. Therefore, we also conducted interviews in Lüleburgaz, a small town 160 kilometres west of Istanbul. Lüleburgaz has a population of 137,000. It is part of the Kırklareli province, which has a mean income higher than the Turkish average, yet lower than Istanbul according to the TurkStat data. We first contacted the mayor of Lüleburgaz through a mutual acquaintance. He introduced us to other respondents working in the municipality after the interview, enabling us to conduct a total of six interviews in the town.

All interviews were conducted in municipality offices. The length of each interview, including the time to fill in the consent form and the questionnaire, varied between ten minutes to an hour. Three out of the 21 interviewees were elected officials, one from the ruling JDP and two from the main opposition RPP. Two interviewees did not give consent to their voices being recorded. The recorded interviews were

transcribed in Turkish by the principal researcher. Analysis of the qualitative data generated through the transcripts and the interview notes was done using NVivo 10.

Interactions with the public officials, including the time to fill in the consent form and the questionnaire took around 15 to 20 minutes each, with only one interview taking over an hour because of the interviewee's interest in the topic. 11 interviewees were female, and majority were in their 30s. Five of the 18 non-elected public officials were sub-contracted public officials, meaning they were not indefinitely employed by the state and their contracts had to be renewed after a set period of time, usually every three years. We will further explain the differences between contracts later in this chapter, and call attention to its significance.

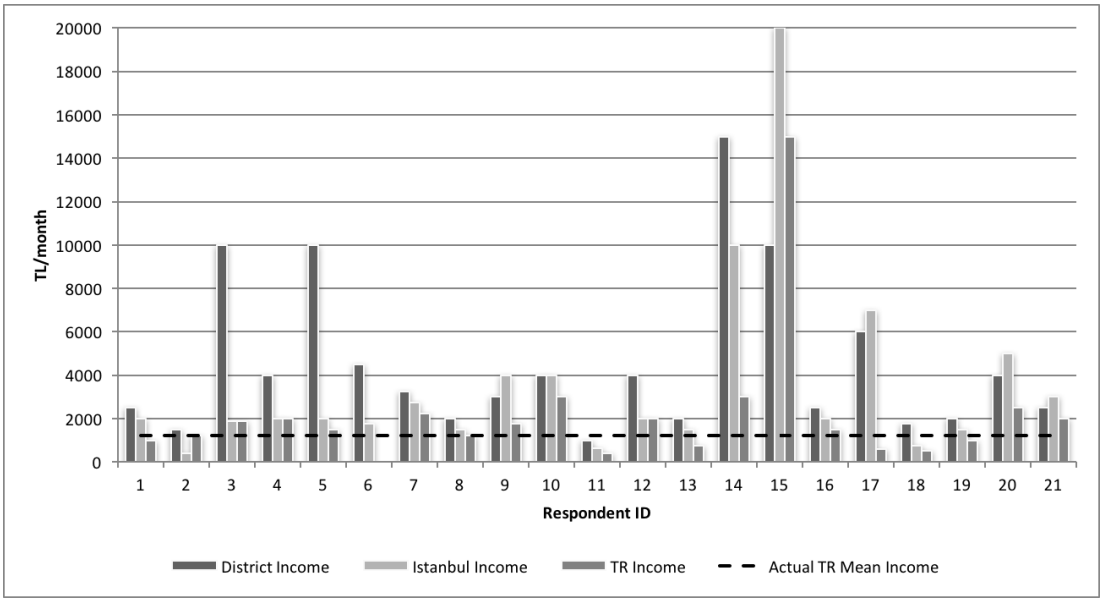
5.4.2 Analysis of the Questionnaire

Interviewees were given a questionnaire consisting of 11 questions before the interview commenced [4]. Our intention was to elicit how interviewees perceived income inequality in Turkey and where they placed themselves in the income scale. In this section, we are going to analyse the responses given to these questions, prior to our interview analysis.

The first set of questions aimed to determine the net monthly personal and household income of the interviewees. 20 of the 21 respondents declared their monthly income as well as their household income. The lowest paid interviewee receives 2000 Turkish Liras (TL) per month, while the personal income of the richest was 10000 TL. The interviewee receiving the lowest monthly wage also came from the poorest household in the sample, with 3400TL monthly income. The highest household monthly income was 18400 TL. We then asked the interviewees their estimations on the average net monthly income in their town, in Istanbul and in Turkey. These estimates are displayed in Figure 5.21. The dashed line indicates the actual average net income in

[4]The full questionnaire can be found in the Appendix D

Figure 5.21: District, Istanbul and Turkey per capita Income Estimates



Turkey in 2015, which was calculated as 1238 TL per month from TurkStat's Income and Living Conditions Survey. The same survey gives the average net individual income in Istanbul as 1620 TL, roughly 30% higher than the country average. Data on average district incomes are not released by any statistical office, hence we are unable to compare the estimates with actual data. Estimates of the Turkish average were closer to the actual amount, than estimates of Istanbul average. All but four individuals had correctly estimated that income in Istanbul is higher than Turkey, and despite being incorrect in mean estimates, the estimated income ratio between Istanbul and Turkey was close to the actual amount in eight cases. At this point, we should note that Respondent 15, who overestimated both the Istanbul and Turkey mean incomes by a margin of 1200% was the only elected official from the ruling Justice and Development Party we have interviewed.

Once we obtained interviewees' incomes and their estimations, we asked them the following question: "There are nearly 20 million households in Turkey. In your view, how many of these households has a total income lower than yours?" This form of questioning was used in Cruces et al. (2013), in order to elicit where the respondents place themselves in the income scale. Using the average net household income information provided by the interviewees, we compared where they placed

Figure 5.22: Self-Placement vs Actual Placement in the Income Scale

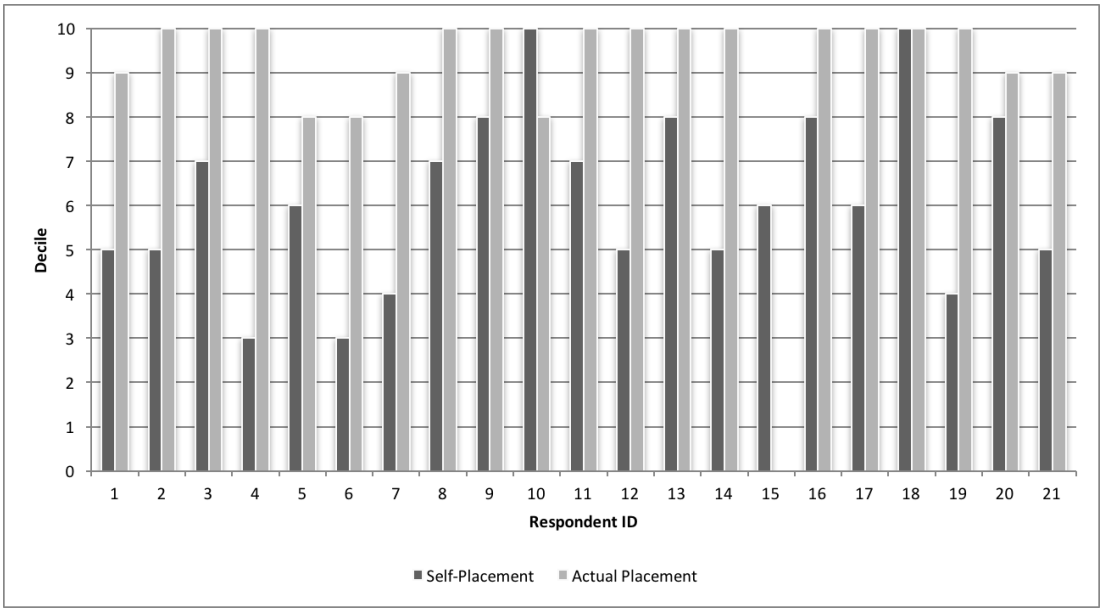
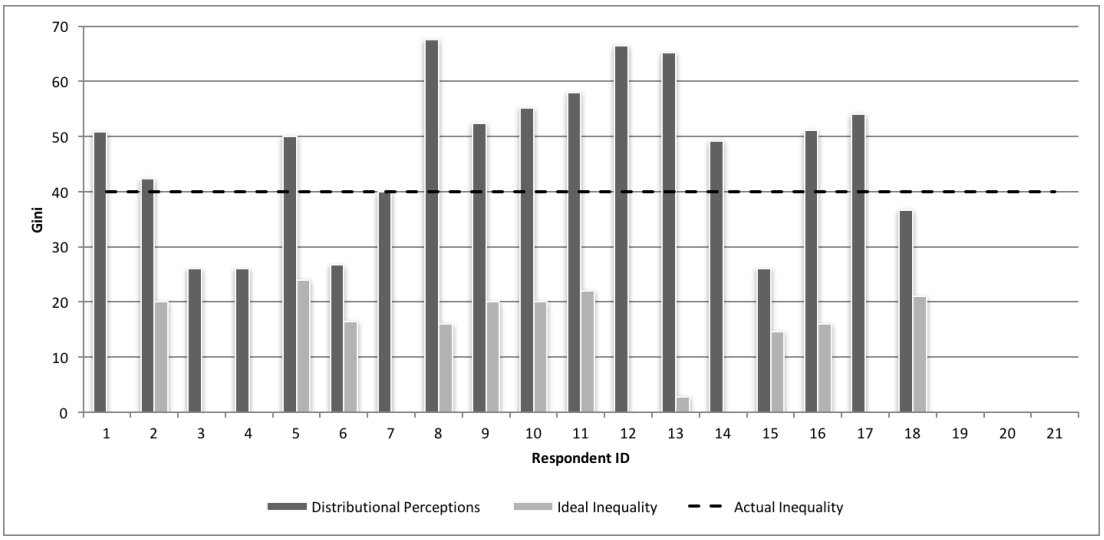


