The Economics of Corruption: A Study of its rationale and measures

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Abstract

Our study aims at considering two aspects of the problem of corruption that are its rationale and measures. The starting point is the presentation of a concise background on the topic as Chapter I highlight definitions, causes, main effects, categorisation and the measures of corruption.

From the causes of corruption it is the case that our understanding of this problem is limited by the assumption of the mechanism through which those causes come together to affect corruption. The way in which incentives predispose individuals to side with corruption has only been assumed in the literature. Hence, Chapter II will look into the rationale of corrupt behaviour and its implications.

Using a modify version of a model developed by Macrae (1982), we build a corruption game illustrating a simple game of bureaucratic corruption between farmers and government officials. We argue that not only corruption is the rationale calculus of agents maximising their income but also that the rationale following which we reach the corruption equilibrium or the honesty one could explain the pervasiveness of either corruption or honesty.

At last Chapter III focuses on the measures of corruption. Perception indexes are widely used as the result of their prevalence and the lack of better alternatives. However, many studies show a disparity between the perception of corruption and its actual incidence (see Mocan 2008, Olken 2009, Donchev and Ujhelyi 2011, Fisman and Miguel 2007).

We propose an alternative by putting together an index of the incidence of corruption accounting for its perception using data from the incidence of corruption as reported by the national agency responsible for the fight against corruption in Kenya. Our study suggests that not only our index account better for yearly change in the prevalence of corruption but perception indexes can be used to account for the inability to detect some form of corruption.

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Author's Declaration:

All the chapters of this thesis are my own work and has not been submitted for examination at this or any other institution for another award. Chapter II was presented at the "Rimini Conference in Economics and Finance", Rimini, Italy, in June 2014 and then at a Thursday Workshop the same month at the University of York.

Chapter I. General Introduction

There is not an agreement within social sciences on the approaches to the study of corruption. Sociologists and anthropologists suggest a focus on norms and values as they believe that corruption is the result of the collapse of ethics (Bardhan 2006, p343). In this view corrupt individuals are lacking or ignoring a moral compass that should have lead them to act according to socials norms of ethics and then behave appropriately avoiding corruption. However, economists see in corruption the consequences of incentives and organisations (Bardhan 2006, p343). Corruption in this extend became a motivated choice, it became quantifiable rather than just immoral or unethical. There is therefore a set of motives and a clear context leading to or perpetuating corruption. This could be a social issue such as the prevalence of corruption or the lack of proper education, an economic matter such as endemic poverty or simply the result of the greed of individuals. Furthermore, in economics one could single out fives keys aspects in the study of corruption that are: its definition, its causes, its effects, its types and its measures.

The understanding of the problem of corruption looking at its causes and context might be highly related to the definition agree upon. Indeed one could consider corruption as a departure from a set of accepted norm or more strictly any misuse whether accepted or not of public office for private gain. While the first definition leaves aside major cases of corruption involving political elite, the second does not. In addition the first definition implies that the greed of political elites leading to political corruption will not be a cause of corruption while the rent seeking behaviour of bureaucrat will be. The other implication is that corruption is characterised by the illegality even though law and regulation could be choose by corrupt individuals. Hence, we will review and choose a definition of corruption before assessing the causes and context of corruption leading to the understanding of such problem.

Having agreed upon a definition of corruption, its understanding will bring about the behaviour of two main actors that are the official and the individual. As such we will dig into the rationale of an individual standing by corruption and later on look at the main effects resulting. Indeed, corruption being a matter of incentives, its causes or incentives will be a set of conditions strategically implemented in a specific context that transform corruption into the best option

for each individual and eventually into a pareto-efficient solution for all those involve. Further, the problem that is corruption will be highlighted looking at the mains effects resulting of its presence. Consequently, we will look at the causes of corruption as presented in the corruption literature focussing on how far and how much they strategically interact together and also highlight the main consequences of this problem.

A corrupt practice could take various form depending on characteristics such as the type of individual involve, the number of individual involve, the size of the amount involve and the legality of the action perform. These classifications will be affected by the definition agreed upon and more importantly dictate the approach to the measure of corruption. As result we will differentiate a corrupt practice from other similar practices but also help to achieve the classification of various types of corrupt acts.

At last, a review of the measures used will bring light to the elusiveness of corrupt acts. Indeed, corrupt practices are not advertised and there are few records of the number or overall values of corrupt acts that take place as those practices are mostly hidden away from public view. Measures of corruption are rather based on the perception of this phenomenon and they allow a comparison and ranking of the incidence of corruption around the world. However, being perception based those measures may be highly subjective. Hence, the necessity to not only review and assess the measures available but also looks into ways to improve them.

Section 1.   Definition of corruption

The importance of defining corruption is the result of the necessity of delimiting the scope and the reach of our research. A definition might help us to figure out the type of actions that will be include and could also be useful to test the quality of the measurement used (Kurer 2005, p234). Indeed, without a precise definition of corruption it is not clear whether a corrupt practice should involve the coalition of a public official and a private individual exclusively or if mismanagement leading to the theft of resources by public officials should be consider as corruption.

Following the earlier works of Heidenheimer et al (1970), Kurer (2005) presents three definitions of corruption. Those definitions consist of a subjective conception that is the public opinion definition and two objectives conceptions that are the public interest definition and the public office definition (Kurer 2005). Kurer (2005, p223) suggests that the foundation of those definitions is the ideal of equality amongst individual living in the same country anything else being equal. In other words it is the assumption that all other things remaining equals, citizens of the same country have identical rights and duties. This suggests that corruption could be considered at first sight as a step toward inequality between individuals in any matters that involves the government. It is the introduction of multiple standards in the practice of justice, the redistribution of wealth or the access to public services. In this extend the subjective conception of corruption is appropriate as it presents corruption as the result of the public perception corrupt behaviour (Kurer 2005, p222). With this, it is those kept away from their rights that will define what constitute the offence. The only problem appears to be the characterisation of the concept "public perception" (Kurer 2005, p222). How will one come up with what will be accepted as the voice of those kept aside is likely to affect the definition. In fact, whether one consider the political elite as part of the public or only individual from the civil society or only those with low level of education or those highly educated, the definition provide will change. Political elite will tend to choose a definition that will downplay or overplay the incidence of corruption depending whether they are in power or not, those with low level of

education within the civil society might just follow the headlines and those highly educated might not constitute a representative sample because not numerous enough. Hence, this conception of corruption does not facilitate the identification of corrupt practice as it is not clear which segment of the population will provide the definition.

The public interest definition, as one of the two objective conceptions of corruption, characterises corruption as anything that causes the mismanagement and/or the theft of public goods (Kurer 2005, p222). The focus is first of all on the negative consequences of the action look at. There should be indeed negative outcomes directly link to this action. The second implication of this definition is the necessity of the involvement of a public good: the negative outcome should be relative to a good that does not belong to a single individual but the whole population. Corruption is in this view any activity or behaviour that has negative consequences attached to the provision and/or use of common goods. This definition like the previous one does not meet the basic requirements as one will find it difficult to define what should be consider as common goods (Kurer 2005, p223). To differentiate a corrupt action from a not corrupt ones one will have to be able to characterise what constitute a common goods and then which action negatively affect its provision or use. The problem now became to figure out who will decide what will constitute or not the pool of common goods: the government approach will be minimalistic as it is costly, those wealthy will be reluctant to be taxed for goods that they can get on their own and the poor will be the one asking for it as they heavily rely on. The current context of recession in Europe could illustrate this problem as household expect the increase of public goods to help them cope, while the government want to reduce the pool of common goods in the aims to reduce the deficit and those wealthy are oppose to any increase of their tax which means no increase of the pool common goods. Hence, the public interest definition of corruption fails because of the difficulty to quantify the concept of common good.

The public office definition, suggests that any action that goes against the generally accepted behaviour of individual within an office and that is motivated by ulterior private incentives should be consider as corruption (Kurer 2005, p225). This presents corruption as the departure from the set of accepted norms regulating any business-related environment caused by a selfish pursuit of wealth.

The emphasis is therefore on inappropriate behaviour in the work place and their cause that are equivocal interests. An obvious limitation of such definition is the claim that acceptable behaviour of individual within an office could be link to a corresponding culture in which case there could not be only one definition of corruption (Kurer 2005, p225). The set of norm regulating business-related environment could be highly related to the set of cultural norm unique to each society. To this extent, what is considered to be a gesture of friendship and appreciation in one place could be seen as corruption in another depending on the prevalent culture. However considering with Tanzi (1998, p565) that the difference between a gift and bribe is obligation of counterparty that comes with the bribe this limitation might fall apart or one could simply argue that gifts also comes with some moral obligations. The other problem with of this definition is the fact that it leaves aside state capture or political corruption (Kurer 2005, p223). State capture or political corruption refers to use of unofficial payment to government official in the aim to influence the process of enactment of law and regulations (Hellman et all, 2003). This type of corruption is not take into account by the definition as it does not go against the accepted norm of an office but just modify those norms to comply with one needs. Consequently, even though one can ultimately agree upon a set of norms regulating business-related environment that are above cultural specifics, this definition is still incomplete as failing to account for attempts to stir these set of norms toward ones needs and interests making corrupt behaviour part of the set of future accepted behaviour.

Other definitions of corruption follow Rose-Ackerman (1975, p187) as she focuses on the illegality of the transfer that takes place whether the counterparty is money or any other advantage while characterising corruption. It is the case of Bardhan (1997, p1321) who presents corruption as an illegal activity involving a public official looking covertly to acquire personal gains. This suggests that corruption may be characterised by the illegality of the practice that takes place. With the assumption that a corrupt act cannot be legal one will exclude political corruption as it refers to the modification of the rule of law to accommodate private interest (Kurer 2005, p225). Further with Senior (2006, p27), it is the act of a corruptor secretly providing a bribe to a corruptee, which is a public official, in the aim to take advantage of the position or power of the corruptee. Senior's definition requires the existence of both a public official and a private party, it also requires the secrecy. The necessity of the existence of the two parties rejects

others forms of corrupt practices such as theft and misappropriation of resources that public officials achieve on their own. In addition, considering the financial contribution of privates firms to political campaigns (aka lobbying) as a form of state capture, the requirement of secrecy could be limitative for a definition of corruption. Indeed, there is generally no secret as to which lobbies belong which political movement even though those lobbies highly influence the erection of law and regulations. At last the Transparency international definition of corruption (2008) presents corruption as "the misuse of public office for private gain". This is similar to the definition of both Kurer (2005, p227) and Amundsen (1999, p2) following whom corruption relate to the behaviour of a state official who takes advantage of his/her position to seek for private gains going against the norms of offices. Here at last there is neither a requirement of the presence of both corruptor and corruptee nor a requirement of secrecy which suggest an inclusion of theft and mismanagement in the pool of corrupt practices. However, state capture is left aside as technically it does not refers to any misuse of mismanagement since law and regulations are already in oriented toward the captors interest legitimating what would have been otherwise illegal.

Hence, we will understand corruption as the rent seeking (greedy) behaviour of state officials that goes against the appropriate code of conduct in an office in addition to other various malpractices that are state capture, thefts, frauds and embezzlement. Corruption define as such takes into account political corruption and others crimes committed by public officials but it leaves aside corrupt practices encountered in private firms. The later cases of corruption will not be considered in this analysis as they do not directly affect the provision of public goods and generally does not involve a government official.

Section 2.   Causes and context of corruption

The cause and context of corruption presented here will account for the understanding of corruption as a as the rent seeking behaviour of individual that goes against office regulation in addition to other malpractices that may remain within the legality.

Although bribing a public official to achieve a task he/she was supposed to do and bribing a public official to disregard rules and regulations are both corrupt acts, the incentives and the individuals involve differs. In the case of the bribery of a public official to provide a service he/she is entitle to provide, the individual providing the bribe will be rationally allocating his/her resources in accordance to its current incentives and context. In this case the bribe provides to the officer is an extra unplanned cost for the individual who in an attempt to minimize its expenditure will paid the bribe only as a last resort. As result the individual bribing the public officer here appears to be acting rationally out of necessity while engaging in corruption. However, in the case of the bribery of a public official to ignore the law, the individual providing the bribe will be acting out of greed. Indeed, the individual bribing the public officer to ignore the law is targeting a profit that is not available for those following the rules. The effect of greed as an incentive could differs from those of necessity. In the following paragraph we will consider and assess some of the mains causes of corruption that are the pre-existing level of corruption, greed, excessive regulations, industrial policy, the quality of regulations and other social settings as found in the literature.

Some authors believe that there is a corruption equilibrium (Bardhan 1997, p1332; Bardhan 2006, p344; Blackburn, Bose and Haque 2006, p2451). The ideas is that since corruption is a frequency dependant equilibrium as any benefit from corruption is function of the number of people potentially corrupt, initial high levels of corruption are likely to remain high while initial low ones would move toward lower one (Bardhan 1997, P1331-1332). This implies that the incidence of corruption does not fluctuate much over the time and current levels are highly

influenced by previous ones. Indeed the equilibrium comes from the fact that as highly dependent on the belief of its occurrence, the incidence of corruption will be very hard to reduce as long as the belief will persist (Bardhan 2006, p344). Blackburn, Bose and Haque (2006, p2451) arrive at the same conclusion by presenting corruption of an individual as the result of the spread of corruption amongst the group which makes its real occurrence the result of its expected one. However both approaches explain the prevalence of corruption simply as a result of the belief (perception) relative to its spread but the rationale behind such consideration remains to be made. As such it remains to be proven that those siding with corruption are or are not rational agents maximising their income in the light of their surroundings. Hence, perceptions and beliefs relative to the incidence of corruption are causes of corruption but the process following which one decide to be corrupt remain to be highlighted.

Corruption in its most simple form can be characterised as the greedy behaviour of a state official who extracts bribes from private individuals in exchange for regular services or favours. This suggests that the proximity to state official might increase the probability of being asked for a bribe. Svensson (2003, p216) argues that the proximity to public official is positively related to the probability of control and regulations and highly to the probability to be ask for a bribe. In addition, he also suggests that the probability to be ask for a bribe is unrelated to the profit made by the provider of the bribe but the later affect the size of the bribe (Svensson 2003, p216-219). Consequently, the frequency of dealing with public official being highly related to the occurrence of corruption, it could be the case that the prevalence of corruption in sectors where public official numerous will be higher.

Presenting corruption as a form of rent seeking behaviour, Anne Krueger (1974, p291) claims that it is the result of an excessive regulation of the economy. Her argument is that people try to get around regulation which gives opportunities to government's officials to extract rents. Indeed, to have a strong hand over the economy the government gives a lot of power to its officials instead of letting the market regulates itself and firms looking forward to operate in such market will not hesitate to pay the bribe asked for. In addition, the existence of many rules and regulations creates a context where facilitators can flourish (Tanzi 1998, p566). Because of the complexity of the system as the result of the multitude of

regulation, another type of corruption comes to life in the form of individual officially unrelated to the state who offers for the right price to provide a way around the system. Hence excessive reforms and regulations are causes of corruption.

One might suggest that the case of market regulations is quite different especially in the light of the dislike of market failures such as unexpected inflation by the general population. However, Acemoglu and Verdier (2000, p18) believe that government inventions aiming to solve those failures have a considerable adverse effect. Indeed, because government invention is achieve by a diversify group of bureaucrats having individual incentives and aware of the principal-agent problem existing between those officials and the state, the result is the spread of corruption (Acemoglu and Verdier 2000, p195). In the process of implementing government interventions, state official may be endowed with a considerable amount of power but the state has very little means to verify the veracity of the information collected by the official. This leave bureaucrats free to act on their own initiatives which might lead to an adverse effects such as corruption. Further in poor countries attempting to generate growth, there is the necessity to increase government intervention aiming at the reduction of market failure but this will ultimately leads to corruption as describe earlier (Acemoglu and Verdier 2000, p196). This is due to the specificity of poor countries as because of low productivity growth is generally achieve through capital intensive activities, it means that the opportunity cost of increasing the number of state's official is very low as compare to rich countries. This is also cause by the attempt to improve growth by pulling people from the private sector to implement government intervention leading essentially to corruption as it increase the interaction with government officials thus giving more opportunities to extract rents (Acemoglu and Verdier 2000, p195). Kaufmann (1997, p122) brings a limit to those arguments as he claims that when reforms are correctly erected and implemented they will not lead to corruption. However, even if one assumes his claim to be correct, the principal-agent problem remains unsolved. It is the case that if we consider a context where reforms are rightly erected and implemented (which by default will get rid of state capture), this will not stop corruption at the level of bureaucrat as one could always create delays and difficulties to extract rents. Hence, even in the light of the necessity of market intervention, rules, regulations and government interventions may be conducive to corruption.

The attribution of an excessive power to government official could also happen as the result of industrial policy as point out by Ades and Di-Tella (1997). They argue in this extend that industrial policy towards investment can provide opportunities to engage in corrupt practices. It is the case that with a targeted industrial policy for investment, the final selection of recipient firms will be the opportunity for government officials to ask for bribe (Ades and Di-TellMocan 2008a 1997, p1039). In addition, corruption is found negatively correlated to spending on Research and Development which could be explained by the consideration following which corruption will act as a "brain drain" or a disincentive for such sectors (Ades and Di-Tella 1997, p1040). Hence, all the advantages of an industrial policy seem lost since the selection process is not based on meritocracy and with no research done there will be not improvement of the productivity.

Another way to provide government officials incentives to engage in corrupt practices is by setting up regulations lacking precision and clarity. Rose-Ackerman (1975, p188) suggests that the lack of clarity and precision in government regulation allows official to order expensive goods that could have been purchased in the private market at a better price. She also suggests that such type of regulations make it harder to detect corrupt practices (Rose-Ackerman 1975, p202). For an official the absence of clarity in rules and regulation is clearly a safe haven in the sense that the interpretation is up to him. Whether the official is already corrupt or not will not really matter because entrepreneurs looking for a better share of the market might be the ones competing to offer the highest bribe. Therefore, the ambiguity of regulations will lead to corruption.

Mocan (2004) finds other social settings beside economical and institutional circumstances allocating too much power to government officials that will cause corruption. He claims that small cities have lower levels of corruption while males, the top half on the income distribution, the most educated peoples, individuals in their twenties and thirties and married people are quite likely to come across corrupt practices (Mocan 2008, p499-500). This might not say a lot since a smaller city means few peoples, fewer interactions and fewer opportunities to ask for bribes. Moreover, these groups of individuals that have the higher probability to come across corrupt practices represent the active population that is generally in contact with government's officials and might have the means to pay

the bribe. However, Mocan also suggests that the size of the population and unemployment are positively link to corruption as he founds that the rise of the population by a million will lead to the rise of the prevalence of corruption by zero point zero one percent and one percent increase in unemployment will lead to zero point one percent increase in corruption (Mocan 2004, p501). This brings us back to the earlier argument following which more people lead to more interactions and more opportunities for rent seeking but this might not be conclusive as it tells us nothing about the type of interaction. One alternative is to consider the increase of population comes along with poverty in the light of the inequality characteristic of poor countries and poverty gives rise to more opportunities for corruption. As result, even if we can only assume that via its effect on poverty and inequality the growth of population causes corruption, there is no doubt that statistically unemployment highly promotes corruption.

The causes of corruption could be summarised as the frequency of dealing with public officials for firm, the strength of rules and regulations or anything that will put too much power in the hands of government officials. The last one could vary from too much constraint on the economy to the implementation of a specific type policy or could simply be the ambiguity in regulations. Corruption might also be cause by the increase of the population assuming a context of poverty and inequality. At last unemployment is a clear cause corruption, ten times faster than population would.

Having presented the main causes of corruption, the mechanism through which individuals choose to be corrupt remains to be clarified. Indeed, most of the causes and context presented in the literature of corruption refers to either the equilibrium in which corruption prevail or the context that will promote or facilitate it. The way in which those incentives predispose individuals to side with corruption is not explain but only assumed. In this respect while it is acceptable to consider that the more prevalent is corruption initially the more new individuals will tend to be corrupt, the rationale of such behaviour remain to be explain. Chapter II will address such concerns as we will assess the rationality of the decision to side with corruption and its implication for both sides involved.

Section 3.   Main effects of corruption

An awareness of the causes and consequences of corruption might help not only to better understand the problem but also to assess its prevalence even in absence accurate indicators. It is therefore necessary to presents the effects of corruption which could be useful to assess the precision of the various indicators available. In addition it is the case that the consequences of corruption could be highly diversified. Whether or not corruption is organised, structured and offering a high degree of guarantee, the consequences of corruption could be either facilitate the economy or weaken it (Amundsen 1999, p19-20). However, the mains effect as identify by the literature are those on tax, efficiency and productivity, institutions, growth, inequality and poverty.

Corruption is first of all a way around tax and regulation. Private individuals and firms bribe corrupt officials to be able to pay a lesser amount of tax or simply be exempt. Further Rose-Ackerman (2004, p7) claims that the presence of corruption validates the belief that not paying tax is normal. This goes beyond an attempt to take advantage of a way around tax that corruption represents as private individuals might end up contesting the legitimacy of the tax system. In such context even if the income from tax is low any attempt to raise the level of tax will just boost corruption (Gupta et all, 1998). Looking into the case of developing countries Tanzi and Davoodi (1998, p16) find out that there is effectively a high correlation between corruption and low level of government income. Consequently, corruption does reduce the amount of tax collected by government.

Corruption presented as speed money is supposed to improve market efficiency and productivity but this does not always happen. Through its negative effect on the rule of law, on people incentives, on tax, on government legitimacy and objectives, corruption negatively affect the market (Tanzi 1998, p583-584). It is the case that corruption by providing a way around rules does make the market ineffective while attracting at the same time individual toward administrative position. In addition with ineffective rules, the government have less hold the

state. Further, Svensson (2003, p223) finds out that the prospect of high corruption push entrepreneurs to opt for less advance technology in the light of the fact that by providing lower return and costing more to operate it will be associate with a lower level of bribe. As such corruption not only disorganise the market but also promote low productivity. Indeed with Mbaku (1996, p2) corruption through its effect on efficiency, rules and regulations appears to be harmful for the state as a whole. Hence, corruption promotes inefficiency and low productivity.

Looking deeper into the effect of corruption on the State institutions, it could be the case that corruption destabilises the rule of law by providing a way around it. In a context of prevalent corruptions institutions affected can no longer play the role they were design to play just like a judiciary system no longer condemning the guilty (Jain 2011, p5). Further, policies implemented suffer adverse effects due to the ineffectiveness of the institutional framework. Ades and Di-tella (1997) take the example of industrial policies as they are more expensive to implement while in corrupt environment. They claim that corruption cut a significant percentage of the profit from an industrial policy as with corruption expected gain in productivity are lost as they opt for less advance technology and advance in research and development is forsaken (Ades and Di-Tella 1997). Hence, corruption distorts institutions either by making them useless in the process of implementing rules or by generating adverse effects to the policies implemented.

Corruption also has a negative effect on investment (Bardhan 1997, p1327; Mauro 1995; Blackburn, Bose and Haque, 2006, p2460 and p2464; Tanzi and Davoodi 1998). According to Blackburn, Bose and Haque (2006, p 2464) this happens because in a corrupt context, the capital will not be allocated based on its return or the even the importance of the sector. This will affect the overall amount of investment available and the accumulation of capital. Corrupt officials make sure that the profitability of the investment is no longer the focus point in the selection process (Tanzi and Davoodi 1998, p8). The case of the infrastructure sector is point out by Collier and Hoeffer (2005, p13) as the most corrupt sector in the light of the high asymmetry of information there. This could be explained by the fact that according to Olken (2009) corrupt individual could easily hide in such sector. Collier and Hoeffer (2005, p16) also claim that by lowering

investment in this sector corruption affects both the productivity and the quality of the outcome. Indeed, corruption reduces the return of investment while increasing its costs due to the misallocation of capital (Gyimah-Brempong 2002, p16). The particularity of investment in road construction illustrates it clearly as the bigger the public investment the bigger the adverse effect of corruption on road quality (Tanzi and Davoodi 1998, p20). This goes well beyond the case of infrastructure as Gyimah-Brempong highlights the negative effect of corruption on investment in human capital (2002, p17). He suggests that corruption affects the hiring process, makes education inaccessible to the poor due to the high cost and might even push away those well-educated because of favoritism (Gyimah-Brempong 2002, p17). Further, corruption would reduce the output of initial investment either directly by diverting such funds or indirectly by reducing the money available for the maintenance of the investment made (Tanzi and Davoodi 1998, p10). At last, considering foreign aid as a type of investment, it is the case that corruption is negatively correlated to foreign aid (Tavares 2003). Conclusively, investment on infrastructure, investment on human capital and foreign aid are negatively affected by corruption.

The effect of corruption on growth is mainly seen as negative by various authors (Mauro 1995, p704; Blackburn, Bose and Haque 2006, p2450; Thamrong Triprasertphot 2011, chap2; Gyimah-Brempong 2002; Gyimah-Brempong and Camacho 2006; Tanzi and Davoodi 1998; Gupta et all 1998). This is the case because of the reduction of the overall level of investment and the inefficiency of the ones achieved (Mauro 1995, p704-705). More specifically, through its negative effect on investment directed to human capital or through its positive effect on income inequality mainly in African countries, corruption negatively affects growth (Gyimah-Brempong 2002, p19; Tanzi and Davoodi 1998). Blackburn, Bose and Haque (2006, p2450 p2464) believe in a cycle of low growth and high corruption where the absence of growth gives more incentives to get involve into corrupt practices since people do not stand to loose much if caught. This contradict the view of Bardhan (1997, p1329) for whom the presence of corruption is conditioned by long lasting growth since the availability of a bribe comes from the fact that investor and entrepreneurs can put aside such money. Thamrong Triprasertphot (2011, chap2) unite those two view by suggesting that there could be the case of positive effect of corruption on the short run and negative one on the long run where corruption takes advantage of potential long

lasting growth on the short term to extend its reaches but this will on the long term considerably lower the growth rate and impose a context of low growth high corruption. Further, Gyimah-Brempong and Camacho (2006, p247) find out that for the case of Africa if corruption increase by 10% this will lead to a reduction of growth rate per capita income by 2.8%. Aware that for 2011 the average growth rate of Sub-Saharan African countries was 5% (IMF 2012, p1), corruption has a considerable effect on growth. However, while testing for the direct effect of corruption on growth taking into account the respect of the rule of law, Mocan (2004) finds out that this effect is null. He suggests that it is in a context of weak institutions that corruption directly affects growth (Mocan 2008, p508; Rose-Ackerman 2004, p15). Consequently, corruption reduces the rate of growth through its effect on investment, on income inequality and on institutions.

Finally, the effect of corruption on both bureaucratic and market efficiency is rather complex. Use as speed money, corruption could effectively improve the efficiency of bureaucracy and hence improve market efficiency as well in cases where bureaucratic procedures are complex and long (Bardhan 1997, p1322; Bardhan 2006, p344-345; Mauro 1995, p685). However it could be the case that speed money is effective only because the delay was just a means to accumulate rents (Clunies-Ross, Forsyth and Huq 2009, p154). In addition, there is a strong positive correlation between bureaucratic efficiency and economic development which means that inefficiencies both bureaucratic and market limit the opportunities for growth (Mauro 1995, p687). This is similar to the findings of Thamrong Triprasertphot (2011, chap3) suggesting that corruption increases income inequality and poverty and also the findings of Gupta et al (1998) suggesting that corruption not only increase income inequality but also reduce poor's income growth. This happens either directly or indirectly via the promotion of inequality within the education system and the repartition of the land, the reduction of investment in social activities and the fall of the income tax (Gupta et al 1998). It is therefore the case that corruption promotes inequality.

To sum up corruption does negatively affect institutions, investment, growth and the overall level of efficiency mainly by restraining the countries in a state of poverty with inefficiency, misallocation and inequality. Consequently it appears that within a corrupt country ways out of poverty are very limited.

Section 4.   Categorisation of corruption

There is a variety of classification of corrupt practices (see Rose-Ackerman, 1975; Kurer, 2005; Amundsen, 1999; Tanzi and Davoodi, 1998; Kaufmann, 1997). It could be based on the type of individual involve, the way it is structured and organised, the effect it has on income and growth or even the group that the extortion targets. However it does involve a bribe taker and in most cases a bribe giver that both are better off standing by corruption. We will review the following categories: various form of bureaucratic and political corruption, concept of centralised and decentralised corruption, redistributive and extractive corruption and at last singular types of corruption that are bribery, embezzlement, fraud and extortion.

Petty corruption or bureaucratic corruption refers to corrupt practices involving public officers with low levels of authority. According to Bradham (2006, p342), even though they are generally numerous, they mainly involve small amount of cash. They can be found in almost every single daily interaction of the population with a public official. Such prevalence could explain the small amount of cash involve, indeed the corrupt official is aware of the high frequency (daily basis) of the opportunity to ask for a bribe therefore there is no point to ask for a huge a bribe which might attract attention or discourage the individual. Other than the recurrence of the practice, there is also the low level authority of the officials involve in this type of corruption that prevent them from asking a huge bribe. Public officials involve in petty corruption are low level ones, this give them a limited power over the individuals to whom they ask the bribe. In other words, within petty corruption the veto of public official may at most just delay the process for the individual seeking the service not stop it. This type of corruption consist of acts like a request of a bribe by a police officer at a check point, a request of a bribe by an administrative officer to deliver a service that is supposed to be free of charge or even the request of a bribe by a public official to speed up the administrative process. It mainly affects individuals in civil society who lack connections with those in power but have to deal daily with state authorities.

Contrary to petty corruption, political corruption involves fewer transactions but leverages a considerable amount of money (Bardhan 2006, p342). High ranking public officials and the political elite are those in a position to exert political corruption. Holding a considerable amount of power as the result of their status they can then ask for bribe per transaction higher than the one asked in the case of petty corruption as the briber expects to have at his/her disposal the discretionary power of the high ranking official. The low amount of transactions involved could be thus explained by the competitive nature of this type of corruption which is fuelled by the discretionary power of the official. In other words, the willingness of the private entities to pay expensive bribes within cases of political corruption suggests itself that they expect benefits from the discretionary power of the official to at least account for all the expenses made including the bribe. In addition, it is also the exclusivity that comes with such power that matter. Such exclusivity will give to the chosen one an edge over other private entities. At last, because it involves highly sensitive issues and involving high ranking officials, political corruption is hidden. Unlike petty corruption which is achieve in broad daylight, political corruption is hidden behind closed doors as political elites would lose the population support otherwise. At this point the main two types of corruption are a widely spread request of bribe by low level public officers in their daily dealing with private individuals and a more secretive form of corruption happening in the high sphere of the state. Furthermore, characteristics of those two types of corruption go beyond the size of the bribe and its frequency.

Petty corruption refers to the opportunistic rent seeking behaviour of public officials at the occasion of their usual interaction with individuals. The origin of the fund extorted and the frequency of the operation suggests the maximisation behaviour of the provider of the bribe. Indeed, being private, the funds extorted could be allocated to another activity or simply moved elsewhere by the owner who therefore pays the bribe because it is its best option. This idea is strengthen by the frequency of the activity as the individual will have the opportunity to learn from his/her eventual mistakes or simply repeat the same strategy if it is optimal. In addition, in the case of the recipient of the bribe who is a low level public official the prevalence of such type of practices in addition to the low level of cash involve reduces the probability of detection and/or

punishment which make such behaviour the best opportunity for a low level official to increase its income.

Political corruption in turn refers to the private use of the discretionary power of high ranking public officers or political elite in exchange for a payment to the officer or elite. Here the payment provide is still a private fund but representing a considerable amount of money, individuals or firms paying the bribe are maximizing their income aware of the exclusivity that comes with it. Indeed, the discretionary power of the high ranking official or political elite will provide to the briber an edge over the rest of individuals or firm that could have benefit from it. However one could suggest that being a bargaining process, the winner will be the one who would provide a bribe above the optimal level and therefore would have fail to choose its best option. In spite that the fact remain that those competing for the discretionary power are attempting to maximize their income by choosing the option that will provide them the highest return. In addition, the public official or political elite involves clearly maximize his/her income as individuals or firms compete to take advantage of his/her discretionary power which means that he/she is ensure to have the highest level of bribe. The recipient of the bribe just like the provider is choosing the best option for him/her by maximizing his/her income.

A more advanced approach to petty corruption and political corruption is given by the World Bank which makes the distinction between Administrative corruption and crony capitalism or state capture (Rose-Ackerman 2004, p12). Elements included in administrative corruption are: bribery and favouritism used to reduce tax, get around regulations and be awarded minor contracts (Rose-Ackerman 2004, p12). Here the emphasis is on the finality of the corrupt behaviour as this approach makes it clear that with administrative corruption the individual's aim is to boost their regular activity by using bribe. An individual will therefore resort to petty corruption in the aim to facilitate and ease his/her daily encounter with public official. Kurer (2005, p234) adds extortion, nepotism and mismanagement in public office and judiciary system to bribery as part of administrative corruption as he focus instead on the type of public official involve. Following Kurer, petty corruption will then be a type of corruption that will involve administrative officer as oppose to politics as he includes corruption in the judiciary system as part of petty corruption. Whether one choose to focus

on the aim of the corrupt act or on the type of officials involve to characterise the type of actions that will counts as petty corruption will affect the concept of political corruption. Hence, considering corrupt practices in the justice system as more than just a means to ease daily dealing with public officers and aware of the discretionary power of judges we will exclude such type of practice from petty corruption. Bribery, favouritism use to reduce tax, favouritism use to get around regulations, favouritism use to get minor contracts and extortion and mismanagement including low level officials will be at this point the infractions that will constitute petty corruption. This widens and clarifies the scope of administrative corruption to include any malpractice that involves a low level state representative and a private individual or entity aiming to provide a service to the private party in exchange for a bribe for the official.

In relation to crony capitalism or state capture, an advance conception adduces that it reflects the focus of powers and means of a whole country on the interest of a few political elite and firm owner (Rose-Ackerman 2004, p12). It is not about misuse or mismanagement made by low level official, it is about modelling regulations and institutions to serve the interest of a minority in power (Amundsen 1999, p3). The scope here goes beyond the action of the few political elite to include an attempt by anyone having the means to put the whole power of the state at his/her service. Hellman et all (2003) define state capture as the act of firm buying the rule of law in a country. In this context law and legislation are design to satisfy the needs of a specific group of firms and institutions serve at the pleasure of those firms. It is also about the behaviour of corrupt political elite in charge of designing and enforcing law (Amundsen 1999, p3; Kurer 2005, p234). In fact in some cases, the political elite will be behind those firms achieving the capture of the state as suggests Amundsen (1999, p12) referring to countries such as Zimbabwe, Ivory Coast and Cameroon. Kurer (2005, p234) considers as state capture: the bribery of high level official aiming to redesign regulations or targeting tax exemption or targeting the provision government funding. To that we will add the bribery of high level official such as judges to form the pool of actions that will be consider as political corruption. Presents like this the detection of political corruption will require a thorough analysis of state policies implemented, their effect and the implementation process. Indeed, to figure out whether or not the state has been taken over by private firm one should look at the redistributive process and repartition of wealth implement within this state in

relation to the situation of the poorest part of the population and also how does high level official interpret policies and regulation in place. However, Amundsen claims that state capture is generally based on pervasive administrative corruption (1999, p4). Indeed, it is sensible to assume that a context of prevalent administrative corruption will be a breeding place for crony capitalism since such practices will became acceptable and be assimilate to just another corrupt behaviour. In other words, the prevalence of administrative corruption in an economy or in a specific sector could be used as an indicator of the potential existence of crony capitalism even in absence of hard evidence suggesting the presence of the later.

