

ON THE LINKAGE BETWEEN CORRUPTION AND MONETARY AUTHORITIES CREDIBILITY

Adel Boughrara*

A Preliminary version

Abstract

This paper studies the linkage between corruption and monetary policy. Unlike previous empirical studies, this research focuses on the effects of corruption on the probability of central banks to pursue a credible monetary policy. To do so, the paper makes use of a multinomial logit model. The paper's results indicate that corruption impacts significantly on central banks' credibility. Low level of corruption is found to enhance the credibility of pursuing a credible policy, whereas high corruption contributes to increase the probability of carrying out incredible monetary policy. It has been found also that openness amplifies strongly the effects of corruption.

Key words: Corruption, Inflation, Credibility, Monetary policy, Multinomial logit model.

* Professor at IHEC. University of Sousse. Sousse. Tunisia. Email address: adel.boughrara@fdseps.rnu.tn

I. INTRODUCTION

Many economists have realized that the international aids, advices on sound policies, and well-intentioned incentives to back up the development strategies carried out by many countries appear to be insufficient to achieve the desired goals. It has been recognized that a necessary condition for such efforts to be productive is good governance, which implies among other things a low degree of corruption. Irrelevant policy actions do not always result from an ill-diagnostic of what the right actions should be. Rather, they may result from policymakers bending economic policies for their own benefits. Corruption, which can be defined as the abuse of public office for private gain, has been identified as the main deterrent for growth and development. Researchers' efforts have been made to understand this phenomenon. Again, one consequence of this interest in the quality of governance has been the desire to gain a better understanding of corruption. Efforts have been made to shed more light on corruption, and a voluminous theoretical literature has emerged on this issue (excellent surveys of the literature on corruption are provided by Bardhan, 1997; Jain, 2001 and Aidt, 2003). However, the literature made up of empirical investigations or surveys into the causes and consequences of corruption in different countries does not even come close to matching the theoretical literature in size because of the lack of data.

This lack of data has so far forced empirical researchers to rely on rough measurements from attitudinal surveys such as the annual corruption perception index (CPI) published by Transparency International (see, for example, Johnston et al. 1998), or to attempt to build indices from measures of governance or openness (see, for example, the measure constructed by Kaufmann, Kraay and Ziodo-Laboton, 1999). A first strand of research has attempted to understand how corruption affects economic growth directly, by shifting allocation of public funds, and indirectly by changing the incentives, prices, and opportunities that entrepreneurs face¹. Another strand has sought to identify the potential determinants or causes of corruption in the world.

¹ All markets depend on price signals to clear, but if corruption becomes prevalent these signals will be distorted, misleading and covert.

There is no unique definition for the slippery concept of corruption. Transparency International defines it as the “abuse of entrusted power for private profit”. A more specific definition would be the abuse of public office for private gain. Tanzi (1998) presents a detailed taxonomy of the different forms corruption may take. There is a consensus that corruption is a global menace. International organizations such as International Monetary Fund, World Bank or the United Nations of Development Program have been warning against the deterrent effects of corruption on growth and development. Other non governmental agencies have been informing governments as well as civil societies about the influences of corruption on political freedom.

Theoretical research on corruption dates back to Krueger (1974), Rose-Ackerman (1975, 1978) and Becker (1968). These authors offered a number of explanations that are deeply rooted in economics and can be referred to as control, market structure and information. Becker and Stigler (1974), Mookherjee and Png (1989), Besley and McLaren (1993) and Andreoni, Erard and Feinstein (1998) among others, develop the theory of how “control” can reduce corruption.

The number of studies devoted to corruption is growing tremendously²; these studies can be classified into two strands. One strand has attempted to examine the influences of corruption on macroeconomic variables such as education and human development (Mauro, 1998; Gupta et al. 2000; Akçay, 2006), growth (Abed and Gupta, 2002; Mo, 2001; Mauro, 1995; Elrich and Lui, 1999; Mendez and Sepulveda, 2006), poverty and inequality (Gupta et al. 1998), trade (Damiana et al. 2003), investment (Tanzi, 1997; Tanzi and Davoodi, 1998; Mauro, 1998; Habib and Zurawicki, 2001), foreign direct investment (Egger and Winner, 2006), and public finance (Hillman, 2004). Another strand has sought either to identify the determinants of corruption (Myrdal, 1989; Tanzi, 1998; Serra, 2006) or to assess the effects of specific government policies (including monetary policy, fiscal policy, and other government regulations) on the incidence of corruption in a country (Goel and Nelson, 2005).

As paradoxical as it may appear, the effects of corruption on inflation and monetary authority’s credibility have received little interest. This study is an exception. This is rather surprising seeing

² It goes without saying that the references cited in this paper are far from being exhaustive. The majority of these studies use bribery perception indexes in the world to econometrically test the effects of corruption.

the recent explosion of interest in the political-economy determinants of inflation in the world. This paper attempts to fill this gap by shedding light on the issue of the link between monetary policy and corruption. More specifically, this paper aims at assessing the effects of corruption on central bank's credibility; to this end, it uses multinomial discrete choice framework (Maddala, 1983; Greene, 2003).

The paper is structured as follows: Section 2 highlights the linkage between corruption and monetary policy. In section 3, the concept of credibility of monetary policies is introduced, and the impact of corruption on central bank credibility is emphasized. In section 4, the data used are described and the econometric methodology is exposed. Finally, section 5 reports the concluding remarks and the policy implications.