Figure 5.23: Distributional Perceptions and Ideal Inequality



themselves in the income scale in Turkey, and where they are actually placed in Figure 5.22.

Only one public official out of the 20 who declared their household income correctly estimated their household's place in the Turkish income scale. One respondent overestimated their position while the rest of the respondents underestimated their rank. In fact, even though most public officials in the sample placed themselves in or near the middle of the income scale, household incomes of 13 out of the 20 interviewees put them in the richest 10%.

Next, in order to elicit how the public officials in our sample perceive income inequality in Turkey, we asked them to estimate how income is distributed by each 20% quintile in Turkey. We calculated the Gini coefficient arising from their answers. They were also asked their ideal distributions. Figure 5.23 shows the comparison of their perceived and ideal distributions. 18 interviewees responded to both questions while two responded only to the ideal distribution question. 12 of the 18 interviewees perceived more inequality than the actual level. Each ideal distribution of income was more equal than what interviewees perceived and nine stated that in an ideal society incomes are distributed perfectly equal between the five quintiles.

Examining how interviewees estimated the income ratio between the richest 20% and the poorest may also help us shape their perceived inequality. According to the TurkStat data, the average income of the richest 20% in Turkey is around seven times higher than the average of the poorest. Interviewees' estimations of this ratio (S80/S20) can be found in Figure 5.24. Two thirds of the respondents overestimated the S80/S20 ratio. Respondent 12's estimation was the most skewed in the sample, with the indication that the richest 20% receives incomes 80 times higher than the poorest quintile.

The last question addressing perceived inequality in the questionnaire was the Social Inequality Survey question that we previously labelled as "Aversion to Perceived Inequality". Given the estimations regarding perceived inequality and ideal distribution, it's not surprising to see that 15 of the 21 public officials in our sample strongly agreed to the statement "Differences in incomes in Turkey are too large" (Figure 5.25). Only two respondents stated they were not averse to the inequality they perceived by answering "neither agree nor disagree". Unfortunately, these two interviewees did not answer the previous two questions regarding estimated and ideal distributions, hence a comparison to set their tolerance levels cannot be made.

The final question of the questionnaire was a simplistic attempt to map the social network of the interviewee without taking too much of the interview time. There

Figure 5.24: Estimated S80/S20 Ratio

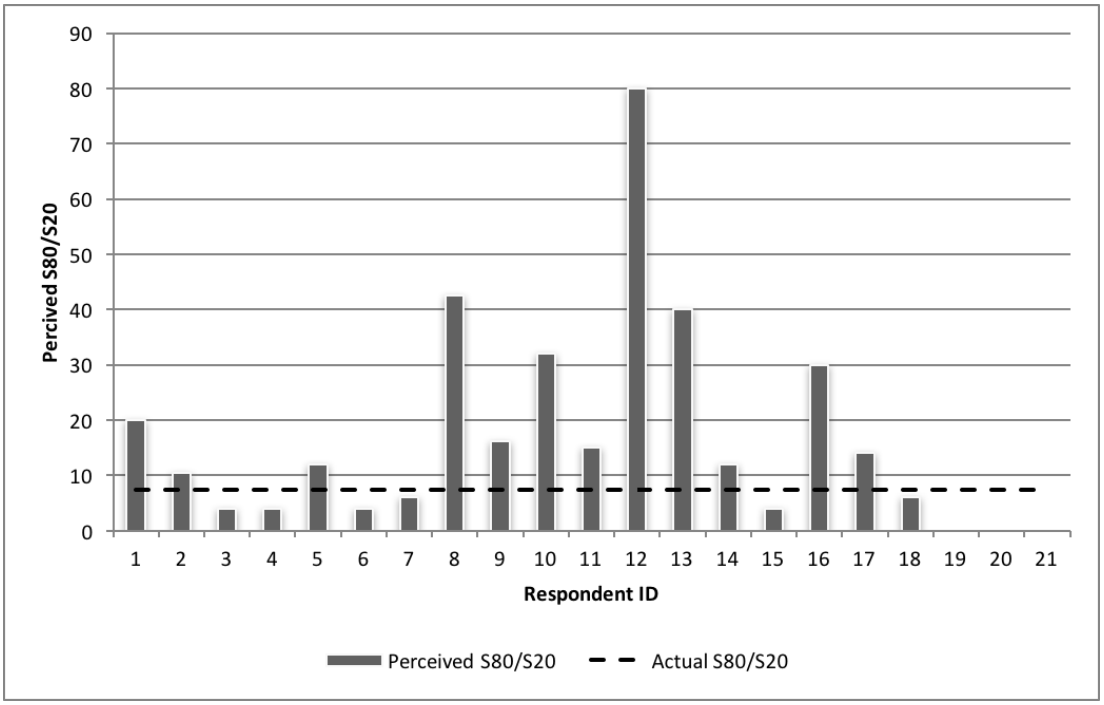
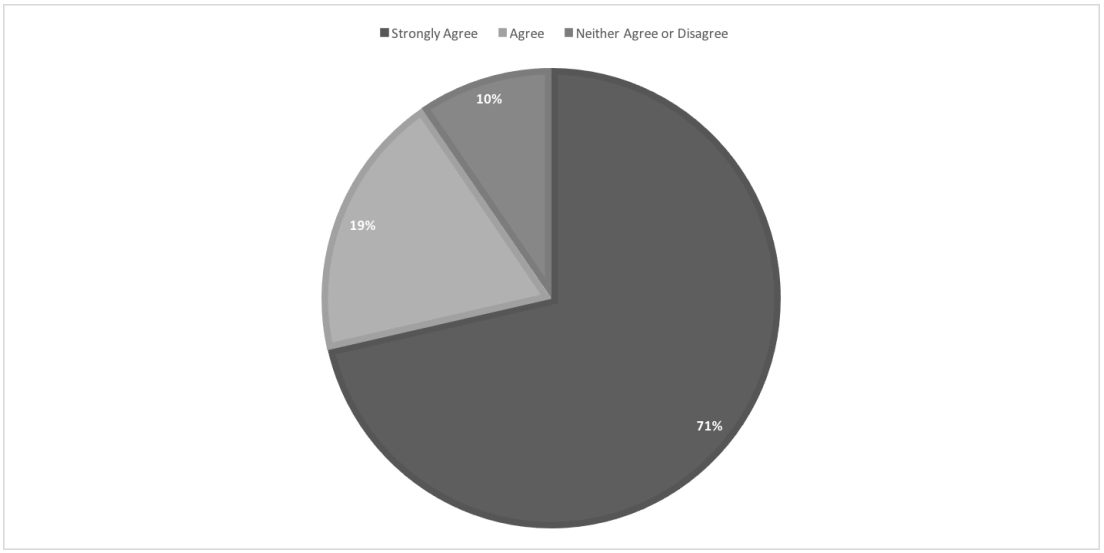