Following the advance approach of petty corruption, individuals will adhere to it in the aim to ease their regular dealing with low level official. This is once again a maximization behaviour as the individual involves in such type of corruption will provide the bribe only if this will ease the process and more importantly lead to the desired outcome. In this extend, the payment of the bribe will take place only in cases where it represent the best option for the individual providing it. In addition, crony capitalism or state capture could suggest the self-maximization behaviour of both the briber and the bribee as it refers to the use of the whole power of the state to serve the interest of a wealthy minority in exchange of a considerable amount of bribe. The choices present to the bribee are either content himself/herself with its regular wage or sell one discretionary power. At this point, the willingness to increase one's income - assuming that everyone is a forced self-maximizer and also that administrative officials and political elite do not have any higher motivation than increasing their own income - will lead both parties to side with corruption (see Cheung 1996). In addition, following the multiple corruption equilibrium, whether we are in a context of high level (low level) of corruption the bribee will be motivated to sell his/her discretionary power (not sell his/her discretionary power). The briber is then choosing his/her best option by siding with such type of corruption as otherwise someone else will take the opportunity and rule of law will became unfavourable for him/her.

Anne Krueger (1974) presents corruption as form of rent seeking. This means that corruption is the opportunistic behaviour of those in a position to ask for money before delivering a service that should be free of charge and is related

to what Mbaku (1996, p1) calls bureaucratic corruption. This suggests that corruption is a matter of opportunity, the corrupt individuals behave as such because they are able to. In other words the problem of corruption is a problem of a lack of regulation and restriction. In addition, Krueger (1974, p292-293) argues that the availability of rents in the public sector explains the high demand for such positions. However this high demand does not means that all bureaucrats are corrupt. The rush for administrative position that could be used as an aggregate of the prevalence of corruption is therefore dismiss as the vocational call of some bureaucrats should be considered. Therefore, bureaucratic corruption will be considered as matter of bad regulations. It could be the case that those willing to take advantage of corruption and in a position to do so will put together the conditions for it to take place. In this extend the recipient of the bribe in his/her position of state representative will set up the wrong regulation or simply undermine the existing one. Hence the prevalence of such type of corruption (rent seeking) will suggests not only bad regulations but also the lack of willingness to fight corruption.

Centralised corruption refers to a monopolistic system where corruption is organised so that the bribe is taken once and redistributed amongst all the corrupt official while in a decentralized one since nothing is organised the amount of the bribe require is not known and new public officers could always appear to ask for a bribe(Triprasertphot 2011). It is the case that the choice between these two types could either boost or damage investment in a country (Amundsen 1999, p19-20). The organisation and structure promoted within a centralised corruption might present corruption as another tax to potential investors while with decentralise corruption the absence of structure mapping the way around the system might just scare away investors unable to make any forecast. In addition, it has been argued that centralised corruption give the advantage to limit the extent of corruption, its inefficiency and even the overall amount of the bribe unlike decentralized one (Bardhan 1997, p1324-1325). This is related to the fact that with centralised corruption the bribe is taken once which limit the eventually of people asking for more bribe at every step, speed the process and relatively guarantee the delivery of the service. Nevertheless, the fact that the bribe is asked once means that it should be big enough to be shared amongst the entire group of corrupt official because being an organisation the affordability and permanence of the system are take into account. Therefore, in a centralised corruption system the private entity

providing the bribe will be kept happy which could be seen as a better form of corruption while with decentralised one since no attention is paid to the private entity it could be consider as a bad form of corruption.

Additional typologies of corruption include redistributive corruption vs extractive corruption. Redistributive corruption refers to case where corruption ultimately takes wealth and resources from the state to give it to specific groups of individuals (Amundsen 1999, p5). Similarly to state capture, powerful groups will take advantage of state resources and wealth by the means of corruption (Amundsen 1999, p6). The particularity here is that those groups could be diverse from ethnic or religious group to corporations whether local or not but they are definitely distinct from state official or politician as a group (Amundsen 1999, p6). Extractive corruption however is the opposite. The state or actually the minority in power will extract resources from the general population or the society in the case of extractive corruption (Amundsen 1999, p8). Here the state official extracts resources not from the state directly but from the firms and individual within the country. Despite the similarity of redistributive and extractive corruption since leading both to the expropriation of resources by a powerful group, there is an important distinction that should be mention. Extractive corruption suggests that the state is strong enough to extract resources from firms and individual but this also imply that those firms already exist and have something to be extracted. Redistributive corruption implies that the state as a whole will still have enough resources or power to be extracted. Indeed, while with extractive corruption one could assume a kind of organised system looking after its permanence and sustainability similarly to centralised corruption and therefore supporting in some ways firms involved, redistributive corruption seems to be just about how much and how fast the powerful group can extract in the light of their power. Further, redistributive corruption is found in Cameroon as some regions (The Sultanate of Bamoun in the West region and the Rey Bouba in the North region) are virtually independent as long as they support the ruling party (Amundsen 1999, p7).

Focussing on the utility of both the provider of the bribe and its recipient we could find further evidences of the difference between extractive and redistributive corruption. Indeed, with extractive corruption aware of the actors concern with their future gain as well as the present one, public official will

ensure that the bribe asked for maximise both their own utility and the ability of various firms providing bribes to afford it. This follows the understanding that the provider of the bribe will keep doing so if and only if it maximizes his/her utility. As such extractive corruption could imply the maximization of the utility of both the provider of the bribe and its recipient. It is the case that both parties could reach a pareto-efficient solution as the maximization behaviour of the recipient of the bribe is function of the possibility of the provider of the bribe to maximize its revenue. However, redistributive corruption being the exploitation of state resources it is the case that the group of individuals or community perpetrating such act is essentially just increasing its income. Here, there is no interest for efficiency but just self-interest having no counter-party. Those groups will attempt to capture as much as possible from states resources.

At last there are fundamental concepts related to corruption such as bribery, embezzlement, fraud and extortion that are useful to complete basic definition of corruption. Bribery refers to the financial counterparty provides to an official in exchange for a favour or service in a corrupt transaction (Amundsen 1999, p11). This is the major tool for administrative corruption as it is the means through which officials extract rents. Embezzlement is technically misappropriation rather than corruption as it involves a criminal act see in the extraction of public resources by officials in charge of managing it (Amundsen 1999, p11). It involves also the use of political status for private dealings, Amundsen (1999, p12) cites the case some African countries amongst which Cameroon where the president and its relatives are owner of majors firms in monopoly such as breweries or sugar refineries. As such it could be seen as a form of redistributive corruption. Fraud, just like embezzlement, is crime rather than corruption in a strict sense. Fraud is a general term that includes all different ways of using deception to obtain bribe or achieve embezzlement (Amundsen 1999, p12). Finally, extortion similarly to fraud and embezzlement is a crime as it consists of the extraction of rent using means that involve violence (Amundsen 1999, p13).

Bribery is a generic term referring to the money that exchange hand in any corrupt transaction, embezzlement, fraud and extortion however it could be included into redistributive corruption with the state official responsible for the misappropriation of state resources. As result while bribery consists of self-

maximizer individuals and could potentially lead to a pareto-efficient state, the three others concepts are simply self-interested acts.

Section 5.   Measuring corruption

1.   Major indicators of corruption:

There is a huge variety of indicators of the perception of corruption, for example the Corruption Perception Index of 2011 includes seventeen indicators (www.transparency.org). Such variety of perception indexes could be useful or not depending on whether or not it leads to an agreement on levels of corruption around the world. Fortunately it appears to be a blessing as indicators are generally correlated one to another (Treisman 2000).

The major indicators of corruption are the Bribe Payer Index (BPI), the Global Corruption Barometer (GCB) and the Corruption Perception Index (CPI) (Transparency International, 2005). The BPI is the result of survey distributed to employee in company from major export countries on their tendency to give bribe to foreigners (Transparency International, 2005). The GCB gives annually the public point of view of corruption as reveal by surveys distributed amongst the general population (Transparency International, 2005).

The CPI is an index produces by Transparency International and it compiles a wide range surveys administrated to experts and businessman on the perception of corruption in the public sector (www.transparency.org/research/cpi). The 2010 CPI for example compiles the results from the following indicators: the Country Performance Assessment Ratings by the Asian Development Bank, the Country Policy and Institutional Assessment by the African Development Bank, the Bertelsmann Transformation Index by Bertelsmann Foundation, the Country Risk Service and Country Forecast by the Economist Intelligence Unit, the Nation in Transit by Freedom House, the Global Risk Service by IHS Global Insight, the World Competitiveness Report by the Institute for Management Development, the Asian Intelligence by Political and Economic Risk Consultancy, the Country Policy and Institutional Assessment by the World Bank and the Global Competitiveness Report by the World Economic Forum (www.transparency.org/research/cpi).

One of the main limit of those indicators is relative to the fact that they are based on surveys distributed either to foreigner who are not always use to local habits or to locals population who will either emphasise or down play the actual incidence of corruption depending - among other factors- on their political orientations. Aware of the importance of the perception of corruption in the matter of its occurrence Bardhan (2006, p347) claims that this is a majors flaws of those indicators. However it should be mention that the lack of accuracy of those indication and apparent biased is tempered by the wide range of indicators take into account in the case of the CPI (Triprasertphot 2011). Indeed, the fact that most of the indicators gravitate toward the same score for a specific country could be a sign that the actual incidence of corruption is not far from that.

2.   Perception of corruption vs. incidence of corruption:

The attempt to measure corruption has but one major flaws; the perception of corruption differs from its actual incidence. The common indicators of corruption such as the BPI, CPI and GCB are indicators of the perception of corruption rather than its incidence. The reason is that it is hard to measure the incidence since those practices are generally hidden. However some authors manage to assess the incidence of corruption either per sector through individual micro-data or within a specific project.

The United Nations Inter-regional Crime and Justice Research Institute collect data from individual in some specific countries (http://www.unicri.it/documentation_centre/publications/icvs/_datafiles/participating%20countries.pdf) on corruption through the International Crime Victim Survey. By 2002, four surveys had already been done. It is worth mentioning that out of 68 countries in this survey, eleven are African countries but only three of them have been survey more than once. Using this dataset, Mocan (2008) looks into the causes of corruption and the link between the incidence of corruption and its perception. Indeed, the survey clearly asks to individual if they have been ask for a bribe by various governments official belonging to services such as administration, customs or police. The answer provides an approximation of the incidence of corruption per sector. Mocan (2008, p499) finds out that the increase of the overall incidence of corruption causes the increase of the perception of

corruption as measure by the CPI. More specifically, the rise of the incidence of corruption in government office and in the police is the main cause of the rise of the perception of corruption as measure by the CPI (Mocan 2008, p507). However, by taking into account the quality of institutions, the incidence of corruption became irrelevant and only the risk of expropriation became relevant (Mocan 2008, p508). It seems therefore that the respect of the rule of law or simply the quality and strength of institutions matter more to the perception of corruption than its actual incidence.

Unlike Mocan (2008) who looks at the incidence of corruption across various countries, Olken (2009) focuses on a specific project in one country. The project in question is the construction of a road in rural Indonesia and the survey takes place after the project is achieved (Olken 2009, p950). The incidence of corruption is define here as the "missing expenditures" seen as the difference between the official cost of the road and the estimation of how much it should have actually cost (Olken 2009, p950). Three surveys were used to estimate the actual cost of the road: an engineering survey to assess the quantity of material required following the analysis of core samples dug at various places of the road, a worker survey to assess the wages level and the number of hours done on a daily base and a supplier survey to assess the price of materials used in the project (Olken 2009, p953-954). In addition, another survey was done to measure the villager's perception of corruption within the project in question. The result shows that the perception of corruption and its incidence are weakly correlated (Olken 2009, p956). In addition, the villager's perception of corruption is highly positively correlated to inflated price and weakly to inflated quantities (Olken 2009, p956). This suggests that individuals cannot detect inflated quantities. Further, the results also show that the inflated quantities account for all the incidence of corruption (Olken 2009, p957). In other words the inaccuracy of the perception of corruption could be the results of the strategic behaviour of corrupt individuals who achieve corruption in such a way that is not perceivable by the general public (Olken 2009, p957).

The difference between the perception and the incidence of corruption is caused by the focus of perception indice on the quality of institutions and/or the strategy of individuals in their attempts to avoid detection. Perception indexes rightfully focus on the quality of institutions as corruption could be seen as the

disregard of the rule of office which ultimately distorts the work of institutions. Corrupt individuals would be the one involve in any activity that led to the disregard of office regulation by administrative officers. It is the case that by providing a way around rule and norms that institutions are supposed to enforce corruption robs them from their purpose. In this regard the extent of the distortion of institution could be seen as an aggregate of the incidence of corruption or at least petty corruption. However, corruption presented as the behaviour of state officials that goes against office regulation only include petty corruption leaving aside fraud, embezzlement, thief and more importantly political corruption or state capture. Subsequently, perception indexes could potentially be far away from the incidence of corruption depending on the persistence of corrupt practices that it does not consider.

The other explanation for the difference between perception indexes of corruption and the incidence of corruption is the strategic behaviour of corrupt individuals. It is the fact that corrupt individuals could actually strategically affect the perception of corruption (downplay or overplay it). This, unlike the focus of perception indexes on the quality of institution, could have damaging adverse effect since it is not a focus on one or another practices but a misrepresentation of the prevalence of corruption. Here, those involve in corruption will affect the gap between perception indexes and incidence of corruption in one way or another. The length of the gap will therefore reflect the needs of the corrupt individuals. Perceptions indexes could downplay the incidence of corruption in a context of fight against corruption with its indexes below the actual incidence of corruption or overplay it where there will be the need to justify the failure of the policies implemented or point out the insolvability of the problem with its index above the actual incidence of corruption. Hence, perception indexes could potentially be use to promote the incentives that will make corruption the optimal option for individuals living in a specific context.

It is therefore the case that perception indexes are limited in their assessment of the prevalence of corruption. Having presented studies combining the perception and the incidence of corruption while measuring the extent of corruption across countries or within a specific project, it remain to be seen if there is a way to improve upon such literature. Indeed, agencies tracking and reporting actual cases of corruption are more and more active in Sub-Saharan

African countries which may lead the way to alternatives ways to measure corruption. To this extend after having assessed the rationale of corrupt behaviour in Chapter II, we will attempt to generate an alternative way to measure corruption taking into account actual data on the incidence of corruption and perception indexes in Chapter III.

Chapter II. The rationale of corrupt behaviour and its implications

Section 1.   Introduction

In economics we approach social deviances such as crime or corruption as problem of incentives. We consider that all individuals are rational and as such moved by the necessity to maximise their utility. Macrae (1982, p678) states that "Corruption is part of a rational calculus and an integral and often deeply rooted method by which reasonable men take decision in the soft states of the third world". He lays as such one of the basic assumption in the economics of corruption.

Our primary objective is to present the rationale of such assumption following the framework use by Macrae in his paper. We want to understand the rationality of agents choosing to be corrupt. However, while Macrae focuses on the behaviour of firms competing for a contract we will look at the behaviour of the two individuals taking part to a corrupt game. Our game consist of a case of bureaucratic corruption where farmers expecting a subvention from the government have to choose between paying a bribe and receive the subvention on time or refusing to pay and receive the subvention with delay. In the meantime the official in charge of delivering the subvention can either be honest and deliver it in time to everyone or be corrupt and request a bribe to deliver on time while creating delays for those who do not pay. In addition, those being corrupt whether farmers or official face the risk of being punished if detected with the punishment function of the prevalence of corruption among each group. The payoff of each strategy is then function of the prevalence of corruption among each group through the effect on the size of the punishment and the size of the boost/delay incur.

Our game presents corruption as the result of the rationale calculus of agent attempting to maximise their income. It is the case that the official will side with corruption as an attempt to take advantage of the rents available while the farmer will only be corrupt in case where such option will yield higher return.

The second objective is to find and understand equilibriums existing in a corruption game. We want to be able to advise players in a corruption game upon the best strategy to adopt while unaware of the prevalence of corruption in the game. In this regards our game leads us to two equilibriums that are: the corruption equilibrium and the honesty one. The corruption equilibrium is found

to be an equilibrium by default as build into the game. The honesty equilibrium is less frequent and always coexists with the corruption equilibrium.

At last, our third objective is to participate to the debate on the fight against corruption. In this extend, we found a divergence in the relationship between the gain from corruption and its prevalence depending on whether one is the provider or the recipient of the bribe. Such fact could potentially bring about a different approach to the fight against corruption aware of the divergence in the incentives of the players.

The remaining of this chapter will be organised as follows: Chapter II.Section 2 will present a selected literature on corruption games, in Chapter II.Section 3 we will review the original version of the model used here and then present our version of it in Chapter II.Section 4, Chapter II.Section 5 will be the analysis and finally Chapter II.Section 6 will be about an overview of the findings and the policies implications.

Section 2.   Literature on corruption games with a focus on competitive bribery games

Corruption has been considered for a long time as a social deviance, a cultural attribute related to some groups or societies. Barr and Serra (2010) illustrate this as they look into the existence of a cultural component in the individual decision to side with corruption. Their aim is to assess how far one's cultural background will affect one's attitude toward corruption. To such extend they use two experiments on bribery games conducted using undergraduate and graduate students from the University of Oxford. The cultural diversity of the sample of both experiments are an essential feature as the result those game are being analysed with regard to the eventual correlation between an individual propensity for corruption and the prevalence of corruption in his/her home country. The 2005 experiment illustrates a case of petty corruption in which private citizens will choose whether or not to offer a bribe in exchange for a service, public officials will choose whether or not to accept the bribe and others members of the society will incur a cost whenever the previous two players opt for corruption (Barr and Serra 2010, p 864-866). With thirty-four countries represented, the 2005 experiment reveals that the sample as whole does not support the hypothesis that levels of corruption exhibited by participants are correlated to the level corruption in their home country. However, introducing a dummy variable relative to whether the participant is an undergraduate or a graduate student reveals that even though the response of graduate participant does not support the hypothesis, the response of undergraduate potentially does (Barr and Serra, 2010). They make the case that one could predict the prevalence of corruption among undergraduate students base on the level of corruption on his/her country of origin. In addition, the 2007 experiment with twenty-two countries represented provides similar results as while one can predict the prevalence of corruption among undergraduate based on the level of corruption in their country of origin, this will not be true for graduate students (Barr and Serra

2010, p867-868). Hence, there could be a cultural component in one's decision to side with corruption.

Barr and Serra (2010) attempt to justify their findings by suggesting that while undergraduate students are still heavily influenced by their home cultural habit, graduate students having been away longer are less so. To this extend culture will be significant in an undergraduate student decision to side with corruption but not for a graduate student. However, if we consider corruption as a rational strategic behaviour, Barr and Serra (2010) results could simply make the case that while graduate students seems to have the knowledge to behave strategically, undergraduate do not as they rely on cultural habit. Indeed, one could consider that graduate students might have strategically updated their behaviour to the new environment not conducive to corruption while undergraduate did not because lacking the knowledge to do so. Here lies the focus of our review of the literature as we will look at the main studies analysing corruption as the behaviour of rational individual attempting to increase their wealth. To that extend we will successively make the case of the efficiency of corruption, the case of the rationale expectation of those paying the bribe and the case of the rationale expectation of both the provider and the recipient of the bribe.

Beck and Maher (1986) look at the efficiency of corruption as a system by comparing the results from bribery and competitive bidding. Focusing on a context of competition for a governmental procurement and in absence of punishment for bribery, the firm providing the highest bribe would have been the same winning the bidding process. In other words, assuming the inability to detect and punish bribery, the winning bid in a competitive bidding (which will be the lowest one in this case) will be equal to the bid propose by the firm providing the highest bribe less the amount of the bribe. This also means that for country as a whole and leaving aside concern over the repartition of wealth, the two systems are identical. Further, Lien (1986) extends the result of Beck and Maher (1986) by looking at the efficiency of a bribery system. Under the assumption that all firms use the same bribe – gross profit function, he founds that all the firms will converge toward the same Nash Equilibrium (Lien 1986, p 340). Indeed, aware that in the bribery system each firm is effectively looking for the optimal level of bribe in the light of its gross profit and having assumed that the ratio bribe to

gross profit is the same for all firms, the firm with the highest gross profit or respectively the lowest cost will win the bid. Hence, corruption in the form of bribery is not only the rational behaviour of agents attempting to increase their income, it could be seen in some cases as the rational strategy for a society as a whole aware that it is as efficient as competitive bidding.

Lien extends his analysis of competitive bribery by first considering the case of incomplete information and then the case of coalition. A model of competitive bribery game with incomplete information is presented in his 1987 paper. There, he considers a case of firms competing for a contract by bribing officials who may or may not be corrupt and hence may award the contract based on the bribe received or may award it based on the bid proposed (Lien 1987, p157). He finds out that at the equilibrium all firms will pay a bribe mainly because in his model the punishment incurs if caught is independent of the awarding process (Lien 1987, p155). Further in his 1988 paper, he extends his work to include cases of coalition. While firms are competing for a government procurement by the means of bribes, each firm knows only its cost and chooses the amount of bribe it will pay accordingly as the amount of bribe a firm is willing to pay will increase with the expected profit (and will decrease with the cost function of the firm) (Lien 1988, p190). Focussing on a game with three firms, when two of them form a coalition he finds out that even though the coalition as a whole end up with a greater expected profit (as compare to the firm left alone), each member of the coalition will have a smaller expected profit (as compare to the firm left alone) (Lien 1988, p194). Indeed, because the coalition reduces the total number of actor on the market (which reduce competition), expected profit rises and the coalition as a whole win as having a lower cost function. However, the expected profit for each of the member of the coalition will be lower than the one from the firm left alone and as result firms will be reluctant to form a coalition in such context. Consequently, with the punishment independent of the award of the contract firms will always remain corrupt even when the officials may or may not be so and coalition is unlikely to happen because not beneficial to the member of the coalition individually.

Following the work of Beck and Maher (1986), Lien (1986), Lien (1987) and Lien (1988), we can make the case of the efficiency of corruption with the underlining assumption of the rationality of the individuals involved. Lambert-

Mogiliansky et al (2008) look into this assumption as they model a case of petty corruption involving an entrepreneur facing one or more bureaucrats in the aim to understand the effect of the existing equilibriums. They design a game in which an entrepreneur requires a bureaucrat approval to proceed with his/her project. Prior to the approval the entrepreneur must qualified his/her project. In the case of only one bureaucrat, the process is a follow: first the entrepreneur learn the value of his/her project, secondly he/she decides whether to qualify or not the project, thirdly he/she decides to apply or not for the approval, if he/she applies the bureaucrat checks whether the project is qualify or not and asks for the bribe and at last if the entrepreneur pays the bribe the project is approve, if he/she refuses to pay the project is not approve (Lambert-Mogiliansky et al 2008, p277). Whether the track consist of one or more bureaucrats they find out that when the cost of qualification for the project is not null (not negative in the case of more than one bureaucrat), the entrepreneur might never apply because there is no Pareto-efficient equilibrium that will guarantee the approval of the project (Lambert-Mogiliansky et al 2008, p278). Indeed, no matter what the entrepreneur expectations are for the bribe, the bureaucrat best response will always be to ask for a larger one. Further, with a repeated game, existing equilibrium can guarantee the approval of the project with a positive probability and replacing a track of bureaucrat with a single one appears to be socially beneficial as it reduces the total amount of bribe. Nevertheless, Lambert-Mogiliansky et al study focuses on only the strategic behaviour of the provider of the bribe aware that the bureaucrat is assumed to always ask for a bribe.

Andvig and Moene (1990) look into the rationality of both the provider and the recipient of the bribe as they assess the link between the prevalence of corruption and its profitability. Focussing on bureaucratic corruption they build a model in which an individual can offer a bribe to an official in exchange for a service. The bureaucrat can be corrupt and accept the bribe or honest and refuse it in which case the individual will look for another official until he find a corrupt one. In addition, the corrupt official can be detected by a colleague who will either be honest and denounce the corrupt official (causing the loss of the bribe received and all future income) or corrupt and ask for a bribe to not report the case of corruption. They characterise corruption as the act of an official concluding an arrangement with an individual trading his/her power of office and access to information in exchange for an illegal payment (1990, p64). They found multiple

equilibrium based on the cost of corruption for the official involve. For example with a bell shaped cost of corruption, three equilibrium levels of prevalence of corruption among officials are found. This illustrate how the return from corruption will increase with its prevalence as the spread of corruption by lowering the cost of taking bribe will lead us to the high corruption equilibrium level (Andvig and Moene, 1990, p70-72). In other words, the increase of the prevalence of corruption will positively affect it profitability which means that rational agents will have more incentive to be corrupt. Thus for a given level of wage the rise of the prevalence of corruption will come along with the rise of its profitability for both sides involved.

However, this does not account for the potential effect of competition on corruption. According to Rose-Ackerman (1978) competition between officials can in some cases reduce the size of the bribe and may even eradicate bribery. Considering officials free to deliver their services to any individual, aware that the service provided is homogeneous with the perfect information about the level of the bribe and the quality of service and assuming that neither group (nor officials or individuals) is organised; the possibility for an official to be honest will provide individual with the bargaining power to lower the size of the bribe (see Rose-Ackerman 1978; p137-151). Indeed, with perfect information and homogenous services provided by the officials, competition among unorganised officials will drive the level of bribe down. A low bribe will reduce the number of official accepting the bribe in the light of the lower gain from corruption and this in turn will increase the bargaining power of individuals leading to a level of bribe even lower than the risk face and hence the end of bribery. As result it is only when one consider that there is asymmetric information and officials and individuals are free to collude that it can simply be accepted with Andvig and Moene (1990) that the prevalence of corruption increase with its profitability for both parties involved.

Despite having consider the behaviour of the individual and the official with both having the option of being either honest and corrupt, Andvig and Moene (1990) study does not present either directly or explicitly the rationale following which individual will side with corruption. Indeed, their study essentially establishes the link between prevalence and profitability of corruption from which

one could infer the existence of incentives that will explain the behaviour of the agents.

Looking into cases of corruption involving a government official and a candidate requesting a permit, Cadot characterises it as the act of an official maximizing his total income that is his/her wage plus the bribe received aware that if caught the official will lose all future income (Cadot 1987, p224). The model used consist of a game in which following a test conditioning one access to a permit, honest official will grant the permit based on the result of the test (whether one is a good candidate ie passed the test or a bad candidate ie failed the test) and corrupt official will grant permit based on the bribe received. The study explores three scenarios that are perfect information, asymmetric information and imperfect information. When candidates know with certainty that they passed or failed the test (perfect information), bad candidate will always pay a bribe as high as the return they expect from the permit, good candidate will refuse to pay anything higher than the cost of denunciation and corrupt officials will act accordingly (Cadot 1987, p226). When the official know the outcome of the test and the candidate does not despite having a belief on his/her result that is assumed to be correct, both type of candidate will use their belief to calculate the cut-off value that will guide their behaviour [like in the previous case] as such corrupt officials will either ask a bribe based on the result of the test (like in the perfect information) in which case bad candidate will pay no more than the expected return from the permit and good candidate will pay no more than the cost of denunciation or choose to ask the same bribe to everyone (Cadot 1987, p 227). At last, in the case where both officials and candidates do not know the result of the test despite the later having a belief on his/her result (imperfect information), an official attempting to ask the same bribe to all the candidate will choose his bribe as the equilibrium point of tangency between the linear probability of not being denounced for asking a bribe and the curve depicting the marginal probability of not being detected (marginalised by the size of the bribe asked) for each candidate.

Although simplistic, Cadot results seem to characterise corruption as seen in poor countries with low wages reinforcing the rent seeking ability of official in the light of the relative low cost of corruption. Interestingly, the game he presents allowed him to thoroughly consider the strategy of both sides involved in the

game. Nevertheless, his focus being on the difference between the cases of perfect information, asymmetric information and imperfect information little is said regarding the existing equilibriums and their implications. Indeed, even though he clearly presents the strategy of each player within each case, his study does not allow for the use of the existing equilibrium to inform upon the behaviour of the players as officials have types (some are corrupt by nature and other are honest by nature) and players play in turn with the candidate choosing whether to pay or not and the amount to pay only after the official has declare his/her type.

Mishra (2006) analyses corruption from two different perspectives that are corruption as a norm at the level of the society and corruption as a choice at the level of an individual. In the case of corruption seen as a social norm, he analyses a model of enforcement in which firms choose whether to comply or not to a regulation while officials decide whether or not to learn how to detect firms not complying to the regulation before both sides settle on the level bribe that the official will accept to not report the firm (Mishra 2006, p 351-353). Such analysis reveals the existence of an equilibrium of high corruption where officials do not acquire the knowledge and most firms choose to not comply with the regulation and an equilibrium of low corruption where officials choose to acquire the knowledge and most firms choose to comply with the regulation. This result is conform to the findings of both Bardhan (1997, p 1331-1332) and Blackburn et al (2006, p2451) characterising corruption equilibrium as the result of beliefs of its occurrence which means that a belief of the high prevalence of corruption (most firm choosing not to comply) will lead to high corruption equilibrium and vice versa. Looking at corruption as an individual choice, Mishra (2006, p 354- 355) uses an evolutionary game theory to show that corruption in this case become the norm rather than a deviance. He suggests that because the strategy being corrupt is more rewarding than any other strategy in a context where most people are corrupt, being corrupt will remain dominant over time as new comers will likely adopt the pre-existing consideration. Hence, Mishra (2006) does not only provide an alternative way of understanding the corruption equilibrium but he also provides a rationale for the persistence of corruption.

Mishra (2006) clearly and with simplicity rediscovers the concept of corruption equilibrium. He also provides an understanding of the persistence of corruption. However, the later finding is based on the assumption that new comers

will simply imitate the behaviour of the majority solely because of the frequency of this behaviour. This means that in a case where existing player in the game can make new comers believe that a specific behaviour is prevalent, the new comers will likely adopt the behaviour independently on whether or not it is actually the best strategy for them.

In the light of the literature on the analysis of corruption using a game theory approach as presented earlier, it is the case that having establish the potential efficiency of corruption suggesting the possibility for rational individual deciding to side with corruption it is not clear what is the process following which those individuals make their choice, what are the existing equilibriums they face and what is the implication of those equilibriums. Consequently, we will consider a game of bureaucratic corruption as we analyse the strategy of both sides taking part to the game in the aim to present rationale following which corruption or honesty will prevail. However, unlike existing studies, our study will not only look back at the rationale of agents while making their choice but also consider the condition and implications of the existing equilibriums. To this extend our model will be based on the one developed by Macrae (1982). In addition, having explored the rationale of agents playing the game we will also consider the likely overall outcome of the game while assuming the rationality of the player in attempt to advise player on the best strategy.

Section 3.   A review of Macrae model

Macrae (1982) models bribery into a game in an attempt to understand the decision of rational agent to opt for corruption. We will review Macrae's approach and main conclusions.

1.   Macrae Game theory approach to Corruption

Macrae's model consists of a bribery game where N firms are competing for a contract worth "P". His aim is to understand the typology of the firms willing to bribe, assess the characteristics relative to the size of the bribe paid and the effect of punishment in the decision to side with corruption.

A is one of the N firms that compete for the project. The project is indivisible as such only one firm will be awarded the whole contract.

In the absence of corruption, the probability for A getting the project is $\frac{1}{N}$ or p.

In the presence of corruption, official will be able to affect (increase) the probability for the firm A getting the contract such as:

$$p' = p + a(1 - p) = \frac{1}{N} + a(1 - \frac{1}{N}) \text{ with } 0 \leq a \leq 1$$

Equation II-1

p' is the probability of A getting the contract in the presence of corruption aware the he bribes the official or make an "arrangement" in the words of Macrae. The parameter "a" reflects the power of office giving the official the ability to boost the probability for the firm A to get the contract.

So far it was assumed that only one of the firm bidding for the contract is making an arrangement. In the case where there was another firm making an

arrangement along with firm A, this will reduce A's chances of getting the contract. Effectively, with "a" being the total boost/leverage that the official can offer, "a" will be share amongst the firms competing for the boost (ie the firms paying a bribe).

The probability for a firm not making an arrangement to get the contract is assume to be greater than zero as Macrae consider that firms are heterogeneous and is attempting to avoid a situation where everyone is oblige to make an arrangement as this will then cancel the expected gain from such arrangement.

For p'' the probability of firm A not making an arrangement to get the contract aware that everyone else is making an arrangement and for p'_b the probability of firm B getting the contract if all the other $(N - 2)$ firms are making an arrangement and B is making an arrangement as well;

$$p'_b = p + \frac{a(1-p)}{(N-1)}$$

<div align="center">Equation II-2</div>

$$p'' = 1 - (N-1) * p'_b = 1 - (N-1) * \left[p + \frac{a(1-p)}{(N-1)}\right]$$

$$= 1 - p(N-1) - a(1-p)$$

$$p'' = \frac{1}{N} - \frac{a(N-1)}{N} \quad as \; p = \frac{1}{N}$$

<div align="center">Equation II-3</div>

Equation II-3 could also be express as;

$$p'' = \frac{1}{N} - \frac{a(N-1)}{N} \Leftrightarrow a = \frac{1 - Np''}{N-1}$$

In other words, for a given number of firm (N) the boost/leverage that the official sells will reach its maximal value when the probability for a firm to get the contract without paying the bribe despite the presence of corruption is zero $(p'' = 0)$. Hence at $a_{max} : p'' = 0$.

However, having set that $p'' > 0$, it will be the case that:

$$p'' > 0 \Leftrightarrow \frac{1}{N} - \frac{a(N-1)}{N} > 0 \Leftrightarrow \frac{a(N-1)}{N} < \frac{1}{N} \Leftrightarrow a < \frac{1}{(N-1)}.$$

Further, the firm A is unaware of the decision of his rivals. It does not know whether or not they will be making arrangement with the official. As such its strategy will have to take into account the two alternatives. For x the proportion of rivals firms making an arrangement, firm A total expected gain will include his expected gain when it makes an arrangement (EY_1) and his expected gain when it does not make an arrangement(EY_2).