II. LINKAGE BETWEEN CORRUPTION AND MONETARY POLICY

Many reasons may explain the potential link between main indicator of monetary policy, inflation, and corruption. A high inflation rate is likely to increase solicitation of bribes by government officials as government salaries are insufficient to keep up with rising prices and officials look for other means to supplement their earnings. Goel and Nelson (2005) show that countries with low inflation tend to experience less corruption activities. When compared to fiscal policy monetary policy seems to be the more effective factor that influences corruption. Tax evasion as well as tax collection costs, which are expected to be greater in more corrupted countries, may make it optimal for the government to rely on the inflation tax (seigniorage revenue) as a source of government revenue (Sargent and Wallace, 1981). In other words, when there is fiscal dominance and when the government is not willing to raise taxes or/and lower public spending, then seigniorage revenues may constitute an exit, especially if borrowing on the domestic or foreign markets reveals to be unfeasible. Likewise, when corruption increases, investors are likely to react by going underground, and thereby increasing reliance on the inflation tax. Corruption may also lead to capital flight, which reduces taxable assets and income of those who are able to meet government revenue requirements. Mauro (1995,1997) shows that corruption reduces economic growth. In the same vein, Tanzi (1999) argues that corruption reduces growth by reducing revenues and increasing public spending (investment) while reducing

its productivity. Thus, corruption may also contribute to larger fiscal deficits, which may have inflationary consequences especially for countries with under-developed financial markets.

While it is hard to establish a theoretically linkage between corruption and the monetary policy, few attempts have been made. For instance, Huang and Wei (2006) examine theoretically, using an extended Barro-Gordon framework a la Alesina and Tabellini (1987), the consequence of corruption for the design of monetary policy strategies. They focus on inflation targeting strategy and model corruption as a leakage of tax revenue. They point out that optimal inflation targeting for a high-corruption country is generally different from that for a low-corruption country. Their result show that while inflation rate generally rises with the level of corruption under a commitment regime, it may fall or rise with corruption under a discretionary regime, depending on the initial level of corruption; albeit, a commitment regime generally generates a higher level of welfare than an ordinary discretionary regime.

In the same vein, Eggertsson and Le Borgne (2004) provides a theoretical argument using policy agency theory for the linkage between corruption and central bank independence (CBI); they demonstrate that the more corrupt is the country, the less independent its central bank should be since politicians can extract more rent from office. Another interesting finding of their study is that the level and the variability (standard deviation) of inflation are positively and significantly affected by different measures of central bank independence. The authors point out theoretically, and confirm empirically, that the higher corruption within the political system, the lower the incentive to establish an independent central bank³. Specifically, they show that decreasing corruption increase delegation, that is central bank independence; the authors emphasize that only instrument independence decreases and not goal independence. Brown and Di Tella (2004) build up a model where agents inflate the price that owners pay for goods needed to launch an investment project. The basic hypothesis their model relies on is that high and variable inflation increases uncertainty about prices, and therefore increases the cost of auditing the agent's behavior. They show how that such practices lead to higher corruption and thereby to lower

³ It is worth noting that the theoretical model the authors develop (the political agency framework) does not rely on the hypothesis of the existence of an inflation bias as in the traditional CBI theories. It could be considered as an answer to the critiques on the foundation of existing CBI theories: the existence of an inflation bias as a rationale for independence.

investment in equilibrium. Their results show that the central bank independence variables affect corruption only through inflation variance. It is worth noting that although the focus of the authors is on inflation variability and not on inflation itself, they nonetheless address empirically this issue in the regressions they run by proxying inflation variance with measures of central bank independence suggested by Cukierman et al. (1992). Such “tour de force” may render policymakers less inclined to lend credibility to the paper’s conclusion.

Empirical studies on the linkage between corruption and monetary policy outcome or design are even scarcer than theoretically ones. A search in many databases turned up only a unique paper, namely Al-Marhubi (2000). Al-Marhubi’s (2000) paper investigates the relationship between corruption and inflation while controlling for a set of variables such as the CBI, political instability, the level of economic development and openness of the economy. Al-Marhubi (2000)’s finding is that corruption has significant impacts on inflation; when corruption increases, the inflation rate goes up and vice versa. Such a finding does not rely on a theoretical model; and, its value-added is rather empirical. On a theoretical level, the Huang and Wei’s (2006) paper may constitute a novelty in shedding light on the potential impact of corruption on the monetary policy design. However, such study focuses only on the linkage between corruption and inflation targeting regime. Yet, it does not quantify the impact of corruption on the main monetary policy outcome, namely inflation. One way to improve upon the previous studies would consist in analyzing empirically the impact of corruption on monetary authority’s credibility since credibility is the primary goal of any central banker. The majority of the studies cited above point out that corruption may have effects on some key determinants of central bank’s credibility. Corruption seems to influence inflation through a variety of channels, such as CBI, growth, public spending, inflation variability etc.... All central banks aim to strength their credibility because by doing so they succeed to guide public’s expectations and thereby improve the effectiveness of their actions (stemming inflation and minimizing output variability).

It is imperative that central bank’s credibility is preserved as this will be a major factor in determining the efficient allocation of resources in the monetary and capital markets. Credibility may also shrink the costs of anti-inflationary policies. An independent central bank that will not accommodate inflationary pressures exhorts producers and trade unions to show moderation in

wage and price rises. This will allow inflation to be reduced with less of a loss in output than otherwise. Being aware of the difficulty of enhancing their credibility directly, central banks seek to act on the factors that might generate more credibility. Among the potential determinants that affect central banks' credibility, independence deserves a special attention⁴.

III. CENTRAL BANK'S CREDIBILITY

Cukierman and Meltzer (1986) define⁵ credibility as “the absolute value of the difference between policymakers' plans and the public's beliefs about those plans”. In other words, credibility will be enhanced if there is a close correspondence between words and deeds. Thus, credibility is driven by the ability and track record of the central bank in fulfilling its mandate, and can be defined as the belief on the side of the public that price stability will be maintained over the medium term. Thanks to its effects on the public's inflation expectations, and thereby on forward-looking wage contracts and long-term nominal interest rates, credibility has direct links to the real side of the economy. Policy signals from a credible central bank will be quickly understood and accepted by the public, resulting in a more effective monetary transmission mechanism and a lower cost of disinflation. In this respect, credibility helps a central bank in achieving its announced policy objectives, because it reduces the output costs of disinflationary monetary policy. Credibility contributes also to achieving financial stability.