Figure 5.25: Aversion to Perceived Inequality



is extensive research done in social resources theory and Lin (1999) provides an excellent review for interested readers. As we previously explained through the work of Cruces et al. (2013), individuals might have less biased estimations on the distribution of income if they are in contact with income and social reference groups outside of their own. Following Savage et al. (2013), we gave the interviewees a list of 18 occupations, and asked them whether anyone in their family or friends circle work in these occupations. The list of occupations can be found in the questionnaire

Table 5.4: Social Class Scores by Occupation

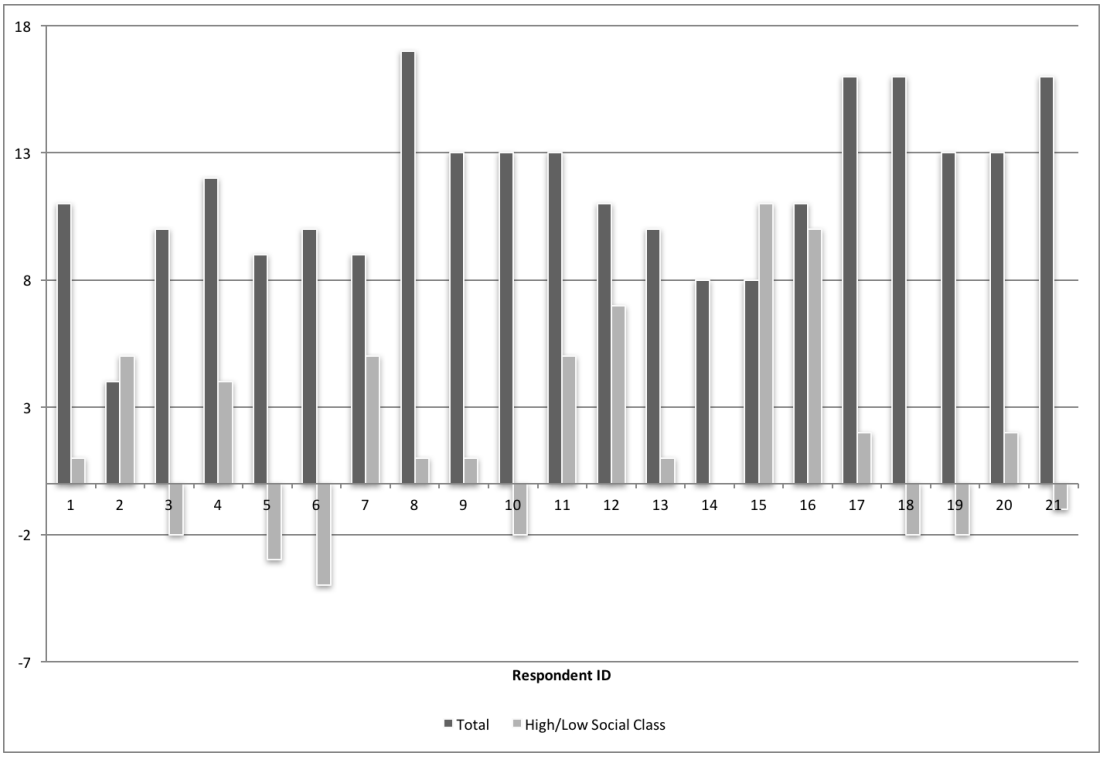
	Low	**Low/Medium**	**Medium**	**Medium/High**	**High**
	Secretary	Farmer	Nurse	Artist	Professor
	Cleaner	Electrician	Teacher	Software developer	Lawyer
	Lorry driver	Call centre employee	Postman	Accountant	Corporate manager
	Shop assistant			Office manager	Scientist
Score	-2	-1	0	1	2

displayed in the Appendix D. Drawing upon the Cambridge Social Interaction and Stratification scale for Turkey, we divided the 18 occupations into five classes and associated them with a score from ranging from -2 to +2 (Table 5.4).

With the scores given to each occupation shown in Table 5.4, a total social class score was calculated. Knowing someone from an occupation in the "Low" class cancels out knowing someone from the "High" class. An individual who knows at least one person working in any of the occupations listed would receive a total score of one, while someone who doesn't know anyone working in an occupation above the "Medium" class would be given a total score of -11. Therefore, respondents who have friends primarily in high social classes would have positive and high scores.

Figure 5.26 displays the total number of occupations from the list given that each interviewee has at least one family member or friend working in. Knowing more people in total and having a social class score close to zero indicates that the respondent has a wide social circle covering both low and higher social classes. Respondents 8, 17, 18, 19 and 21 have the widest social circle according to our measure, with the latter three's social circles being skewed towards lower classes. Respondents 15 and 16's social circles are both very skewed towards the higher class with relatively low total number of occupations known. Interestingly, as we have pointed out previously in this section, Respondent 15 also widely overestimated average incomes in Istanbul and Turkey. We will come back to respondents' social networks when we discuss the results from our interviews.

Figure 5.26: Number of Contacts in Occupations and Social Class Score



5.4.3 Analysis of the Interviews

The interview questions are divided into two main subjects, which are fairness and perceived income inequality in Turkey. We commenced our interviews with discussing the interviewees' duties as in their work and eliciting their opinions on the fairness of their wage. Hence, we will start the analysis with the responses focused on fair wage.

5.4.3.1 Fair Wage and Income Comparisons in the Public Sector

The fair wage theory of Akerlof and Yellen (1990) suggests that when workers do not receive a wage that they deem fair, they may reduce their effort. This may translate into higher levels of corruption in the case of public officials (Van Rijckeghem and Weder, 2001). Therefore, we first set out to observe whether public officials we interviewed believe their compensation for their effort is fair, and how do they establish the wage they consider fair.

Two thirds of the public officials we interviewed are of the opinion that they receive a fair wage. One interviewee stated that his wage is unfair because rest of the country is not being paid enough. The rest believes that they are not rewarded fairly for the effort they put in. Evidently, one first needs to determine a fair wage in order to compare their own remuneration. Discovering the income comparison group of a public official is also necessary to justify and validate our own theory with the intuition based on inequity aversion. Hence, we asked the interviewees with whose incomes they compare their own wages and received various responses that shed light into the process of fair wage determination in public sector.