When firm A makes an arrangement, it incurs the cost "c" which represents the bribe it pays to the official in the aim to take advantage of his power of office. The bribe paid "c" will account also for the opportunity cost of making an arrangement or the cost that firm A will have face if it has not made the arrangement. In addition, by making an arrangement firm A exposes itself to a sanction "F" that is assumed to be exclusively monetary. Firm A will face the sanction with the probability "p_f".

Therefore, the expected gain when firm A makes an arrangement will be:

$$EY_1 = p * x * P + p' * (1 - x) * P - p_f * F - c$$

Equation II-4

When firm A does not make an arrangement, the frustrated official will cause delays and difficulties which can be consider as a cost "d" that firm A will have to bear.

Hence the expected gain when firm A does not make an arrangement will be:

$$EY_2 = p'' * x * P + p * (1 - x) * P - d$$

Equation II-5

Now, assuming that the cost of the arrangement is equal to its opportunity cost $(c = d)$ and that F is proportional to the benefit from the project $(F = vP)$, then:

$$p_f * F = p_{1F} * x * vP + p_{2F} * (1 - x) * vP$$

<center>**Equation II-6**</center>

Here, p_{1F} is the probability of being fined given that all the rivals are making arrangements and p_{2F} is the probability of being fined given that no other rival is making an arrangement.

2.   The equilibrium

Macrae's model brings together firms that compete to increase their expected gain in the award of a contract while facing a corrupt official. As result we will look at existing equilibrium between firms testing whether they will choose the corruption equilibrium or the honesty one.

The expected gain for a firm is as follow:

- When the firm choose to make an arrangement (be corrupt): $EY_1 = pxP + p'(1-x)P - p_f F - c$

However, $p' = p + a(1 - p)$, $p = \frac{1}{N}$ and $p_f F = p_{1f} xvP + p_{2f}(1 - x)vP$

Hence, $EY_1 = \frac{1}{N}xP + \left(\frac{1}{N} + a\left(1 - \frac{1}{N}\right)\right)(1 - x)P - p_{1f}xvP + p_{2f}(1 - x)vP - c$

$$= \frac{1}{N}xP + \frac{1}{N}P - \frac{1}{N}xP + aP - axP - \frac{1}{N}aP + \frac{1}{N}axP - \left(p_{1f}x + p_{2f}(1 - x)\right)vP$$
$$- c$$

$$= \frac{1}{N}P + aP\left(1 - x - \frac{1}{N} + \frac{1}{N}x\right) - \left(p_{1f}x + p_{2f}(1 - x)\right)vP - c$$

- When the firm choose to not make an arrangement (be honest): $EY_2 = p''xP + p(1-x)P - d$

However, $p'' = \frac{1}{N} - \frac{a(N-1)}{N}$ and $p = \frac{1}{N}$

Hence, $EY_2 = \left(\frac{1}{N} - \frac{a(N-1)}{N}\right)xP + \frac{1}{N}(1 - x)P - d$

$$= \frac{1}{N}P + \left(\frac{1}{N} - \frac{a(N-1)}{N} - \frac{1}{N}\right)xP - d$$

$$= \frac{1}{N}P - \frac{a(N-1)xP}{N} - d$$

We   have   then:

$$\begin{cases} EY_1 = \frac{1}{N}P + aP\left(1 - x - \frac{1}{N} + \frac{1}{N}x\right) - \left(p_{1f}x + p_{2f}(1-x)\right)vP - c \\ \qquad EY_2 = \frac{1}{N}P - \frac{a(N-1)xP}{N} - d \end{cases}$$

Now assuming that P=1, that gives us:

$$\begin{cases} EY_1 = \frac{1}{N} + a\left(1 - x - \frac{1}{N} + \frac{1}{N}x\right) - \left(p_{1f}x + p_{2f}(1-x)\right)v - c \\ \qquad EY_2 = \frac{1}{N} - \frac{a(N-1)x}{N} - d \end{cases}$$

Considering a firm A attempting to decide whether to make an arrangement or not, we will focus on two contexts: In case 1, x=0 as all other firms decided to not make an arrangement and in case 2, x=1 as all the other firms decide to be corrupt.

> Case 1: All the other firms decide to not make an arrangement (remain honest)

As result : $$\begin{cases} EY_1 = \frac{1}{N} + a\left(1 - \frac{1}{N}\right) - p_{2f}v - c \\ \qquad EY_2 = \frac{1}{N} - d \end{cases}$$

Here, aware that all the other firms are honest, honesty will be an equilibrium among firm if and only if: $EY_2 \geq EY_1$

This means that: $-d \geq a\left(1 - \frac{1}{N}\right) - p_{2f}v - c$

If we consider a large enough population suggesting that $\frac{1}{N} \simeq 0$ and assuming that the delay caused is higher or equal to the bribe paid ($d \geq c$); We have now:

$$0 \geq a - p_{2f}v.$$

This is highly unlikely as the boost (a) received is expected to account for not only the risk of detection but also the bribe paid. In case where the punishment $(p_{2f}v)$ is equal to only the boost (a) the firm will not be willing to be corrupt as having no incentive to do so. Hence when all the other firms decide to make an arrangement it is not beneficial for firm A to do the same as honesty is not an equilibrium among firms.

> ➤ Case 2: All other firms decide to make an arrangement (be corrupt)

As result: $\begin{cases} EY_1 = \frac{1}{N} - p_{1f}v - c \\ EY_2 = \frac{1}{N} - \frac{a(N-1)}{N} - d \end{cases}$

Here, aware that all the other firms are corrupt, corruption will be an equilibrium among firms if and only if: $EY_1 > EY_2$

This means that: $-p_{1f}v - c > -\frac{a(N-1)}{N} - d \Leftrightarrow p_{1f}v + c < \frac{a(N-1)}{N} + d$

Considering once again a large enough population so that $\frac{N-1}{N} = 1$ and assuming that $d \geq c$; we have now:

$$p_{1f}v < a$$

This is true aware that in a context of prevalent corruption the probability of detection will be lower and as such the punishment inflicted will hardly be as high as the boost received from corruption. In addition, just like in the previous case the boost will be attractive to firms if and only if it account for not only the bribe paid but also the risk of detection. Therefore, when all other firms decide to make an arrangement it is beneficial for firm A to do the same as in such case corruption is an equilibrium among firms.

Macrae reaches others conclusions; firstly whenever a corruption equilibrium exist, firms and official will attempt to cooperate in a way that prohibit anyone else from providing a bribe. Secondly, as result of the first conclusion only one bribe will be accepted, it will be the bribe of the winning bid. Thirdly, it is impossible to determine the firm which will be awarded the contract

based on economics consideration since all firm have the same profit curve. Fourth, it is up to the official to make sure that the bribe required will be affordable by the firm in light of the boost offered.

Here, Macrae not only highlights the rationale following which agents decide to side with corruption but he also presents bribery as the result of the strategy of rational agents attempting to maximise their expected gain.

Section 4.   Our model

Macrae (1982) looks at a case of a bribery game consisting of a group of firm competing for a contract that is to be awarded by an official. However, in his case firms can only attempt to increase their expected gain but not the probability of winning the bid as only one firm will emerge as the winner with the contract being indivisible. Further, there is no indications here as to the size of bribe provide by each firm as it is not clear whether each firm choose the level of bribe it is going to pay or the bribe is identical across all firms. This means that it is unclear how the selection process will take place.

The other concern with Macrae approach is that he assumes that the official responsible for the evaluation of the bid made by each firm will be corrupt. Indeed, he only considers the strategy of the firm between being corrupt and being honest and assumes that whenever the firm chooses honesty it will be punished by the official.

We will consider instead a case of bureaucratic corruption involving farmers applying for a stamp to officials. Here, all farmers will eventually receive their stamp but some will have theirs faster than other which will be accounted for as either a reward or a punishment. In addition, both farmers and officials will have the choice between being corrupt and being honest and the bribe paid by every farmer siding with corruption will be assumed to be identical.

1.   Definition and context

We consider three keys elements while defining corruption:

- It is a rent seeking activity. As such it could be understood as the trade of an official power of office for monetary gains.
- The official extracting the rent expose himself to the risk associated to such activity that will be the potential punishment inflicted if caught.
- The farmers siding with corruption are expecting to take advantage of the official power of office in exchange for the payment made.

We have a group of "N" farmers who are all eligible to receive funding from the government. To such aim each farmer is require to obtain a stamp from one of the "M" administrative officers. The purpose of the stamp is simply to identify each farmer making sure that the government funding went to the intended beneficiary. At last, each farmer is supposed to receive an equal share "s" of the total funding "S".

2. The model

The model we will use will simply be a modified version of Macrae approach as presented earlier. In a corruption-free environment, each farmer I is expecting an amount of funding s such as $s = \frac{S}{N}$. In the presence of corruption or a case where both the official and the farmer are corrupt, a farmer wishing to increase his share of the funding could take advantage of the tradable power of office of the official. Practically, having assumed that all farmers eventually obtain their funding, the tradable power of office will consist of the idea that the official will choose to process faster the case of farmers paying the bribe. Such speed will be accounted for monetary as we will assume that by having access to the funding in advance, corrupt farmer will be able to purchase fertilizers and other necessary equipment at a better price that they would have otherwise.

The parameter "a" will represent the power of office or boost that the corrupt official sells to corrupt farmers. As such for "s_c" the amount of subvention received by a corrupt farmer from a corrupt official:

$$s_c = s + a$$

In addition, the farmer could choose to be honest despite facing a corrupt official. In such case, the official will not only refuse to speed the process but will manage to punish the honest farmer. The punishment here will consist of delays and difficulties that the corrupt official will create. For the honest farmer, this will effectively means that he/she will incur a cost "d" accounting for the extra amount of money he/she will add while attempting to purchase fertilizers at the last minute. Hence, for "s_h" the share of the funding received by the honest farmer facing a corrupt official:

$$s_h = s - d$$

So far we have consider that only one farmer is taking advantage of the official's power of office. In fact, more than one farmer could choose to side with corruption. As result, for x the total number of farmers taking advantage of the official's power of office (being corrupt), the amount of subvention received by a corrupt farmer will now be:

$$s_c = s + \frac{a}{x}$$

This means that "a" is now the total amount of power of office that the official holds.

For a farmer choosing to remain honest (ie not making an arrangement) while all the remaining farmers are corrupt, his/her share of the funding will remains $s_h = s - d$. The understanding here is that the official selling his/her power of office is just reprioritising the provision of the stamp based on the bribe received. Indeed, the official will delays and creates difficulties to honest farmers while focussing his/her attention and energy to corrupt farmers. Hence, we suggest that the power of office "a" that the official sell will be equal to the delays and difficulties "d" caused to honest farmers: $a = (N - x) * d$.

Turning to the official, an honest official will provide stamp immediately upon request in the aim to avoid any favouritism. Here, all farmer will receive an equal share "s" and will not incurs any delay or difficulties in the process. However, as presented earlier a corrupt official will punish the honest farmer through delays and difficulties which will effectively reduce the farmer share of the funding by an amount "d" and reward corrupt farmers by speeding the process which will be account for by the variable "a" accounting for the total official's power of office that the farmer will take advantage of.

We assume that both farmers and officials are unaware of the proportion of corrupt individuals amongst either group. As such the total expected gain of each farmer (EX) will depend on; his/her choice between being corrupt or not, the overall number of farmers being corrupt and the number of officials being corrupt. Similarly, the total expected gain of each official (EY) will depend on; his/her

choice between being corrupt or not, the overall number of officials being corrupt and the number of farmers being corrupt.

a)   *Expected gain of a farmer*

For any farmer i and for EX_1 his/her expected gain assuming that he/she chooses to be corrupt:

If the official is corrupt:

The expected gain of the corrupt farmer will be:

$$\frac{x}{N}(s - p_{x1} * F_x - c) + \frac{N - x}{N}(s_c - p_{x2} * F_x - c)$$

$$= s - c + \frac{N - x}{N} * \frac{a}{x}$$

$$- F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)\frac{x}{N}(s - p_{x1} * F_x - c)$$

$$+ \frac{N - x}{N}(s_c - p_{x2} * F_x - c)$$

$$= \frac{x}{N} * s + \frac{N - x}{N} * s + \frac{N - x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)$$

$$- c = s - c + \frac{N - x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)$$

$(s - p_{x1} * F_x - c)$ is the gain that the corrupt farmer will obtain in the case that all the other farmers are corrupt aware that the official is corrupt.

$(s_c - p_{x2} * F_x - c)$ is the gain that the corrupt farmer will have in the case that all the other farmers are honest aware that the official is corrupt.

If the official is honest:

The expected gain of the corrupt farmer will be:

$$\frac{x}{N}(s - p_{x1} * F_x) + \frac{N - x}{N}(s - p_{x2} * F_x)$$

$$= \frac{x}{N} * s + \frac{N - x}{N} * s - F_x(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2})$$

$$= s - F_x(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2})$$

$(s - p_{x1} * F_x)$ is the gain that the corrupt farmer will have in the case that all other farmers are corrupt aware that the official is honest.

$(s - p_{x2} * F_x)$ is the gain that the corrupt farmer will have in the case that all other farmers are honest aware that the official is honest.

p_{x1} and p_{x2} represent respectively the probability for the farmer i of being detected if all other farmers are corrupt and the probability for the farmer i of being detected if none of the remaining farmer is corrupt.

As result, the total expected gain for a corrupt farmer is:

$$EX_1 = \frac{y}{M}\left(s - c + \frac{N - x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)\right)$$
$$+ \frac{M - y}{M}\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)\right)$$

<div align="center">Equation II-7</div>

For any farmer i and for EX_2 his/her expected gain assuming that he/she chooses to be honest:

If the official is corrupt:

The expected gain of the honest farmer will be: $\frac{x}{N}(s_h) + \frac{N-x}{N}(s_h) = s_h = s - d$

Here, the gain from a case where the remaining farmers are corrupt and a case the remaining farmers are honest is the same as our farmer i does not participate to corruption.

If the official is honest:

The expected gain of the honest farmer will be: $\frac{x}{N}(s) + \frac{N-x}{N}(s) = s$

Once again, the gain from a case where the remaining farmers are corrupt and a case the remaining farmers are honest is the same as our farmer i does not participate to corruption.

As result the expected gain for a honest farmer is:

$$EX_2 = \frac{y}{M} * (s - d) + \frac{M - y}{M} * s = s - \frac{y}{M} * d$$

"y" represents the number of officials that are corrupt and "x" the number of farmers that are corrupt. "c" is the payment or bribe made by the farmer to the official in exchange for his/her power of office "a".

The fine imposed to corrupt farmers caught is F_x and $F_x = v * \frac{a}{x}$ with $v \in [0; \infty]$. This fine is based on the extra funding $(\frac{a}{x})$ acquired by the farmer with the help of the official. In addition, "v" accounts for the ability of agents investigating cases of corruption to accounts for all the extra funding as such we should have $v \in [0; 1]$. However, v also accounts for the strategy chooses by the government in the fight against corruption. As such if the aim is simply to recapture the extra funding the we will have $v = 1$ but if the aim is to also prevent and discourage further corrupt acts then: $v \geq 1$. This is why we consider that $v \in [0; \infty]$.

b)   *Expected gain of the official*

For any official j and for EY_1 his/her expected gain assuming that he/she chooses to be corrupt:

If the farmer is corrupt:

The expected gain of a corrupt official will be:

$$\frac{y}{M}(c - p_{y1} * F_y) + \frac{M-y}{M}(c - p_{y2} * F_y) =$$

$$= \frac{y}{M} * c + \frac{M-y}{M} * c - \frac{y}{M} * p_{y1} * F_y - \frac{M-y}{M} * p_{y2} * F_y$$

$$= c - F_y(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2})$$

$(c - p_{y1} * F_y)$ is the gain of the corrupt official when all the other officials are corrupt and the farmer is corrupt as well.

$(c - p_{y2} * F_y)$ is the gain of the corrupt official when all the other officials are honest aware that the famer is corrupt.

If the farmer is honest:

The expected gain of a corrupt official will be:

$$\frac{y}{M}(kd - p_{y1} * F_y) + \frac{M-y}{M}(kd - p_{y2} * F_y)$$

$$= \frac{y}{M} * kd + \frac{M-y}{M} * kd - \frac{y}{M} * p_{y1} * F_y - \frac{M-y}{M} * p_{y2} * F_y$$

$$= kd - F_y(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2})$$

$(kd - p_{y1} * F_y)$ is the gain of the corrupt official when all the other officials are corrupt aware that the farmer is honest.

$(kd - p_{y2} * F_y)$ is the gain of the corrupt official when all the other officials are honest aware that the farmer is honest.

p_{y1} and p_{y2} are respectively the probability for a corrupt official of being caught when all the other officials are corrupt and the probability for a corrupt official of being caught when no other officials is corrupt.

As result the total expected gain for a corrupt official is:

$$EY_1 = \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)$$
$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)$$

Equation II-9

"k" represents the percentage of the cost "d" impute to the honest farmer that the corrupt official will absorb. This follow the idea that while facing an honest farmer, a corrupt official will be delaying and complicating the process that the farmer has to go through to have access to his/her share of the funding. These delays could be considered as a time off from work that the official will take (or simply the time off that the official will allocated to those farmers who pay the bribe). Here we capture this time off by considering that it could represent a fraction k of the financial punishment inflicted to the honest farmer.

The fine imposed to corrupt officials who are caught is F_y and $F_y = w(kd * \frac{N-x}{N} + c * \frac{x}{N})$. This fine is based on the profit accumulated by the official through the means of corruption $(kd * \frac{N-x}{N} + c * \frac{x}{N})$. In addition, "w" accounts for the ability of agents investigating cases of corruption to account for all the profits accumulated by the official as such we will have $w \in [0; 1]$. However, w also accounts for the strategy chosen by the government in the fight against corruption that is if the aim is to simply recapture the rents then we will have $w = 1$ but if the aim is to prevent other officials from following the same path then $w \geq 1$. This is why we suggest that $w \in [0; \infty]$.

For any official j and for EY_2 his/her expected gain assuming that he/she chooses to be honest:

If the farmer is corrupt:

The gain will be: 0

If the farmer is honest:

The gain will be: 0

As result the expected gain of for a honest official is:

$$EY_2 = 0$$

Equation II-10

We can summarise the previous result in the following pay-off matrix:

Table II-1

		Official j	
		Corrupt	Honest
Farmer i	Corrupt	$\left(\left(s - c + \frac{N-x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right); \left(c - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)\right)$	$\left(\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right); 0\right)$
	Honest	$\left((s - d); \left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)\right)$	$(s; 0)$

3. Implications of the model

a) *For the farmer*

(1) Strategy of the farmer

If the farmer is indifferent between being honest and being corrupt then:

$$\left(s - c + \frac{N-x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x1}\right)\right) = (s - d)$$

$$\Rightarrow \left(d + \frac{N-x}{N} * \frac{a}{x} - c\right) = F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x1}\right)$$

Equation II-11

And

$$\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right) = s$$

$$\Rightarrow F_x = 0 \ or \left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right) = 0$$

Equation II-12

If Equation II-12 is true then: $d + \frac{N-x}{N} * \frac{a}{x} - c = 0 \Leftrightarrow d + \frac{N-x}{N} * \frac{a}{x} = c$

If Equation II-12 is not true then: we will assume that:

$$F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right) = P_{ux}$$

Equation II-13

P_{ux} being a constant term as ultimately the punishment imposed by the government should be an exogenous variable (a given variable or constant term) for the farmer when deciding to whether or not to be corrupt. Indeed, even though the level of punishment is based on the prevalence of corruption, the individual farmer has a very little impact on it as he/she is assumed to have no information on the prevalence of corruption amongst his/her pairs.

Then we have: $d + \frac{N-x}{N} * \frac{a}{x} = c + P_{ux}$

Hence, in the absence of any punishment the farmer will be indifferent between being corrupt and being honest if and only if the bribe paid is equal to the delay he/she will incur when honest plus the boost obtain when corrupt. However, in the presence of punishment the farmer will be indifferent between being corrupt and being honest if and only if the bribe paid plus the punishment incurred is equal to the delay he/she will face if honest plus the boost he/she will face if corrupt.

(2)   Implications

We looked at the condition for the indifference of the farmer between honesty and corruption. Now we will consider the conditions following which the farmer will always choose to be corrupt and those following which he/she will always choose to be honest.

A farmer will always choose to be corrupt (ie corruption will be a dominant strategy) if and only if $d + \frac{N-x}{N} * \frac{a}{x} > c + P_{ux}$. This means that as long as the benefit from corruption – the delay plus the boost – is higher than its cost – the bribe plus the punishment – , the farmer will always choose to be corrupt. This condition will remain the same whether the punishment exist or not. However, if the benefit from corruption is lower than its cost ($d + \frac{N-x}{N} * \frac{a}{x} < c + P_{ux}$) then the farmer will always choose honesty over corruption (ie honesty will be the dominant strategy). Hence, the strategy of the farmer will always depend on the weight of corruption (the cost of the bribe and the eventual punishment) as compare to the reward (the delay avoided and the boost received).

b)   *For the official*

(1)   Strategy of the official

If the official is indifferent between being honest and being corrupt then:

$$\left(c - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right) = 0$$

$$\Rightarrow \; c = F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)$$

Equation II-14

And

$$\left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right) = 0$$

$$\Rightarrow \; kd = F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)$$

Equation II-15

Assuming that:

$$F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right) = P_{uy}$$

Equation II-16

P_{uy} being a constant (similarly to P_{ux}), the official will be indifferent between being corrupt and being honest if and only if: $c = P_{uy} \; and \; kd = P_{uy} \Rightarrow c = kd = P_{uy}$. This means for the official to be indifferent between corruption and honesty the reward obtains when facing a corrupt farmer (c) should be equal to the one extorts from an honest farmer (kd).

(2) Implications

We found out that the official will be indifferent between corruption and honesty if and only if the reward he/she obtains from facing a corrupt farmer and the one from facing an honest farmer are both equal to the punishment he/she will face (which will be the same in both case since he/she is corrupt). However, the reward obtains from facing a corrupt farmer and the one obtain from facing an honest farmer cannot realistically be assumed to be equal. Indeed, here we consider that the official ultimate goal is to trick the farmer into paying the bribe

by punishing him/her when he/she decides to be honest. As result we can consider that the gain from a corrupt farmer will be higher than the gain from an honest farmer ($c > kd$).

This means that if $kd > P_{uy}$ the official will always choose to be corrupt (aware that $c > kd$) as corruption will be a dominant strategy for him/her. Further, if only $c > P_{uy}$ (with $kd < P_{uy}$), the official may not always choose to be corrupt but will have a strong incentive to do so. At last, the official will always remain honest (ie honesty will be a dominant strategy) if and only if $c < P_{uy}$ as the bribe receive fails to cover the punishment the official will face.

Hence, as long as the gain from corruption while facing either a corrupt farmer or an honest one is higher than the punishment, the official will have a strong incentive to be corrupt.

Section 5.   Analysis

So far, we only consider the case of dominant strategies ie the best response of one player to every strategy of his counterpart. Such approach does not allow us to consider cases where the game could present multiple equilibriums. This is why now we will instead look at Nash equilibriums. Nash defines an equilibrium as a point where one's strategy will maximise his/her payoff given the strategy of the other players (Nash 1951, p287). This means that we will now look for undominated strategies instead of dominant ones.

By design, this game has only two potential Nash equilibriums: the farmer and the official are either both corrupt or both honest. Indeed, whenever their strategy diverges one of them will be worse off. With a corrupt official, the farmer will do best by being corrupt as well or otherwise he/she will incur delay. In addition, with an honest official the farmer will do best by being honest otherwise he/she will still not receive the boost but be punish because being corrupt. Looking at the official, he/she will rather be corrupt when facing a corrupt farmer and honest when facing an honest farmer thus ending up with a higher gain in the first case and avoiding punishment which may not be cover by the income from the delay inflicted to the farmer in the second case. Hence, the best strategy for the farmer will be to do whatever the official does and the best strategy for the official will be to do whatever the farmer is likely to do.

1.   The Nash equilibrium corrupt-corrupt

Table II-2

		Official j	
		Corrupt	Honest
Farmer i	Corrupt	$\left(\left(s - c + \frac{N-x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right); \left(c - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)\right)$	$\left(\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right); 0\right)$
	Honest	$\left((s - d); \left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)\right)$	$(s; 0)$

For corrupt-corrupt to be an equilibrium, the farmer has to always choose corruption whenever the official is corrupt:

$$\left(s - c + \frac{N-x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x1}\right)\right) > (s - d) \Leftrightarrow d + \frac{N-x}{N} * \frac{a}{x} > c + P_{ux}$$

As for the official, whenever the farmer is corrupt he/she will always choose to be corrupt if and only if the gain from corruption is higher than the punishment he/she is expose to ($c > P_{uy}$).

The conditions for corrupt-corrupt as an equilibrium is therefore as follow:

$$\begin{cases} d + \dfrac{N-x}{N} * \dfrac{a}{x} > c + P_{ux} \\ c > P_{uy} \end{cases}$$

Equation II-17

Equation II-17 has two main implications: the prevalence of corruption as equilibrium exclusively depends on the behaviour of the official and corrupt-corrupt will always be an equilibrium as long as corruption exist.

For a given level of punishment for corrupt farmers and corrupt officials, the size of the bribe paid (c), the size of the delay (d) created by the corrupt

official, the boost (a) the official will award to corrupt farmers and the prevalence of honesty among farmers are the key elements determining the existence of corrupt-corrupt as an equilibrium (see Equation II-17). The scale of the first three key elements are effectively chosen by the official and as such emphasise upon his/her key role in establish corruption as a dominant strategy.

Looking at the prevalence of honesty among farmer, this could be once again seen as highly linked to the behaviour of the official aware that each farmer will choose between corruption and honesty based on the same three key elements that are set by the official. The farmer choice between corruption and honesty can be consider as weighting the net gain of those two options (ie comparing the boost from a corrupt official net the bribe paid to the delay incurred if honest). In addition, the importance of the prevalence of honesty among farmers as a key element is caused by our assumption following which the boost given to corrupt farmer is the result of the delay caused to honest ones. In other words, corrupt officials need a critical mass of honest farmers to fuel the boost received by corrupt ones as if every farmer where to be corrupt, corruption will stop being rewarding.

The official is responsible for setting up the size of c, d and a while the farmer essentially choose between corruption and honesty based on the size of those key elements relatively to the punishment he/she may face. It is the case that the corrupt official will set up the four key elements in such a way that makes corruption the best option for the farmer if he/she wants the farmer to be corrupt. Hence, as long as the official will want corruption to exist as an option for the farmer, it will prevail as equilibrium simply by design.

Consequently, looking at the equilibrium corrupt-corrupt it appears that the existence of such equilibrium is related to the behaviour of the corrupt official. It is also the case that a degree of honesty among farmers matter for the corrupt official. At last, corruption will be an equilibrium simply by design.

2.   The Nash equilibrium honest-honest

For the strategy honest-honest to be an equilibrium, the farmer has to always choose honesty while facing an honest official; $\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right) < s \Leftrightarrow P_{ux} > 0$

Evidently as suggests the equation, the simple existence of a punishment (not null) will be enough to steer the farmer toward honesty while facing an honest official. As for the official as he/she will always choose honesty while facing an honest farmer if and only if;

$$\left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right) < 0 \Leftrightarrow kd < P_{uy}$$

In other words whenever the percentage of delays absorbed by the official is lower than the punishment this official is exposed to, an official facing an honest farmer will always remain honest.

This gives us two conditions for the existence of honest-honest as equilibrium:

$$\begin{cases} P_{ux} > 0 \\ P_{uy} > kd \end{cases}$$

Equation II-18

A farmer will choose honesty over corruption while facing an honest official whenever there is a punishment for corrupt farmer. Our model does assume that the punishment for a corrupt farmer will be non-null as function of the prevalence of corruption among farmer and the fine impose to those caught (see Equation II-13). A justification for this could be to consider corruption as a way around rules and regulations, a misuse of public goods or public office for private gain and as such punishable by law. Hence, because there will always be a non-null punishment for corrupt farmers, they will always have an incentive to be honest while facing an honest official.

An official will choose honesty over corruption while facing an honest farmer whenever the advantage he/she gets from delaying the farmer cannot cover the punishment he/she faces. Interestingly, Equation II-17 presents two conditions

for the existence of corrupt-corrupt as an equilibrium that are: the gain from corruption should outweigh its cost as far as the farmer is concern and the bribe should be higher than the punishment as far as the official is concern. Those two conditions for the existence of corrupt-corrupt as equilibrium (see Equation II-17) do not exclude the conditions for the existence of honest-honest as an equilibrium (see Equation II-18). The fact that the gain from corruption while facing a corrupt official is higher than it cost for a farmer $(d + \frac{N-x}{N} * \frac{a}{x} > c + P_{ux})$ does not exclude the existence of a non-null punishment $(P_{ux} > 0)$. In addition, having already assumed that $c > kd$ (see Chapter II.Section 4.3.b)(1) it is possible that $c > P_{uy} > kd$ and as such the official will choose corruption while facing a corrupt farmer and honesty while facing an honest one. Hence, corrupt-corrupt and honest-honest can simultaneously be equilibrium for a given game.

In summary, it is not only the case that the farmer will always have an incentive to remain honest but corruption as an equilibrium and honesty as an equilibrium will coexist in such game.

3. The effect of the incidence of corruption on its profitability

Andvig and Moene (1990) find out that the income from corruption is supposed to increase with its prevalence. Indeed, their model suggests that the higher the prevalence of corruption the higher the equilibrium level of bribe which will boost the income of the official involve. We will test this result in our model.

The punishment for corrupt agents is present as follow in our model:

For the farmer:

$$P_{ux} = F_x \left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2} \right) \text{ with } p_{x1} < p_{x2}$$

For the Official :

$$P_{uy} = F_y \left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2} \right) \text{ with } p_{y1} < p_{y2}$$

The increase of the prevalence of corruption will means the decrease of the overall punishment as more weight will be given to the lower probability of

detection which is the one corresponding to a state where everyone else is corrupt. Hence, more corrupt individual means lower level of punishment which also means higher expected income from corruption.

Our model also consider that the power of office sell by official as a boost to corrupt farmers is in fact function of the delay caused to honest farmers as $a = (N - x) * d$. This implies that for corruption to be efficient there is the need for a critical mass[1] of honest farmer who will fuel the boost sell to corrupt ones. Indeed, in a case where all the farmers are corrupt, the official will no longer have any power of office to sell $(a = (N - N) * d = 0)$ which means that there will no longer be a return from corruption but just a cost. Consequently, the return from corruption is positively related to its prevalence through its effect on the level of punishment but also negatively through its effect on the availability of the power of office to be shared among the corrupt farmers.

Further, If we consider the expected gain of a corrupt farmer (see Equation II-7), its differentiation respective to the prevalence of corruption among farmers (x) will highlight the relationship between the gain from corruption and its prevalence as far as the farmer is concern.

$$EX_1 = \frac{y}{M}\left(s - c + \frac{N - x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)\right)$$

$$+ \frac{M - y}{M}\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N - x}{N} * p_{x2}\right)\right)$$

$$= \frac{y}{M}\left(s - c + \frac{a}{x} - \frac{a}{N} - F_x\left(\frac{x}{N} * p_{x1} + p_{x2} - \frac{x * p_{x2}}{N}\right)\right)$$

$$+ \frac{M - y}{M}\left(s - F_x\left(\frac{x}{N} * p_{x1} + p_{x2} - \frac{x * p_{x2}}{N}\right)\right)$$

$$= \frac{y}{M}\left(s - c + \frac{a}{x} - \frac{a}{N} - F_x\left(\frac{x}{N} * (p_{x1} - p_{x2}) + p_{x2}\right)\right)$$

$$+ \frac{M - y}{M}\left(s - F_x\left(\frac{x}{N} * (p_{x1} - p_{x2}) + p_{x2}\right)\right)$$

---

[1] The critical mass of corrupt farmer will be function of the ratio between the gain from the decrease of the level of punishment and the loss from the reduction of the share of the boost available.

$$\frac{\Delta EX_1}{\Delta x} = \frac{y}{M} * \frac{-a}{x^2} - \frac{y}{M} * \frac{F_x(p_{x1} - p_{x2})}{N} - \frac{M - y}{M} * \frac{F_x(p_{x1} - p_{x2})}{N}$$

$$= -\frac{ay}{Mx^2} - \frac{F_x(p_{x1} - p_{x2})}{N}$$

And

$$\frac{\Delta EX_1}{\Delta x} = 0 \Leftrightarrow -\frac{ay}{Mx^2} - \frac{F_x(p_{x1} - p_{x2})}{N} = 0 \Leftrightarrow \frac{ay}{Mx^2} = -\frac{F_x(p_{x1} - p_{x2})}{N} \Leftrightarrow Mx^2$$

$$= -\frac{ayN}{F_x(p_{x1} - p_{x2})} \Leftrightarrow x^2 = -\frac{ayN}{MF_x(p_{x1} - p_{x2})}$$

However, $p_{x1} < p_{x2}$.

So :

$$x^2 = \frac{ayN}{MF_x(p_{x2} - p_{x1})} \Longrightarrow x = \sqrt{\frac{ayN}{MF_x(p_{x2} - p_{x1})}}^2$$

$\frac{\Delta EX_1}{\Delta x} = 0$ has a solution meaning that the expected gain of the farmer EX_1 will either have a minimum or a maximum (see proof in Appendix 1). As such it is the case that the prevalence of corruption for the farmer will affect the profitability of corruption both negatively and positively depending on the value of the surrounding parameters such as the prevalence of corruption among official, the value of the boost and the level of punishment.

Now considering the expected gain of a corrupt official (see Equation II-9), similarly to the case of the farmer, the differentiation of the official expected gain will provide evidences relative to the relationship between the profitability of the corruption and its prevalence as far as the farmer is concern.

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[2] x is positive by definition as it is the number of farmers who choose corruption

$$EY_1 = \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)$$

$$= \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * p_{y1} + p_{y2} - \frac{y}{M} * p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * p_{y1} + p_{y2} - \frac{y}{M} * p_{y2}\right)\right)$$

$$= \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * (p_{y1} - p_{y2}) + p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * (p_{y1} - p_{y2}) + p_{y2}\right)\right)$$

$$\frac{\Delta EY_1}{\Delta y} = -\frac{x}{N} * \frac{F_y(p_{y1} - p_{y2})}{M} - N - \frac{x}{N} * \frac{F_y(p_{y1} - p_{y2})}{M} = -\frac{F_y(p_{y1} - p_{y2})}{M}$$

However, with $p_{y1} < p_{y2}$.

So:

$$\frac{\Delta EY_1}{\Delta y} = \frac{F_y(p_{y2} - p_{y1})}{M} > 0$$

$\frac{\Delta EY_1}{\Delta y}$ being strictly positive, the expected gain of the official is increasing with the prevalence of corruption among officials (see proof in Appendix 1).