On the one hand, credibility is found to be highly correlated with low inflation (Al-Marhubi, 2000). On the other hand, inflation records are linked to the degree of central bank independence. The latter issue has been investigated extensively by Cukierman (1992) and Cukierman et al (1992) who document that there is a negative correlation between inflation and (legal) independence. In the same vein, other economists point out that a highly independent CB with the overriding objective of price stability results in lower mean levels of inflation and less

⁴ Some economists (see for instance, Grilli, Masciandro, and Tabellini 1991) have divided the concept of independence into political and economic independence. Others have divided it into goal and instrument independence. This latter dichotomy is the most widespread in the economic literature (see DeBelle and Fischer 1994). Goal independence, which reflects the CB's freedom to determine the final objective of the monetary policy, is not appropriate. However, it is commonly admitted that CBs are more independent when they are goal-dependent; that is, when price stability is explicitly stipulated in the CB charter (see Fischer 1994). What is rather necessary is the instrument independence, which is defined as the CB's freedom to choose the means by which it seeks to achieve its goals. Therefore, a CB is said to be instrument independent when it has full discretion to attain its goals

⁵ In an interesting pairs of papers, Blinder (1999, 2000), credibility is defined in a similar way: a central bank is credible if the public believes that the monetary authority will do what it says.

uncertainty about future inflation. While the former is important the latter is most salient as uncertainty results in sub-optimal investment decisions by shortening effective planning horizons. Attempting to prove a causal relationship between low inflation and highly independent CBs has been difficult. Measuring independence is an arbitrary process. Independence does not mean that a CB can do anything it pleases. It means the freedom to pursue price stability possibly at the cost of other objectives.

Although the central bank's credibility is relatively easy to define, it is nonetheless difficult to measure since it is linked to agents' perceptions of policymakers' actions as well as intentions. There is no commonly accepted and used indicator of monetary policy credibility. Many of the existing measures refer to the distance between inflation expectations of economic agents and the central bank's inflation forecast (Faust and Svensson, 1998; Hutchison and Walsh, 1998) or target (Cecchetti and Krause, 2002). An alternative approach to measuring central bank's credibility is based on inflation expectations; according to this approach, credibility is proxied by a weight attached to the central banks' inflation target in the formation of the private sector's long-term inflation expectations (Bomfim and Rudebusch, 2000; Breedon and Hume, 2007). The credibility index suggested by Cecchetti and Krause (2002) seems to be the most practical. It is simple to compute and easy to understand. Unfortunately, it is not suitable for the purposes of the present research because of at least two reasons: Firstly, the credibility index supposes that monetary authorities do have explicit inflation targets (see Cecchetti and Krause, 2002; Svensson, 1999); actually, only few countries in the sample the present study considers target explicitly inflation (21 countries out of a total of 78). Secondly, even if one admits that it is possible to compute the index for all countries, it won't be possible to distinguish countries with credible monetary policies from those with incredible policies. Furthermore, the index of Cecchetti and Krause (2002) assumes a constant inflation target for every country, which is rather unrealistic. Indeed, Ireland (2007) indicates that the Federal Reserve's inflation target rose from 1 1/4 percent in 1959 to over 8 percent in the mid-to late 1970s before falling back below 2 1/2 percent in 2004. Thus, even in a developed country like the US, the inflation target varies a lot. Thus, an index based on the inflation target might not be reliable. Another weakness the index exhibits is its threshold inflation level; it considers that a policy is not credible at all whenever expected inflation exceeds the 20% level. This level is rather high seeing the growing consensus that inflation is decreasing in the world. Threshold values such as 10% would have appeared more

reasonable. The solution, this paper suggests, consists in generating a polychotomous discrete nominal variable with just three possible values or categories (0 if the policy is credible, 1 if it is averagely credible, and 2 if it is incredible). These categories translate the credibility status of our sample central banks. Unlike the measure put forth by Cecchetti and Krause (2002), our measure does not require the knowledge of inflation targets; the only information it necessitates is the thresholds that define the categories. However, it remains to be seen which thresholds should be used in order to classify countries.

This is a question unsolved so far. To answer this question, we proceed according to the following two-step procedure. During the first step, the threshold that separates countries into two subgroups (moderate-inflation and high-inflation countries) has to be identified. A scrutinize of Central banks Governors as well as IMF managing Directors' speeches show that a country is said to record a high inflation level when it records a double-digit inflation (that is 10% or greater)⁶. Again, it has been argued (see for instance Barro, 1995) that beyond the single-digit inflation range, the negative relationship between growth and inflation is robust, even after controlling for a wide range of other factors. While the threshold value that splits the countries set into two subgroups (moderate and high-inflation countries) is relatively easy, the identification of an additional threshold inside the first subgroup (moderate-inflation countries) is more difficult. The motivation behind splitting moderate-inflation countries into two subsets is that central banks do not pursue the same monetary policy actions when inflation rate is below or above a given threshold level. So, it is important to identify the threshold to distinguish the two type policies. Consequently, the second threshold is identified by having recourse to inflation targeters (IT) countries. IT central banks are known to define inflation target as a symmetrical range most often centered on 3%; this value (threshold) is not substantially different from other thresholds provided for instance by Khan and Sendhadji (2001) or Vaona and Schiavo (2007). A sensitivity analysis with respect to the value of the first threshold has shown that the results do not vary substantially if the threshold of 3% moves up to 4%. Thus, the thresholds that will be considered throughout this paper are 3% and 10%.