The interviewees have several groups they compare their own wage with and more often than not they make comparisons with multiple groups. The majority of the interviewees do not compare their incomes with their co-workers or other public officials because wage determination is regulated and transparent, with each public official's wage determined by certain criteria that applies to all. However, remarks of three interviewees displayed separate social comparison groups can be formed between public officials who are state employees and public officials hired through sub-contracts. In Turkey, sub-contracted public officials have different and more flexible contracts and labour rights. Their employment may be easily terminated compared to the state employees, their wage may be pegged to the minimum wage, which was raised 30% at the beginning of 2016, and they may receive complimentary bonuses in their pays to compensate for other contractual rights they forego as a sub-contractor, such as the social security contribution, or the "green passport" that enables state employees to travel visa free in the Schengen zone. These differences in compensation create tensions between the state employees and sub-contracted public officials. Below, Respondent 14, who is sub-contracted herself tells why she does not use the free shuttle bus to work provided by the municipality:

> I live close to work, but I wouldn't use the shuttle bus even if I had to. Because I hear that when the bus gets full, the state employees complain

> that we get a transport supplement in our wages and we shouldn't use the free bus. I don't want to get into those kind of internal petty polemics. But the free shuttle bus is actually my right too.
> **Respondent 14, Female in 20s, Kadıköy, Istanbul**

A state employee states his dissatisfaction as:

> The sub-contracted workers are paid more than the state employees. But, in fact, their productivity, their education, and the responsibility given to them is less than ours. So they should be paid less than us. We also have the signing authority. Of course the fault is not theirs, it's the state's fault. But I am legally responsible for everything I do, every paper I sign. They don't have such a responsibility. If I have the legal responsibility and I face higher risks, I should be paid more.
> **Respondent 10, Male in 30s, Maltepe, Istanbul**

Only a few public officials stated that they compare their wage with the income of their clients, while most rejected having such an income comparison group. One interviewee said:

> People I work with may earn up to two to five million a year. But of course, you need to consider the risk they take. If I were able to take such risks I'd be an entrepreneur myself, but I don't envy them.
> **Respondent 9, Male in 50s, Maltepe, Istanbul**

Most interviewees, such as Respondent 9 quoted above, are of the opinion that individuals should be rewarded according to the risk they take and their productivity. When asked what would be the wage they demand if they worked in the private sector, all but one interviewee, indicated that they would demand higher wages than they currently receive in the public sector. People with similar educational backgrounds working in the private sector was also the most common income reference

group among the interviewees. Those who think they receive less than fair stated that wages are determined by individual productivity, education level and experience in the private sector, as opposed to the public sector, where merit is not taken into account in wage negotiations.

When asked why they prefer to work in the public sector instead of the private sector, two main themes emerged. First, working in the public sector provided job security, as it is very difficult to be removed from duty if one is a state employee in Turkey, and a more relaxed professional environment with fewer working hours compared to the private sector. The other main reason for working in the public sector was the feeling of satisfaction generated by undertaking social responsibilities and helping the society.

> The reason I don't want to work in the private sector is that I love my job. The primary school I attended to was next to an orphanage. I use to play with the orphans a lot. We used live in a middle class conservative neighbourhood in Istanbul. There was a family wearing hijabs next door. Three of their four daughters were deaf and speech impaired. I also interacted with them a lot. The difference between my family and theirs intrigued me. That was a defining experience. I love helping people. The spiritual satisfaction is more important than the wage I receive.
>
> **Respondent 11, Female in 30s, Kadıköy, Istanbul**

Another interviewee who defined himself as a "statist" felt that he needs to give back to the state, which "took [him] under her wings" during his poverty-stricken childhood. He indicated that despite the multiple formal inquiries he has to deal with because of the decisions he takes at work, he still continues to work as a public official because he "owes it to [his] country".

5.4.3.2 Perceptions of Income Inequality

We previously stated that 19 of the 21 public officials we interviewed agreed to the statement that differences in incomes in Turkey are too large. Similarly, all but two interviewees are of the opinion that inequalities have grown larger in the recent years. When asked about their opinion on inequalities in Turkey, the most common term to describe inequalities was "chasm". Eight interviewees used the term to explain the gaps in incomes between the rich and poor.

How they form their perceptions of inequality, and the reasons behind such inequalities according to the interviewees differed. One of the frequent observations that help form their perceptions is the differences in housing in Istanbul:

> Income inequality in Turkey is not optimal at the moment. There is a chasm. There are gecekondu (informal housing) and villas of the wealthy, skyscrapers in the same neighbourhood in Istanbul, even in the same street. It is clear as day.
> **Respondent 1, Male in 30s, Üsküdar, Istanbul**

For those we interviewed in Istanbul, inequalities in the city, as well as inequalities between Istanbul and the rest of the country, shaped their perceptions.

> Even in the Kadıköy district, there is a chasm between the life in Merdivenköy and the life in Feneryolu. People living in those neighbourhoods have very different worries in life than each other.
> **Respondent 13, Female in 20s, Kadıköy, Istanbul**

> There are great inequalities. Industrialisation, urbanisation is all here in Istanbul. A huge chunk of the economy is located here, and this creates great inequalities with other regions. That's why inequalities are regional. Even in Istanbul, there are chasms between different districts.
> **Respondent 5, Male in 20s, Beşiktaş, Istanbul**

Interviewees gave several different reasons on what causes inequalities in their opinion. Many blamed the systemic and neo-liberal policies of the state:

> The inequalities in Turkey is caused by structural faults within the system. The unionized labour in 1960s has been constitutionally scythed and destroyed in the 80s.
>
> **Respondent 3, Male in 50s, Beşiktaş, Istanbul**

Tax evasion and the size of the informal economy were also given as primary causes of inequalities in Turkey. Several public officials complained that their wages are taxed disproportionately because entrepreneurs and businesses are not taxed enough, or they evade paying their taxes. Migration of Syrian refugees into the Turkish cities and the surge in terrorism were given as contemporary causes of inequality.

The final question put to the public officials was whether they think incomes should be made more equal by the state. All but one of the interviewees agreed with the statement and indicated their preference for a more equal society. Most believed that inequalities obstructed peace in any society.

> We do not need inequalities to incentivize people to work because perfect equality is not possible anyways. However, if we can reduce the existing inequality, we have a chance at creating a balanced social life and obtain peace in the society. If not, society explodes in certain ways, as it does now. And we cannot control it.
>
> **Respondent 16, Male in 50s, Lüleburgaz, Kırklareli**

> One can be employed in many different statuses and contracts. Employment policies change frequently and this ruins the peace in the workplace. I think it also fosters inequalities. Of course, the government benefits from not providing job security to people.
>
> **Respondent 12, Female in 60s, Kadıköy, Istanbul**

One respondent tells that inequalities lead to corruption, reaffirming our main hypothesis:

> A public official represents the state. In many other countries, they are paid much more than others. But in our country, because we only work 40 hours a week and because some political leaders encourage bribery and corruption by saying "My bureaucrats know their business", we are given lower wages. The inequality and unfairness in the distribution of income forces one to profit from other actions. It forces one to engage in corruption and to take bribes.
>
> **Respondent 11, Female in 30s, Kadıköy, Istanbul**

In our economic model, we defined a social equity preference that steers how an agent would behave if they are intolerant of inequality. An agent with a low social equity parameter is more concerned with the income gap between them and the rich. Those with a high social equity parameter would focus on the poor, and refrain from increasing the gap between them and the poor. How a person describes inequality may be indicative of their social equity preference. Two examples, both from interviews we conducted in Lüleburgaz, help visualize how we set the social equity parameter, and validate its necessity in the model. Respondent 18 gave the following answer to the question "What is your opinion on the disparities of income in Turkey?":

> I know from my social circle that some people live in seriously difficult economic conditions. I also know that because I am responsible for some of the social assistance in the municipality. There is a group of people who live in distress with only the minimum wage. In our region, people still have some land, so these difficulties are not as apparent in other parts. They do some minor farming, consume that or create additional income. But I know for a fact that a part of the community lives in great

poverty.

Respondent 18, Female in 50s, Lüleburgaz, Kırklareli

This individual focused on the economic conditions of the poor when we asked her opinion on income inequality in Turkey. The emphasis she puts on poverty in her response indicates that she may have a high preference for social equity. Another interviewee, who finds the wage he receives unfair, because in his opinion, he receives much more compared to the poor people he works with told us:

"When I started working in the municipality back in 92 or 93, Nurettin Sözen was the mayor of Istanbul, he raised the wages of the cleaners, and other low-skilled workers in the municipality so high that they were even higher than what a teacher or doctor was being paid. When others complained, he said I have the authority to raise the incomes of my workers, the government should do the same. I agree with this. Poverty is the reason inequality is increasing every single day."