In conclusion, we can confirm the findings of Andvig and Moene following which the profitability of corruption will increase with its prevalence only as far as the official is concern. Looking at the farmer, the prevalence of corruption will increase and then decrease the profitability of corruption (or decrease then increase it).

Section 6.   Summary of the Findings and Policy implications

1.   Summary of the Findings

We set out to contribute to the understanding of the rationality of agents siding with corruption through the rationale they follow, the equilibrium they face and its implications. To that extend we use a corruption game in which both sides can choose whether or not to be corrupt with the payoff matrix ultimately depending on the prevalence of corruption amongst each group through its effect on the punishment. We reach six main conclusions that are relative to the implications of the setup of the game as a whole, the implications of the setup of each variable within the game, the existing equilibriums, the implication of the characterisation of the game, the implications of the solution of a mixed strategy game with imperfect information and the relationship between the profitability and the prevalence of corruption.

The primary implications of the game is that the farmer will always remain corrupt (respectively honest) if and only if the benefit from corruption (honesty) is higher than the bribe paid plus the punishment faced (the delay incurred). However, for the official with the gain from the delays caused to honest farmer higher than the punishment faced he/she will always be corrupt (aware that the gain from the delay is lower than the bribe he/she ask for). In addition, the official will have strong incentive to be corrupt when only the bribe received is higher than the punishment faced.

The payoff of the game is determined by the setup of key variables such as the level of the bribe, the delay inflicted and the boost received among others. In addition, those variables are all determined by the official who is expected to calibrate them according to his/her aim and objectives. Hence, it is the case that whenever corruption exist the strategy corrupt-corrupt will always be equilibrium. Further, the boost provide to corrupt official being function of the delay cause to honest ones, the prevalence of corruption as an equilibrium require a critical mass of honesty.

Alongside corrupt-corrupt, the other equilibrium is honest-honest. Indeed, the farmer will always have an incentive to remain honest while facing an honest

official as the punishment is non-null and the official will choose honesty while facing an honest farmer whenever the punishment face is greater than the gain from the delay inflicted. Moreover, the condition of the existence of each of the two equilibriums being non-exclusive both equilibriums can exist simultaneously. Consequently, while corrupt-corrupt will always be an equilibrium, we have cases where honest-honest appears as a secondary equilibrium.

The existence of an equilibrium in which both sides choose to remain honest is similar to the findings of Bardhan (1997) and Ryvkin and Serra (2011). Using a Shelling diagram Bardhan (1997, p1331-1332) shows that in a bribery game three equilibriums can be found: two stable equilibriums that are the corruption equilibriums and the honesty one and one unstable one where both parties are indifferent between corruption and honesty. Similarly, Ryvkin and Serra (2011, p470) analysing a bargaining model of bribery between citizens and officials randomly matched find out that such game will have two stable equilibriums (an honesty equilibrium and a systemic corruption equilibrium) and an unstable one that is an interior equilibrium. In both cases, the unstable equilibrium is essentially a transition stage where a little increase of incentives for corruption will lead to the stable corruption equilibrium while a little decrease of incentives for corruption will lead to the stable honesty equilibrium. This leads to the conclusion that initial levels of corruption are important as they will dictate whether a country is heading toward the corruption equilibrium or the honesty one depending on which side of the unstable equilibrium it find itself initially (Bardhan 1997, p 1332).

Our work confirms the existence of the two stable equilibriums as we present the rationale leading to either equilibrium but more importantly we suggest that the two equilibriums can coexist simultaneously. The possibility for the two equilibriums to coexist together will limit the strength of the initial prevalence of corruption in dictating the future and also open alternatives to the fight against corruption. Indeed, having the honesty equilibrium alongside the corruption one will reduce the dominance of either equilibrium. This is positive in cases where corruption is more prevalent than honesty as it gives an alternative to corruption but this also bring about caution in cases where honesty is more prevalent than corruption as the corruption equilibrium still exist. Further, it is

now the case that fighting corruption could rather consist of promoting honesty focusing on the honesty equilibrium.

At last, similarly to Andvig and Moene (1990) we found out that the gain from corruption is increasing with its prevalence as far as the official is concern. Nevertheless, while considering the case of the farmer it is not strictly the case as the relationship between the gain from corruption and its prevalence is either a concave or a convex function.

2.   Policy implications

The simple existence of corruption implies that the strategy corrupt-corrupt will be an equilibrium. This means that the only way to fight it will be by eradicating it. In other words, if the focus of the fight against corruption is to make it not profitable for its participant this will require the extinction of corruption as a whole which seems unfeasible. In addition, having found that the function expressing the gain from corruption relative to its prevalence in the case of a farmer will be different from the one in a case of an official, we can suggest that the approach to the fight of corruption should be targeted accordingly. Indeed, while for the farmer restricting the prevalence of corruption to levels where it negatively affects the gain from corruption will be enough to discourage corrupt farmers, the same strategy will not works for officials. Hence, while the implications of the corruption equilibrium makes the fight against corruption based on the reduction of the gains from corruption hardly achievable, the reality of the difference of gains from corruption between farmers and officials calls for a more tailored approach to the fight against corruption.

The existence and importance of honesty for corruption (as a system) has been highlight earlier. Indeed, it appears that according to our model a mass of honest individual is important for the corruption equilibrium. As such, an alternative to fighting corruption through the reduction of the gain it procures could be the promotion of honesty as an equilibrium. Promoting honesty as an equilibrium can be done independently of the presence of the corruption

equilibrium having seen that both corruption equilibrium and honesty equilibrium can co-exist independently one of the other. This could consist of simply rewarding honest individuals from both sides (whether farmer or official), which will ultimately increase the opportunity cost of the honesty equilibrium. Hence, a strategy of promotion of good behaviour will be advised over a strategy of punishment of bad one.

In this vein, Mookherjee and Png (1995) introduce a model highlighting the divergence between punishing corruption and rewarding honesty as a means to fight corruption. They present a model in which factories choose the level of untreated waste they will illegally release in the public sewer while simultaneously inspectors choose to invest or not in learning to detect the level of illegal waste disposal and inspectors having learn to detect it will later on choose to report accurately or not the level of waste detected in exchange for a bribe exposing themselves and the factories concerned to a punishment if detected pollute (see Mookherjee and Png 1995, p148-150). They find out that when inspectors can detect level of illegal waste disposed, an increase of penalty for corrupt inspectors will increase the level of the bribe asked to alter the report instead of decreasing the willingness of factories to pollute (Mookherjee and Png 1995, p153-154). One explanation is that increasing the penalty for corrupt inspectors will discourage them from learning to detect pollution which will lead to more pollution and higher level of bribe asked by the remaining inspectors having learnt to detect level of pollution. Alternatively, rewarding inspectors proportionally to the level of pollution detected will increase their willingness to learn how to detect it while reducing the willingness of factories to pollute (assuming that inspectors have no incentives to over-report the level of pollution in the light of the high level of penalty incurred and the low cost of appeal for factories).

Practically, looking at the case of corruption in public administration whether it is when one want to collect its pension or a subvention provided by the state, it is generally the case that official will tend to ask for a percentage of one's allocation. This will be call petty corruption or administrative corruption. Here, instead of increasing the penalty for corrupt officials caught one could consider acclaiming and rewarding those remaining honest. Indeed, by publishing regularly a list of officials being professional and honest one will spread the news about an

alternative to corruption, which will raise the incentive for individuals to refuse to pay the bribe and remain honest. Rewarding those professional and honest officials with the reward proportional to their wage for example will increase their incentive for honesty which in turn not only convinces honest one to remain so but eventually rallies corrupt one to honesty. Measuring the level of corruption of the official in this case could consist of measuring the involvement of ones department in cases of corruption detected, denunciations made and opinion survey relative to customer satisfaction and efficiency. Considering now types of corruption such as embezzlement or mismanagement, a solution could consist of putting together a fund rewarding monthly or annually the best managed institution and its team. The reward once again proportional to one wage will encourage everyone (especially those not taking advantage of the mismanagement) to be honest and professional but also to denounce corruption seen as having a direct negative impact to individual overall income. In those two alternatives approaches to the fight against corruption, the main idea is to propose an alternative to corruption identified here as the promotion of honesty. Both individuals and officials need to be presented with options around corruption. In this respect the diversification and simplification of the payment of the property tax as done in Cameroon recently with the introduction of online registration and mobile payment method could participate to a new approach to the fight against corruption (see Cameroonpostline.com, 2015 and Ecofin Agency, 2015)

In cases where one will still prefer to punish instead of reward, it appears that the focus should be on the official. Indeed, with the official being the one setting up the level of the key elements determining the gain from corruption and aware of the strictly positive relationship between his expected gain and the prevalence of corruption, reducing his/her incentive to be corrupt will not only affect his/her choice between corruption and honesty but also the game as a whole through its constraint on the level of the key elements.

Chapter III. Incidence and perception of Corruption: Case of Kenya

Section 1. Introduction

The sentence to life in prison for a former high Chinese political figure – Bo Xilai – (The Economist Printed Edition China, 2013), the arrest of the chief of justice of the constitutional court in Indonesia - Akil Mochtar – (The Economist printed Edition Asia, 2013) and the arrest of a Venezuela mayor – Edgardo Parra – (BBC Latin America & Caribbean, 2013) all over the last few months on ground of corruption and corruption related practices suggest the high prevalence of corruption and related offence on the headlines.

Indeed, with the rise of anti-corruption program and anti-corruption related policies (see the Ethic Intelligence website: http://www.ethic-intelligence.com/compliance-tools/43-voluntary-initiatives-against-bribery/), the topic of corruption alleviation seems to be fashionable. Moreover, its importance goes far beyond the headlines as suggests the British Independent Commission for Aid Impact (ICAI). In the light of the growing concern of foreign aid donors, they advocate for a wide range of approaches including a clear anti-corruption strategy, an investment in management of risk relative to corruption, an investment in a sectorial analysis of risk associated with corruption and the promotion of transparency and accountability (ICAI, 2011). Further, as corruption appears to undermine development mainly through two of the Millennium Development Goals that are education and health care, the necessity to reach those MDGs will have to include a tighter hold on corruption (TI, 2010).

The necessity of the study of the problem of corruption will bring about concerns relative to its characterisation and also its detection. Corruption is designed as a way around institutions as result it constantly evolves as a response to new challenges presented by improved institutions. In addition, similarly to crime it is generally consider as an activity in marge of the legality and as such perform behind closed doors which make it hard to detect. Those two features will therefore limit the availability of direct measures of this problem with instead the proliferation of measures relative to the perception of its occurrence.

The 2013 edition of the Corruption Perception Index (CPI) by Transparency International includes thirteen different perception indexes relative to the prevalence of corruption among which none existed before 2000 (see TI, 2013). Such recent spreads and increasing reliance on perception indexes of

corruption bring about two concerns: how are they made and how far do they actually reflect the incidence of corruption. Our focus is on the second concerns as the first one has been considerably discussed (see Lambsdorff (2006), Kaufmann et all (2006), Knack (2007) and Huberts et all (2006)). Indeed, because the purpose of perception indexes of corruption is to provide a measure of the incidence of corruption, it is important to insure the accuracy of such measures.

Hence, aiming to further understand the relationship between a measure of the perception of corruption and a measure of its actual incidence, our next step will be a look at the roots of the problem in addition to the review of the main empirical work on the topic. In Chapter III.Section 2, we will not only introduce the dataset used but also highlight the difficulties faced in this process and the importance of such analysis. The presentation of the data, it advantages and disadvantages and the identifications of events related to corruption will constitute 0. Chapter III.Section 4 will consist of the model used, the presentation of the dataset before transformation, the transformation process and the result of such transformation. Finally, before providing the conclusion and limitations of our work in Chapter III.Section 6, the Chapter III.Section 5 will present the analysis conducted as follow: Firstly the description of indexes of societal corruption generated, secondly the highlight of the distinctive features of these new indexes in the light of the perception of corruption, thirdly a review of those distinctive features through the lens of keys facts of the history of Kenya and the summary of the findings at last.

Section 2.   Perception indexes of corruption and data on its actual incidence

1.   The origin of the problem

Perception indexes relative to corruption refers to indexes constructed from opinion surveys administrated to various entities assumed to be primarily concern or involve in such practices. In this extend entrepreneurs whether foreign or local and individual are generally the target of such surveys. The main ones are the Corruption Perception Index (CPI) from Transparency International (TI) and the Country Policy Institutional Assessment (CPIA) from the African Development Bank (AFDB). In addition, there is also the CPIA from the World Bank (WB), the Global Integrity Index from Global Integrity (GII), the Mo Ibrahim Index from the Mo Ibrahim Foundation, the Global Corruption Barometer (GCB) and the Bribe Payer Index from TI (BPI).

At the other end there is the actual incidence of corruption which will refers to the volume of case of corruption brought to light. This type of data is reported by the growing number of national agency in charge of the fight against corruption. Indeed with the rise of the anti-corruption movement, countries have to not only track case of corruption on the daily base but also publicly report cases founds. It is the case of the Economics and Financial Crimes Commission in Nigeria (EFCC 2013), the Liberia Anti-Corruption Commission in Liberia (LACC 2013), the Ethic and Anti-Corruption Commission in Kenya (EACC 2013) and the National Anti-Corruption Commission in Cameroon (NACC, 2013). However, the quality of such type of index is highly correlated to the level of actual commitment to the fight against corruption.

A very corrupt regime might create an agency responsible for the fight against corruption but will hardly give them all the required accreditations and power to do so. This could be seen as a principal-agent problem as the country as a whole (the principal) will be better off without corruption hence the need for an anti-corruption agency but the regime in power (the agent) does not feel the same way because being already involve in corruption. This is why countries that would

mostly benefit from a well-functioning anti-corruption agency are generally the one unable or unwilling to do so. The EFCC was establish in 2004 but it is only in 2012 that the Directorate of planning, policy and statistics was created, as result the EFCC have not publicly release data on the incidence of corruption in Nigeria so far (EFCC 2013). The LACC was establish in 2008 but only corruption cases relative to 2011 and 2012 have been publicly released (LACC 2013). The NACC was created in March 2006 by presidential decree but it was only in 2008 that the commission started working effectively since it was then that the members were appointed (NACC, 2013). Since then, only two reports were publicly released: the first one in 2011 and the second in 2012. At last in the case of Kenya, the history of the actual EACC dates back to 1997 when it was then known as Kenya Anti-Corruption Authority and despite a turbulent beginning since 2004 it publicly releases a yearly report on the incidence of corruption in Kenya (see EACC 2013).

In addition to the principal-agent problem affecting the production of data on the actual incidence of corruption, it should be noted that corruption is primarily an illegal act and as such it happens behind closed doors which make its detection even harder. Indeed data on the incidence of corruption have to be obtained on the case by case and each case could represent a totally independent investigation. While looking into corrupt practices in the award of government contracts one will have to audit case by case the award of each of them not just look into the rule and regulation in place. Despite such limitations, the negative effect of corruption on government income (see Tanzi and Davoodi, 1998), on market efficiency (see Tanzi, 1998), on the quality of institutions (see Ades and Di-Tella, 1997) and on investment (see Bardhan, 1997; Mauro, 1995) highlight the importance of such type of information. Hence the use of perception indexes of corruption.

Perception indexes of corruption unlike data on the actual incidence of corruption will be relatively easier to collect. The understanding is that by collecting individual perception level of corruption from a large enough (representative) sample one will have a close enough idea of the prevalence of corruption in the area covered. This is done with the use of opinion surveys and interview generally under anonymity due to the sensitivity of the topic. The GCB is an example. It is a world-wide opinion survey on people experience with

corruption in their respective country (TI 2, 2013). In addition, a more qualitative approach is often used by targeting a specific sample. As such the CPIA either from the AFDB or the WB will be using a more selective sample of both local and international economist to answer their surveys. However, such approach is potentially flawed as it will be highly sensitive to the quality of the survey and the sample. It is the case that an investor used to the mechanism of the business sphere of specific country will be less likely to see corruption to the same extend than another investor who is not just like local will be less likely to see the extend of corruption the same way foreigner will.

Resulting from surveys, perception indexes are highly dependent of the quality of the questionnaire use, the awareness of the participants and even their political and/or economical affiliation as such those indexes are highly subjective. William De Maria (2008) in this extend describe the CPI as a tool for foreign policy in the case of Africa. He points out that with the allocation foreign aid more and more linked to the performance of anti-corruption policies as it is the case for the Millennium Challenge Corporation, this may limit the focus of government to the fight against corruption leaving aside important sectors like health and education (De Maria 2008, p 781-782). He also suggests that corruption as done in Africa should be seen as the result of a needy behaviour rather than a greedy behaviour as suggested by the assimilation of corruption to a rent seeking behaviour (see also Bayart, 1993). This will in fact widen the gap between petty corruption and political corruption as the former will be seen as needy corruption while the later will represent greedy corruption. The importance of such distinction is that it effectively reduces the scope of what is generally depicted as corruption with all the negative externalities coming along. Indeed, corruption resulting from a needy behaviour will be more like a tax as inevitable, constant and predictable while corruption resulting from a greedy behaviour or rent-seeking will be effectively harming due to its unpredictability and randomness. This contradict the findings of Curvo-Cazurra (2008) in his study of transition economies as he suggests that unpredictability in the form of arbitrary corruption is better than predictability in the form of pervasive corruption while looking at FDI. However, Curvo-Cazurra results are not only limited to transition economies, they also seem to be more related to the public image that the country in question display rather than the actual effect that the type of corruption will have on the country.

Hence, data on the actual incidence of corruption should be the primary source of information relative to the prevalence of corruption when available but when those data are not available the concern over the reliability of perception indexes remains. This concern is the focus of the growing literature on the assessment of perception indexes of corruption and also the comparison of perception indexes to actual evidence of the incidence of corruption. Our focus is on the later following the work of Sequeira (2012), Mocan (2008), Olken (2009), Donchev and Ujhlyi (2011) or even Fishman and Miguel (2007).

2. Review of the literature on the comparison of perception indexes and the actual incidence of corruption

New approaches to the measure of corruption are presented by Sequeira (2012) as she looks into field's approaches to the measure of corruption. She advocates for measures of the incidence of corruption instead of its perception as perception index are potentially biased due to the impartiality of the respondents. As such, surveys relative to the experience of corruption that are the World Bank Enterprises surveys, the Business Enterprise Economic Survey and the International Crime and Victimization surveys could be good indicators. However, the wording of questions and cultural differences will highly affect their accuracy and reliability. As result she proposes three approaches to the measure of the incidence of corruption. One way could be to fill the gap between two official administrative datasets as in Ferraz et all (2012). This could be for example the case of the comparison between the amount of funds allocated by the state to a specific group and the amount of funds the group declares to have received from the state. Another way could be a comparison between administrative dataset and an independent audit as in the case of Olken's paper (2009). Here the missing expenditure will constitute the incidence of corruption. At last one could generate two datasets and compare the gap between the two that will suggest corrupt behaviour. The relationship between measures of the incidence of corruption and its perception, the extent to which the culture explain difference in institution design and the rule of law and the conditions for the aggregation of direct measures of corruption at micro level to bring to life an accurate measures of the

level of corruption at country level are potential areas of future research made available by this methodology following Sequeira (2012).

The methodology consisting of filling the gap between two administrative datasets is been use by Ferraz, Finan and Moreira in their paper on effects of corruption to the education system in Brazil (2012). They look into the hypothesis that corruption sees as the missing expenditures in federal education funds affects student's outcome. As such they gather data from public primary school receiving central government's funding and government audits in addition media report on corruption involving central government's funding for education. Regressions of the academic achievements of an individual on his previous academic achievement and the amount of central government's fund for education that has not been stolen reveals that students from corrupt localities present significantly lower output that those from non-corrupt localities in addition to higher drop out and failures rate as compare to other primary school.

Mocan in his paper questions the causes of corruption in addition to the relation between its perception and its actual incidence (2008). He limits corruption to cases of bribery as he uses the United Nations Interregional Crime and Victimization Survey (ICVS) collecting individual data on reported payment of bribe by individual living in countries surveyed. This dataset clearly reports the respondent's experience of case of corruption with bribe. While regressing the perception of corruption as reported by various perception indices such as the CPI on data on the incidence of corruption represented here by the ICVS and various others variables related to corruption such as governance and the quality of institutions, Mocan made two major findings. Firstly, the evolution of the perception of corruption is caused by the evolution of the incidence of corruption mainly the administration and the police but this only when one does not account for the quality of institutions. Secondly, taking into account the quality of institutions makes the incidence of corruption irrelevant to the evolution of its perception leaving the rule of law the only relevant variable.

Focussing on a specific project, Olken (2009) similarly assess the difference between the perception and the incidence of corruption in addition to the relation between the two variables. Corruption in his paper is defined as the missing expenditures within a project of road construction in India. The dataset

used here is constituted of four surveys in addition to the administrative report on the official cost of the project. Indeed, an engineering survey is used to assess the effective quantity and quality of the material used and also the labour required for the project by digging and analysing samples of the road build. A worker survey is used to assess the work force employed for this project and the wage paid. A supplier survey is used to evaluate the price of the material at the time of the execution of the project. The last survey assesses the local population's perception of corruption for this specific project. Using the first three surveys, Olken calculates the real cost of the road build which compared to the official reported cost provides the missing expenditure understood as the incidence of corruption. The missing expenditures are then compared to the perception of corruption as revealed by the last survey. This reveal that the local population could not detect corruption within the project as carried out through inflated quantities instead of inflated prices.

Donchev and Ujhelyi present yet another way to compare the incidence of corruption to its perception as they attempt to find out if there are characteristics that will affect the perception of corruption in case of a constant incidence of corruption and also how accurate measures of the incidence of corruption will predict its perception (2011). For such purpose they use both the United Nation Interregional Crime and Victimization survey (ICVS) for the period 1996-1997 and 2000-2001 and the World Bank Business surveys on firms experiences with corruption. As such they assess both corruption at individual level and country level. The method used is the regression at both country level and individual level. At country level they regress the CPI, the World Bank Governance indicator and the Political Risk Service corruption index and at the individual level they regress the ICVS and the World Bank Business Survey. The independent variables used are characteristics such as the origin of the legal system (whether British or not), the Colonization history (whether colonize or not), the religion (percentage of protestant population), the GDP per capita, the size of the population, the ethno-linguistic fractionalization, the political regime and the percentage of primary resources exported. This reveals that at country level the economy, the religion (Protestantism), the political regime and the protection of individual rights will reduce the perception of corruption for a steady incidence of corruption. In addition, at individual and firm level, the education, the age, the income and the employment status will increase the perception of corruption for a steady

incidence of corruption. One could conclude with those authors that the perceived level of corruption could differ between two countries even though its actual incidence is identical.

Fisman and Miguel (2007) found an innovative way to compare the perception of corruption to its incidence while assessing the importance of the corruption culture and legal framework. Their paper looks at the illegal parking of United Nations Diplomats in New York City which is assimilate to the misuse of public office for private gains aware that their status did protect them from prosecution over parking fines up to 2002. The dataset used is the reported parking fines of United Nations Diplomatic plates in New York City for periods of November 1997 to November 2002 and November 2002 to November 2005 put together from the New York City Department of Finance, the United Nations Blue Book of permanent mission staff with diplomatic privileges and the United States Department Office of Foreign Mission. Fisman and Miguel regress the parking violation data on the enforcement measures taken, the corruption level of corresponding countries as reveal by perception indices, the number of diplomats included in the mission and various other countries related characteristics such as the GDP per capita. The regression shows that the behaviour of a diplomat (assimilated to the parking violation) is positively correlated to the corruption culture of his country (assimilated to the perception of corruption).

There are others studies of the relationship between the perception of corruption and its actual incidence such as Weber Abramo (2005), Razafindrakoto and Roubaud (2010) or even Dreher et all (2007). Weber Abramo (2005) conducts an econometric analysis using the Global Corruption Barometer to compare the people experience with bribery and opinion on the prevalence of corruption found out that there is no relationship between the experience of bribery and the perception of corruption. A study by Razafindrakoto and Roubaud (2010) comparing a survey administrated to a general population regarding their experience with corruption and an opinion survey administrated to expert for the six Sub-Saharan African countries suggests that the perception (opinion survey from experts) does not concur with the actual incidence of corruption (survey on people experience with corruption). At last, Dreher et all (2007) after isolating variables that will cause the presence of corruption (such as historical, socio-cultural and economic context) and infer the presence of corruption (such as the

GDP per capita, the level of investment, the mobility of capital, the quality of infrastructure, financial development and the consumption of cement) and then generating a new index of corruption for over hundred countries concludes that perception indexes of corruption do not reflect factors that are directly causing corruption. It is the case that, as Weber Abramo (2005) concludes, perception indexes reflect the quality of institution rather than its actual incidence.

We propose a different approach to the study of the relation between the perception of corruption and its actual incidence as we use the perception of corruption to improve the poor dataset on the incidence of corruption. In effect, we will use the CPIA and the CPI to not only account for the effect of the perception of corruption on its actual incidence but also to account for the lack reliability or availability of data on the actual incidence of corruption. The data on the incidence of corruption is obtained from actual reports by national agencies responsible for the fight against corruption. The novelty of our study is that we aggregate micro data on the incidence corruption into macro data that could be compared to the perception indexes that are at a macro level. This means that we could actually compare the prevalence of corruption on a daily base to the perception that people will have of it. As such effect we use an agent-based model of corruption that Chakrabarti developed and use to simulate the evolution of corruption in a fictional world. The other interest of this work is to take a step further into ways of not only improving perception indexes of corruption but maybe looking for indexes of the actual incidence of corruption. In addition, unlike any other of the studies mentioned above in which the focus is on a specific type of corruption (following the particularity of the dataset used) here we will be including all forms of corruption from petty or bureaucratic corruption to political corruption or state capture. This is because in the dataset for the incidence of corruption that we will be using all corrupt acts reported by the anti-corruption agency independently of the author of the act or his/her position are included.

3.   The importance of our study: Looking at the data on the prevalence of corruption in Cameroon

Despite the growing dedication to the fight against corruption in Sub-Saharan Africa attested by the growing number of national agencies reporting case of corruption as mentioned earlier, the dataset on the actual incidence of corruption is still poor. Second to the Kenyan's dataset that will be used for our analysis, only the Cameroonian's dataset come close. However, concerns such as gaps within the dataset, inconsistencies over the years, unreliability of the data, micro-level data and the inability to detect some form of corruption are some of the main difficulties that considerably limit the use of this dataset. We will present the main concerns prohibiting the use of the Cameroonian's dataset as an illustration of the overall limitations of studies using the actual incidence of corruption in Sub-Saharan Africa.

The National Anti-Corruption Commission (NACC), who is the Cameroonian anti-corruption commission, published so far two reports on the prevalence and fight against corruption in Cameroon (see NACC, 2013). The 2011 report includes investigations carried out between 2008 and 2010 (see our summary of this report in Appendix 2). Those investigations include investigations within institutions whether at a national level (such as various ministry or the postal service) or at a local level (such as local treasury offices) and investigations within specific projects (such as the Maize project or the construction of the road Ayos-Bonis). The second report published in 2012, takes a more qualitative approach as it assess the practice and the repression of corruption. It looks at practice of corruption within the allocation of wood-cutting permit by the ministry of forest and wildlife, the collusion between public officers and private individuals regarding the public procurement policy in local communities. Investigation into the repression of corruption targets corruption within the police and departments of ministries such as the ministry of domains, the ministry of lands and properties, the ministry of healthcare, the ministry of higher education, the ministry of secondary education and the ministry of transport.

The dataset of the incidence of corruption in Cameroon covers a wide range of sectors. There is corruption within institutions such as ministries, the postal service, local treasury offices and the police and also corruption within specific projects such as the construction of the road Ayos-Bonis, the construction of teaching facilities and the provision of subventions to farmers. However, those

data are the result of one time only investigation in those sector. Indeed, investigation into corruption within ministries happens only for the year 2008 as it is only this year that reports from ministry cell in charge of the fight against corruption came out. Investigations into local treasury offices are only reported for the year 2009 and in 2010 only investigations into two projects in addition to the audit of the postal services took place. This means that one can only look at the state of corruption within ministries for 2008 or within local treasury offices for 2009 or within projects such as the maize project or the construction of a road for 2010. This also means that a study of the evolution of corruption is not feasible due to the random change of the sector surveyed over time. Further, with the second report published in 2012, the focus changed from a qualitative survey and detection of case of corruption to a qualitative research into the practices and repression of corruption. As result the second report focuses less on providing a detail database into the incidence of corruption in Cameroon and more on analysing the prevalence of corruption based on the limited surveys done. Hence, this dataset could not be used in another set-up than a temporal and sectorial analysis of corruption.

A sectorial view of corruption will limit the usefulness of the data since such type of data is not as well documented. While with a broad view on corruption one could find a range of perception indexes that would be used to assess this big picture, with the incidence of corruption on a narrow and specific sector one will have to return to the field to gather perception of corruption for this specific sector. This is the case of the study of Olken (2009) as he compares incidence of corruption as suggested by the difference between the engineer and the worker surveys to the perception of corruption amongst the population. As result a sectorial approach of the collection of the data on the incidence of corruption will not be useful without another survey on the incidence of corruption in this specific sector.

Looking at the case of ministries within the sectorial approach of the data on the incidence of corruption in Cameroon, the survey appears to be incomplete. The data in this case is the result of reports made by ministerial cells responsible for the fight against corruption located within each ministry. Those cells report directly to head of their department and send copy of their report to the NACC. This is already a considerable flaw as those cells are not independent from the

ministry in which they are located. Further, in their report of corruption within ministries, in the case of keys ministries such as Trade, Defence, Economy, Planning and Regional Development and Public work only case of mismanagement and unethical behaviour are reported (Here we characterise a ministry as key base on the amount of fund it is supposed to have access to, in this extend a ministry such a Public Work or Defence will be key ministry while Higher Education or Secondary Education will not). This is surprising as ministries such as Social Affairs or Youth have case of embezzlement and fraud. As result we can only suggest that this is an evidence of either the presence of political corruption hard to detect or it is part of a political unwillingness to do so. In either case, the data on the incidence of corruption within ministries become less credible as we seem to be missing keys elements.

In addition to the case of ministries, local treasury offices and the postal services seems to suggest the presence of political corruption as well. In those last two instances, the amount of funds stolen per transaction is so high that one might need to have a considerable power of office to have access to it. For local treasury offices amounts varies between 30,000,000 Fcfa (£ 36 153.16) and 400,000,000 Fcfa (£ 482 042.12) and for postal services they varies between 20,000,000 Fcfa (£ 24 102.11) and 13 billion Fcfa (£ 15 666 368.76). This could be therefore a clear sign of the heavy presence of political corruption in which case one will understand the concern over the availability of data on the incidence of corruption. Indeed, the presence of political corruption suggests that elite in power is corrupt as result they might want to protect the system that serve their interest which means that the detection of corruption will be harder as anti-corruption agencies have more difficulties to get through the opacity of the administration. In this context, data on the prevalence of corruption will be just part of a bigger strategy targeting the prosperity of the existing corrupt system rather than its end. The prevalence of political corruption could then justify the scarcity and uselessness of the dataset.

Nevertheless, It could be the case that amounts suggesting political corruption are just cases of corruption involving a group of individual colluding to achieve such act. The audit of corruption in the postal services is in this extend really vague as to how many individual were involve for cases detected or any other detail relative to the case in question at the exception of the amount

involved. In such absence of details we can only speculate which once again highlight the unreliability of the dataset.

The concern over the reliability of the dataset goes far beyond the absence of details as we did find some contradictions in the case of the audit of local treasury offices. Putting together regional reports of corruption within local treasury offices gives us a total of 6,179,458,559 Fcfa (£ 7 534 139.15) while the summary of cases of corruption around the country for this institution found in the same report gives us a total of 8,142,257,140 Fcfa (£ 9 927 228.69). The difference being considerable and the two totals nowhere similar to suggest a clerical error, we can question again the reliability of the dataset.

Still within the audit of local treasury offices, another difficulty was to make the difference between acts of corruption and ordinary crimes such as theft and vandalism. The audit of the local treasury offices differentiates acts of embezzlement and fraud to acts of burglary and robbery. However, the question as to know whether one should put together those two categories remain as it could be that case that the burglary or robbery was just aiming a covering prior case of embezzlement or simply that those burglars were in collusion with administrative officer. Indeed, acts of embezzlement and fraud are considered as corrupt behaviour while burglary and robbery are not. The importance of this concern come to light when one considers the prevalence (accidental or not) of such acts of robbery and the amount of cash involved.

Moving on to specific investigations the concern over the ability of the dataset to give a comprehensible picture of corruption in the sector considers remains. Looking at the Maize project difficulties seems to arise. The audit of the maize project reveals cases of corruption within the award of subvention to farmer as promised by the State. However, this audit considers as corruption only cases where the farmer did not receive at all the funding he/she was promised. This means that farmers who had to pay a bribe to receive a fraction of the subvention are not accounted for. This could possibly considerably affect the data as evidently it will be simpler and strategic for the corrupt official to require a bribe from the farmer willing receive the subvention and only steal all the subvention from farmers unwilling to pay the bribe instead of just stealing it all while taking into account the probability of detection and its implications.

At last, the government launch in 2004 the so call "Operation Sparrow-Hawk" which is an anti-corruption campaign targeting high profile civil servant. The idea was to detect and arrest political elite guilty of embezzlement of considerable amount of money, obliging them when possible to reimburse the State. However, having found evidences of the presence of political corruption in the 2011 report and in the light of the inconsistency, unreliability and unavailability of critical information within this dataset, "Operation Sparrow-Hawk" does not seem to have succeeded its goal. An alternative approach will be to consider this anti-corruption campaign as a strategy implemented by the corrupt elite in power in the aim to comply with the need to advocate the end of corruption without effectively reducing the prevalence of corruption. In either case the ability and perhaps willingness of the NACC to effectively fight corruption can be questioned. As result, we will not be using this dataset but instead focus on the case of Kenya where the dataset seems more reliable and consistent over time.

In the light of concerns over the continuity, the reliability and the ability to account for all forms of corruption relative to dataset on the incidence of corruption in Cameroon see as the second best dataset on the incidence of corruption in Sub-Saharan Africa, our study using the dataset on Kenya will lead the way to such type of studies and hopefully bring about the importance of such dataset.

The availability and the collection of the data is a fundamental for our analysis as corrupt practices are not done in the open. We will therefore present the data of both the perception and the actual incidence of corruption in Chapter II.Section 3. More importantly, we will discuss in the same section the problematic with the use of data on the incidence of corruption.

Section 3.   The Dataset on corruption

We will be using perception indexes and data on the incidence of corruption relevant for Kenya. First we will introduce those data and later on discuss the problem face while trying to use them.