⁶ For instance, IMF Managing Directors often speak about double-digit and single-digit inflation rates (see for instance Krueger, 2006). Again, many IMF programs exhibit a strong willingness to get rid of double-digit inflation rates.

IV. DATA DESCRIPTION AND ECONOMETRIC METHODOLOGY

4.1. Data Description

The conceptual framework analyzes the underlying incentives and constraints faced by policy-makers in their strategic decisions regarding monetary policy. The analysis is based on cross-country data consisting of 78 countries for which economic and institutional data (such as indices of corruption) are available over the period of 2000-2010. The study of the linkage between credibility and corruption necessitates measure of inflation, indices of corruption and some additional control variables. These latter variables are necessary in order to make sure that the regression results will be robust. It is question of the following variables: level of economic development measured by per capita real GDP (PRGDP), the openness variable (OPENESS) which is measured by the ratio of imports and exports to GDP, a measure of political instability (INST) as well as a measure of central bank independence (TOR).

As a measure of central bank independence, one may consider the index of the turnover of central bank governors considered by Cukierman et al. (1992). This index is considered as an informal indicator of actual independence. It is based on the assumption that a more frequent turnover of central bank governors creates dependence on the political authorities. It may, actually, indicate the possibility of the Government dismissing whoever is not consistent with its own objectives – including political objectives. In such a case, the governor may be discouraged from applying a long-term policy. Accordingly, a more rapid turnover of the governor is considered to indicate a lower level of independence. The turnover rate (TOR) actually indicates the average tenure of the Governors measured in years. The data related to Governors turnover variable up to year 1989 are drawn from Cukierman et al.(1992) and the data from 1990 to 2010 are either from Syklos (2002) or generated by observing the frequency of the Governors turnover.

Inflation is measured as the logarithm of the average annual percentage change in the GDP deflator over the period 2000-2010. Likewise, OPENESS and PRGDP variables are averaged over 2000-2010. The economic data are obtained from World Bank Indicators⁷. As for corruption measure, ideally it would consist of objective evaluations that are comparable across countries

⁷ Data were downloaded from <http://publications.worldbank.org/subscriptions/WDI/>

and over time; unfortunately, such measures are not yet available. Transparency International, the main source of information on corruption in its different forms, has started to provide since 1995 three indicators which are updated annually: a corruption perceptions index (hereafter CPI), which is based on perceptions of experts, foreign businessmen and international correspondents of how corrupt countries are; a global corruption barometer, which is based on a survey of general public attitudes toward and experience of corruption; and a bribe payers survey, which assesses the willingness of foreign firms to pay bribes. According to some economists (see for instance Palm, 2001; Wilhelm, 2002 and Morse, 2006), the CPI is one of the best measures of corruption currently in place.

In this paper, the corruption perception index, which is obtained from the Transparency International, is used. It represents an average of a number of indices that are based on the public and business people's perceptions of the prevalence of corrupt practices in a country. The index ranges between zero (highest degree of corruption) and ten (lowest degree of corruption). While these perceptions might be different from actual corruption and might be based on experiences in a given year, some have argued that this index is the best source of cross-country corruption data.

4.2. The model

In order to assess the effects of corruption on central banks' credibility, the use of the polychotomous regression models is helpful. However, as mentioned above in the text, the credibility notion is difficult to measure. Many procedures have been suggested in the literature to quantify and measure credibility. All these measures are far from being perfect. Being aware of this weakness, we deem it more judicious to generate a polychotomous variable to summarize the credibility state of the sample central banks⁸. To this end, sample countries' central banks have been classified in three categories according to the quality of their monetary policy: credible, averagely credible and incredible.

The central bank of country i is said to pursue a "credible policy" if its inflation record is less or equal to 3%, an "incredible policy" if its inflation rate is greater than 10%, and finally an

⁸ Throughout the text, the term "credibility" for central banks for convenience reasons only. We are aware that it rather should be used for policies and strategies.

“averagely credible policy” otherwise. The categorical variable, CRED, is generated as follows: it scores 0 if the policy is credible, 1 if the policy is averagely credible and 2 if the policy is incredible. The most suitable technique that might be used in such context is the multinomial choice models (see Greene, 2003; Maddala, 1983). These models permit to appraise the effects of changes in the explanatory variables of interest on the probability of pursuing a credible, an averagely credible or an incredible monetary policy. The multinomial logit (MNL) and the multinomial probit (MNP) models fit this requirement.

When compared with the MNL, the MNP presents a difficult computational problem. It may produce arbitrary parameter estimates within the tolerance of the estimation procedure (Alvarez and Nagler, 1998) because its likelihood function is often flat near its optimum. The restrictions that have been suggested in the literature (i.e. including one alternative specific variable in each utility) do not warrant convergence at a global optimum. Furthermore, the MNP likelihood presents a difficult optimization problem because it generally requires numerical approximation for the multivariate integrals. As for the MNL model, one of its most appealing aspects is that it does not require numerical integration, and almost always converges to a global optimum. For these reasons, we preferred to use the MNL model.