Respondent 8, Male in 40s, Maltepe, Istanbul

On the other hand, Respondent 16 gave the following answer to the same question:

> Inequalities increased in Turkey. I can see this in my daily life. How many Dollar billionaires did we have in Turkey ten years ago, and how many do we have now? If some is getting richer much more than the country, without any particular reason, unfairness of incomes can be the only reason.
>
> **Respondent 16, Male in 50s, Lüleburgaz, Kırklareli**

Compared to the previous responses, Respondent 16 emphasizes the rise in the number of ultra-rich in Turkey to describe increasing inequalities. He also states that he is of the opinion that "poverty is the prize given to laziness". His preference for social equity would be represented with a lower social equality parameter in our model. Interestingly, going back to Figure 5.26, where we displayed the social class scores indicating the width and skew of the interviewees' social network, we saw that Respondent 16's social circle was greatly skewed towards higher social classes, while Respondent 8 has the most balanced

social network and Respondent 18's social circle consisted of more people working in lower class occupations. Their social network is likely to have an impact on their social equity preference and income reference group.

5.4.4 Discussion of the Results

Income inequality in Turkey has been reducing steadily over the past 50 years. Data from TurkStat that we presented previously in this chapter suggested that the downward trend in inequality continued in the last decade. The richest 20% received an income ten times higher than the poorest 20% in 2006, and this ratio was seven to one in 2014. The country's shift towards a more equal distribution of income is apparent in the data. However, when asked, only two interviewees expressed that inequality has been reducing. The rest firmly stated, with the use of phrases such as "growing chasms between the rich and the poor", that in their opinion, inequalities has been increasing in Turkey.

The deviation of public officials' perceptions of inequality from the actual levels indicated by economic data, was not limited to misperception of the inequality trend. Their questionnaire answers display that all but two underestimated their income rank in Turkey. This result is in line with the opinions of the Social Inequality survey respondents, where we detected that 80% of the public officials that took part in the survey underestimated their own income rank. Despite the underestimation, according to the Social Inequality survey, public officials were more satisfied with their wages than the rest of the sample. Similarly, majority of the public officials we interviewed believed that they received a fair wage, albeit that wage being lower than what they would receive in the private sector. Wage comparisons with the private sector was common in our sample. Comparisons with colleagues were minimal, and only between officials with different contract types.

A common theme that emerged during interviews, which is likely to shape perceptions, was differences in housing in Istanbul. The existence of gecekondus, nearby luxury residences was frequently given as an answer to why they think inequality was increasing. The current "urban transformation project" that is taking place in order to enhance building durability against the expected earthquakes in Istanbul, is also causing rapid gentrification of low

income neighborhoods, which may further deepen misperceptions of the interviewees living in Istanbul.

Interviewees in both Istanbul and Lüleburgaz, have underlined the differences in living conditions and disparities of income and prices between Istanbul and the rest of the country. Many in Istanbul emphasized that they would be much better off living in another city with the same wage, while in Lüleburgaz we were told several times that the wage they receive would not be enough to support themselves in Istanbul. We were unable to detect any particular variations in perceptions or attitudes between responses given by interviewees living in the two cities. This could be because of the proximity of the two cities. Three out of the six interviewees in Lüleburgaz stated that they visit Istanbul once every few months.

Our sample size is not sufficient to conduct tests of statistical inference and make generalizations. Nevertheless, we did detect alterations of discourse on inequality based on whether the public officials interact with relatively poorer or richer part of the population. For instance, interviewees that strongly supported wage increase for the unskilled work force were all employed in departments where high number of interactions with the lower class citizens take place. However, it is also possible that these interviewees have chosen to work in such departments, such as the department of social assistance, because of their views.

5.5 Conclusion

In line with the fourth and the fifth research questions pursued in this thesis, the primary objective in this chapter was to explore how public officials in Turkey perceive inequality, as well as how they determine their income reference group. Secondary data analyses, and the data we obtained from the interviews, demonstrated that Turkish public officials, like the rest of the society, incorrectly estimate their place in the income rank. Public officials mostly underestimate their standing. Their primary reference groups are individuals who work in the private sector in positions similar to theirs, as well as the clients with whom

they interact.

Despite the small sample size, we were able to use interview data to determine that biases in distributional estimates do actually occur. The majority of their opinions on income inequality and its emergence, also stood in stark contrast to the actual numbers measured in Turkey over the years. Finally, we detected differences in individual descriptions of inequality, which may be in line with our assumption on the differences in social equity preferences in our model that we presented in Chapter 3.

Chapter 6

Conclusion

6.1 Summary of Findings

In this thesis, we explored the economic relationships between income inequality, how it is perceived by public officials, their attitudes towards inequality and the extent of corruption in societies. Existing theories either link income inequality to corruption through the conflict inequality creates between the rich and the poor, or the wage inequalities between the public and private sector. However, they have not been able to produce sufficient empirical support for either claim. We offered an alternative theoretical channel through which a society's income inequality can lead to forms of corruption in societies; namely through an assessment of individual perceptions of and aversions to income inequality, and their effect on decision-making.

Evidence shows that public officials often incorrectly estimate income distribution. If they regard the estimated distributions as unfair, this will affect their overall view of inequity. The resulting inequities depend on the level of income inequality they are willing to tolerate. An estimation of inequality higher than their tolerance level may generate aversions to the perceived inequality. If they are averse to the inequality they perceive, they may try to compensate for this perceived difference in income by extorting bribes.

In the second chapter, we conducted an extensive regression analyses using panel data

across countries to investigate whether actual income inequality is a determinant of corruption. The System GMM regressions we ran produced unexpected results. Contradictory to the existing theories that suggest that income inequality causes more corruption, our results suggested that the extent of corruption was lower in countries with higher levels of actual income inequality, measured by the Gini coefficient. Further analysis revealed that income inequality's reducing impact on corruption is mostly present in countries with high inequality and a weak rule of law. We suspect that in countries with weaker legal institutions and unequal societal conditions, the threat of criminal violence may pose a greater risk to public officials than would any form legal repercussion, which would thus reduce the incentive for them to be corrupt.

After presenting the conceptual and economic framework linking perceived income inequality to corruption in Chapter 3, we proceeded to test the hypotheses emerging from our theory. The first hypothesis concerned individual tolerance levels for inequality. The tolerance for inequality is the maximum level of inequality that an individual finds acceptable. We theorized that people with very low tolerance (those who desires perfect or near perfect equality of incomes) and people with very high tolerance (those who are willing to accept any level of inequality) should be less corrupt than those whose tolerance levels lie in between. Using data from the World Values Survey, we found empirical support for this hypothesis. Next, we moved on to testing whether aversion to perceived inequality across countries is a determinant of corruption. Results demonstrated that perceived inequality, instead of actual income inequality, as commonly suggested in existing theories, significantly and positively correlated with corruption in the sample of countries for which we have available data. Unfortunately, that sample is small and only consists of 40 countries, the majority of which are developed. In the final section of Chapter 3, we proposed a proxy measure for perceived inequality in countries in order to increase sample size in future research. We call this proxy the "Football Inequality Index". Our reasoning is simple: In countries where football is a popular sport, the salaries of football players are publicly available, and may be better known than actual country-wide distribution of wages. Hence, the difference between the average salary of a football player and the average national income might have a strong effect on the formation of public perceptions. We show that despite various limitations, the Football Inequality Index can be used as a

proxy for perceived inequality on a national scale; however, more research is required to improve the quality and sample size of the index.

Certain complacencies in the data, such as the ethical and practical concerns in measuring the extent of bribery, make researching corruption and perceived inequality difficult. In order to overcome these data issues related to corruption's clandestine nature and the subjectivity of perceptions, we designed a laboratory experiment based on an adjusted ultimatum game. This allowed us to further analyse the theoretical relationship between inequality and corruption, presented in Chapter 4. We conducted eight experimental sessions at the Istanbul Bilgi University, where subjects assumed the roles of either public officials (PO) or citizens (clients). Over the course of two different treatments with differing levels of initial endowment inequality, we observed their decisions to engage in corruption and gain additional monetary profits in exchange of economically harming a charitable organisation. We found that changing the distribution of initial endowments did not alter PO subjects' behaviours when we compare simple means between treatments. However, the impact of a subject's perception of inequality became apparent when we controlled for their tolerances for inequality. PO Subjects who were more tolerant of inequality demanded more bribes. Once we controlled for tolerance, we also found a significant and positive impact of endowment inequality between treatments on the amount of bribes demanded.