1.   Presentation of the data
a)   *Perception indexes*

The Country Policy and Institutional Assessment from AFDB is a perception index measuring the quality of institutions and their ability to promote development. The overall CPIA that we will be using is a composite of three categories that are: Economic Management, Structural Policies and Policies for Social Inclusion and Equity. In addition, there is a fourth category that stands on its own that is the Governance rating and there the sub-category Property Rights and Rule Based Governance will be included in our work. In addition, the CPIA from the WB also known as International Development Association Resource Allocation Index (IRAI) is the equivalent of the previous index at the difference that it is produced by the WB. As such it has a more international view on the subject as the previous one includes only African countries. Once again we will be using the overall IRAI score and the sub-category Property Rights and Rule Base Governance from the IRAI Governance Rating category.

The GII is a perception index produced by Global Integrity a Non-profit organisation whose goal is to promote accountability and transparency amongst governments by providing tools essential to achieve such goals (see GII 2013). Two of those tools will be included in our analysis, they are the overall GII score and the score for Government accountability. The overall score as a measure of the quality of governance include six categories that are: Civil society, public information and media, Elections, Government accountability, administration and civil service, oversight and regulation and anti-corruption and rule of law. This perception index as an indicator of the quality of governance will be useful as it could highlight the relationship between the perception that individual have of their government and the prevalence of corruption amongst them.

One will notice that so far we are effectively only using the overall score of the index and the specific sub-category focusing on the accountability and transparency of institutions. The overall score which is in general a broad measure of governance is our actual perception index of corruption as it takes into account all the sectors that will be affected by a prevalence of corruption such as the macro-economy or trade or even equity amongst the population. In addition the accountability and transparency of institutions will be used as a measure of the quality of institutions as which is fundamental for our model as we will present later on.

The CPI produced by Transparency International is an aggregate of a variety of other perception indexes on corruption, democracy and other factors related to corruption. Its 2010 version includes surveys from ten different sources that are: the AFDB, the Asian Development Bank, the Bertelsmann Stiftung, the Economist Intelligence Unit, the Freedom House, the IHS Global Insight, the International Institute of Management Development, the Political & Economic Risk Consultancy Ltd, the World Bank and the World Economic Forum. As part of this work we will be using only the Overall score of the CPI (see the summary of the data on the perception of corruption in Appendix 3).

b)   Data on the Incidence of Corruption

We gather data on the incidence of corruption for Kenya through website of the anti-corruption agency in Kenya. The Ethic and Anti-Corruption Commission (EACC) is the agency responsible for the fight against corruption in Kenya. It is a model in the fight against corruption in Africa as it has produce quarterly reports on the fight against corruption since 2003 and annually report since 2004 (see EACC 2013). This means that so far it has produced nines reports on the incidence of corruption in Kenya all using a similar approach and covering the same sectors. The EACC presents the evolution of the following main characteristics across years: the classification of corrupt acts by type of offence and by type of individual involve, the list of complete and on-going investigations, the list of cases before the court, the list of complete and on-going asset tracing investigations and the list of averted losses due to the work of the EACC. Such continuous dataset unlike the one on Cameroon will be at the heart of our analysis despite the limitations inherent to its collection.

2.   Advantages and disadvantages of our dataset

Designs as responses to the lack of data on the actual incidence of corruption, perception indexes of corruption are generally consistent at least as far as the last eight years are concerned. They are consistent in the sense that year after year they use a similar methodology to survey the perception of corruption around the world. This consistence in addition to the variety of perception indexes makes them easy and practical to use even if they are limited for comparison over time and also cross-country comparison. The definition of corruption, the type of acts included, the capacity to detect, the number of countries included and mostly the awareness of people toward the problem considerably increase over time with the widespread of those indexes. Such change will affect the study of the evolution of corruption over time for any given country as those indexes rank the perception of corruption in a given country relatively to the other countries include in the dataset. This means that an increase or decrease of the number of countries included will affect the other countries included depending on where the incoming ones rank comparatively. As for cross country comparison because of the link between the phenomenon of corruption and the social context in which it operates what will be consider as heavy corruption in one context will could just be seen as local habits and attitudes in another. These are limitations faced while using perception indexes of corruption, they are inherent to perception indexes and the difficulty of the subject of corruption.

Turning to the case of data on the incidence of corruption, we suggest earlier that such type of dataset is not without flaw considering its discontinuity and unreliability (see Section 2.3). However, the Kenya's dataset is the exception considering its mains features that are its length, its spread and its continuity. The dataset of Kenya presents cases of from July 2004 to June 2012 divided into eight periods with each representing a report publish by the EACC (see an extract of the dataset in Appendix 4). This is a considerable amount of data compared as it could allow for a comprehensible analysis of the medium term evolution of corruption in Kenya. For example one can observe that the understanding of the work and the mandate of the EACC increases over the years as the relevance of corruption claims receive goes from nineteen per cent in 2006/2007 to forty-one per cent in 2011/2012 (see EACC 2013). This could suggest either an increase of the awareness and acceptance of the work of the EACC in the fight against

corruption or an increase of the mandate of the EACC over the years. In either case this will be a sign of the increasing efficiency of this agency in the fight against corruption. Hence, the length of the dataset as it covers eight years could give us an understanding of the picture of corruption in the medium term.

The spread of the dataset is equally important as for a comprehensive picture of the incidence of corruption one will need details of the incidence of corruption across sectors rather than within specific sectors or projects. The EACC conducts investigations based on corruption claims received without any prior agenda. The variety of sectors targeted by those denunciations is insured by the multitude of ways to report corruption and the anonymity associated to it. Indeed, denunciations could be made in person, by phone, by mail and by email and more importantly the anonymity of whistle blower is protected via the provision of a secure platform where one can freely communicate with the EACC that is the Anonymous Whistleblower's System. This representativeness of the data on the incidence of corruption in Kenya as the result of the ease and safety of the denunciation process in addition to the increase relevance of denunciations justify the spread of data on the incidence of corruption across sectors. As result the Kenyan dataset can give us a general view of the incidence of corruption within the country.

The continuity feature links the length of the dataset to its spread as one will need to be able to observe the same general view of the incidence of corruption at different point in time in the aim to understand its evolution. Over the years the EACC report kept the same structure as it highlight the same type of statistics on the incidence of corruption in Kenya. Those statistics are: the classification of corrupt acts by type offence, the classification of corruption by type of individual involve, the list of complete and on-going investigations, the list of case before the court, the list of complete and on-going asset tracing investigations (investigations into the origin of assets that people have declare) and the list of averted losses (acts of corruption stop before happening) due to the work of the EACC. We can then assess how a specific type of offence did evolve over time or more importantly how corruption evolve for a specific group of offenders. Consequently, the length, the spread and the continuity of the Kenyan dataset give us the means to build a comprehensive picture of the evolution of the incidence of corruption in Kenya over the period observed.

Despite the many advantages of the data on the incidence of corruption in Kenya, some difficulties arose while using it. Cases of corruption highlight within the EACC report are generally relative to an institution, a sector or a project with details relative to the individual and amount involved. The classification of corruption acts by type of individuals involved is just summary table without details. This means that to establish a detailed table of cases of corruption by type of individual involved one will need to go through the each of the lists (the list of complete and on-going investigations, the list of case before the court, the list of complete and on-going asset tracing investigations and the list of averted losses due to the work of the EACC) and figure out how many individuals where involved, which type of individuals where involved and how much money was stolen. It is then highly time consuming.

The other difficulty faced while using this dataset is the micro level of the data reported. Indeed, while we are attempting to compare perception of corruption to its incidence, data on the perception of corruption are generally macro-indicators. Perception index of corruption will report the perceive level of corruption for a specific country or institutions at best. It is different for data on the incidence of corruption as with the EACC report corruption is reported on case by case which means that we will have cases of corruption found per institutions or project or sector which will need to be aggregated before being able to see the overall picture of the incidence of corruption within institutions or for the country. However, this difficulty will be alleviate with the use of a model develop by Chakrabarti (2002) to aggregate micro level data into macro one as we will present in Section 4.

3. Identifying the events that could have affected the prevalence of corruption in Kenya

Looking at the history of Kenya within the period 2004-2012, we will attempt to recognise events that could have acted as causes or deterrents of corruption as this will give us further indications relative to the actual incidence or prevalence of corruption within the country. In the absence of a better alternative we use the list of key facts from the timeline of the history of the country provided by the BBC (http://www.bbc.co.uk/news/world-africa-13682176). We can summa-

rise the causes of corruption as presented earlier into four mains categories that are: the frequency of dealing with public officials, the strength of rules and regulations, the power of government officials and others causes such as the size of the population and unemployment (see Chapter I.Section 2).

Table III-1

Periods / reports	Causes of corruption			
	Frequency of dealing with public officials	Strength of rules and regulations	Power of government officials	Population and Unemployment
July 2004-June 2005	0	- March-July 2004: completion of the draft of the new constitution (<u>Negative</u>) - February 2005: following the revelation of the overall cost of corruption under the president Kibaki ($1billion) the leading anti-graft official is forced to resign (<u>Negative</u>)	-March July 2004: the new draft of the constitution reducing the power of the president failed to be enacted on time (<u>Positive</u>)	0
July 2005-June 2006	0	- July 2005: the parliament approves a draft of constitution extending the power of the president (<u>Positive</u>) - November – December 2005: the draft of the constitution approve by the parliament is rejected by voters as the result of the extended power given to the president (<u>Negative</u>) - January- February 2006: the finance minister resign	-April 2006: signature of oil contracts with China (<u>Positive</u>)	0

		following a corruption scandal relative to the allocation of government contracts (Negative)		
July 2006-June 2007	0	0		-October 2006: arrival of 35.000 Somali refugee in Kenya following drought and conflict in their home country (Positive)
July 2007-June 2008	0	- December 2007: post electoral violence 1.500 death (Positive)	0	0
July 2008-June 2009	0	0	0	0
July 2009-June 2010	0	- October 2009: the government aggress to co-operate with the ICC regarding the trial of keys suspect of the post-electoral violence (Negative)	-January 2010: suspension of funding for free primary school by the US as the result of fraud allegations (Negative) -February 2010: continuing support of ministers involve in corruption allegation by the president (Positive)	0
July 2010-June 2011	0	-July 2010: Kenya join its neighbour to form the East African Common market (Negative) -August 2010: adoption by referendum of the new constitution limiting the power of the president and decentralising power to regions	0	0

		(Negative) -March 2011: the government agrees to investigate the illegal gold trade prevalent in Kenya (Negative)		
July 2011-June 2012	0	0	-March 2012: Oil discovery in Kenya (Positive)	0

Table III-1 bring together all events that could have affected corruption based on their relationship with the four main causes of corruption selected. Their effect could be negative which means it could be seen as a cause of the reduction of the prevalence of corruption. It could be also seen as positive in which case this will essentially be cause for the increase of the prevalence of corruption.

The frequency of dealing with public official as a cause of corruption refer to any event that will either increase or decrease the need for an individual or a firm to face a public official. It could be an event such as the creation of excessive or cumbersome regulations. Unfortunately, we did not find any event that could be related to such cause of corruption. One explanation could be the fact that such type of event because directly affecting only local population will rarely make it to international news aware that we collected information from an international news website (BBC Online). Another explanation will be to consider that the frequency of dealing with public official could be accounted for by the power of government officials. One could consider that because more power to officials essentially means more rent available, this will be an accurate measure of the frequency of dealing with public officials.

The strength of rules and regulations as a cause of corruption refers to any related events that will cause or suggest either its increase and as such a "negative" effect on the prevalence of corruption or its decrease and as such a "positive" effect on the prevalence of corruption. This category is very important as corruption is generally considered in the literature as the lack of strong rule of law (see Jain 2011 and Ades and Di-Tella 1997). Hence, events here will be consid-

ered as strongly having an effect on the prevalence of corruption. We find many events related to such cause of corruption.

The power allocated to government officials see as a cause of corruption refers here to any events that will cause or reflect the increase ("positive" effect) or decrease ("negative" effect) of the power of officials. Indeed, the power allocated to officials is directed assimilated to the increase or the decrease of rents available for those willing to sell them. Hence, events related to the power allocated to government officials could be eventually link to the increase or the decrease of the prevalence of corruption. We find some evidence of such events.

Population and unemployment as a cause of corruption refers to events related that will participate to or suggest the increase or decrease on this cause of corruption. By increasing (decreasing) such cause of corruption one will be increasing (decreasing) the weight on already weak institutions which will have a "positive" ("negative") effect on the prevalence of corruption. The effect of the event consider here is appreciated relatively to its effect on the quality institutions as weak institutions is considered as a breeding ground for corruption. It could be events such as a sudden rise of population or unemployment levels or simply an increase of those taking advantage of the public goods for a given period. We find only one events related to such cause of corruption.

For period one that goes from July 2004 to June 2005, we found two events strongly indicating the regression of the prevalence of corruption and one event suggesting its increase (Table III-1). Those events are the completion of a new draft of the constitution and the resignation of a high public figure on ground of corruption on one side and the failure to actually pass that new constitution on time on the other. Such failure to enact the constitution on time mitigates the resolve of the apparent determination of the move toward better rules and regulations.

For period two that goes from July 2005 to June 2006, a modified draft of the constitution giving more power to the president approved by the parliament is then rejected by referendum. In addition, we have strong signal of the improvement of the rule of law in the form of the resignation of the finance minister following a corruption scandal despite a potential increase of rent seeking as the re-

sult of the signature of oil contract with China. Hence, this depicts an overall improvement of rule and regulation in a context where more rents are available.

In period three that goes from July 2006 to June 2007, we only have the increase weight on weak institutions due to the arrival of Somali refugee in Kenya. This could potentially increase the prevalence of corruption due to the erosion of the quality of institutions.

For period four that goes from July 2007 to June 2008, the post electoral violence suggests a clear context of weak institutions leading to the prevalence of corruption.

In the period five that goes from July 2008 to June 2009, we register no event related to our selected causes of corruption.

For period six that goes from July 2009 to June 2010, the decision to cooperate with the International Criminal Court in the matter of the post electoral violence suggests an improvement of the quality of the rule of law. However, with the limitation of available rent following the suspension of the US funding because of fraud allegations despite the continue support of alleged corrupt minister by the president on the other the picture is less clear.

For period seven that goes from July 2010 to June 2011, events gathered clearly point toward the improvement of the quality of the rule of law. These are the integration the East African Common market, the adoption of the new constitution limiting the power of the president and agreement to investigate the illegal trade of gold. It is a clear sign of a move toward better governance which will limit the prevalence of corruption.

At last for period eight that goes from July 2011 to June 2012, the discovery of oil reserves in the country suggests an increase of rent available to official that could potentially foster corruption.

Section 4. **The transformation of the data**

Our aim is to transform micro-evidence of corruption into macro ones while accounting for the effect of the perception of corruption. Focussing on the case of Kenya we have perception indexes from the WB, the AFDB, Global Integrity and TI but also data on the incidence of corruption in Kenya from the EACC. Perception indexes reflect the belief on the level of corruption for this country as a whole. Those indexes are macro indicators of the belief on the prevalence of corruption. However, the dataset on the incidence of corruption list cases of corruption detected over time. Those cases represent evidences of corruption at a micro-level as each of these cases will just be a composite of the bigger picture of the prevalence of corruption in Kenya. This is why we need to aggregate these micro-evidences of the incidence of corruption in a way that will give us the big picture of corruption at the level of the country before proceeding to any analysis.

The easiest way to aggregate micro-evidences of the incidence of corruption could have been to use a weighted average. By using data on the incidence of corruption classify by type of individual involved, a weighted average will be use to give more importance to case of corruption achieved by high ranking official. However, one will have to decide whether to average the number of case by type of official or the amount involved. On one hand, averaging the number of case found give us no indications as to what the result found actually means in the light of the impossibility to compare it to the perception of corruption and the lack of similar data for other countries. On the other hand, averaging the amount of money stolen still give us no information as the result is meaningless and the amount themselves being already representative of the type of individual involved (this is based on the hypothesis that the amount of money capture is function of one position in the society as prior to capturing it one will need to have access to it). Hence, any attempt to aggregate those micro-evidences will not be useful for our analysis.

Unable to aggregate those micro-evidences of the incidence of corruption in a way that will be help for our analysis we extract from it the individual propensity to be corrupt. In fact while the amount of case of corruption per type of individual or the amount of money capture per type of individual is meaningless, the propensity to be corrupt per type of individual is a lot more useful as it tells us how far individual are willing to be corrupt just like a an individual perception of corruption. Indeed, perception indexes of corruption are actually the perception of the propensity to be corrupt for the country as a whole. Individual answering surveys on perception indexes are ultimately just giving their belief on the probability corruption in the country in question.

The individual propensity to be corrupt is measure as the quotient of the amount that the individual captures to the average of the amount captured by individuals from the same type. The underlined assumption here is that individuals capturing as much as the average of their type are considered as fully corrupt (the propensity to be corrupt is 1). The average per type considers here is the average from all the individuals from the same type across the years in the light of the small size of the dataset. This method will not allow us to account for the current value of amount embezzled in the past but again the density and the size of the dataset limit our options.

Individual propensity to be corrupt could then be aggregate per type and per year using a simple average method and the result will be weighted to form the overall yearly propensity to be corrupt. The individual propensity to be corrupt for individual from the same type will form a yearly propensity for corruption for this type of individual while average per type and year. All four propensities to be corrupt (aware that we have four types of individuals) will be aggregated each year using a weighted average method. The use of a weighted average method at this point reflect the fact that each type will affect the overall level of corruption differently in the light of their different access to rent or their different power of office. In this extend one can see that the effect of corruption perpetrated by a minister or any other political elite will potentially be more harmful and attract more attention than corruption perpetrated by a police officer.

So far we build our index of the prevalence of corruption by only using the propensity to be corrupt of individual extracted from the dataset on the incidence

of corruption. However, the reliability of the dataset will be function of its ability to detect cases of corruption which in turn will be function of the institutional framework allowing that to happen. This means that to attempt to account for the full extent of the prevalence of corruption one should use the quality of institutions to account for the potential loss due to the inability to detect. This is the reason why we use the agent based model of Chakrabarti (2002) to transform our individual propensity to be corrupt understood as individual level of dishonesty into a societal corruption index.

1. The Model

Chakrabarti (2002) builds an agent based model of corruption to understand the way in which corruption evolves, the effect of the initial level of corruption to its overall level on the long run and the effect of socio-economic parameters on corruption. The agent based model is an attempt to bridge the gap between on one side an individual approach to the problem of corruption and a country level approach on the other. He suggests that the country level of corruption or societal corruption is the result of individual choice of his/her level of corruption or level of dishonesty that will optimise his/her aversion to risk and endowment in human capital. Further, Chakrabarti (2002) using heterogeneous agents and an overlapping generation model simulate the evolution of an economy to study corruption.

a) *Modelling corruption at different levels*
(1) At the level of individuals

For k_i the endowment in human capital of individual i, $\hat{y}_i$ the expected income level of individual i, Θ_y^2 the variance of $\hat{y}$ and b_i the degree of aversion toward risk of the individual i;

The individual utility function u_i is therefore:

$$u_i = \hat{y}_i - b_i \Theta_y^2$$

Equation III-1

(2)   At a country level:

We have two main input; K the individual input or simple sum of individual human capital and S the societal input or institutional set-up enabling the production process. Chakrabarti characterises S as externalities that makes the economy greater than the sum of its parts. Hence, for Y the total production of the economy we have:

$$Y = SK$$

Equation III-2

However, S will be a function of K as the increase of human capital will also improve the ability of individual to create better institutions. Therefore, we have:

$$\alpha = \frac{S}{K} \implies Y = \alpha K^2 \ with \ 0 \leq \alpha \leq 1$$

Equation III-3

(3)   At a joint micro-macro level:

For p_i is the level of dishonesty of the individual i and q the societal corruption index:

$$q = \frac{1}{K} \Sigma p_i k_i$$

The societal corruption is present as the sum of the relative human capital of each individual weighted by their level of dishonesty. Here the individual level of human capital of an agent will determine his/her economic power which in turn determines his decisional or discretionary power that could be assimilated to the level of rent available to him/her. Indeed, it is the power that comes with one's position or responsibilities within the state that is use to leverage rents. However, Chakrabarti here presents societal corruption as the sum of individual level of dishonesty that is aggregate with the relative human capital of each individual leaving aside a major component that is the quality of institutions.

Indeed, although the social input that are institutions are take into account through the effect of K on S, this could not account for the fact that bad institutions are now accepted as the main driver of corruption. Ades and Di-Tella (1997), Acemoglu and Verdier (2000) and Rose Ackerman (1975) all insist on the institutional framework as the main cause of corruption. Further, the social input sees here as the quality of institutions will not only affect the societal corruption index through its effect on the human capital but also directly through its effect on the ability to detect cases of corruption. As we mention earlier the ability for the relevant agency to detect cases of corruption will depend on the institutional framework allowing it to operate smoothly. In the case of Cameroon for example we saw that despite being created in 2006, it was only in 2008 the member of the NACC were appointed, this suggests that the quality of the NACC as an institution (see here as it ability to effectively operate) could be seen as one of the reason why cases of corruption detected go as far as 2008 (see Appendix 2). This is why we suggest that the social capital should be added as a mark-up factor as ceteris paribus its will negatively affect the societal level of corruption. Hence, we will express the relationship between societal corruption and individual level of dishonesty as:

$$q = \frac{1}{SK}\sum p_i k_i = \frac{\alpha}{S^2}\sum p_i k_i$$

Equation III-4

This means that given a constant level of individual level of dishonesty, the societal corruption will increase with the relative human capital of the individual but decrease with the social input or quality of institutions which is conform to the literature on corruption. Indeed, high ranking official are involve with political corruption which has a worse effect on the economy than bureaucratic corruption and weak institutions are seen as the main cause of corruption. In addition, we are using the perception of the quality of institutions to account for the inability of institutions to detect all cases of corruption.

Both p and q have their range between 0 and 1 with 0 corresponding to a totally honest individual or an absence of corruption in a country and 1 corresponding to a totally dishonest individual or a completely corrupt country. A

totally honest individual refers to one who does not take advantage of the rent available to him and a corrupt free country will refer to one in which the total output function remain :

$$Y = SK$$

A totally dishonest individual will be the one whom captures the full amount of rent available to him and a completely corrupt country will be the one in which the effective production is zero as the full amount of the total output is absorb by corruption.

Consequently, taking into account the presence of corruption, the total production function become:

$$Y = (1 - q)SK$$

Equation III-5

At this point Chakrabarti highlight two main effects of corruption:

- The Output Reducing effect as he claims that corruption will reduce the total output through its negative effect on the social input aware that the social input is the externality that makes the economy greater than the sum of its part. This could be judge constraining as corruption will not only affect institutions (the social input S) but also the use of the human capital (the individual input K) as the decay of institutions will limit the access to human capital and as such reduce the overall human capital. In other words corruption will affect the productivity of the economy through mainly its effect on institutions (social capital) but also on the reproduction of human capital.
- The Output Distributive effect is the idea that corruption extorts a proportion q of the total output while a proportion (1 - q) becomes the new total output available to all the individual in the society. This could be seen as the next step of the previous effect as here the new total output following the output reducing effect will be further divided. Corrupt individuals are expected to gain more than the rest of the society as in addition to their regular share of the reduced new total output ((1-

q)Y), they will also have a share of the "corruption pie" qY which is a proportion of the reduce new total output [3].

b) *Risk associated with corruption*

For y_c^i the income of a completely dishonest individual i ($p_i = 1$), y_c^i have the following characteristics:

- It is assumed to be randomly distributed following a normal distribution.
- The mean of the normal distribution of y_c^i is likely to be positively related to the human capital endowment (k_i) of the individual i.
- It is positively related to the size of the corruption pie qY.
- It is negatively related to the human capital weighted cumulative efforts of the other contenders $\sum p_i k_i$. This for a very large population could be approximated to qK.

We will disagree with Chakrabarti on the last characteristic as we suggest that for a large enough population:

$$\sum p_i k_i \simeq K.$$

The reason is that by assuming $\sum p_i k_i \simeq qK$ Chakrabarti suggests that the income of the corrupt individual i will be negatively related to the human capital of (only) corrupt individual relative to the human capital of the individual i. However, the access to rent that is determined by the level of human capital of an individual will be the same whether or not the individual in question decides later on to capture those rents (be corrupt or not). In other words, a corrupt minister and a not corrupt one (ceteris paribus) should both have access to the same power of office (or same level of rent) as their power of office (access to rent) is not function of their level of dishonesty but their social capital (such as level of education). As result the income of the corrupt official should be negatively related to the level of the human capital of the rest of the population relative to his/her human capital as his/her access to rent will depend on his/her

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[3] It is similar to assimilating the societal corruption to an additional tax. However, it is widely accepted now in the literature that corruption is more insidious that a simple tax. This is accounted for by the double effect of corruption as it first reduce the output and then reduce it again by distributing it unequally.

relative human capital (relative to the society as a whole)[4]. This means that under the assumption that one's status in the society is function of his/her level of education (see here as human capital), the level of education of the rest of the population relative to the corrupt individual will negatively affect his/her overall income as this will determine how much he/she can capture[5].

The risk associated with corruption will be measure by the variance of the distribution of y_c^i and this will be a function of:

- The level of effective social capital (1-q)S (positive)
- The proportion of national income devoted to the fight against corruption γ(positive)
- The increase of the human capital of the individual k_i (positive)

Hence the income of a totally dishonest individual will be:

$$y_c^i \sim N(\frac{k_i}{\sum p_i k_i} qY, \gamma k_i (1-q)S) \Leftrightarrow y_c^i \sim N(q(1-q)Sk_i, \gamma k_i(1-q)S)[6]$$

Equation III-6

With $\sum p_i k_i = K \ and \ qY = q(1-q)SK$

Interestingly here both the risk $(\gamma k_i(1-q)S)$ and the return (qSk_i) from corruption increase with the quality of institutional set up (S) which is similar to the literature on corruption as there is an emphasis on the importance of institutions.

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[4] Posing $\sum p_i k_i \simeq K$ and aware that $q = \frac{1}{SK} \sum p_i k_i$ we have then $q = \frac{1}{S}$. Despite being an extreme case, assuming that the societal corruption will be proportional to the inverse of the quality of institutions is not far from the reality especially if we consider that this relationship should be strictly true for country with a large population such as India, Russia or China.

[5] By assuming the absence of corruption in the repartition of the power of office with instead an honest repartition based on the level of human capital we limit the scope of this model. Indeed, one can easily point out that the presence of corruption will not be limited to the capture of the available rent where one stand but could also be included in the fight for the positions with the higher power of office. However, our assumption make the model realistic enough as we pose that the income of a corrupt individual i will be negatively affected by the human capital of all the other individuals relative to the human capital of the individual i but not just the corrupt ones.

[6] For Chakrabarti, $y_c^i \sim N\left(\frac{k_i}{qK} qY, \gamma k_i (1-q)S\right) \Leftrightarrow y_c^i \sim N(Sk_i, \gamma k_i (1-q)S)$ as he assume that $\sum p_i k_i \simeq qK$ in addition to considering that $Y = SK$ despite being in the presence of corruption.

c) *Choice of the level of dishonesty p_i*

The individual choosing his level of dishonesty p_i within the range 0 to 1 is effectively choosing a type of asset that vary from an honest activity which is a risk-free asset $((1 - q)S\ k_i)$ to a fully corrupt activity that is risky (qSk_i). Such choice will depend on the distribution of $\hat{y}_i$ and the risk aversion level of the individual b_i. In other words the individual will choose a level of dishonesty that maximise his utility function.

According to Chakrabarti this give then:

$$Max_{pi}(1 - q)\big((1 - q)S\big)k_i + p_i k_i\big((1 - q)S\big) - b_i[\gamma k_i(1 - q)Sp_i]^2$$

Further assuming that the individual does not cares about his effect on the societal corruption:

$$p_i = \frac{1}{2b_i\gamma^2 k_i(1 - q)S}$$

We will disagree again with Chakrabarti here. The function p_i set to be maximise is compose of three elements: the normal income of all agent as a share of the new total income following corruption$\big((1 - q)\big((1 - q)S\big)k_i\big)$, the surplus that only corrupt individual receive as a share of the corruption pie $p_i k_i\big((1 - q)S\big)$ and the cost of the activity choose due to the potential exposure to risk $b_i[\gamma k_i(1 - q)Sp_i]^2$.

Looking at the first term, Chakrabarti is suggesting that corruption is affecting the society through two effects: the output reducing effect which in fact decreases the productivity and an output distributive effect which captures a share of the new reduce production output to constitute the corruption pie. Hence, although the new total output of is (1 - q)SK for the society and (1 - q)S k_i for the individual only (1 - q)((1 - q) S K) will be share amongst all the individual independently of their dishonesty level just like Chakrabarti point out.

However with the second term that is the return from corruption, we presented earlier that it is $\frac{k_i}{K}qY$ (instead of $\frac{k_i}{qK}qY$) and aware that the corruption pie is $qY = q(1 - q)SK$, the return from corruption for all individual will be:

$p_i \frac{k_i}{K} q(1 - q)SK = p_i k_i q(1 - q)S$. Chakrabarti obtains $p_i k_i ((1 - q)S)$ as he considers that the return from corruption is $\frac{k_i}{qK} qY$ instead. Once again this brings us back to the understanding that corruption will not only be affected by the quality of institution through its effect on human capital but also directly as the decreasing (increasing) quality of institution will be a mark-up (discount) factor for the societal corruption (Hence $q = \frac{1}{SK} \sum p_i k_i$ instead of $q = \frac{1}{K} \sum p_i k_i$).

The third term which represents the cost of the activity chosen relative to the exposure to risk is simply the risk aversion level of the individual b_i multiply by the square of the risk which gives $b_i[\gamma k_i (1 - q)Sp_i]^2$ just like Chakrabarti suggests.

Therefore, we suggest that p_i will be chosen so that it maximises the function:

$$Max_{pi}(1 - q)((1 - q)S)k_i + p_i q((1 - q)S)k_i - b_i[\gamma k_i (1 - q)Sp_i]^2$$

At this point, Chakrabarti assumes that individuals will not care about their effect on the societal corruption while attempting to solve the maximisation problem. We will not make this assumption. We will instead differentiate the function as it is easy to find the solution.

For $f(p_i) = (1 - q)((1 - q)S)k_i + p_i q(1 - q)Sk_i - b_i[\gamma k_i (1 - q)Sp_i]^2$

$$\frac{df(p_i)}{dp_i} = q(1 - q)Sk_i - 2 b_i \gamma^2 k_i^2 (1 - q)^2 S^2 p_i$$

By posing we obtain: $\frac{df(p_i)}{dp_i} = 0$ we obtain:

$$p_i = k_i \frac{q(1 - q)S}{2 b_i \gamma^2 k_i^2 (1 - q)^2 S^2} \Leftrightarrow p_i = \frac{q}{2b_i \gamma^2 (1 - q)Sk_i}$$

This means that the level of dishonesty of an individual will increase with the societal corruption and decrease with both his own aversion to risk and the proportion of national income devoted to the fight against corruption.

$$p_i = \frac{q}{2b_i\gamma^2(1-q)Sk_i} \iff q = \frac{2p_ib_i\gamma^2Sk_i}{1+2p_ib_i\gamma^2Sk_i}$$

That is q is an function such as $y = \frac{x}{1+x}$ where the $\lim\limits_{x\to\infty} y = 1$ and for

$x = 1 \Rightarrow y = .5$. In addition, aware that $x = 2p_ib_i\gamma^2Sk_i < 1 p_i, b_i, \gamma, S$ and $k_i \in$

[0,1], y will never be higher than .5. As result such approximation cannot be use

as an index of the incidence of corruption since we consider that $q \in [0,1]$.

We will therefore only use Equation III-4 for our transformations.

Chakrabarti extends his work to a multiple period model using an overlapping generation's model as he primarily studies the evolution of corruption. We will not go that far as we aim to propose an index of the incidence of corruption at a macro-level accounting for the perception of corruption and that could be directly compare to perception indexes. Hence we will use the model just to transform micro data on the incidence of corruption into country level data.

2.   Presentation of the dataset before transformations

As mention earlier we will use two types of data in this research: data relative to the perception of corruption that are various perception indexes on the prevalence of corruption at countries levels and data relatives to the incidence of corruption that are reports on actual cases of corruption obtained from state agencies responsible for the fight against corruption.

The data on the perception of corruption have been provided by the African Development Bank (AFDB). They brought together all the majors perception indexes of corruption in addition to their own CPIA. Here we will mainly use the AFDB CPIA and AFBD GR, the World Bank CPIA and GR (IRAI and IRAI GR), the Global Integrity Index (GII) and the Transparency International Index (CPI).

The Country Policy and Institutional Assessment (CPIA) index produces by the AFDB measures various aspects that will affect corruption. The AFDB uses available surveys to create a benchmark per type of country and then adjust it over the years based on macroeconomics indicators and other indicators such as the quality of social and economic policies. It is divided into three clusters that are

economic management, structural policies and policies for social inclusion and equity. Governance Rating indicators (GR) focuses on quality of institutions that is a proxy for the quality of governance. It is divided into sub cluster that are: Property rights and rule based governance, quality of budgetary and financial management, efficiency of revenue mobilization, quality of public administration and transparency, accountability and corruption in public sector. The rating of those two indexes has a range going from 1 suggesting that the aspect measure has been very weak for two years or more to 6 suggesting that the aspect measure has been very strong for three years or more.

The World Bank Resources Allocation Indexes that are IRAI and IRAI GR are similar to the AFDB indicators as the IRAI is divided into three clusters similar to the one presented for the AFDB CPIA and the IRAI GR focuses on the quality of governance. In addition, IRAI and IRAI GR indexes have a range from 1 corresponding to a very weak performance to 6 corresponding to a very strong performance. The main difference between those two types of indicators is the fact that while the first one is provided by the AFDB, the second one is provide by the World Bank as result the first one is more appropriate for African economies as it is focus on them while the second is a worldwide indicator.

The Global Integrity Index (GII) is produce by the Global Integrity an independent provider of information relative to governance around the world. The GII provide an "empirical on-the-ground research" done by local expert on both governance and corruption (see GII 2013). Here, data are collected first hand and adjusted with the help of local experts. In addition, the GII index is a percentage. It indicates a very weak aspect for score below 60, a weak aspect for score above 60, a moderate aspect for score above 70, a strong aspect for score above 80 and a very strong aspect for score above 90.

Transparency International produces the Corruption Perception Index (CPI) which is essentially an aggregate of all the majors' indicators available. The aggregation is weighted based on the reputation of the indicators and the indicators included will vary over the years. The final score is on a scale 0-100 where 0 characterises countries highly corrupt and 100 characterises country very clean. We present in Appendix 3 a summary of the data on the perception of corruption use for our analysis.

Data relative to the incidence of corruption are the result of yearly reports issued by states organisations responsible for the fight against corruption. In the case of Kenya the Ethic and Anti-Corruption Commission (EACC) - former Kenya Anti-Corruption Commission - is the agency responsible for the yearly release of those documents since 2003. Their reports include six main classifications of corrupt acts. First corruption is classify according to the type of practices that are: civil issues, bribery embezzlement, abuse of office, criminal offence, fraud, public procurement irregularities, administrative issues, labour issues and other issues.