The MNL assumes that each central bank of a country i ($i=1,\dots,N$) could pursue one policy among a set of $J+1$ ($j=0,1,\dots,J$) consisting alternative choices, where $j=0, 1$ and 2 choices on a credible policy, averagely credible policy and incredible policy. The indirect utility of country i 's central bank⁹ for pursuing policy j , U_{ij} , ($i = 1,\dots,n$; $j = 1,\dots,J$) is a function of both country characteristics (openness, degree of corruption,...) and policy attributes (independence, transparency,...) and a stochastic error. A typical representation (Maddala, 1983; Alvarez and Nagler, 1998; Powers and Xie, 2000) is:

$$U_{ij} = X_i'\beta_j + e_{ij} \quad (1)$$

⁹ Although the MNL may be derived from economic theories of utility maximization, it nonetheless could be adapted in the case at hand. Indeed, assuming that central bank attempts to minimize a loss function could be deemed as equivalent to assuming that it seeks to maximize its “utility function”.

where X_i is a vector of the central bank characteristics and other variables. e_{ij} denotes a stochastic term. The purpose is to estimate the coefficients β_j and their standard errors. The probability that a country i 's central bank pursues a policy j which maximizes its utility is expressed as:

$$P(y_i=j) = P(U_{ij} > U_{ik}, \forall j \neq k) \\ = \frac{\exp(X_i' \beta_j)}{\sum_{k=1}^J \exp(X_i' \beta_k)} \quad \text{for } j=0, \dots, J \quad (2)$$

Eq.(2) is called the Multinomial Logit model (MNL). The MNL model is a direct extension of binary logistic regression when the outcome variable is polychotomous (Agresti, 1990; Maddala, 1983). It is derived from the assumption that the error terms of the utility functions are independent and identically Gumbel distributed. MNL model and MNP model differ according to the assumed error structure for the e_{ij} . The model expressed in Eq.(2) is under identified because the identical set of probabilities result if we define $\beta_j^* = \beta_j + \gamma$ for any nonzero vector γ . In order to identify the parameters of the model, we impose the convenient normalization that $\beta_0=0$, Eq.(2) is then expressed as:

$$P(y_i=j) = \frac{\exp(X_i' \beta_j)}{\sum_{k=1}^J \exp(X_i' \beta_k)} \quad \text{for } j=0, \dots, J \quad (3)$$

From Eq. (3), we can compute J log-odds ratios: $\ln(P_{ij}/P_{i0}) = X_i' \beta_j$. Thus, the coefficients in the model represent the effects of country-specific characteristics on the relative size of the probability that country i 's central bank selects policy j as opposed to a standard alternative ($j = 0$, credible policy) as the primary source. It is not difficult to obtain other odds ratios, and they are computed as:

$$\ln \left[\frac{P(y_i = j)}{P(y_i = 0)} \right] = X_i' (\beta_j - \beta_0) \quad (4)$$

Eq.(3) can be estimated by the method of maximum likelihood. Define $s_{ij}=1$ if country i 's central bank pursues policy j and 0 if not. The log likelihood function for Eq.(3) can written as:

$$\ln L = \sum_i^n \sum_{j=1}^J s_{ij} \ln P(y_i = j) \quad (5)$$

The parameter estimates for the β_j vectors that maximize the long likelihood function can be obtained using the Newton method (Greene, 1993), and the marginal probabilities of the choice (marginal effects) can be calculated as follows:

$$\frac{\partial P_j}{\partial x_i} = P_j \left[\beta_j - \sum_{k=1}^J P_k \beta_k \right] \text{ for } j=0, \dots, J. \quad (6)$$

Using Eq. (5), we can find changes in probabilities for pursuing a policy j due to a slight change in one of the central banks' characteristics while holding all other explanatory variables fixed. In eq.(6), P_j stands for the average probability of pursuing policy j .

V. RESULTS AND DISCUSSION

Some preliminary estimates have been run; they have shown that the variable openness is not significant. Thus it has not been considered. The variables that haven been involved in the regressions are Governors turnover (TOR), corruption index (CORRUP), openness (OPENESS) and per capita real GDP (PRGDP). During the preliminary estimates, the variables PRGDP and OPENESS were found insignificant, but only the first was dropped from the regression. OPENESS was kept because it seemed to amplify the effects of corruption (see below). The estimates of the MNL model, by the maximum likelihood method, allow obtaining the results of Table 1. These results appear to be quite sensible and do not contradict our prior expectations¹⁰. The model performs well when judged by the pseudo- R^2 of MacFadden (22.4%); it is statistically significant at 0% level and is statistically significant based on the χ^2 test statistic criterion. The estimates have been undertaken while considering the “pursuing an averagely credible policy” as a reference outcome; thus, only two sets of regression estimates are reported. The first objective of multinomial analysis is to estimate the gross effects of each independent variable on the probability that a given central bank pursues a policy j . It stands out from Table 1 that corruption (CORRUP) affects the probability for a central bank to pursue a credible policy (equation 1) as well as a non-credible policy

¹⁰ One would have liked to assess the robustness of the paper's results by replicating the analysis using the index of Cecchetti and Krause (2002), however the outcome of such an exercise is meaningless. The reason is straightforward: The index of Cecchetti and Krause (2002) is defined on the interval [0,1]; and consequently, it takes real continuous values. Thus, the use of discrete choice models (such as the multinomial logit model) to estimate the coefficients in this case does make any sense.. Per contra, the index this paper puts forward is an integer (the values it takes are 0, 1 or 2), and the use of discrete choice models is appropriate seeing the discrete nature of dependent variable.

(equation 2). The governor turnover variable (TOR) is found significant in the first equation only. Despite its importance in explaining inflation records (see Al-Marhoubi, 2000), the OPENESS variable appears to be insignificant in the two equations of Table 1, and its contribution seems more important in equation 2 when compared to equation 1. Dropping this variable from the specification worsens the model fitness. Its marginal effect could however enlighten policymakers about its role in affecting the (lack of) credibility.

Table 1: Parameter estimates of the Multinomial Logit model (MNL).