Our theory is based on the assumptions that public officials may incorrectly estimate the income distribution in the society. This leads them to incorrectly gauge their own income. Two studies, Norton and Ariely (2011) and Cruces et al. (2013), demonstrate that the general public hold biased and incorrect opinions of the state of inequality in their country, as shown in their respective studies of the United States and Argentina. In Chapter 5, we conduct a mixed-methods study in Turkey in order to investigate public officials' perceptions of and attitudes towards inequality and inequity within Turkish society. We discovered that despite the fact that the country has seen a steady decrease in income inequality, the majority of the public officials we interviewed believed that inequality has increased. They also reported to perceive high income inequality, and commonly expressed the income gap between the poor and the rich as a "chasm". Even though their incomes

placed the Turkish public officials near the top of the income scale, most underestimated their rank, and perceived themselves relatively than they actually were.

In summary, in this thesis, we have found strong empirical evidence supporting our theory that a rise in the perceptions of income inequality, rather than actual income inequality, frequently measured with the Gini coefficient, tends to foster corruption in societies. Perceptions are formed through the possibly biased estimations of actual income distribution, and the subjective tolerance for inequality. In the next section, we are going to discuss theoretical and empirical implications of the results we have obtained throughout the thesis.

6.2 Theoretical and Empirical Implications

By emphasizing the role that perceptions of inequality play in the decision-making processes of agents who are considering engaging in corruption, we challenge the assumption of perfect information, which is frequently used in economic theories. The assumption of perfect information is particularly unrealistic in the case of income distribution. Economic agents are unlikely to know how much others in the market earn, or how income is distributed within the economy. Through our interviews with public officials in Turkey, we have demonstrated that their estimations of the mean income in their country, income distribution, and their self-placement in the income ranking were largely incorrect. Hence, we suggest forming theories on perceptions of inequality when micro-agents' decision making process is modelled.

Economists have only recently begun placing emphasis on perceptions of inequality. Even though theories on possible measurements of inequality that incorporates subjective opinions of inequality exist, such as the Atkinson Index (Atkinson, 1970); systematic measurement of perceived inequality in a society has not been conducted in any academic work until Norton and Ariely's 2011 study in the US. While datasets such as the Social Inequality Surveys of the ISSP and the World Values Survey did make some attempts to gauge perceptions, improvements on the formation of the survey questions are necessary

in order for these data sources to be correctly utilized in empirical economic research on perceived inequality.

In addition to measuring perceived inequality, more research is needed to understand how these perceptions are formed. What is factored in when an individual estimates the distribution of income? How do they reach the conclusion that "inequalities in the society are increasing?". In our interviews, we made preliminary attempts to address how such perceptions are formed; such as the role of Istanbul's housing quality and its links to inequality. While such factors as housing quality and living conditions are easier to measure than the distribution of income, issues of housing, in particular, are more likely to be subject to wealth gaps than they are linked to questions of income inequality. This would, in turn, make it less likely that individuals make accurate assumptions about income inequality if they are based on issues of housing quality.

Housing quality and living conditions are visible in daily life, and values of assets are easier to estimate than wages. However, housing is likely to relate to wealth inequality rather than income. As we evidenced in the interviews, people might perceive a sudden increase in inequality –and define it as a "chasm" between the rich and the poor- even though actual inequality has been steadily declining in the country.

In order to obtain more data on perceptions, we proposed a proxy for perceived inequality: Football Inequality Index. Here, we made use of the fact that due to football's global media coverage, it is easy to access published information on the value of individual players and their salaries. As the information about football players' income can be considered public knowledge, we are of the opinion that it may shape public perception. Further research on how perceptions are formed can help us obtain better proxy measures for perceived inequality.

6.3 Policy Implications

Through the various analysis we conducted in this thesis, we have reached the conclusion that as perceived inequality in a society increases, so does the extent of corruption. If

public officials in a given country earn less than the private sector average, basic intuition would suggest that increasing public wages would lead to a reduction in corruption. However, such a policy can be very costly. Apart from its cost, increasing public wages may actually be inefficient. In the case of China for example, Gong and Wu (2012) found that raising civil servant wages had no impact on corruption.

Furthermore, it is likely that public sector workers already earn more than average. In the Turkish case, we have seen that most of the public officials we interviewed belonged to the group of richest 20% in the country. However, they greatly underestimated their own ranking in the income scale. In fact, data from ISSP Social Inequality Survey showed us that public officials in Turkey were more likely to underestimate their relative income than the rest of the country.

Based on our findings, we can offer a less costly alternative to reduce perceived inequality than increasing public sector wages. We have demonstrated that even though public officials may be rich, they might still underestimate their income, while overestimating income inequality. Therefore, they are likely extort bribes to compensate for the perceived inequity. In such a situation, altering perceptions by making more transparent information on actual income distribution available to the public, would represent a more cost-efficient and effective policy tool for combating corruption.

Evidently, reducing inequalities directly while also providing information to lower biases in individual perceptions, would also lead to less corruption. That being said, it is important to effectively communicate with the public while forming and implementing policies geared towards inequality reduction. It is wise to make the public aware of the aim and expected results of the, sometimes inexplicably complicated, policies in order for them to be able to form unbiased perceptions of inequality. In fact, providing information on the policy may accelerate the positive impact on corruption. While it can take time to address the structural problems that generate inequality, a societal perception of a reduced inequality may be formed much quicker when effective policies are implemented.

In this thesis, we have made serious contributions to a broad debate on inequality and corruption, both of which continue to hinder economic development. Reducing income

inequality should lead to less corruption in theory; however, like other policies implemented to fight corruption, empirical support for inequality's positive impact on corruption is weak (Persson et al., 2013). Our investigation has shown that reducing a country's inequality would also decrease the extent of corruption, provided that individuals receive greater access to transparent information on income distribution, as well as the economic policies aimed at improving it.

Appendix A

Sample of Countries in World Values Survey

Country	Wave	Country	Wave	Country	Wave
Algeria	6	Hong Kong	5	Poland	5 & 6
Andorra	5	Hungary	5	Qatar	6
Argentina	5	India	5 & 6	Romania	5 & 6
Armenia	6	Indonesia	5	Russia	5 & 6
Australia	5 & 6	Iran	5	Rwanda	5 & 6
Azerbaijan	6	Iraq	5 & 6	Serbia	5
Belarus	6	Italy	5	Singapore	6
Brazil	5	Japan	5 & 6	Slovenia	5 & 6
Bulgaria	5	Jordan	5 & 6	South Africa	5
Burkina	5	Kazakhstan	6	South Korea	5 & 6
Canada	5	Kyrgyzstan	6	Spain	5 & 6
Chile	5 & 6	Lebanon	6	Sweden	5 & 6
China	5 & 6	Libya	6	Switzerland	5
Colombia	5 & 6	Malaysia	5 & 6	Taiwan	5 & 6
Cyprus	5 & 6	Mali	5	Thailand	5
Ecuador	6	Mexico	5 & 6	Trinidad	5 & 6
Egypt	5 & 6	Moldova	5	Tunisia	6
Estonia	6	Morocco	5 & 6	Turkey	5 & 6
Ethiopia	5	Netherlands	5 & 6	Ukraine	5 & 6
Finland	5	N. Zealand	5 & 6	Uruguay	5 & 6
France	5	Nigeria	6	USA	5 & 6
Georgia	5	Norway	5	Uzbekistan	6
Germany	5 & 6	Pakistan	6	Viet Nam	5
Ghana	5 & 6	Palestine	6	Yemen	6
G. Britain	5	Peru	5 & 6	Zambia	5
Guatemala	5	Philippines	6	Zimbabwe	6