Second, there is the classification of corruption following the type of individual involved such as top level officials, senior officials, middle level officials and low level officials. They include in the category top level officials ministers, assistant minister and political elite. Senior public officials refer to permanent secretaries, accounting officers and chief executive officers. The category middle level officers include inspectors and procurement officers. Low level personnel refers to chief, assistant chief and clerks. It is worth mentioning that for the first and second classification we only have the percentage of complaints relative to each category with no further details.

Third, there are the completed and on-going investigations of cases of corruption. This classification give details regarding the amounts and in some cases institutions and individuals involved.

Fourth, there are cases of corruption before the court. This category summarises the case in front of the court for the period observed.

Fifth, the completed and on-going cases of assets tracing investigations category presents case of corruption relative to misappropriation of assets such as land or cash in addition to the case of individual not able to justify the provenance of their assets.

At last the sixth category present averted losses as the result of the work of the EACC. This classification just like the others at the exception of the first and the second one, provide details relative to the amount per case found and sometime the name of individuals and/or institutions involved.

Out of the nine reports produced by the EACC so far, we will be using the eight covering the following period: July 2004- June 2005, July 2005- June 2006, July 2006- June 2007, July 2007- June 2008, July 2008- June 2009, July 2009- June 2010, July 2010- June 2011 and July 2011- June 2012. In addition, we did rearrange all those data into one big dataset showing each corrupt case per year, amount involved and type of official involved. We present in Appendix 4 a sample of our aggregation of the dataset on the incidence of corruption in Kenya based on the report by the EACC.

Further, we also use data from the Kenya Ministry of Finance relative to budget of the country in the aim to assess the percentage of the government fund allocated to the fight against corruption.

3.   Presentation of the transformation process

Our objective is to be able to compare the perception of corruption to its actual incidence looking for any relationship between those two variables. However, while for the perception of corruption we have a range of country level measures of corruption, for the incidence of corruption we only have micro data highlighting cases of corrupt practices detected in Kenya. This is the reason why we will use a modified version of the Chakrabarti agent based model of corruption to convert the micro data we have into a country level measure of corruption.

We will use Equation III-4 to compute a societal measure of corruption. Equation III-4 characterises societal corruption as the result of the sum of the relative human capital of each individual weighted by their individual level of dishonesty which will be divided by the level of social input or quality of institutions within the society.

The Equation III-4 is as follow:

$$q = \frac{1}{SK}\Sigma p_i k_i = \frac{\alpha}{S^2}\Sigma p_i k_i$$

k_i is the individual level of human capital, p_i is the individual degree of dishonesty, K is the individual input in the process of production or simply the sum of individual human capital k_i, S is the social input or quality of institutions

that complete the process of production and q is societal level of corruption that we are attempting to compute.

The human capital is used here to determinate the level of rent that each individual will have access to. It represents not only the level of education but include also all the relationships and network that one might use to get in a position of power. However, we will simplify our model by assuming that we only have four level of human capital within the society following the categorisation of the type of corrupt official as done by the EACC in their report. We will thus have: Top level officials, senior public officials, Middle level officers and low level personnel. Top level officials will be refers to as k_1, Senior public official as k_2, Middle level officers as k_3 and low level personnel as k_4.

Aware that each type of official have access to a different level of rent and assuming that the total individual input K is equal to 1 we will distribute the access to rent amongst officials as follow: $k_1 = 0.5$, $k_2 = 0.35$, $k_3 = 0.10$, $k_4 = 0.05$ and $K = k_1 + k_2 + k_3 + k_4 = 1$. By designing the access to rent of group of official as such we are suggesting that the higher an individual is in the society to more rents he/she can extract.

The individual level of dishonesty is the main component of our equation and we will use the amount of money captured by the individual as a proxy. However, the level of dishonesty should be about the percentage of the rent available that the individual is extracting. As result we will have to define the level of rent available per type of corrupt official ($\bar{p}_j$) and then compute the individual level of dishonesty as the percentage of this level of rent that the individual extracted $(p_j^i)^7$. In addition, $\bar{p}_j$ will be compute as the average of all the corrupt case detected over the year per category of corrupt official with all the case with amounts above the average corresponding to a fully corrupt official $(p_j^i = 1)$. Following that we will generate the annual average weighted sum of human capital per type of individual and then bring the four results together to form the annual overall weighted sum of human capital $\sum p_j^i k_j$.

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[7] Here the notation slightly changes as it become p_j^i instead of p_i with j representing the type of official to which the individual i belongs to.

The social input or quality of institutions S will be proxy by a range of perception index on the quality of institutions in Kenya. The reason is that individual will choose their level of dishonesty based on their own perception of societal corruption amongst other things. This individual perception of societal corruption will be informed in general by media and popular opinions regarding the quality of governance and the spread of corruption which is now heavily affected by the widespread of perception indexes. Hence, we suggest here that those perception indexes will inform individual on the quality of institutions within the country. Effectively S will be in percentage the rank of the country relative to the range of the index, this percentage will be rescale to fit the range 0-1 representing the increasing good quality of institutions.

Consequently for the transformation we will have:

$$q_{t1} = \frac{1}{S} \sum p_j^i k_j \ as \ K = 1$$

Equation III-9

Evolution of perception indexes and our indexes of the prevalence of corruption

	july 2004 - june 2005	july 2005 - june 2006	july 2006 - june 2007	july 2007 - june 2008	july 2008 - june 2009	july 2009 - june 2010	july 2010 - june 2011	july 2011 - june 2012
• afdb_ind (AFDB perception index of corruption for Kenya)	0.44	0.44	0.404	0.38	0.366	0.36	0.36	0.42
• irai_ind (WB perception index of corruption for Kenya)	0.46	0.46	0.454	0.454	0.464	0.422	0.44	0.44
• gii_ind (GII perception index of corruption for Kenya)	0.2908	0.2908	0.2908	0.2726	0.3085	0.3144	0.3172	0.32
• ti_ind (TI perception index of corruption for Kenya)	0.79	0.79	0.78	0.79	0.79	0.78	0.79	0.78
q_Safdb (our index of the prevalence of corruption in Kenya majored by the AFDB perception index)	0.816408	1	0.5321048	0.649248	0.624991	0.623229	0.436621	0.7156889
q_Swb (our index of the prevalence of corruption in Kenya majored by the WB perception index)	0.816408	1	0.5321048	0.865663	0.833321	0.830972	0.582162	0.7156889
q_Sgii (our index of the prevalence of corruption in Kenya majored by the GII perception index)	0.6664555	1	0.4343710	0.472180	0.462956	0.470361	0.326446	0.3976049
mpk (our index of the prevalence of corruption in Kenya)	0.3265632	0.620041	0.2128419	0.259699	0.249996	0.249291	0.1746486	0.2147067

Figure III-1

Notes:

Using majors perceptions indexes as provided by the African Development Bank and accounting for the real incidence of corruption using corrupt acts

detected as reported by the Ethic and Anti-Corruption Commission of Kenya we put together our indexes of the prevalence of corruption that are mpk, q_Safdb, q_Swb and q_Sgii

The majors' perception indexes of corruption in Kenya used are afdb_ind, irai_ind, gii_ind and ti_ind. They have been rescaled to fit the range 0 to 1.

mpk is the yearly average of individual weighted propensity for corruption, as such it is the index of the prevalence of corruption while accounting exclusively on detected cases of corruption.

q_Safdb, q_Swb, q_Sgii are our indexes of the prevalence of corruption majored by respectively Afdb, Wb and Gii perception of the quality of institutions following Equation III-9. They actually reflect how the perception of the quality of institutions by those respective agencies will affect mpk.

Looking at subjective indicators of corruption that are perception indexes such as the AFDB index (afdb_ind), the WB index (irai_ind), the GII index (gii_ind) and the TI index (ti_ind) and at our indexes of the actual prevalence of corruption based on cases of corruption detected (mpk, q_Safdb, q_Swb and q_Sgii), it is clear that there is a divide between the perception of corruption and its actual incidence. Perception indexes are not only flatter but also lower than their corresponding indexes of the actual prevalence of corruption. Here lies the novelty of our work as in the aim to circumvent the limitations of perception indexes and improve upon the literature we use data accounting for actual detected cases of corruption. Aside from concerns over the ability to detect cases of corruption that lead us to the inclusion of the perception of corruption in our estimation (as discuss in section 4- 1), this data is an accurate indicator of how spread corruption is in a given country. At last the inclusion of perception indexes as proxies to account for the effect of the perception of corruption on its incidence and also the potential inability to detect some cases of corruption, improve the quality of our indicators making it stands as actual indexes of the prevalence of corruption.

Section 5.   Analysis

1.   Description of the trend of the indexes of societal corruption
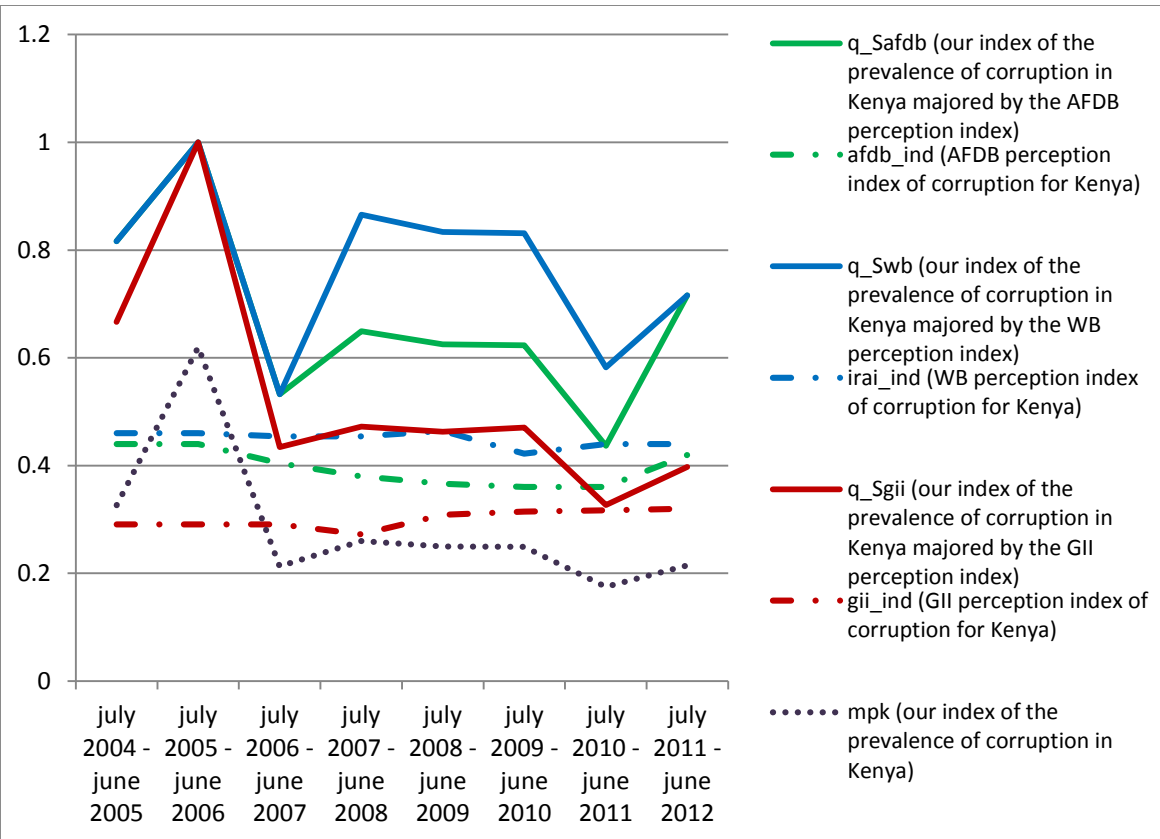
Figure III-2

<u>Source</u>: **African Development Bank and Ethic and Anti-Corruption Commission of Kenya**

The average of weighted individual propensity to corruption that is mpk decreases on overall for the period observed (see **Figure III-2**). Within this period it reaches its peak in the period July 2005 – June 2006 and its base in the period July 2010 – June 2011. At last, from the period July 2006 to June 2007 mpk is lower than all the perception indexes suggesting less incidence of corruption than it is perceived (see **Figure III-2**).
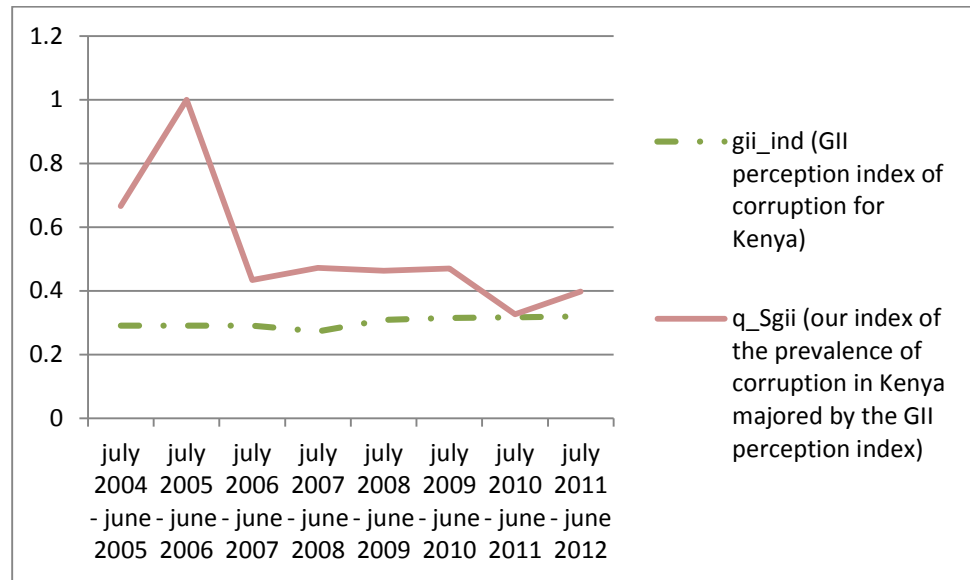
Figure III-3

Figure III-3 represents our index of the prevalence of corruption using the quality of institution as suggested by the GII index (q_Sgii) and the GII perception index of corruption (gii_ind). **Figure III-4** and **Figure III-5** do the same for respectively Afdb and the Wb. It is the case that in all the case our index of the prevalence of corruption is higher and curvier than it respective perception of corruption (the perception index use to account for the quality of institution).

Our indices depict a higher prevalence of corruption on overall as compare to their respective perception indices (see **Figure III-3**, **Figure III-4** and **Figure III-5**). In fact, the index representing the marginal propensity for corruption of the society (mpk) that is an index of the prevalence of corruption while accounting exclusively for the actual incidence of corruption is always lower than our other indices of the prevalence of corruption and also lower than all the perception indices used by July 2006 (see**Figure III-2**). It is only when we use perception indices to account for potential flaws of the dataset that our indices of the prevalence of corruption (q_Sgii, q_Safdb and q_Swb) rise above the perception indices level. One explanation is to consider that such leap can illustrate the effect of the perception of corruption on its actual incidence. Our indexes clearly capture such effect aware that the hierarchy (as suggested by the overall level of the index) between the perception indices used is the same for our respective indices of the prevalence of corruption as from low to high we have q_Sgii, q_Safdb and q_Swb (see **Figure III-2**). The other explanation will be to simply continue with

the assumption that our indexes of the prevalence of corruption (and not the marginal propensity for corruption) depict the actual level corruption as our dataset fail to account for all the case of corruption.

Our indices of the prevalence of corruption are also changing a lot more overtime than perception indices. Indeed, our perception indices are made out of micro-evidence of the prevalence of corruption which means that they are sensible to short term change in the prevalence of corruption unlike perception indexes which resulting from surveys are less quantitative. Hence, our indices are more appropriate to account for the short term evolution of corruption compare to perception indices.
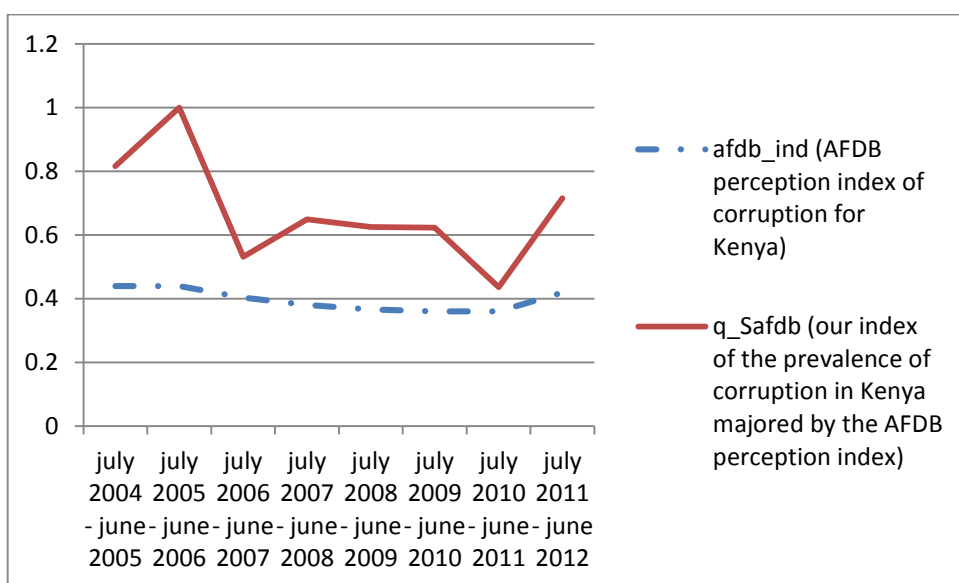
Figure III-4

<u>Source</u>**: African Development Bank and Ethic and Anti-Corruption Commission of Kenya**
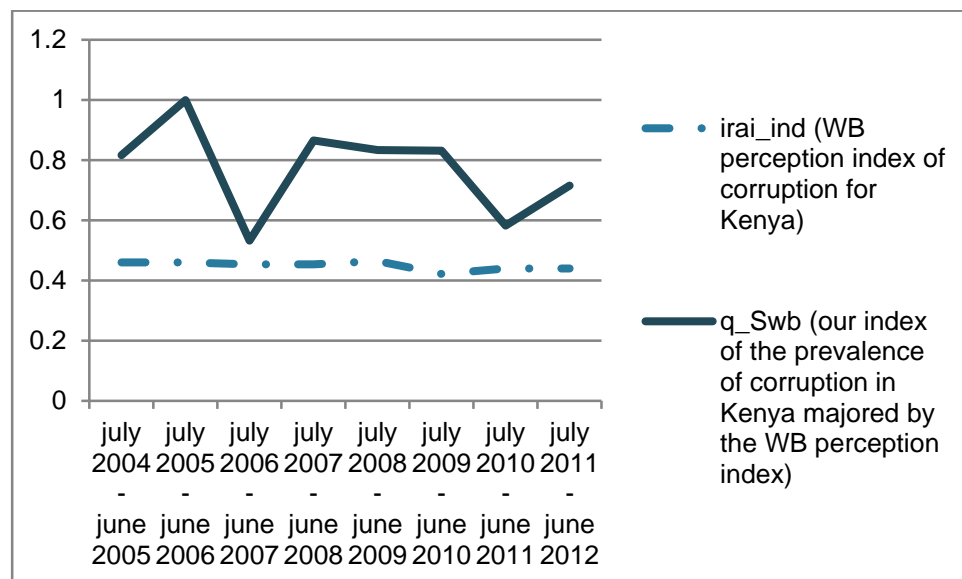
Figure III-5

The index of the prevalence of corruption using the perception of the quality of institutions by GII (q_Sgii) considerably decreases over the period observed (see **Figure III-3**). It reaches its peak in the period July 2005 to June 2006 and its base in the period July 2010 to June 2011. It also suggests a higher prevalence of corruption than all the perception indexes only for the period July 2005 – June 2006 but for the period July 2007 to June 2010, only the TI index is higher.

The index of the prevalence of corruption using the perception of the quality of institutions by AFDB that is q_Safdb slightly decreases over the period observed (see **Figure III-4**). Similarly to q_Sgii it reaches its peak in the period July 2005 – June 2006 and its base in the period July 2010 – June 2011. This index is higher than the AFDB, the WB and the GII perception indexes of corruption except during the period July 2010 – June 2011. At last q_Safdb is higher than the TI index for the period July 2004 – June 2006.

The last index produce following equation 4 is q_Swb. It is the index of the prevalence of corruption using the perception of the quality of institutions by WB. Its overall decrease over the years is the same as q_Safdb (see **Figure III-5**). It reaches its peak in the period July 2005 – June 2006 and its base the following period (July 2006 – June 2007). In addition, for the period July 2004 to June 2006

and July 2007 to June 2010 this index is the highest and for the period July 2006 to June 2007 and July 2010 to June 2012 it came second after the TI index.

2. Distinctive features

After its peak in the period July 2005 – June 2006, the average weighted individual propensity to corruption that is mpk suggests the lowest presence of corruption amongst all the indicators (see **Figure III-2**). That is, by July 2006, all the indicators of the perception of corruption in Kenya might have over-estimated corruption. However, mpk is highly dependent of the ability to detect cases of corruption (also seen as quality of institutions) as it is made of actual detected cases. As result, the fact that mpk is lower than all perception indexes (by July 2006) is a sign that perception index of corruption might actually account for the full extent of the incidence of corruption as unburden by the inability to detect some case of corruption. It could be also the case that perception indexes instead inflate the actual incidence of corruption.

Moreover, mpk peaks in the period July 2005 – June 2006, rising above all but the TI perception index of corruption (see **Figure III-2)**. In addition, looking at the perception indexes they do not increase from the previous period to suggest an even slightly change in the prevalence of corruption. This means that for the period July 2005 to June 2006 it is the case of the high prevalence of the incidence of corruption and the inability of perception indexes to detect the increase of corruption above a threshold (which will be July 2004 – June 2005 level). One could explain the failure of perception indexes to account for this drastic rise of the incidence of corruption by considering that as result of the belief in the prevalence of corruption perception indexes are less likely to change over a short period. Indeed, ceteris paribus people belief in the occurrence of corruption is more likely to remain steady from one year to another as only an event that will affect the whole sample of respondents could shift it in one way or the other.
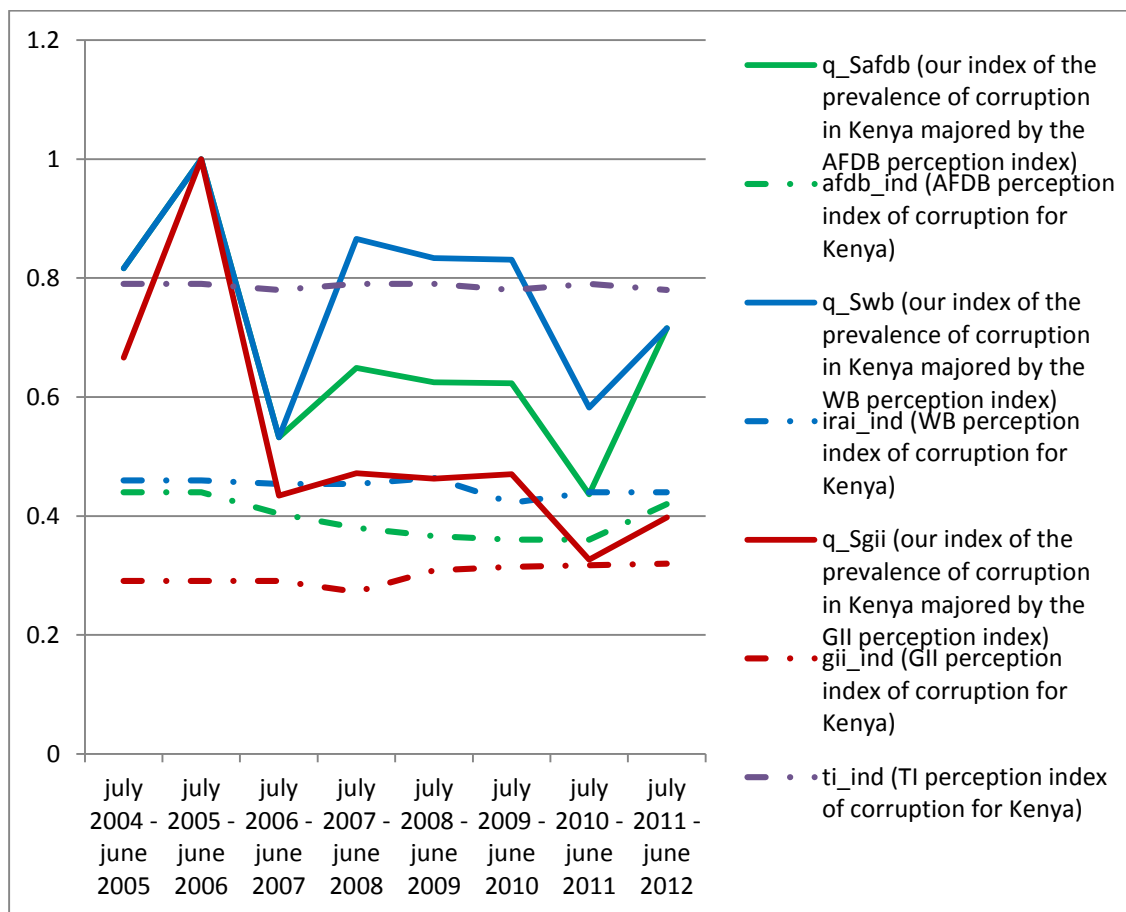
Figure III-6

Source: African Development Bank and Ethic and Anti-Corruption Commission of Kenya

The indexes of the incidence of corruption that are q_Swb, q_Safdb and q_Sgii all have a similar pattern over time (see**Figure III-6**). The main difference is the level of each index which is the result of the effect perception index of the quality of governance used. Hence, from the high prevalence of corruption to low prevalence of corruption we have q_Swb, q_Safdb and q_Sgii which correspond perception of the quality of governance from low to high as the WB index suggest the worst rating followed by the AFDB index and the GII index at last.

Presenting the same pattern over the period observed means that they all reach their peak and base at the same time. They all peak in three periods that are: July 2005 – June 2006 (peak 1), July 2007 – June 2008 (peak 2), and July 2011 – June 2012 (peak 3) (see**Figure III-6**). In addition, they all considerably decrease in two periods that are July 2006 – June 2007 (base 1) and July 2010 – June 2011 (base 2).

Looking at the peaks, none of them correspond to a definitive increase of the perception across all the indicators. With peak 1, none of the perception index has change from the previous period. This is unexpected considering the magnitude of the increase of the index of the incidence of corruption as they all suggest the maximal prevalence of corruption.

For peak 2, two perception indexes suggest a decrease of corruption, one remains steady and the last one increase. Indeed, both AFDB and GII perception indexes suggest a decrease of corruption which contradicts all the indexes of the incidence of corruption. The WB index remains steady and only the TI index seems to follow the index of the incidence of corruption.

The last peak (peak 3) is only a peak due to the limited availability of the dataset (as the incidence of corruption could still be rising after June 2012). Nevertheless, the perception of corruption by AFDB and GII confirm the increase of the prevalence of corruption as they both increases from the previous period. The TI index contradicts such result as it decreases instead of increasing while the WB index remains steady. This time the same perception indexes that did contradict the results of the index of the incidence of corruption in peak 2, confirms it in peak 3. The TI index behaves similarly as it increases with peak 2 but decreases with peak 3.

As far as q_Swb and q_Sgii are concerns, the three peaks suggest an overall decrease of the incidence of corruption over the whole period as they are getting lower over time. In this extent, one could conclude that indexes of the incidence of corruption make the case of the reduction corruption over the period 2004 – 2012 as far as Kenya is concern.

The existence of the first base (base 1) for all the indexes of the incidence of corruption is supported by the perception of corruption following AFDB, WB and TI. All three perception indexes suggest a decrease of the prevalence of corruption in that period. The fourth perception index (GII) does not change in that period which does not support nor contradict the finding of the index of the incidence of corruption.

Base 2 as the second base of indexes of the incidence of corruption is supported by none of the perception indexes. Indeed, while the index perception

of corruption by AFDB remains the same in that period, all the other increase suggesting a rise of corruption which is the opposite of the finding from all the indexes of the incidence of corruption.

Consequently, the index resulting of accounting only detected cases of corruption post July 2006 make the case of the perception of corruption as either a precise measure of corruption or an overestimated one. Nevertheless, with the peak of the prevalence of corruption in the period July 2005-June 2006 it is the case of the inability of perception indexes to account for short term change in the prevalence of corruption. Further, accounting for the potential effect of the perception of corruption on its prevalence to overcome the difficulty to detect corruption we obtain three indexes similar in shape as all having three peaks and two bases but all at different level highlighting the effect of the perception index for the quality of governance used. At the exception of peak three supported by the Afdb and Gii perception indexes and base one confirm by all perception indexes, the remaining peaks and base are not supported and sometime contradicted (see peak one and two) by the evidence from perception indexes of corruption.

3.   Incidence and perception of corruption looking at the key fact of the history of Kenya

We compare the incidence of corruption to its perception earlier by looking at the change of perception indexes in peaks and bases of the incidence of corruption. We found out that peaks and bases depicted by our indexes of the incidence of corruption (q_Swb, q_Safdb and q_Sgii) are generally not supported by the evidence from perception indexes. Now looking back at the event that could have affected the prevalence of corruption in Kenya (see Section 3.3Chapter III.Section 3.3) we will attempt to assess the accuracy of our indicator of the prevalence of corruption compare to perception indexes.

In peak one (which occurs in period two) none of the perception indexes support the considerable rise of the prevalence of corruption suggested by our indexes. However, during the same period rules and regulations seems to have improved in Kenya despite a clear rise of opportunities for corruption. This means

that the sudden rise of the prevalence of corruption could only be explained by a punctual rise of the ability to detect cases of corruption which could be explain by the improvement of rules and regulations.

Peak two (which occurs in period four) is contradicted by two perception indexes suggesting instead a decrease of corruption. With up to 1.500 death as the result of post electoral violence (see Table III-1), there is a clear sign of weak institutions. This will justify the increase of the prevalence of corruption aware that weak institutions are a breeding ground for corruption.

The existence of the last peak (peak three) occurring in period eight is supported by afdb_ind and gii_ind. The discovery of oil reserve during the same period could potentially justify such increase of corruption as it means more rent available and potentially more corruption.

Looking at the bases, base one (which occurs in period three) is supported by all perception indexes as they all suggest the decline of corruption in that period. However, during the same period there are evidences of an increasing weight on institutions that could potentially harm them. Indeed, the additional population taking advantage of the common good that are the Somali refugee could have weaken the quality of institutions which will lead the way to more opportunities for corruption. This does not seems to have happen as all indicators suggested the decline of corruption.

Base two (which occurs in period seven) is supported by none of the perception indexes. There is a clear divide between our index of the prevalence of corruption suggesting the decline of corruption and perception indexes such as gii_ind and ti_ind suggesting instead a rise of corruption. Nevertheless, events such as the integration of a common market and the adoption of a new constitution limiting the power of the president are indicators of an improvement of governance which will reduce the scope of corruption.

Our indexes of the prevalence of corruption are supported by perception indexes as far as peak three and base one are concern. However, for peak one, peak two and base two it is not the case as perception indexes contradict our indexes of the prevalence of corruption. The existence of peak one can only be explained by considering a punctual rise of the ability to detect corruption which

discredit the suggestion of a rise of the prevalence of corruption in that period. Peak two and base two are both supported by evidences suggesting respectively a clear decline of the quality of institutions and the improvement of the quality of governance. Hence, it is the case that our indexes of the prevalence of corruption despite being sensible to the ability to detect cases of corruption appears to draw a better picture of the evolution of corruption from one year to the other as compare to perception indexes in the case of Kenya.

4. Summary of the findings

We compute the marginal propensity for corruption of the society as a whole (mpk) using average individual propensity for corruption. Using perception indexes to account for the effect of the perception of corruption on its prevalence, we generate societal indexes of corruption or indexes of the prevalence of corruption that are q_Safdb, q_Swb and q_Sgii. We found out that while the marginal propensity for corruption is generally lower than perception indexes, it is the opposite for our societal indexes of corruption. The leap from the marginal propensity for corruption to our societal indexes of corruption could be seen as the effect of the perception of corruption on its actual incidence. We also found out that compare to perception indexes our societal indexes of the prevalence of corruption are far more fluctuating overtime suggesting a higher sensibility to short term change in the prevalence of corruption.

All three societal indexes of corruption are similar in the sense that their evolution over time follows the same pattern with the only difference that each suggests a unique level of the prevalence of corruption following the perception of the quality of governance as suggest by the perception index use as such effect. They all reach their peak in period 2 (peak one), period 4 (peak two) and period 8 (peak three). They also reach their base all together in period 3 (base one) and period 7 (base two).

The evolution of corruption as depicted by our societal indexes of corruption is rarely supported by evidence from perception indexes. Only peak three and base one are consistent with the evidences from perception indexes. Peak one, peak two and base two are contradicted by the evidences from perception indexes. Nevertheless, considering evidences relatives to significant events in the history of Kenya that could have affected the prevalence of

corruption it is the case that our societal indexes of corruption draw a better picture of the evolution of corruption in Kenya despite a clear sensitivity toward the ability to detect corruption.

Section 6.   Conclusion and limits of the analysis

Few countries seem to actually report a comprehensive dataset on the actual incidence of corruption mainly due to the difficulty to detect it but also because of the lack of willingness to do so. As result perception indexes of corruption proliferate as the main option for a viable study of the phenomenon of corruption. However, those perception indexes because highly subjective as depending on the sample use or the definition use or even the approach take could be biased and as such not appropriated for a study of corruption.

Many authors looked at the relationship between those two types of indexes using more and more ingenious ways to achieve it. Sequeina (2012) suggests the use of specific wording referring to the incidence of corruption rather than its perception especially while using surveys. Ferraz et all (2012) propose to fill the gap between dataset as they consider corruption as the missing expenditures between two administrative datasets. Mocan (2008) looking at the relationship between the incidence of corruption proxy by the prevalence of bribery and the perception of corruption proxy by the CPI index find out that the perception of corruption measures the quality of institutions rather than its actual incidence. Olken (2009) using four different surveys to assess the relationship between individual perception of corruption and its actual incidence in a project of road construction in India find out that people are not able to perceive some type of corruption.

Our approach is different from all those studies as instead of using proxies of the incidence of corruption we use data of its actual incidence. Indeed, here we compare perception indexes of corruption to data of the actual case of corruption detected as reported by national agencies responsible for the fight against corruption. In addition, we are not limited to a specific type of corruption as we include all case as reported by anti-corruption agencies. At last, we propose here

an effective way to aggregate micro evidences of the incidence of corruption into an indicator of the level of societal corruption.