Explanatory variables	Credible (j=0)	Non-credible (j=2)
	versus Averagely credible (j=1)	versus Averagely credible (j=1)
OPENESS	0.443 (0.413)	1.428 (0.197)
TOR	-3.63 (0.064)	0.998 (0.605)
CORRUP	0.414 (0.002)	-1.140 (0.030)
CONST	-3.519 (0.159)	-3.995 (0.354)
(n=78)	Pseudo-R ² =24.3%	χ^2 =36.77 (0%)

Notes: CRED is the dependent variable..The numbers between parentheses represent the p-values

It should be emphasized, however, that the meaning of coefficients is not straightforward, as Greene (2003) pointed out. The marginal effects provide a better interpretation of the model results. In this model, marginal probability measures the change in the probability of pursuing a policy j (primary preference outcome) with respect to a change in each explanatory variable. The marginal effects are listed in Table 2. In order to assess the potential interaction between corruption and credibility or/and inflation, an inflation targeting dummy variable has been introduced into the regressions. It scores 1 if the country follows an inflation targeting regime and 0 otherwise. It turned out that this variable is not statistically significant and its removal does not worsen the model fitting.

Table 2: Estimated marginal effects and marginal probabilities

	Credible (j=0)	Averagely Credible (j=1)	Non-credible (j=2)
OPENESS	0.096	-0.118	0.022
TOR	-0.881	0.836	0.045
CORRUP	0.108	-0.084	-0.024
Marginal Probability of j	0.399	0.571	0.028

The sign of marginal effect of corruption index (CORRUP) varies across the policies considered. It indicates that the effects of corruption are not homogenous across the different monetary policies. The marginal effect of corruption implies that the probabilities of pursuing an averagely credible monetary policy ($j=1$) and incredible monetary policy ($j=2$) decrease while the probability of pursuing a credible monetary policy ($j=0$) increases. These findings seem quite sensible since large values of corruption index denote less corruption. Likewise, the marginal effect of the TOR variable is consistent with prior expectations; less central bank independence is often associated with less monetary policy's credibility. Again, it stands out from Table 2 that the TOR's marginal effect implies that the probability of pursuing an averagely credible policy or an incredible policy increases whereas the probability of carrying out a credible policy decreases.

These findings are consistent with what has been reported by Cukierman (1992) and Cukierman et al (2002). They indicate that when TOR grows up, that is when the governor turnover increases, the central bank independence decreases which affects negatively the policy credibility. The effect of central bank independency seems more important for central banks pursuing credible monetary policies when compared with central banks carrying out incredible or averagely credible policies.

Table 3: Interaction effects

CORRUP	OPENESS	Pr($j=0 x$)	Pr($j=1 x$)	Pr($j=2 x$)
Max		0.823	0.176	0.000
Min		0.069	0.390	0.539
	Max	0.507	0.406	0.085
	Min	0.280	0.716	0.003
Max	Max	0.893	0.106	0.000
Min	Max	0.030	0.096	0.873
Max	Min	0.724	0.275	0.000
Min	Min	0.075	0.760	0.164

As a result, given the relatively large marginal effects, and the frequency of the corruption variable's significance, one might conclude confidently that CORRUP is an important variable explaining the choice of pursuing a credible monetary policy. Our prior belief that OPENESS variable plays an important role in strengthening and amplifying the incidence of corruption on monetary policy is supported by the calculations of the probabilities of pursuing policy j while corruption is maximum and minimum (sensitive analysis). These conditional probabilities are reported on Table 3.

The relative importance of corruption might also be assessed from Table 3 which depicts the probabilities of different monetary policy conditional to extreme events (CORRUP or/and OPENESS variables record(s) maximum or minimum values). The results reported on table 3 confirm our prior expectations about the effects of corruption on monetary policy. Besides, these results illustrate the importance of the contribution of openness in improving the monetary policy credibility of sample countries. For instance, when OPENESS is at its maximum, the probability of pursuing a credible monetary policy is high (0.507). Likewise, when the CORRUP index is maximum (or similarly when corruption is at its lowest level), the probability of pursuing a credible policy is very high (0.823). Better still, the latter probability reaches its highest value (0.893) if and if only the corruption index, CORRUP, is maximum (less corruption is recorded) and OPENESS is maximum.

Table 4: The effects of corruption change.

Country	CORRUP	Benchmark	$P(j=0 \cdot)$	$P(j=0 8.6)$	δ_{i0}
Bahrain	5.8	8.6	0.724	0.896	0.172
Jordan	5.7	8.6	0.501	0.774	0.273
Tunisia	4.9	8.6	0.468	0.810	0.342
Egypt	3.4	8.6	0.284	0.787	0.503
Qatar	5.9	8.6	0.735	0.896	0.161
Morocco	3.2	8.6	0.220	0.766	0.547
Kuwait	4.7	8.6	0.582	0.880	0.298
Oman	6.3	8.6	0.755	0.890	0.135
Turkey	3.5	8.6	0.215	0.724	0.509

Notes: δ_{i0} denotes the probability improvement of pursuing a credible monetary policy ($j=0$) when the corruption index reach its benchmark level. $P(j=0|\cdot)$ represents the conditional probability for a country i to pursuing policy $j=0$ when all the explanatory variables are set at their effective value. $P(j=0|8.6)$ denotes the same conditional probability when CORRUP increases to 8.6 level while the other variables are kept at their original values.

One striking result deserves to be mentioned; when CORRUP scores its lowest value and when OPENESS scores its highest value, the probability of pursuing incredible monetary policy reach its maximum (see column 5 of Table 3). This finding is very instructive for policymakers; it implies that effects of corruption on monetary policy are amplified by the country's high degree of openness. A high degree of corruption (a low corruption index value) coupled with a high degree of openness could be harmful for the country. Besides, the highest value of the probability of pursuing a credible policy is observed when OPENESS as well as CORRUP variables are at their maximum levels. Once again, this confirms the "positive" role of openness when coupled with a high value of

corruption index (less corruption). Thus, open economies amplify corruption's effects on monetary policy credibility in two directions.