Appendix B

List of countries in Social Inequality IV

survey: Argentina, Australia, Austria ,Belgium, Bulgaria, Chile, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Israel, Italy, Japan, Latvia, New Zealand, Norway, Philippines, Poland, Portugal, Russian Federation, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Turkey, Ukraine, United Kingdom, United States and Venezuela

Appendix C

Football Inequality Index

Country	Year	FII Score	Country	Year	FII Score
Albania	2009	6	Austria	2014	2.7
Albania	2010	5.2	Azerbaijan	2011	5.6
Albania	2011	4.9	Azerbaijan	2012	5.7
Albania	2012	5.1	Azerbaijan	2013	5.8
Albania	2013	5	Azerbaijan	2014	6.4
Albania	2014	5.3	Belarus	2009	4.4
Algeria	2013	5.2	Belarus	2010	5.1
Algeria	2014	5	Belarus	2011	6.1
Armenia	2011	5	Belarus	2012	6.3
Armenia	2012	5.1	Belarus	2013	6.1
Armenia	2013	5.8	Belarus	2014	5.9
Armenia	2014	5.5	Belgium	2006	3.5
Australia	2005	2.1	Belgium	2007	3.5
Australia	2006	2.2	Belgium	2008	3.4
Australia	2007	2.9	Belgium	2009	3.5
Australia	2008	2.8	Belgium	2010	2.6
Australia	2009	2.9	Belgium	2011	2.6
Australia	2010	3.7	Belgium	2012	2.6
Australia	2011	3.6	Belgium	2013	2.6
Australia	2012	3.6	Belgium	2014	2.7
Australia	2013	3.8	Bosnia and Her.	2008	4.5
Australia	2014	4	Bosnia and Her.	2009	4.7
Austria	2005	3.3	Bosnia and Her.	2010	4.7
Austria	2006	3.3	Bosnia and Her.	2011	4.8
Austria	2007	3.2	Bosnia and Her.	2012	4.7
Austria	2008	2.9	Bosnia and Her.	2013	4.7
Austria	2009	3.1	Bosnia and Her.	2014	4.6
Austria	2010	2.7	Brazil	2007	5.4
Austria	2011	2.4	Brazil	2008	5.7
Austria	2012	2.6	Brazil	2009	6.4
Austria	2013	2.6	Brazil	2010	6.8

Football Inequality Index -continued

Country	Year	FII Score	Country	Year	FII Score
Brazil	2011	6.9	Czech Republic	2006	3.5
Brazil	2012	6.8	Czech Republic	2007	3.4
Brazil	2013	6.5	Czech Republic	2008	3.3
Brazil	2014	6.1	Czech Republic	2009	3.6
Bulgaria	2008	4.3	Czech Republic	2010	3.4
Bulgaria	2009	4.5	Czech Republic	2011	3.4
Bulgaria	2010	5.6	Czech Republic	2012	3.4
Bulgaria	2011	5.6	Czech Republic	2013	3.5
Bulgaria	2012	5.6	Czech Republic	2014	3.3
Bulgaria	2013	5.9	Denmark	2006	1.9
Bulgaria	2014	5.9	Denmark	2007	2.2
Chile	2011	3.1	Denmark	2008	2.4
Chile	2012	2.9	Denmark	2009	2.8
Chile	2013	2.7	Denmark	2010	2.9
Chile	2014	2.8	Denmark	2011	2.8
China	2009	6.5	Denmark	2012	2.6
China	2010	6.2	Denmark	2013	2.5
China	2011	6.9	Denmark	2014	2.6
China	2012	7.6	Ecuador	2012	4.7
China	2013	7.2	Ecuador	2013	4.8
China	2014	6.9	Ecuador	2014	4.4
Colombia	2011	5	Egypt, Arab Rep.	2009	6.5
Colombia	2012	4.8	Egypt, Arab Rep.	2010	6.9
Colombia	2013	5.3	Egypt, Arab Rep.	2011	6.8
Colombia	2014	5	Egypt, Arab Rep.	2012	6.8
Costa Rica	2012	3.2	Egypt, Arab Rep.	2013	6.8
Costa Rica	2013	3.5	Egypt, Arab Rep.	2014	6.6
Costa Rica	2014	3.2	England	2005	4.3
Croatia	2007	3.7	England	2006	4.3
Croatia	2008	3.9	England	2007	4.3
Croatia	2009	4	England	2008	4.4
Croatia	2010	4.2	England	2009	4.6
Croatia	2011	4.6	England	2010	4.7
Croatia	2012	4.6	England	2011	4.7
Croatia	2013	4.8	England	2012	4.6
Croatia	2014	4.5	England	2013	4.6
Cyprus	2009	3.2	England	2014	4.7
Cyprus	2010	3.5	Estonia	2011	3.5
Cyprus	2011	3.5	Estonia	2012	3.8
Cyprus	2012	3.6	Estonia	2013	3.7
Cyprus	2013	3.8			
Cyprus	2014	3.6			

Football Inequality Index -continued

Country	Year	FII Score	Country	Year	FII Score
Estonia	2014	3.6	Greece	2010	3.9
Finland	2008	1.4	Greece	2011	3.9
Finland	2010	3.1	Greece	2012	4.1
Finland	2011	2.8	Greece	2013	4
Finland	2012	2.8	Greece	2014	3.9
Finland	2013	2.8	Hungary	2009	4
Finland	2014	2.3	Hungary	2010	4.1
France	2005	4	Hungary	2011	4.1
France	2006	4.1	Hungary	2012	4.1
France	2007	4.1	Hungary	2013	4.2
France	2008	4	Hungary	2014	4.2
France	2009	4	Iceland	2011	1
France	2010	4.1	Iceland	2012	1
France	2011	4	Iceland	2013	1.1
France	2012	4.2	Iceland	2014	1
France	2013	4.1	India	2014	8.6
France	2014	4.1	Iran, Islamic Rep.	2011	5.8
Georgia	2010	7.6	Iran, Islamic Rep.	2012	6.1
Georgia	2011	7.8	Iran, Islamic Rep.	2013	7
Georgia	2012	7.5	Iran, Islamic Rep.	2014	7.1
Georgia	2013	7.6	Ireland	2010	1.5
Georgia	2014	7.3	Ireland	2011	1.8
Germany	2005	3.1	Ireland	2012	2
Germany	2006	3.1	Ireland	2013	1.7
Germany	2007	3.1	Ireland	2014	1.4
Germany	2008	2.9	Israel	2007	2.6
Germany	2009	3.1	Israel	2009	2.8
Germany	2010	2.8	Israel	2010	3.6
Germany	2011	2.7	Israel	2011	3.6
Germany	2012	2.8	Israel	2012	3.8
Germany	2013	2.9	Israel	2013	3.7
Germany	2014	3.1	Israel	2014	3.9
Greece	2006	3.6	Italy	2005	4.8
Greece	2007	3.5	Italy	2006	4.7
Greece	2008	3.5	Italy	2007	4.6
Greece	2009	3.7	Italy	2008	4.6