The perception indexes used are those provide by the AFDB, the WB, the GII and TI. The data of the incidence of corruption are issued by the EACC which is the institution responsible for the fight against corruption in Kenya. Our focus is limited to this country as we hardly found similar comprehensive and usable evidences of the actual incidence from another country. Indeed, among all the Sub-Saharan African countries publicly releasing data on the incidence of corruption we also looked at the case of Cameroon (who provide the second best dataset behind Kenya) and found out that its lacks the density, the precision, and the size require for an analysis of corruption.

Having selected the case of corruption in Kenya, the next step was to transform micro-evidences of the incidence of corruption into macro data that could be compared to the perception of corruption that is only available at macro levels. As such focussing on the individual propensity for corruption defined as the quotient of the amount captured to the average captured by individuals from the same type, we use the Chakrabarti (2002) agent-based model of corruption to obtain societal indexes of corruption or indexes of the incidence of corruption.

Initially build to simulate the long term evolution of corruption in an economy, the Chakrabarti model was modify to allow us to convert the individual propensity for corruption or individual level of dishonesty into a societal index of corruption using the perception of the quality of institutions to account for cases where institutions fail to detect corruption. Chakrabarti makes further assumptions beyond that point but we demonstrate that they do not hold in for the specificity of our work.

Our transformation gives us three indexes of societal corruption following the three perception indexes of the quality of institutions used. Those societal indexes of corruption are q_Safdb, q_Swb and q_Sgii and they depict a similar pattern of the evolution of the prevalence of corruption in Kenya at different levels corresponding to the perception of the quality of institutions used. In addition, it is the case that the effect of the perception of corruption on its actual incidence can be characterise as the leap between an index of the prevalence of corruption accounting only for detected case (the marginal propensity of

corruption of the society) and our societal indexes of corruption. It is also the case that our societal indexes of corruption are more sensible to short term change in the prevalence of corruption compare to perception indexes.

Considering our societal indexes of corruption and perception indexes it is the case that they present different picture of the evolution of corruption in Kenya. However, coming back to the keys events of the history of Kenya that will affect the prevalence of corruption we found out that even though our societal indexes of corruption are sensible to the anti-corruption agency's ability to detect cases of corruption, it is the case that our societal indexes of corruption present a better picture of the evolution of corruption in Kenya.

These results bear similarities to the work of Mocan (2008), Olken (2009) and Donchev and Ujhelyi (2011) as its gives evidences of the divergence between the actual incidence of corruption and its perception. However, we go beyond that as we suggest yet another innovative way to generate an index of the incidence of corruption while confirming in the same time the importance of the perception of the quality of institutions for corruption. Finally, our index being sensitive to the slight change in the incidence of corruption, it could potentially be a better way to assess corruption.

Nevertheless, the availability of data on the actual incidence of corruption will limit the production of such type of indexes as suggested by the inability to use the dataset of the incidence of corruption in Cameroon. Further, because highly function of the ability to detect cases of corruption our result should be consider carefully. Indeed, one could consider the size and deep of the yearly dataset as the result of the willingness, means and power of the anti-corruption agency which cannot be account for. This will hopefully participate to the promotion of the necessity of such type of data rather than the reliance on perception indexes.

Chapter IV.   General Conclusion

The Economic of corruption proposes a focus on incentives and motives while attempting to study the problem of corruption. Defined as the rent seeking behaviour of state official that goes against the rule of law and in some case is within the law (given that the law no longer express the will of the majority), corruption is a motivated choice. State officials motivated by their greed will attempt to boost their income through the means of corruption. In addition, the main causes of corruption being excessive bureaucracy, the quality of rule and regulations, the amount of power allocated to government officials, excessive population mainly poor and unemployment, we can see that corruption is all about individuals being in a position to extract rent with a minimal risk. It is the case that each cause of corruption can be characterised as a means by which official are in a position to increase their income through rent seeking. Hence the study of corruption will start with the understanding of corruption as a motivated choice.

If it is true that corrupt individuals are motivated to behave accordingly, it will be interesting to figure out how does those incentives come together to lead individuals toward corruption. Indeed, the knowledge of the equilibrium in which corruption dominates and the context that will foster it tell us little regarding the rationale of such behaviour. To this extend, we looked at the rationality of the decision to side with corruption and its implication in Chapter II.

The understanding of the rationality of agents deciding to be corrupt; the rationale of their actions and its implications are the focus of Chapter II. With the understanding that the choice of corruption over honesty is the result of motives and incentives making the former more rewarding than the later, the question become the process or rationale through which thoses incentives come together to lead to such result. Such rationale has only been assumed in the literature especially while accounting for the behaviour of both sides taking part to the corruption game and free to decide what is best for them in the context of the game.

The efficiency of corruption has been established by a wide range of studies on corruption (see Beck and Maher 1986, Lien 1986, Lien 1987 and Lien 1988). This essentially leads the way for the rationality of the decision process for those siding with corruption. The literature on the analysis of corruption will also promote a methodology for the study of the interactions leading to corruption and

the implications of such problem. This methodology consist of using game theory for the modelling of problems into a game in which the behaviour of players will be assimilated to the one expected from individuals in a real world.

We aimed at understanding the strategies of both sides taking part to a corruption game consisting of a case of bureaucratic corruption. The particularity of our study being the focus on the strategies of both sides, the implications of those strategies and also the implication of the resulting equilibrium. To this end we used a modified version of Macrae (1982) model. Macrae build a model to study the rationale of agent deciding to be corrupt in a context of bribery for the award of a contract.

Macrae focus on bribery as he builds a game in which firm will bribe an official while competing for a contract that is to be awarded by the official. Here the purpose of the bribe is only to increase the expected gain but not the probability of winning the contract. In addition, officials are assumed to be corrupt and only firms can choose between corruption and honesty. Macrae concludes that firm and officials will attempt to cooperate in a way that prohibit other firm to do the same as only one bribe will be accepted. However, our version of Macrae model will diverge as we model a case of bureaucratic corruption in a game where farmers apply for a stamp to officials.

Although every farmer will eventually receive his/her stamp the difference will be how long it will take to get it as a bribe will speed the process. In addition, we also consider that both the official and the farmer are free to side with either corruption or honesty. The corrupt official will be rewarding the corrupt farmer while punishing the honest one. At last, the prevalence of corruption among each group will affect the payoff of both group through its effect on the ability to detect corrupt individual (which in turn determinate the level of punishment) and its effect on the availability of rents to be purchase (as the rent sold by corrupt officials will be equally share among corrupt farmer).

We found out that while the farmer will always side with corruption as long as the reward is higher than the cost, an official will be willing to do so even when only the bribe receive from a corrupt farmer is higher than the cost of being corrupt (the punishment he/she face). Looking at the equilibriums, it is the case that whenever corruption exist, the strategy corrupt-corrupt is an equilibrium.

There is also a second equilibrium that is the strategy honest-honest and this one will always coexist with the corruption equilibrium as it appears only in few cases unlike the previous one. It is worth mentioning at this point that the corruption equilibrium require a critical mass of honest farmers as the rent sold to corrupt farmers is function of the delay caused to honest ones. At last, we confirm the findings of Andvig and Moene (1990) following which the gain from corruption is increasing with its prevalence as far as the official is concern. However, it is not the case while looking at the farmer.

Prior to analysing the rationale of corruption, we reviewed the mains points of the debate of corruption in Chapter I. There we looked at the definition, the cause, the effects, the types and the measures of corruption. Considering the measure of corruption, the variety of corrupt acts and their illegality make them hard to account for. This is why measures of its perception rather than its prevalence are generally accepted as indicators of the widespread of corruption.

Perception indexes are widely spread and used as a reliable source of information relative to the prevalence of corruption. There is a wide range of indicators published regularly and covering an increasing amount of countries. However, they remain perception indexes as they are essentially the result of survey of opinion relative to people belief on the level of corruption in a country. In this regard they will fail to assess the prevalence of corruption.

The growing commitment to the fight against corruption comes along with an increasing number of country agencies tracking and reporting cases of corruption. Those reports are essentially data on the actual incidence of corruption. Various studies proposing innovative ways to compare the perception and the actual incidence of corruption comes to the conclusion of the divergence between perception of corruption and its actual incidence. Hence, we propose in Chapter III an index of the actual incidence of corruption out of data on its actual incidence and accounting for the effect of its perception.

We build a new index of the actual prevalence of corruption that could be compared to perception indexes. This is done using reports from national agencies relative to cases of corruption found as data on the actual incidence of corruption. Focussing on the case of Kenya, we have micro evidence of the prevalence of corruption from 2004 to 2012. However, perception indexes being at a macro

level; we will use a model developed by Chakrabarti to aggregate those micro evidences of corruption into a country level index of the prevalence of corruption (or societal corruption).

Chakrabarti model was built to simulate and understand the evolution of corruption in the long term. We will use it to aggregate the individual propensity for corruption see as the individual percentage of rent capture comparatively to the average capture per category into the incidence of corruption for the country as a whole while accounting for the effect of the perception of corruption.

This gives us three indexes of the societal level of corruption each using the quality of institutions to account for the effect of the perception of corruption. Those new indexes have a similar evolution over time with the only difference being the level of corruption depicted. The level of each index reflects the difference between the perception of quality of institutions following each perception index. However, there is a clear divergence in the evolution of corruption in Kenya whether one look at our new indexes or at perception indexes. Looking at keys fact of the history of Kenya in an attempt to side with one of the indexes, we found out that the societal index of corruption that we put together is more accurate than perception indexes while accounting for yearly changes of the prevalence of corruption. In addition, this process confirms that the quality of institutions can effectively account for the difficulty to detect all cases of corruption.

Appendices:

Case of the expected return of the corrupt farmer:

$$EX_1 = \frac{y}{M}\left(s - c + \frac{N-x}{N} * \frac{a}{x} - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right)$$

$$+ \frac{M-y}{M}\left(s - F_x\left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right)$$

$$= \frac{y}{M}\left(s - c + \frac{a}{x} - \frac{a}{N} - F_x\left(\frac{x}{N} * p_{x1} + p_{x2} - \frac{x * p_{x2}}{N}\right)\right.$$

$$+ \frac{M-y}{M}\left(s - F_x\left(\frac{x}{N} * p_{x1} + p_{x2} - \frac{x * p_{x2}}{N}\right)\right)$$

$$= \frac{y}{M}\left(s - c + \frac{a}{x} - \frac{a}{N} - F_x\left(\frac{x}{N} * (p_{x1} - p_{x2}) + p_{x2}\right)\right.$$

$$+ \frac{M-y}{M}\left(s - F_x\left(\frac{x}{N} * (p_{x1} - p_{x2}) + p_{x2}\right)\right)$$

However $F_x = v * \frac{a}{x}$ and $a = (N-x)*d$ as result $F_x = v * \frac{(N-x)d}{x}$

$$EX_1 = \frac{y}{M}\left(s - c + \frac{N-x}{N} * \frac{(N-x)*d}{x} - v * \frac{(N-x)d}{x}\right.$$

$$* \left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)\right) + \frac{M-y}{M}\left(s - v * \frac{(N-x)d}{x}\right.$$

$$* \left(\frac{x}{N} * p_{x1} + \frac{N-x}{N} * p_{x2}\right)$$

$$= \frac{y}{M}\left(s - c + \frac{(N^2 - 2Nx + x^2)d}{Nx} - \frac{v(N-x)dp_{x1}}{N}\right.$$

$$\left. - \frac{v(N^2 - 2Nx + x^2)dp_{x2}}{Nx}\right)$$

$$+ \frac{M-y}{M}\left(s - \frac{v(N-x)dp_{x1}}{N} - \frac{v(N^2 - 2Nx + x^2)dp_{x2}}{Nx}\right)$$

$$= \frac{y}{M}\left(s - c + \frac{Nd}{x} - 2d + \frac{xd}{N} - vdp_{x1} + \frac{vxdp_{x1}}{N} - \frac{vdNp_{x2}}{x}\right.$$

$$\left. + 2vdp_{x2} - \frac{vxdp_{x2}}{N}\right)$$

$$+ \frac{M-y}{M}\left(s - vdp_{x1} + \frac{vxdp_{x1}}{N} - \frac{vNdp_{x2}}{x} + 2vdp_{x2} - \frac{vxdp_{x2}}{N}\right)$$

$$= \frac{y}{M}\left(s - c + \frac{Nd}{x}(1 - vp_{x2}) + \frac{xd}{N}(1 + vp_{x1} - vp_{x2})\right.$$

$$\left. - d(2 + vp_{x1} - 2vp_{x2})\right)$$

$$+ \frac{M-y}{M}\left(s + \frac{vdx}{N}(p_{x1} - p_{x2}) - \frac{vNdp_{x2}}{x} - vd(p_{x1} - 2p_{x2})\right)$$

$$\frac{\Delta X_1}{\Delta x} = -\frac{y}{M} * \frac{Nd(1 - vp_{x2})}{x^2} + \frac{y}{M} * \frac{d(1 + vp_{x1} - vp_{x2})}{N} + \frac{M - y}{M}$$

$$* \frac{vd(p_{x1} - p_{x2})}{N} + \frac{M - y}{M} * \frac{vNdp_{x2}}{x^2}$$

$$= \frac{Nd}{x^2}\left(-\frac{y}{M}(1 - vp_{x2}) + \frac{M - y}{M}(vp_{x2})\right)$$

$$+ \frac{d}{N}\left(\frac{y}{M}(1 + vp_{x1} - vp_{x2}) + \frac{M - y}{M} * v(p_{x1} - p_{x2})\right)$$

$$= \frac{Nd}{Mx^2}(-y + vyp_{x2} + Mvp_{x2} - vyp_{x2})$$

$$+ \frac{d}{NM}(y + vyp_{x1} - vyp_{x2} + Mvp_{x1} - Mvp_{x2} - vyp_{x1} + vyp_{x2})$$

$$= \frac{Nd}{Mx^2}(-y + Mvp_{x2}) + \frac{d}{NM}(y + Mvp_{x1} - Mvp_{x2})$$

$$\frac{\Delta X_1}{\Delta x} = 0 \iff \frac{Nd}{Mx^2}(-y + Mvp_{x2}) + \frac{d}{NM}(y + Mvp_{x1} - Mvp_{x2}) = 0$$

$$\iff \frac{Nd}{Mx^2}(-y + Mvp_{x2}) = -\frac{d}{NM}(y + Mvp_{x1} - Mvp_{x2})$$

$$\iff \frac{Mx^2}{NM}(y + Mvp_{x1} - Mvp_{x2}) = -\frac{Nd}{d}(-y + Mvp_{x2}) \iff x^2$$

$$= -N^2 * \frac{(-y + Mvp_{x2})}{(y + Mvp_{x1} - Mvp_{x2})} \iff x^2$$

$$= N^2 * \frac{(Mvp_{x2} - y)}{(Mvp_{x2} - Mvp_{x1} - y)}$$

Hence, $x = N * \sqrt{\frac{(Mvp_{x2} - y)}{(Mvp_{x2} - Mvp_{x1} - y)}}$ (aware that $x \geq 0$.

As such once again $\frac{\Delta X_1}{\Delta x} = 0$ has a solution. Consequently the expected gain of the farmer EX_1 will either have a minimum or a maximum. The case that the prevalence of corruption for the farmer will affect the profitability of corruption both negatively and positively depending on the value of the surrounding parameters such as the prevalence of corruption among official, the value of the boost and the level of punishment.

Case of the expected return of the corrupt official:

$$EY_1 = \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * p_{y1} + \frac{M-y}{M} * p_{y2}\right)\right)$$

$$= \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * p_{y1} + p_{y2} - \frac{y}{M} * p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * p_{y1} + p_{y2} - \frac{y}{M} * p_{y2}\right)\right)$$

$$= \frac{x}{N}\left(c - F_y\left(\frac{y}{M} * (p_{y1} - p_{y2}) + p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - F_y\left(\frac{y}{M} * (p_{y1} - p_{y2}) + p_{y2}\right)\right)$$

However $F_y = w(kd * \frac{N-x}{N} + c * \frac{x}{N})$

$$EY_1 = \frac{x}{N}\left(c - w\left(\frac{kd(N-x)}{x} + \frac{cx}{N}\right)\left(\frac{y}{M}p_{y1} + \frac{M-y}{M}p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - w\left(\frac{kd(N-x)}{x} + \frac{cx}{N}\right)\left(\frac{y}{M}p_{y1} + \frac{M-y}{M}p_{y2}\right)\right)$$

$$= \frac{x}{N}\left(c - w\left(kd - \frac{kdx}{N} + \frac{cx}{N}\right)\left(\frac{y}{M}p_{y1} + p_{y2} - \frac{y}{M}p_{y2}\right)\right)$$

$$+ \frac{N-x}{N}\left(kd - w\left(kd - \frac{kdx}{N} + \frac{cx}{N}\right)\left(\frac{y}{M}p_{y1} + p_{y2} - \frac{y}{M}p_{y2}\right)\right)$$

$$= \frac{x}{N}\Bigg(c$$

$$- w\left(\frac{kdy}{M}(p_{y1} - p_{y2}) + kdp_{y2} + \frac{x}{N}(c - kd) * \frac{y}{M} * (p_{y1} - p_{y2})\right.$$

$$\left.+ \frac{x}{N}(c - kd)p_{y2}\right)\Bigg)$$

$$+ \frac{N-x}{N}\Bigg(kd$$

$$- w\left(\frac{kdy}{M}(p_{y1} - p_{y2}) + kdp_{y2} + \frac{x}{N}(c - kd) * \frac{y}{M} * (p_{y1} - p_{y2})\right.$$

$$\left.+ \frac{x}{N}(c - kd)p_{y2}\right)\Bigg)$$

$$= \frac{x}{N}\Bigg(c$$

$$- w\left(\frac{y}{M}(p_{y1} - p_{y2})\left(kd + \frac{x}{N}(c - kd)\right)\right.$$

$$\left.+ p_{y2}\left(kd + \frac{x}{N}(c - kd)\right)\right)\Bigg)$$

$$+ \frac{N-x}{N}\Bigg(kd$$

$$- w\left(\frac{y}{M}(p_{y1} - p_{y2})\left(kd + \frac{x}{N}(c - kd)\right)\right.$$

$$\left.+ p_{y2}\left(kd + \frac{x}{N}(c - kd)\right)\right)\Bigg)$$

$$\frac{\Delta EY_1}{\Delta y} = -\frac{x}{N} * \frac{w}{M} * (p_{y1} - p_{y2}) * \frac{y}{M}(p_{y1} - p_{y2})\left(kd + \frac{x}{N}(c - kd)\right) - \frac{N - x}{N}$$

$$* \frac{w}{M} * (p_{y1} - p_{y2}) * \frac{y}{M}(p_{y1} - p_{y2})\left(kd + \frac{x}{N}(c - kd)\right)$$

$$= -\frac{w}{M} * (p_{y1} - p_{y2}) * \frac{y}{M}(p_{y1} - p_{y2})\left(kd + \frac{x}{N}(c - kd)\right)$$

$$= \frac{w}{M} * (p_{y2} - p_{y1}) * \frac{y}{M}(p_{y1} - p_{y2})\left(kd + \frac{x}{N} * c - \frac{x}{N} * kd\right)$$

$$= \frac{w}{M} * (p_{y2} - p_{y1}) * \frac{y}{M}(p_{y1} - p_{y2})\left(\frac{x}{N} * c + \frac{N - x}{N} * kd\right)$$

Since $p_{y2} > p_{y1}$, $N \geq x$, $w \in [0; \infty]$, $M > 0$, $N > 0$, $c > 0$ and $kd > 0$ then $\frac{\Delta EY_1}{\Delta y} > 0$. In other words, the expected gain of the official is increasing with the prevalence of corruption among officials.

Presentation of the NACC and the various others actor in the fight against corruption:

The National Anti-Corruption Commission (NACC) was created in March 2006 by presidential decree. The article 24 alineas 3 and 4 of this decree impose the annual publication of a report presenting the state of the fight against corruption in the country (p2). However it was only in 2008 that the commission start working effectively since it was then that the various members were appointed by the presidency of the republic.

Similarly, the law of the 16 April 2006 create a commission in charge of the declaration of wealth (p10). The article 66 of the constitution institutionalizes and organizes the duty of declaration of wealth by high public officers of the state. This instance was suppose to assist the NACC in the fight against corruption by reporting cases where the wealth of an individual was not explain by its legal and declared income but once again the members of this commission are still to be appointed and no one have ever declare the extent of his wealth within the country.

The NACC understand corruption as acts of offering, asking or accepting any kind of gifts or advantages carry out by public officers, regular citizen or foreigner for themselves or a third part aiming to take advantage of their position (p2-3). This definition is the short version of the large definition of corruption in the criminal law article 134 alineas 1, article 134 bis and 312. It is also in the line of the definition of corruption by the United Nations Convention Against Corruption that the country joint in October 2003 at Merida (p13). The convention assimilates corruption to the following actions: embezzlement, the misuse and misappropriation of public funds, the misuse and misappropriation of public office and money laundry (p14).

As one of the major actors in the fight against corruption the NACC is responsible for a wide range of missions such as the follow up and evaluation of the implementation of the government strategy in this domain, the reception, collection and investigation of denunciations, the conduct of studies targeting the causes and the ways out of corruption, the vulgarisation of documents relative to the fight against corruption and at last the accomplishment any task assign by the presidency of the republic (p24-25). In addition within its ability to investigate any corrupt practice brought to its attention, the NACC has the obligation to protect its sources at the only exception of cases where the denunciator appears willing to harm (p25). However the specificity of what constitutes the willingness to harm is not explain which could imply that in case of corruption involving powerful political figures the anonymity of the denunciator could be uncovered.

The NACC is composed of two main bodies. On one hand there is the coordination committee compose of the president of the commission, the vice president of the commission and nine other members chose by presidential decree amongst the administration and the civil society based on their integrity (p26). On the other hand the permanent secretary is compose of the following division; the investigation division, the prevention and communication division, the studies and cooperation division, the courier and archive service, the general affair service and the translation services (p25). However, it is worth mentioning that despite the existence of the translation service within the

NACC and aware that English and French are equally official language within the country, the first and only up to this date report of the NACC was only available in French.

Looking at the institutions involve in the fight against corruption, beside the presidency of the republic over viewing and shadowing the whole process and the NACC as presents, they are:

- The ministry of justice: there is there a department highly involve in the fight against corruption since this department is responsible for the discipline and efficiency of all those include with the ministry p17
- The ministry of the supreme state audit: it is responsible for the external audit of publics services, publics establishments, decentralised territorial collectivities, public and semi-public companies, religious and laic establishments receiving financial assistance from the government. It is also responsible for the control of the proper use of the state budget, the control of the proper execution of project finance externally and the technical, methodological and pedagogical assistance to structures responsible for internal audit of departmental ministry, public and semi-public organisms p18.
- The audit bench of the supreme court of Cameroon: it overview the execution of ex-post of the state budget and report annually to the president of the republic p18
- The judicial police: with the help of the General Delegation for National Security and the Secretary State to Defence has an important role in all criminal matters p18-19
- Ministerial cells for the fight against corruption: present in every ministry those cells have as task; follow the effective implementation of the measure adopted by government for the fight against corruption, prevent and sanction corruption and propose measures aiming to eradicate corruption p19
- The Governance National Program: aiming to improve transparency of the government body and fight corruption (p20)
- the Public Contract Regulatory Agency: this institution contain two organs; the administrative council and the general management team. This organism is responsible for the regulation, the follow up and the evaluation of public contract award system p20
- the National Agency for Financial Investigation: this agency have the task to track illegal financial transaction potentially link to the finance of terrorism, track financial fraud and provide financial information to judicial police for their investigation p21. This institutions is involve in the prevention, formation and awareness of economic criminality within the country and internationally p93-94

Further it should be mention the so call "Operation Sparrow-Hawk" launched in 2004 targeting corruption cases involving high profile civil servant. Just like the Sparrow-Hawk stalks and snatches it victims within this operation corrupt formers or current public officers are arrested and jailed. This is however seen by the opposition as a way to push aside eventual contenders for the presidency while for the UN Commission on Human rights and the UN Committee Against torture this seems to increase human rights violations and impunity (UN Commission on Human Rights august 2010 and UN Committee Against Torture may 2010).

At last the civil society and various NGO do play an important role in the fight against corruption in Cameroon. As the main representative of the civil society the GICAM which is an association regrouping all the private companies and private investors within the country did made recommendation to the NACC following its report on the mission achieve in the northen part of the country. Those recommendations involve the importance of the vulgarisation of regulations, the fight against smuggling, the importance of the collaboration between economics actors and the administration and the simplification and clarification of procedures within the customs services (p98). Amongst the various NGO such as "Action Citoyenne", "Voies Nouvelles" and "Bonne Conscience", Transparency International Cameroon did play a majors role especially with the publication of the index of incidence of corruption revealing the steady state if not increase of the incidence of corruption despite all the measures taken since the creation of the NACC in 2006 or the start of the "Operation Sparrow-Hawk" in 2002.

Instruments used within the fight against corruption in Cameroon:

NACC publish three majors documents relative to the fight against corruption in 2010: the National Coalition Charter for the Fight Against corruption, the National Strategy for the Fight against Corruption and the National Program for the Education to Integrity. The National Coalition Charter for the Fight Against Corruption aims to strengthen and organize the participation of the civil society to the fight against corruption in Cameroon (p203).

The National Strategy for the Fight Against Corruption base on the Document for the Strategy for Growth and Employment (DSCE) and the Millennium Development Goals is oriented toward the following objectives; improve the efficiency of institution within the country, mobilize the civil society and the majors sectors toward the eradication of corruption, participate to the rise of positive social norms require for the eradication of corruption and implement the organization and follow up of strategies agreed upon (p210-211). Within this strategy eight priority sectors are define for the fight against corruption call Integrity pillars they are; the executive system, the judiciary system, the legislative system, the institutions fighting corruption, the technical and financial partners, the media, the private sector and the civil society (p214). They could be sees as the backbone of the fight against corruption in Cameroon. In addition to the integrity pillars some sectors have been targeted base on the prevalence of corruption, they are; the public investment budget and public works, private sector and business, decentralization, education, finances (customs, tax...), environment and forest, industries and mines, public health and transport(p215).

The National Program for the Education to Integrity , at last , attempt to address the problem of the distortion of moral values within the Cameroonians society where bad practices such as embezzlement and misuse of public office became so common that people tend to see them as example to follow (p219). It aims to bring back good moral values through education system right from the early age.

Data on corruption in Cameroon:

Summary of investigations and reports for 2008:

Reports from the ministerial cells:

Within each ministry there is a specialise cell responsible for the fight against corruption reporting annually to the NACC. Those cells are responsible for the effective implementation of measures include in the governmental plan for the fight of corruption, for carrying out the prevention and the repression of corruption and the suggestion of measure aiming to eradicate corruption (p55). For 2008 in addition to the report of the General Delegation for National Security thirty ministries over thirty-five did submit their annual report to the NACC (p55). The following tables summarise those reports

In the case of administrative measures:

Ministries	Facts	Sanctions or measures taken
Social Affairs ministry	Embezzlement of 4.133.000 FCFA in two social centre	The two authors sack
Agriculture and rural development ministry	Mismanagement of the Project for the improvement of rural familial income (PARFAR)	The coordinator was sack
Commerce ministry	Unethical behaviour	Suspension of two officers plus another one sack
Culture ministry	Unethical behaviour and misuse of public fund	Suspension and
Defence ministry	Unethical behaviour consisting of swindle at road control	Strong disciplinary sanctions
Urban development and housing ministry	Fault and unethical behaviour	Cancelation of some public contract and sanctions toward public officers involve
Lands and titles ministry	Corruption, embezzlement and other misuse of public funds	Administrative sanctions, sacks and reimbursement of stolen funds
Economy, planning and regional development	Corruption involving the award of public contract for this ministry	The chef of staff has been sack
Basic education ministry	Embezzlement of funds supposedly receive for temporarily teachers in the East	The former regional delegate and also the former departmental delegate to basic education were sack
Livestock and fisheries ministry	Embezzlement, fraud and falsification of statistical documents of livestock	Administrative sanctions for all the people involve into those practices
Employment and professional formation ministry	Embezzlement of public and privates funds	Sack of some of the people involve and administrative sanctions for the others are to be expected
Energy and water resources ministry	Suspicion of corruption and misbehaviour	Warning to those involve
Secondary education ministry	Embezzlement of the official examinations cost (5000000 Fcfa+2000000 Fcfa+3431670	Administrative sanction and judiciary one on the way for the first three

	Fcfa+365000 Fcfa)	and restitution of the funds plus sack for the last one
Higher education ministry	Cheating during exams organised by some professor, embezzlement of 141743272 Fcfa by the former director of the development of higher education and unethical behaviour.	Administrative sanctions for professors and students involve in the cheating and further judiciary sanctions to come for the embezzlement
Environment and nature protection ministry	Scam and misuse of public office	Sack of the one involve
Forestry and wildlife ministry	Illegal activities	Suspension of some companies, administrative sanctions, fines impose to some firms and confiscation of products obtain illegally
Youth ministry	Fraud, unethical and unprofessional behaviour	Sack of the people responsible
Post and telecommunication ministry	Suspicion of corruption	Sack of the people responsible
Women and family protection ministry	Unethical behaviour	Recommendations has been made
Public health ministry	Scam, fraud, unethical behaviour, misuse and mismanagement of public goods. Illicit medicine sell on the street	Warnings made in addition to administrative sanction to those involve. Reimbursement in sums stolen in some cases and destruction of illicit medicine
Public works ministry	Collusion aiming to direct the award of contracts to relatives or allies. Non respect of contract (mainly concerning the quality of the work provide)	Suspension and sack of public officers and suspension of public works
Labour and social security ministry	Strong suspicion of corruption	Reimbursement of sums stolen under the treat of disciplinary sanctions
General Delegation for national security	Bribe at check-point and for any service require, embezzlement and others unethical and unprofessional behaviour	Disciplinary sanctions to patrolman, inspectors, officers and commissioners

Sources: NACC report p84-87

In the case of judiciary measures:

Ministries	Facts	Judiciary sanctions
Social Affairs ministry	Scam organised by public officers within the ministry	Judiciary enquiry open by the ministry
Lands and titles ministry	Corruption, embezzlement and other misuse of public funds	Judiciary enquiry open by the ministry
Basic education ministry	Embezzlement of funds supposedly receive for temporarily teachers in	The two responsible are under provisional

	the East	custody
Employment and pro-fessional formation ministry	Embezzlement of funds provide for formation	A judiciary procedure has been open in the justice department for the one responsible
Secondary education ministry	Embezzlement of the official exam-inations cost (5000000+2000000+3431670)	Provisional custody for the two involve
Higher education minis-try	Cheating during exams organised by some professor, embezzlement of 141743272 by the former director of the development of higher edu-cation and unethical behaviour.	Provisional custody for the one involve
Environment and nature protection ministry	Scam and misuse of public office	A judiciary procedure has been open in the justice department for the one responsible

Source: the NACC report p88-89

Procedure and arrests involving "Operation Sparrow-hawk":

Procedures started before 2008	Judiciary decisions
Embezzlement of public funds by Mr Titus Edzoa former general secretary at the pres-idency	15 years of prison
Embezzlement of public funds by Mr Engo Pierre Desire former General Director of the CNPS (National Fund for Social Preven-tion a kind of Social Security)	10 years of prison
Embezzlement of public funds (2.5 billions FCFA) by Mr Mounchipou Seidou former minister of Post and telecommunication	15 years of prison
Embezzlement of public funds (over 26 billions Fcfa) by Gerard Ondo Ndong former General director of FEICOM (interregional funds for equipment and intervention) and companies	Between 20 to 10 years of prison for those involve
Embezzlement of public funds by Mr Belin-ga Jules former general director of SIC (Re-al-estate Society of Cameroon) and compa-nies	The case is on trial
Embezzlement of public funds by Mr Edou Joseph former general director of CFC (Land Loan Company of Cameroon) and companies	Between 45 to 1 years of prison for those involve in addition to the confiscation of their assets
Embezzlement of public funds by Mr Etonde Ekoto Edouard former president of the administrative board of the autono-mous harbour , Mr Siyam Siewe Alphonse former general director of the autonomous harbour and some of their collaborators	The first two have been inculped of re-spectively 15 and 30 years of prison. For the others the case is still on trial
Embezzlement of public funds by Mr Ur-	Provisional custody of since april 2008

bain Olanguena Awono former public health minister and sixteen of his collaborators	
Embezzlement of public funds by Mr Abah abah Polycarpe former general director of taxes and former finance minister	Provisional detention since april 2008
Embezzlement of public funds (1.189.251.144 fcfa) by Mr Moampamb Abono Paulin former secretary of the state for public works and former mayor of Yokadouma	Provisional detention mandate issued
Embezzlement of public funds by Mr Jean Marie Atangana Mebara former general secretary at the presidency	Provisional detention mandate have been issued in august 2008
Embezzlement of public funds by Mr Zacchaeus Nforjindam former General director of the Industrial Shipyard of Cameroon and collaborators	Provisional detention mandate have been issued

Source: NACC report p88-89

Summary of investigations carried out by the NACC in 2008:

For eighty-three files receive the institution transmit twenty-eight to the judiciary system representing a financial incidence of two hundred and forty billion eight hundred thirteen million five hundred eighty four thousand one hundred fourteen Fcfa

Cases	Number	Amount in Fcfa	Amount in £
Misuse of corporate assets	2	1,592,718,214	2,016,201
Corruption	7	1,310,639,531	1,659,121
Embezzlement	6	221,027,314,477	279,795,578
Various frauds	11	13,870,788,086	17,558,849
Impersonation of public officers	2	3,012,123,806	3,813,008
Total	**28**	**240,813,584,114**	304,842,757

Source: NACC report p94-95

Summary of investigation carried out by the NACC in 2009:

Case of the locals finance offices:

The local finance office are generally not well secure which make them easy targets for burglar and thieves. Indeed up to FCFA 178 754 333 have been already stolen in such manner (p118-119). In addition in those local finance offices there is a lack of up to date informatics equipment or in some case informatics equipment at all, a lack regular control and qualified people (p120-129).