In order to investigate the precise impact of corruption on specific countries (for instance, some MENA countries), we conduct a sensitivity analysis by considering the corruption level of United Kingdom as a benchmark value (8.6). The purpose of the analysis is to quantify the improvement of the probability for a country i central bank to pursue a policy j ($j=0$) under the hypothesis that corruption index improves from its present level to 8.6. Table 4 reports the sensitivity analysis of the impact of a change in corruption index on the probability for a country belonging to MENA region to pursue policy $j=0$ (a credible monetary policy). The estimates corroborate our prior expectations, namely decreasing corruption improves the probability of carrying out a credible monetary policy. More specifically, these estimates imply that a change in Egypt's corruption index from its present value to the benchmark value of 8.6 induces an improvement of the probability of pursuing a credible policy by almost 50%. Likewise, if Moroccan's corruption index improves to the benchmark value of 8.6, the probability of pursuing a credible monetary policy will increase by almost 55%.

V. CONCLUDING REMARKS, MAIN FINDINGS AND POLICY IMPLICATIONS

The effects of corruption on many fields (investment, FDI, education...) have been extensively investigated. But few studies have been produced on the potential impacts of corruption on monetary policy outcomes and design. This theme is still under-explored theoretically and empirically. This paper attempts to fill this gap by shedding light on the possible effects of corruption on central banks' credibility. To this end, a multinomial discrete choice model has been used. Such approach permits to assess corruption's effects in terms of its contribution to the probability of pursuing a credible, averagely credible or incredible monetary policy.

The paper's results are very interesting. They show that corruption has a significant impact on pursuing different monetary policies. More specifically, less corruption is found to bring about an increase in the probability for monetary authorities to pursue a credible policy, and more corruption raises the probability of pursuing a non-credible policy. Furthermore, the Governors turnover is

found to affect significantly central bank's credibility. Its marginal effect is found to be positive when it comes to the probability of pursuing a credible policy and negative otherwise. This finding implies that increasing CBs independence contributes to lower the probability of pursuing a credible policy and decreases the probability of pursuing the other policies.

One of the main findings of this paper concerns the role of openness. It has been shown that a high degree of corruption (a low corruption index value) coupled with a high degree of openness could be harmful for the country. Besides, the highest value of the probability of pursuing a credible policy is recorded when openness is at its highest value and corruption and at its lowest level. These findings show that openness is critical when coupled with a high/low value of corruption. Briefly, depending on the magnitude of corruption, openness intensifies corruption's effects on monetary policy credibility. This finding is very instructive for policymakers; it implies that corruption's effects on monetary policy are amplified by the country's high degree of openness. It implies also that to face upcoming globalization challenges, countries would be well advised to pursue anti-corruption policies. Furthermore, the paper's results point out that high corruption seems to be an important hindrance for central bank's credibility. This finding is very important for MENA countries, which have relatively high corruption levels when compared to developed countries. For instance, countries such as Egypt or Morocco have much to gain from undertaking actions and policies that allow to lower corruption to the level of industrialized countries such as UK or USA. Undertaking economic reforms is necessary, but not sufficient, to achieve good economic performances. Indeed some monetary regimes (i.e. pegged exchange rate) that have been often prescribed as a solution to the lack of credibility might reveal to be not ineffective in countries with high degree of corruption. MENA countries policymakers should be aware of the necessity of figuring out effective ways to combat corruption. This could be done by reforming economic and political institutions to strengthen the rule of law. Otherwise economic reforms will be meaningless.

REFERENCES

- Abed, G. T. and Gupta, S., eds. (2002). *Governance, Corruption and Economic Performance*. Washington D.C.: International Monetary Fund.
- Abdiweli A. M. and Hodan I.S. (2003). Determinants of Economic Corruption: A Cross-Country Comparison. *Cato Journal* 22(3), pp. 449-66.
- Aidt T.S. (2003). Economic analysis of corruption: a survey. *Economic Journal* 113, F632–F652.
- Akçay, S. (2001). Is corruption an obstacle for foreign investors in developing countries? Cross-country evidence. *Yap Kredi Economic Review* 12, pp.27– 34.
- Al-Marhubi, F. A. (2000), Corruption and Inflation. *Economics Letter* 66, pp.199-202.
- Alvarez, R. M. and Nagler, J. (1998). “When Politics and Models Collide: Estimating Models of Multiparty Elections,” *American Journal of Political Science* 42(1), pp.55-96.
- Agresti, J. (1990). *Categorical data analysis*. New York: Wiley.
- Andreoni, J., Erard, B., and Feinstein, J. (1998). Tax compliance. *Journal of Economic Literature* 36(2), pp.818–860.
- Bardhan, P. (1997). “Corruption and Development: A Review of Issues,” *Journal of Economic Literature*, Vol. XXXV (September), pp. 1320-1346.
- Barro, R., (1995), "Inflation and Economic Growth," *Bank of England Quarterly Bulletin* 35 (May), pp. 166-176.
- Barro, R. (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study*. MIT Press, Cambridge, Massachusetts.
- Becker, G., and Stigler, G. (1974). Law Enforcement, Malfeasance and the Compensation of Enforcers. *Journal of Legal Studies* 3(1), pp. 1-19.
- Becker, G., (1968). Crime and punishment: an economic approach. *Journal of Political Economy* 76(2), 169–217.
- Besley, T. and J. McLaren, 1993, Taxes and bribery: the role of wage incentives. *Economic Journal* 103(416), 119–141.
- Blinder, A. (2000). Central bank Credibility: Why Do We Care? How Do We Build It? *American Economic Review* 90, pp.1421-1431.
- Braun, M, and Di Tella, R. (2004). Inflation, inflation variability, and corruption. *Economics and Politics* 16(10), pp.77-99.
- Breedon, F. and Hume, M. (2007). “Does the European Central Bank have a credibility problem?”, *Economic Letters* 95, pp. 438–442
- Bomfim, A., and Rudebusch, G., (2000). Opportunistic and deliberate disinflation under imperfect credibility. *Journal of Money, Credit and Banking* 32, pp. 707–721.
- Cadot, O. (1987). Corruption as a Gamble. *Journal of Public Economics* 33(2), pp.223-44.
- Cecchetti, S. G. and Krause, S. (2002). “Central Bank Structure, Policy Efficiency and Macroeconomic Performance: Exploring Empirical Relationships,” *Economic Review of the Federal Reserve Bank of St. Louis*, 84 (July/August), pp. 47-59.
- Cukierman, A. (1992). *Central Bank Strategy, Credibility and Independence-Theory and Evidence*. The MIT Press, Cambridge, MA.
- Cukierman, A., (1998). The economics of central banking. In: Wolf, H. (Ed.), *Contemporary Economic Issues: Macroeconomics and Finance* (IEA Series). The Macmillan Press, Houndmills, Basingstoke, UK.