Football Inequality Index -continued

Country	Year	FII Score	Country	Year	FII Score
Italy	2009	4.6	Malta	2011	2.4
Italy	2010	4.7	Malta	2013	3.3
Italy	2011	4.5	Mexico	2007	4.1
Italy	2012	4.4	Mexico	2008	5.5
Italy	2013	4.7	Mexico	2009	5.8
Italy	2014	4.6	Mexico	2010	5.7
Kazakhstan	2012	5.2	Mexico	2011	5.6
Kazakhstan	2013	5.4	Mexico	2012	5.7
Kazakhstan	2014	5.6	Mexico	2013	5.8
Korea, Rep.	2011	5.4	Mexico	2014	5.4
Korea, Rep.	2012	6	Morocco	2013	6.2
Korea, Rep.	2013	6.1	Morocco	2014	6.3
Korea, Rep.	2014	5.9	Netherlands	2005	2.7
Latvia	2009	3.6	Netherlands	2006	2.5
Latvia	2011	4.3	Netherlands	2007	2.5
Latvia	2012	4.4	Netherlands	2008	2.4
Latvia	2013	4.4	Netherlands	2009	2.6
Latvia	2014	4.3	Netherlands	2010	2.4
Lebanon	2012	3.2	Netherlands	2011	2.5
Lebanon	2013	3.8	Netherlands	2012	2.6
Lebanon	2014	3.8	Netherlands	2013	2.6
Lithuania	2012	4.3	Netherlands	2014	2.6
Lithuania	2013	4.2	New Zealand	2010	3.3
Lithuania	2014	4.1	New Zealand	2011	3.5
Luxembourg	2009	0.1	New Zealand	2012	3.5
Luxembourg	2010	0.5	New Zealand	2013	3.1
Luxembourg	2011	0.4	New Zealand	2014	3.4
Luxembourg	2012	0.3	Norway	2006	1.3
Luxembourg	2013	0.1	Norway	2007	1.3
Luxembourg	2014	-0.1	Norway	2008	1.1
Macedonia, FYR	2010	6.3	Norway	2009	1
Macedonia, FYR	2011	6.1	Norway	2010	1.8
Macedonia, FYR	2012	6.4	Norway	2011	2.1
Macedonia, FYR	2013	6.3	Norway	2012	1.9
Macedonia, FYR	2014	6.1	Norway	2013	2
Malta	2010	2.7	Norway	2014	2

Football Inequality Index -continued

Country	Year	FII Score	Country	Year	FII Score
Peru	2012	4.9	Russian Federation	2008	5.4
Peru	2013	5	Russian Federation	2009	5.7
Peru	2014	5.2	Russian Federation	2010	6
Poland	2006	5.4	Russian Federation	2011	6.2
Poland	2007	5.3	Russian Federation	2012	6
Poland	2008	5.1	Russian Federation	2013	6.3
Poland	2009	5.3	Russian Federation	2014	6.4
Poland	2010	4.8	Saudi Arabia	2010	6.1
Poland	2011	4.7	Saudi Arabia	2011	6.6
Poland	2012	4.7	Saudi Arabia	2012	6.3
Poland	2013	4.7	Saudi Arabia	2013	6.1
Poland	2014	4.5	Saudi Arabia	2014	6.3
Portugal	2006	4.1	Scotland	2006	3.3
Portugal	2007	3.8	Scotland	2007	3.3
Portugal	2008	3.9	Scotland	2008	3.3
Portugal	2009	4	Scotland	2009	3.7
Portugal	2010	4.1	Scotland	2010	3.3
Portugal	2011	4.3	Scotland	2011	3.2
Portugal	2012	4.4	Scotland	2012	2.8
Portugal	2013	4.5	Scotland	2013	2.6
Portugal	2014	4.3	Scotland	2014	2.6
Qatar	2011	4.1	Serbia	2006	5.2
Qatar	2012	4.3	Serbia	2007	5
Qatar	2013	4.4	Serbia	2008	4.8
Qatar	2014	4.4	Serbia	2009	5.3
Romania	2006	4.8	Serbia	2010	5.9
Romania	2007	4.5	Serbia	2011	5.7
Romania	2008	4.9	Serbia	2012	5.9
Romania	2009	5.4	Serbia	2013	5.7
Romania	2010	5.2	Serbia	2014	5.7
Romania	2011	4.9	Slovak Republic	2005	1.9
Romania	2012	5	Slovak Republic	2006	2.6
Romania	2013	5	Slovak Republic	2007	2.6
Romania	2014	4.9	Slovak Republic	2008	2
Russian Federation	2006	5.1	Slovak Republic	2009	2.2
Russian Federation	2007	5.4	Slovak Republic	2010	2.6

Football Inequality Index -continued

Country	Year	FII Score	Country	Year	FII Score
Slovak Republic	2011	2.6	Sweden	2013	2.3
Slovak Republic	2012	2.8	Sweden	2014	2.1
Slovak Republic	2013	2.7	Switzerland	2005	2.2
Slovak Republic	2014	2.9	Switzerland	2006	2.2
Slovenia	2005	2.5	Switzerland	2007	2.2
Slovenia	2006	2.4	Switzerland	2008	1.9
Slovenia	2007	2.3	Switzerland	2009	2.2
Slovenia	2008	3.2	Switzerland	2010	1.9
Slovenia	2009	3.6	Switzerland	2011	1.9
Slovenia	2010	4	Switzerland	2012	2
Slovenia	2011	4	Switzerland	2013	2.1
Slovenia	2012	3.8	Switzerland	2014	1.9
Slovenia	2013	3.4	Tunisia	2010	5.3
Slovenia	2014	3.2	Tunisia	2011	5.6
South Africa	2009	4	Tunisia	2012	5.5
South Africa	2010	3.4	Tunisia	2013	5.5
South Africa	2011	4.2	Tunisia	2014	5.4
South Africa	2012	4.4	Turkey	2005	6.8
South Africa	2013	4.4	Turkey	2006	6.5
South Africa	2014	4.7	Turkey	2007	6.6
Spain	2005	4.7	Turkey	2008	6.4
Spain	2006	4.9	Turkey	2009	6.6
Spain	2007	4.9	Turkey	2010	6.7
Spain	2008	4.7	Turkey	2011	6.5
Spain	2009	4.9	Turkey	2012	6.7
Spain	2010	5.3	Turkey	2013	6.7
Spain	2011	5.3	Turkey	2014	6.8
Spain	2012	5.3	Ukraine	2005	6.2
Spain	2013	5.3	Ukraine	2006	6.2
Spain	2014	5.3	Ukraine	2007	5.8
Sweden	2007	2.2	Ukraine	2008	6.5
Sweden	2008	2	Ukraine	2009	7.1
Sweden	2009	2.1	Ukraine	2010	7
Sweden	2010	2.5	Ukraine	2011	6.8
Sweden	2011	2.3	Ukraine	2012	6.7
Sweden	2012	2.4	Ukraine	2013	6.8
Ukraine	2014	7.7	United States	2013	2.3
United States	2007	1.6	United States	2014	2
United States	2008	2	Uruguay	2010	4.3
United States	2009	1.6	Uruguay	2011	4.3
United States	2010	1.6	Uruguay	2012	4.3
United States	2011	2.2	Uruguay	2013	4.4
United States	2012	2.2	Uruguay	2014	4.6

Appendix D

Interview Questionnaire

Municipality:
Department:
Age Group: 18-22, 23-29, 30-39, 40-49, 50-59, 60-69, 70-

Total individual net monthly income (from all income sources):
_____ TL
Total household net monthly income (from all income sources):
_____ TL
What is your estimation of the average monthly income in your city?
_____ TL
What is your estimation of the average monthly income in Turkey?
_____ TL
There are 20 million households in Turkey. Of those 20 million households, how many do you think have an income lower than yours?

(1) 0 to 2 million
(2) 2 to 4 million
(3) 4 to 6 million
(4) 6 to 8 million
(5) 8 to 10 million
(6) 10 to 12 million
(7) 12 to 14 million
(8) 14 to 16 million
(9) 16 to 18 million
(10)18 to 20 million

Let us assume that the total income in Turkey equals 100, and we divide the entire population into 5 groups based on their income. How much do you think each of these 5 income groups receive out of that 100 in Turkey?

1) Poorest 20% _____
2) Second 20% _____
3) Third 20% _____
4) Fourth 20% _____
5) Richest 20% _____

In an ideal society, how much of that 100 should each of these 5 groups receive?

1) Poorest 20% _____
2) Second 20% _____
3) Third 20% _____
4) Fourth 20% _____
5) Richest 20% _____

To what extent do you agree with the following statement? Differences in income in Turkey are too large.

1) Strongly agree
2) Agree
3) Neither agree nor disagree
4) Disagree
5) Strongly disagree

Which of these people do you know socially?

Secretary	Farm worker
Nurse	Chief executive
Teacher	Software designer
Cleaner	Call center worker
University lecturer	Postal worker
Artist	Scientist
Electrician	Lorry driver
Office manager	Accountant
Solicitor	Shop assistant

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