Here is an overview of the deficit within each region

Region	Initial amount (FCFA)	Amount found (FCFA)	deficit (FCFA)	deficit in £
Centre	1,949,346,295	22,231,242	1,927,115,053	2,439,510
Adamawa	22,416,406	6,272,549	16,143,857	20,436
Far-North	415,924,014		335,709,486	424,970
South			351,539,013	445,009
Littoral			3,051,211,584	3,862,489
Littoral 2			115,496,811	146,206
East	456,785,885	4,732,533	704,903,389	892,328
North-west		13,887,442	205,144,154	259,689
South-west		16,208,397	612,567,563	775,441
North			238,070,422	301,370
West			548,672,280	694,557
Total	2,844,472,600	63,332,163	6,179,458,559	7,822,496

Region	Initial amount (FCFA)	Amount found (FCFA)	deficit (FCFA)
Centre	1,949,346,295	22,231,242	1 927115053
Adamawa	22,416,406	6,272,549	16,143,857

Far-North	**415,924,014**		**335,709,486**
South			**351,539,013**
Littoral			**3,051,211,584**
Littoral 2			**115,496,811**
East	**456,785,885**	**4,732,533**	**704,903,389**
North-west		13,887,442	205,144,154
South-west		16,208,397	612,567,563
North			238,070,422
West			548,672,280
Total	2,844,472,600	63,332,163	6,179,458,559

Source: NACC report p120-128

However the reliability of those data could be question since the table below showing a summary of the deficit per region is quite different from the data obtain through the detailed report of each finance office as present before.

Dénominations	Montants constatés (FCFA)	Observations
Circonscription financière du Littoral	3 051211584	2,9 milliards affaire FRU SALAH
Circonscription financière du Centre	2038452801	
Circonscription financière de l'Est	630168614	Inspection des Services
Circonscription financière de l'Ouest	548672280	Inspection des Services
Circonscription financière du Nord-Ouest	204324672	Inspection des Services
Circonscription financière du Sud-Ouest	612567563	
Circonscription financière du Sud	351439050	
Circonscription financière du Nord	238070422	Inspection des Services
Circonscription financière du Littoral II (Nkongsamba)	115496811	
Circonscription financière de l'Extrême-Nord	335709486	Mission de contrôle
Circonscription financière de l'Adamaoua	16143857	
Total	**8142257140**	

Source: NACC report p128

Specific cases of fraud and embezzlement for the year 2009

N°	Responsable	Matricule	Montant (FCFA)	Poste compta-ble	Observations
MONTANTS DE PLUS DE 400 000 000					
1	NASAKO PETER		468 000 000	R.F. LIMBE	
2	DALIL AMOUM BOUBA	050.623-Z	493 423 293	OFFICE DU BACC	
TOTAL1			**961 423 293**		
MONTANTS DE PLUS DE 300 000 000					
3	ZILI ATOUBA EU-GENE	123.625-C	355 278 334		2ème déficit après celui de 109 381 500
4	ASSANA ABAKAR	532.378-R	341 415 500		

N°	Nom	Matricule	Montant	Lieu	Observation
5	NSORO		336 449 580	R.F. BANGANTE	1997
TOTAL2			**1 033 143 414**		

MONTANTS DE PLUS DE 200 000 000

N°	Nom	Matricule	Montant	Lieu	Observation
6	NGAMVOAH EDITH ARMAND		291 337 510	P. MINDEF	EN FUITE
7	HAMIDOU MAIBOURO	106.031-M	280 274 154		
8	NGNIA Levid	048.716-P	255 809 304	9	
9	NANGA LOUIS Bernard		249 768 031	P. AWAE	
TOTAL3			**1 077 188 999**		

MONTANTS DE PLUS DE 100 000 000

N°	Nom	Matricule	Montant	Lieu	Observation
10	ASSIGA CELESTIN	068.107-Z	179 792 530		
11	NJABA MARTIN	171 675 258		R.F. BAFIA	
12	JEAN PIERRE SEKE	127 231 136		ANC. PERCEPTEUR NSIMALEN	
13	MIMBANG CYRIAQUE	586.617-R	123 784 453	CHEF DE COMPTABILITE A MAROUA	
14	OWOUNDI ZAMBO	122 961 950		PERCEPTEUR OKOLA	
15	AYIMANE ANSENE J	172.031-P	115 301 434	CHEF SERVICE COMPTABILITE R. F. BATOURI EN 2005	
16	ZILI ATOUBA EUGENE	123.625-C	109 381 560	EN FUITE	
TOTAL4			**950 128 321**		

MONTANTS DE PLUS DE 50 000 000

N°	Nom	Matricule	Montant	Lieu	Observation
17	MAMADALA BIANAKAL	89 576 460		P. LEMBE YEZOUM	
18		88 008 350		R.F. BAFANG	
19	NDJAMEN NJIYA IDE	050 885-H	80 680 000		
20	HAMAN NASSOUROU	78 985 044		P. DE BOGO	2002
21	BOUHARI OUSMANOU	062 222-S	76 000 000		
22	MEDIO EBOLO DAVID	056 482-Z	71 561 960		
23	GBAMBIE ALIOU	095 018-P	70 016 290		
24	TCHAIJ THEODORE	68 385 871		R.F. D'ABONG-BANG	
25	NKELZIEH WILLIAM	66 336 681		R.F. YOKADOUMA	
26	BABA OUMAR	081.814-K	65 511 328		
27	NOUMSI PAUL	023.303-0	65 399 371		
28	MAME THOMAS	084.148-J	60 000 000	ANC. CAISSIER A PARIS	DECEDE
29	ANONG MACHIA ABDOULAYE	047.417-T	59 557 660		
30	EMINI ZANGBWALA	55 152 950		R.F. MBALMAYO	DECEDE
31	TABI TAKO HENRIETTE	53 498 935		TG YAOUNDE	
32	ABDOULAYE DJARMA	174.324-M	53 419 502	P. BANGOUA	
33	AMADOU BENGA BENGA ISAAC BAKARI	51 597 735		P. DIBANG	
34		50 067 760		R.F. MONATELE	
TOTAL 5			**1 203 755 897**		

MONTANTS SUPERIEURS A 30 000 000

N°	Nom	Matricule	Montant	Lieu	Observation
35	BRAQUEURS	47 135 751		P. MBANGASSINA	
36	OWONO PAUL	069 518-G	46 656 589		
37	YEDNA HIOBI	134 066-D	46 369 355		
38	NGAMVOAH EDITH ARMAND	515 195-?	44 485 800	EN POSTE AU MINDEF	2e détournement
39	TCHOUBALA A BETCHEM CALVIN	018 426-N	42 045 000		
40	EVINA BANGA	056 005-G	40 789 226		2ème détournement

No	Name	ID	Amount	Place/Receiver	Year
	BASILE				
41	BABA TOUKOUR	054 895-C	40 220 000		
42	AKONO DANIEL ROUSSEL	173 426-M	38 872 928	P. BATSENGA	2006
43	OTTO EYENE AUGUSTE		38 073 061	P. ASSAMBA	
44	NTSAMA BELINGA JEAN	170 082-A	37 416 636		
45	EBANGA NGOUMOU	511 311-M	36 453 400	Billeteur personnel enseignant Ordre de recette du MINFI N° 1879 du 23 mai 2008	
46	MEESIENG Emmanuel		36 136 218	RF MBALMAYO	
47	ESSAMA OTABELA	370 087-T	35 685 623	P. SA'A	2006
48	EVINA BANGA BASILE		35 547 185	P. ESSE	
49	BOMBA EFFA ALAIN FRANCOIS	567 316-X	35 357 138	R.F. MANGE	2003
50	ABINA MEKOUBOU TIMOTHEE	047 716-P	34 722 287		
51	MOHAMADOU OUSMANOU	018 697-T	33 439 680		
52	MAMA MARC	068 108-A	31 734 000		
53	ZOLLO HANS	012 507-Q	30 538 715		
54	RECEVEUR DES FINANCES		30 187 803	R.F. NGOUMOU	
TOTAL6			**723 793 334**		
TOTAL GENERAL (T1+T2+T3+T4+T5)			**5 949 433 258**		

Source: NACC report p131-133

Case of the maize project:

An NGO (ACDIC) reveals embezzlement and various others unacceptable practices within the project maize relative to subventions provide by the Cameroonians government to local maize producers. Started in 2006, It could be the case that up to half of the two billion Fcfa made available for farmers have been stolen (p138).

Summary of the allocation of the subvention for this program:

Regions controlled	Years of the reception of the subvention	Total amount allocated to the maize project	Total number of recipient	Total number of recipient controlled	Number of fake or unknown associations found	Total amount perceive by fake or unknown associations (in FCFA)	Total amount perceive by fake or unknown associations (in £)	Total amount perceive by fake or unknown associations (in percentage of the total allocation for those controlled)
Centre	2006, 2007, 2008	235,961, 000	457	25	8	4,700,0 00	5,950	39.82%
Littoral	2006, 2007, 2008	160,664, 000	250	10	4	2,630,0 00	3,329	57.35%
West	2006, 2007, 2008	278,101, 000	648	32	5	3,000,0 00	3,798	17.39%
South	2006, 2007, 2008	156,447, 000	273	14	6	3,449,0 00	4,366	38.44%
South-west	2006, 2007, 2008	171,161, 000	358	16	6	4,200,0 00	5,317	58.33%
Total		**1,002,33 4,000**	**1,986**	**97**	**29**	**17,979, 000**	22,759	

Regions controlled	Years of the reception of the subvention	Total amount allocated to the maize project	Total number of recipient	Total number of recipient controlled	Number of fake or unknown associations found	Total amount perceive by fake or unknown associations (in FCFA)	Total amount perceive by fake or unknown associations (in percentage of the total allocation for those controlled)
Centre	2006,2007, 2008	235961000	457	25	8	4700000	39.82%
Littoral	2006, 2007, 2008	160664000	250	10	4	2630000	57.35%
West	2006,2007, 2008	278101000	648	32	5	3000000	17.39%
South	2006, 2007, 2008	156447000	273	14	6	3449000	38.44%
Southwest	2006, 2007, 2008	171161000	358	16	6	4200000	58.33%
Total		**1,002,334,000**	**1,986**	**97**	**29**	**17,979,000**	

Source: NACC report p147

The report note that out of the 1,002,334,000 Fcfa at the disposition of the program for subventions up to 341,194,495 Fcfa(34.04%) have been embezzle through by various means (p148)

<u>Summary of Investigations carried out by the NACC in 2010:</u>

Investigation of the Construction of the road Ayos-Bonis:

This public work was divided into two contracts the first for the road Ayos-Abong Mbang (88km) won by PANTECKNIKI for a cost of 17935171630 FCFA and the second for the road Abong Mbang-Bonis (103km) won by PANTECHNIKI/EDOK ETER for a cost of 21610523415 FCFA (p229-230). For this project the investigation reveals a collusion of public officer within the ministry of public work and the enterprise which won the contract, this lead to up 932000000 Fcfa increase of the initial budget, up to two billions Fcfa illegally obtain for transport indemnities, up to 71737933 Fcfa obtain through the misuse of public office at customs plus various frauds corresponding to fraudulent billing (p230-231). This leads to a final cost of 14694371927 Fcfa for the two projects (almost three time the initial cost) (p233).

Investigation of the construction of teaching facilities and laboratory at the medical science faculty of the University of Buea:

This contract was awarded to "Group WAGA INC" for a cost of 567291600 Fcfa. At the time of the control the project was achieve at more than 75% but many irregularities were observed including the replacement of many majors actors of the project (which will inevitably affect the quality of the final outcome), delay within the execution and the falsification of document for the award of the contract.

The audit of the Cameroon Postal Services:

Looking at the financial aspects of this audit, the following irregularity appears:

Irregularities	Amount in Fcfa	Amount in £
an invoice for provision of services waiting to be paid in the economic and finance ministry for the account of the Postal Services	405000000	515956.4
Embezzlement	20000000	25479.33
Embezzlement through a fake contract of provision of services	123927375	157879.3
Embezzlement	2120000000	2700809
falsification of accounting documents	Unknown	#VALUE!
Mismanagement through unauthorised payments to relatives or unidentified people	1477405185	1882165
Subvention for investment from the State to the Postal Services in 2005, there is no records of the investment made	13232223338	16857409
The subvention for exploitation provide in 2005 appear to have not being use appropriately since the complains of the former employee did increase	4687852588	5972167
Land previously own by the Postal Services which has been sell to the company TRADEX S.A without any deposit made into the account of the Postal services	238997484	304474.8

Irregularities	Amount	authors
an invoice for provision of services waiting to be paid in the economic and finance ministry for the ac-	405000000 Fcfa	unknown

count of the Postal Services		
Embezzlement	20000000 Fcfa	Mr Jean Marie Mioumnde Senior Executive in the Post and telecommunication ministry
Embezzlement through a fake contract of provision of services	123927375 Fcfa	Mr Charles Tawamba
Embezzlement	2120000000 Fcfa	Unknown
falsification of accounting documents	Unknown	Unknown
Mismanagement through unauthorised payments to relatives or unidentified people	1477405185 Fcfa	Unknown
Subvention for investment from the State to the Postal Services in 2005, there is no records of the investment made	13232223338 Fcfa	Unknown
The subvention for exploi-tation provide in 2005 ap-pear to have not being use appropriately since the complains of the former employee did increase	4687852588 Fcfa	Unknown
Land previously own by the Postal Services which has been sell to the company TRADEX S.A without any deposit made into the ac-count of the Postal services	238997484 Fcfa	Unknown

Source: the NACC report p243

Year	AFDB CPIA Score	Property Rights and Rule Based Governance (Afdb)	Quality of Budgetary and Financial Manageme	Efficiency of Revenue Mobilizatio n (Afdb)	Quality of Public Administra tion (Afdb)	IRAI Score (WB)	Property Rights and Rule Based Governance (WB)	Quality of Budgetary and Financial Managmt	Efficiency of Revenue Mobilizatio n (WB)	Quality of Public Administra tion (WB)	GII Score	Public Access to Informatio n (GII)	Executive Accountabi lity (GII)	Legislative Accountabi lity (GII)	Judicial Accountabi lity (GII)	CPI TI
2004	3.8	3	3.5	4	4	3.7	3	3.5	4	3	70.92	56	49	57	42	2.1
2005	3.8	3	3.5	4	4	3.7	3	3.5	4	3	70.92	56	49	57	42	2.1
2006	3.98	3	3.5	4	4	3.73	3	3.5	4	3.5	70.92	56	49	57	42	2.2
2007	4.1	3	3.5	4	4	3.73	2.5	3.5	4	3.5	72.74	53	55	57	28	2.1
2008	4.17	3	3.5	4.5	4	3.68	2.5	3.5	4	3.5	69.15	37	54	57	32	2.1
2009	4.2	3	3.5	4.5	3.5	3.89	2.5	3.5	4	3.5	68.56	38	53	57	32	2.2
2010	4.2	3	3.5	4.5	4	3.8	2.5	3.5	4	3.5	68.28	44	53.5	55	41.5	2.1
2011	3.9	2.5	3.5	4	3.5	3.8	2.5	3.5	4	3.5	68	50	54	53	51	2.2

Appendix 4: Capture of our aggregation of the dataset on the incidence of corruption in Kenya base on the report by the EACC

Period	Level																				
July 2004-June 2005	Top level officials	Name/Institution	Depart of Immigration Fraud	National Museum Of Kenya Fraud																
		Amount in Kshs	750,000,000	2,500,000																
	Senior public officials	Name/Institution	Irregular payments PS	Irregular payment by PS Araza	Irregular payment by Muthui Senior	Irregular payment by Bono Senior Min	Irregular payment by	Irregular payment by	Depart of Immigration Fraud	Depart of Immigration	Depart of Immigration	Anglo Leasing and Finance Ltd	Anglo Leasing and Finance Ltd							
		Amount in Kshs	14,183,333	14,183,333	14,183,333	14,183,333	14,183,333	14,183,333	750,000,000	750,000,000	750,000,000	2,000,000,000	2,000,000,000							
	Middle level officers	Name/Institution	Harambee SACCO Fraud																	
		Amount in Kshs	467,000,000																	
	Low level personnel	Name/Institution																		
		Amount in Kshs																		
July 2005-June 2006	Top level officials	Name/Institution	Security Contrat Fraud Min of Fin	Security Contract Fraud Office of the	Security Contract Fraud Min of Transp	Security Contract Fraud Min of Home	Fraud by Senior													
		Amount in Kshs	17,250,000,000	17,250,000,000	17,250,000,000	17,250,000,000	100,000,000													
	Senior public officials	Name/Institution	MD of Gov comp Fraud	Senior Off Fraud	Min of Health Fraud by Senior Off	Min of Local Gov Fraud by Senior Off	Min of Roads Fraud by Eng	Min of Roads Fraud by	Fraud by MF over Debt servicing	Fraud by Senior Administrative	Min of Home Affairs Fraud	Kenya Revenue Authority Fraud								
		Amount in Kshs	50,000,000	50,000,000	300,00,000	99,000,000	33,333,334	650,000,000	2,000,000,000	40,000	40,000,000	62,000,000								
	Middle level officers	Name/Institution	Anglo Leasing Type Contract	Irregular payment by Off																
		Amount in Kshs	1,200,000,000	30,400,000																
	Low level personnel	Name/Institution	Kenya Revenue Authority Tax	Min of Roads Fraud by Construction	Min of Roads Fraud by Construction	Min of Roads Fraud by Contractors	Fraud by Clerk at Min of													
		Amount in Kshs	1,600,000,000	33,333,333	33,333,333	650,000,000	100,000,000													
July 2006-June 2007	Top level officials	Name/Institution																		
		Amount in Kshs																		
	Senior public officials	Name/Institution	Kenya Sugar Board Fraud by	NACC embzz by Senior off 1	NACC embzz by Senior off 2	NACC embzz by Senior off 3	NACC embzz by Senior off	CDF Fraud by MP	Kenya R-Insur Corp Embz by MD	Kenya R-Insur Corp Embz by	Local Authority	CC Fraud by Kisumu	CC Fraud by Bomet	CC Fraud by Migori	CC Fraud by Homabv	CC Fraud by Wareng	CC Fraud by KaKamega	CC Fraud by Transmara		
		Amount in Kshs	540,000,000	4,700,000	4,700,000	4,700,000	4,700,000	30,000	17,450,000	17,450,000	9,100,000	785,714,286	785,714,286	#########	785,714,286	785,714,286	785,714,286	785,714,286		
	Middle level officers	Name/Institution	Kenya Sugar Board	Min of Roads pending bills Fraud	Min of Roads pending bills Fraud	Min of Roads pending bills Fraud	Min of Roads pending bills	Min of Roads pending bills	Min of Roads pending bills	Min of Local Gov procurement	KEMSA Fraud	Local Authority Transfer Fund	Local Authority Transfer Fund	Local Authority	Local Authority	Local Authority	Local Authority	Local Authority	Min of Road Fraud	NSSF Fraud
		Amount in Kshs	22,000,000	107,850,140	107,850,140	107,850,140	107,850,140	107,850,140	107,850,140	144,000,000	356,000,000	4,914,286	4,914,286	4,914,286	4,914,286	4,914,286	4,914,286	4,914,286	57,000,000	1,000,000,000
	Low level personnel	Name/Institution	Keny Sugar Board Irregular	Kenya Sugar Board Irregular payment to	Postal Corporation of Kenya Fraud	Fraud Junior Custom off	Local Authority	Local Authority	Local Authority Transfer Fund CC	CC HomaBay Fraud	CC Nairobi Fraud									
		Amount in Kshs	8,000,000	10,000,000	2,700,000	5,500,000	9,100,000	9,100,000	9,100,000	16,000,000	9,718,068									
July 2007-June 2008	Top level officials	Name/Institution																		
		Amount in Kshs																		
	Senior public officials	Name/Institution	Embzz by Financial	Embzz by Chief Acc	Kenya Sugar Board of Trustee															
		Amount in Kshs	188,308,000	75,690,000	2,200,000,000															
	Middle level officers	Name/Institution	Miwani Sugar Company Ltd	Alienation of public Land Mombasa	Kenya Sugar Company Fraud	Kenya Port Authority Fraud	Min of Educ procurement													
		Amount in Kshs	2,300,000	5,000,000	181,000,000	840,000,000	63,000,000													
	Low level	Name/Institution	CC Nakuru Alienation of...																	

Abbreviations:

- AFDB: African Development Bank

- afdb_ind: perception index of corruption in Kenya from AFDB

- BPI: Bribe Payer Index from TI

- CPI: Corruption Perception Index from TI

- CPIA: Country Policy and Institutional Assessment index from AFDB

- CPIA GR: Governance Rating index from AFDB

- EACC: Ethic and Anti-Corruption Commission of Kenya

- EFCC: Economic and Financial Crime Commission of Nigeria

- GCB: Global Corruption Barometer from TI

- GII : Global Integrity Index from Global Integrity

- gii_ind: perception index of corruption in Kenya from Global Integrity

- GR: Governance Rating Indicator

- ICVS: United Nation Crime and Victimization Surveys

- IRAI: International Development Association Ressource Allocation index or CPIA from WB

- IRAI GR: Governance Rating index from WB

- irai_ind: perception index of corruption in Kenya from WB

- LACC: Liberia Anti-Corruption Commission

- NACC: National Anti-Corruption Commission of Cameroon

- mpk : Yearly average of individual weighted propensity for corruption in Kenya as the result of data on the prevalence of corruption from EACC

- q_Safdb: Our index of the prevalence of Corruption in Kenya using the CPIA GR

- q_Sgii: Our index of the prevalence of Corruption in Kenya using the GII index of the quality of governance

- q_Swb: Our index of the prevalence of Corruption in Kenya using the IRAI GR

- TI: Transparency International

- ti_ind: perception index of corruption in Kenya from TI

- WB: World Bank

Bibliography:

Acemoglu D, Verdier T, (2000). "The Choice between Market Failure and Corruption". *The American Economic Review, Volume 90, Number 1, p 194-211.*

Ades A, Di-Tella R, (1997). "National Champions and Corruption: Some unpleasant interventionist Arithmetic". *The Economic Journal, Volume 107, Number 443, p1023-1042.*

Amundsen, I. (1999). "Political Corruption: An Introduction to the Issues". *Developments Studies and Human Rights, Chr Michelsen Institute WP 1999; 7.*

Andvig, J. Moene, K. (1990). "How corruption may corrupt". *Journal of Economic Behaviour and Organisation, Volume 13. P 63-76.*

Banerjee, A. (1992). "A simple model of Herd behaviour". *The Quarterly Journal of Economics, Volume 107, Issue 3.* Pp 797-817.

Bardhan, P. (1997). "Corruption and Development: A review of Issues". *Journal of Economic Literature, Volume 35, September.* P 1320 -1346.

Bardhan, P. (2006). "The Economist's Approach to the Problem of Corruption". *World Development, Vol 34, No 2.* P 341-348.

Barr, A. Serra, D. (2010). "Corruption and Culture: An experimental analysis". *Journal of Public Economics, Volume 94.* P 862-869.

Bayart, J-F. (1993). *The State in Africa. The Politics of the Belly.* Longman, London.

BBC Latin America & Caribbean. (2013). Venezuela mayor arrested over corruption allegations. *BBC.* [Online]. Oct 13, 2013. Available from: http://www.bbc.co.uk/news/world-latin-america-24514943 [Accessed 14/10/2013].

Beck, P. Maher, M. (1986). "A Comparison of Bribery and Bidding in thin Markets". *Economics Letters, Volume 20.* P 1-5.

Blackburn, K. Bose, N. Haque, E. (2006). "The Incidence and Persistence of Corruption in Economic Development". *Journal of Economic Dynamic & Control, Volume 30*. P 2447 – 2467.

Cadot, O. (1987). "Corruption as a Gamble". *Journal of Public Economics. Volume 33*. P 223-244.

Cameroonpostline.com. (2015). Mobile Tax: Landed Property Tax Payers To Enjoy Low Charges. *Cameroonpostline*. [Online]. Available from: http://www.cameroonpostline.com/mobile-tax-landed-property-tax-payers-to-enjoy-low-charges/ . [Accessed 26/09/2015].

Chakrabarti R, (2002). "An Agent Based Model Of Corruption". *Working Paper, Georgia Institute of Technology*.

Cheung, S. (1996). "A Simplistic General Equilibrium Theory of Corruption". *Contempory Economic Policy, Volume 14, July*.

Clunies-Ross, A. Forsyth, D and Huq, M. (2009). *Development Economics*. Mc Graw-Hill Higher Education. London, UK.

Collier, P. Hoeffer, A. "The Economic costs of Corruption in Infrastructure". P12-18. In Transparency International. (2005). *"Global Corruption Report 2005 – Special focus: Corruption in Construction and Post-Conflict Reconstruction"*. Pluto Press. London, Uk.

Cuervo-Cazurra, A. (2008). "Better the devil you don't know: Type of Corruption and FDI in Transition Economies". *Journal of International Management, Volume 14*. P12-27.

De Maria, W. (2008). "Measurements and Markets: Deconstructing the corruption perception index". *International Journal of Public Sector Management, Volume 21, Number 7. P 777 – 797*.

Dreher, A. Kotsogiannis, C. McGorriston, S. (2007). "Corruption around the World: Evidences from structural model". *Journal of Comparative Economics, Volume 35, Issues 3. P 443 – 466*.

Donchev, D. Ujhelyi, G. (2011). "What do Corruption Indices Measure?". *Working paper Economic Department, University of Houston*.

EACC, (2013). Ethic and Anti-Corruption Commission. [Online]. Available from: http://www.eacc.go.ke/index.asp [Accessed 14/10/2013].

Ecofin Agency. (2015). Au Cameroun, Le Paiement De La Taxe Foncière S'Effectuera Par Mobile Money (In Cameroon, the payment of land tax shall be effected by Mobile Money). *Agence Ecofin*. [Online]. Available from: http://www.agenceecofin.com/gestion-publique/0912-24997-au-cameroun-le-paiement-de-la-taxe-fonciere-s-effectuera-par-mobile-money . [Accessed 26/09/2015].

EFCC, (2013). Economic and Financial Crime Commission. [Online]. Available from: http://www.efccnigeria.org/efcc/ [Accessed 14/10/2013].

Ferraz, C. Finan, F. Moreira, D. (2012). "Corruption Learning: Evidences from Missing Federal Education Funds in Brazil". *Public Economics, Volume 96, Number 9-10. P712-726*.

Fisman, R. Miguel, E. (2007). "Corruption, Norms, and Legal Enforcement: Evidences from Diplomatic Parking Tickets". *Journal of Political Economy, Volume 115, Number 6*.

GII, (2013). Global Integrity. [Online]. Available from: www.globalintegrity.org [Accessed 14/10/2013].

GII, (2013) Press Room: Frequently Asked Questions. Goblal Integrity Index [Online]. Available from: http://www.globalintegrity.org/pressroom/FAQ [Accessed 24/04/2013].

Gupta, S. Davoodi, H. Alonso-Terme, R. (1998). "Does Corruption Affect Income Inequality and Poverty ?". *IMF, Fiscal Affairs Department, WP/98/76*.

Gyimah-Brempong, K. (2002). "Corruption, Economic Growth and Income Inequality in Africa". *Economic of Governance, Vol 3*. P183-209.

Gyimah-Brempong, K. Camacho, S. (2006). "Corruption Growth and Income Distribution: Are there Regional Differences?". *Economic of Governance, Vol 7*. P245-269.

Heidenheimer, A. (1970). *Political Corruption: Reading in Comparative Analysis*. Holt, Rinchart and Winston, New York.

Hellman, J. Jones, G. Kaufmann, D. (2003). "*Seize the State, Seize the Day: State Capture and Influences in Transition Economies*". Journal of Comparative Economics, Vol 31. P751-773.

Huberts, L.W.J.C. Lasthuizen, K. Peeters, C.F.W. (2006). Measuring Corruption: Exploring the iceberg. Chapter 14 in: Charles, S et al. (Ed), *Measuring Corruption*. Ashgate Publishing Limited, Law, Ethics and Governance Series, Hampshire, UK ,pp. 265 – 294.

ICAI, (2011). The Department for international development approach's to anti-corruption. *Independent Commission for Aid Impact, Report 2, November 2011*. [Pdf]. Available from: http://icai.independent.gov.uk/wp-content/uploads/2010/11/DFIDs-Approach-to-Anti-Corruption.pdf [Accessed 14/10/2013].

IMF. (2012). "Sub-Saharan Africa: Sustaining Growth admits Global Uncertainty". *World Economic and Financial Surveys: Regional Economic Outlook, April 2012*.

Jain, A. (2011). "Corruption: Theory, Evidences and Policy". *CESifo Dice Report*.

Kaufmann, D. (1997). "Corruption: The Facts". *Foreign Policy, No 107*. P114-131.

Kaufmann, D. Kraay, A. Mastruzzi, M. (2006). "Measuring corruption: Myths and realities". *Development Outreach, Volume 8, Number 2*.

Knack, S. (2007). "Measuring Corruption: A Critique of Indicators for Eastern Europe and Central Asia". *Journal of Public Policies, Volume 27, Number* 3. P255-291.

Krueger,A. (1974). "The Political Economy of Rent-Seeking Society". *The American Economic Review, VOl 64, No 3*. P291-303.

Kurer, O. (2005). "Corruption : An Alternative Approach to Its Definition and Measurement". *Political Studie,. Vol 53*. P222-239.

LACC, (2013). Liberia Anti-Corruption Commission. [Online]. Available from: http://www.lacc.gov.lr/ [Accessed 14/10/2013].

Lambert-Mogiliansky, A. Majudar, M. Radner, R. (2008). "Petty Corruption a Game-Theory Approach". *International Journal of Economic Theory. Volume 4.* P273-297

Lambsdorff, J.G., (2006). Causes and consequences of corruption: what do we know from a cross-section of countries? In: Rose-Ackerman, S. (Ed.), *International Handbook on the Economics of Corruption*. Edward Elgar, Cheltenham, UK, pp. 3–51.

Lien, D. (1986). "A Note on Competitive Bribery Games". *Economics Letters, Volume 22*. P 337 – 341.

Lien, D. (1987). "Asymetric Information in Competitive Bribery Games". *Economics Letters, Volume 23*. P153-156.

Lien, D. (1988). "Coalition in Competitive Bribery Games". *Mathematical Social Sciences, Volume 15*. P 189-196.

Macrae, J.(1982). "Underdevelopment and the Economics of Corruption: A Game Theory Approach". *World Development, Volume 10, Number 8*. P 677-687.

Mauro, P. (1995). "Corruption and Growth". *The Quarterly Journal of Economics, Volume 110, Number 3. P681-712.*

Mbaku, J. (1996). "Bureaucratic Corruption in Africa: The futility of Clean-ups". *The Catho Journal, Vol 16, No1*. P 99-108.

Mishra, A. (2006). "Persistence of Corruption: Some Theoretical Perspectives". *World Development, Volume 34, Number 2*. P 349-358.

Mocan, N. (2008). "What determine Corruption? International Evidences from Micro-Data". *Economic Inquiry, Volume 46, Number 4,* October. P 493-510.

Mookherjee, D. Png, I, P, L. (1995). "Corruptible Law Enforcers: How Should They Be Compensated?". *The Economic Journal, Volume 105, Number 428*. P 145-159.

Nash, J. (1951). "Non-Cooperative Games". *Annals of Mathematics, Volume 54, Number 2*. P 286-295.

NACC, (2013). National Anti-Corruption Commission. [Online]. Available from: http://www.conac-cameroun.net/en/index_en.php [Accessed 14/10/2013].

Olken, B. (2009). "Corruption Perception vs Corruption Reality". *Journal of Public Economics, Volume 93*. P950-964.

Razafindrakoto, M. Roubaud, F. (2010). "Are International Databases on Corruption Reliable? A comparison of expert opinion surveys and household surveys in Sub-Saharan Africa". *World Development, Volume 38, Issue 8. P 1057 – 1069*.

Rohwer, A. (2009). "Measuring Corruption: A Comparison between the Transparency International's Corruption Index and the World Bank's World Wide Governance Indicators". *CESifo DICE Report March*.

Rose-Ackerman, S. (1975). "The Economics of Corruption". *Journal of Public Economics, Volume 4, p 187-203. Working paper LSE*.

Rose-Ackerman, S. (1978). *Corruption: A Study in Political Economy*. New York: Academic Press.

Rose-Ackerman, S. (2004). "The Challenges of Poor Governance and Corruption". *Copenhagen Cosensus Challenge Paper*.

Ryvkin, D. Serra, D. (2011). "How corruptible are you? Bribery under uncertainty". *Journal of Economic Behavior & Organization. Volume 81*. P 466-477.

Senior, I. (2006). *Corruption – TheWorld's Big C*. London: Institute of Economic Affairs.

Sequeina, S. (2012). "Advances in Measuring Corruption in the Field". *Working paper LSE*.

Svensson, J. (2003). "Who must pay bribes and how much? Evidences from a cross section of firms". *The Quaterly Journal of Economics, February 2003*. P 207-230.

Tanzi, V. (1998). "Corruption Around the World: Causes, Consequences, Scope and Cures". *IMF Staff Paper, Volume 45. Number 4. P559-594.*

Tanzi, V. Davoodi, H. (1998). "Corruption, Public Investment and Growth". In *The Welfare State, Public Investment and Growth*, edited by Hirofumi Shibata and Toshihiro Thori. Springer-Verlag. Tokyo, Japan.

Tavares, J. (2003). "Does Foreign Aid Corrupt*?". Economics Letters, Vol 79*. P99-106.

The Economist Printed Edition Asia, (2003). Indonesia: You're nicked, your honour. *The Economist*. [Online]. Oct 12, 2013. Available from: www.economist.com/node/21587849 [Accessed 14/10/2013].

The Economist Printed Edition Middle East and Africa, (2005). Kenya: The Corruption is sickening. *The Economist* [Online]. Aug 11, 2005. Available from: www.economist.com/node/4277328 [Accessed 05/05/2013].

The Economist Printed Edition China, (2013). The Bo Xilai trial: End of the road?. *The Economist*. [Online]. Sept 28, 2013. Available from http://www.economist.com/news/china/21586884-tough-sentence-popular-leader-end-road [Accessed 14/10/2013].

TI, (2010). The Anti-Corruption Catalyst: Realising the MDGs by 2015. *Transparency International, September 2010*. [Pdf]. Available from: http://www.transparency-usa.org/documents/AntiCorruptionCatalystRealisingtheMDGby2015.pdf [Accessed 14/10/2013].

TI, (2013). Corruption Perception index 2002. *Transparency International Archive Site*. [Online]. Available from: http://archive.transparency.org/policy_research/surveys_indices/cpi/2002 [Accessed 14/10/2013].

TI 2, (2013). Global Corruption Barometer. Transparency International. [Online]. Available from: http://www.transparency.org/gcb2013/in_detail [Accessed 14/10/2013].

Transparency International. (2005). *Global Corruption Report 2005 – Special focus: Corruption in Construction and Post-Conflict Reconstruction*. Pluto Press. London, Uk.

Treisman, D. (2000). "The Causes of Corruption: A cross-national study". *Journal of Public Economics, Vol 78*. P 399-457.

Triprasertphot, T. Chapter 2: Survey of the literature on corruption. Chapter 3: The institutional Economics of Corruption in Thailand

Weber Abramo, C. (2005). "How far goes perception?". *Transparencia Brasil*. [Pdf]. Available from: www.transparencia.org.br/docs/howfar.pdf [Accessed 14/10/2013].