- Cukierman, A., Webb, S. (1995). Political influence on the central bank: international evidence. *The World Bank Economic Review* 9 (3), 397–423.
- Cukierman, A. and Meltzer, A. H. (1986) “A Theory of Ambiguity, Credibility, and Inflation under Discretion and Asymmetric Information.” *Econometrica* 54(5), pp.1099-128.
- Cukierman, A., Webb, S., Neyapti, B. (1992). Measuring the independence of central banks and its effect on policy outcomes. *The World Bank Economic Review* 6, pp.353–98.
- Damania, R., Fredriksson, P.G. and List, J.A. (2003). Trade liberalization, corruption, and environmental policy formation: theory and evidence. *Journal of Environmental Economics and Management* 46(3), pp.490-512.
- Debelle, G. and Fischer, S. (1994). How Independent Should a Central Bank Be? In *Goals, Guidelines, and Constraints Facing Monetary Policymakers*, ed. Jeffrey C. Fuhrer. Boston: Federal Reserve Bank of Boston
- Elliott, K. A. (ed.), (1997). *Corruption and the Global Economy*. Institute for International Economics, Washington, DC.
- Egger, P. and Winner, H. (2006). How Corruption Influences Foreign Direct Investment: A Panel Data Study. *Economic Development and Cultural Change* 54, pp.459–486.
- Ehrlich, I. and Lui, F.T., (1999). Bureaucratic corruption and endogenous economic growth. *Journal of Political Economy* 107, 270–293.
- Fischer, Stanley (1981). Towards an Understanding of the Costs of Inflation: II. *Carnegie-Rochester Conference Series on Public Policy* 15, pp. 5-41.
- Faust, J., and Svensson, L. (1998). Transparency and credibility: monetary policy with unobservable goals. NBER Working Paper, vol. 6452. National Bureau of Economic Research, Cambridge, MA.
- Goel, R. and Nelson, M.A. (2005). Economic freedom versus Political freedom: Cross-Country Influences on Corruption. *Australian Economic Papers* 44(2), pp. 121-133.
- Greene, W. (2003). *Econometric Analysis*. Prentice Hall, 5th Edition.
- Ghosh, A. and S. Philip (1998). Inflation, Disinflation, and Growth. *IMF Working Paper* No.WP/98/68. Washington, D.C.: IMF.
- Gupta, S., Davoodi, H., and Rosa, A. (1998). Does Corruption Affect Income Inequality and Poverty? *IMF Working paper No.76*. Washington: International Monetary Fund.
- Gupta, S., Davoodi, H., and Alonso-Terme, R. (1998). Does Corruption Affect Income Inequality and Poverty? *IMF Working Paper* No. 79. Washington: International Monetary Fund.
- Gupta, S., Davoodi, H., and Tiongson, E. (2000). Corruption and the Provision of Health Care and Education Services. *IMF Working Paper No. 116*. Washington: International Monetary Fund.
- Grilli, V., Masciandaro, D., and Tabellini, G. (1991). Political and Monetary Institutions and Public Financial Policies in the Industrial Countries. *Economic Policy* 6(13), pp.341–92.
- Habib, M. and Zurawicki, L. (2001). Country-level investments and the effect of corruption - some empirical evidence. *International Business Review* 10, pp.687-700.
- Harrison, A. (1996). Openness and Growth: A Time-Series, Cross-Country Analysis For Developing Countries. *Journal of Development Economics* 48(2), pp. 419-47.
- Hillman, A.L. (2004). Corruption and public finance: an IMF perspective. *European Journal of Political Economy* 20, pp.1067-77.
- Hochreiter E., Rovelli R., and Winckler G. (1996). Central banks and seigniorage: A study of three economies in transition. *European Economic Review* 40, pp.629-43.
- Hosmer, D., & Lemeshow, S. (1989). *Applied logistic regression*. New York: Wiley.

- Huang, H. and Wei, S. (2006). Monetary Policies for Developing Countries: The role of institutional quality. *Journal of International Economics* 70, pp.239–252.
- Hutchison, M., and Walsh, C. (1998). The output-inflation trade-off and central bank reform: evidence from New Zealand. *Economic Journal* 108, pp. 703–725.
- Ireland, P.N. (2007). Changes in the Federal Reserve's Inflation Target: Causes and Consequences, *Journal of Money, Credit and Banking*, forthcoming.
- Jain A. K. (2001). Corruption: a review. *Journal of Economic Surveys* 15(1), pp. 71–121.
- Johnson B.T., Holmes K.R., Kirkpatrick M., 1998. The Index of Economic Freedom. *The Heritage Foundation*, Washington, DC.
- Khan, S., and Senhadji, A. (2001). Threshold Effects in the Relationship between Inflation and Growth. *IMF Staff Papers* 48 (1), pp. 1–21.
- Kaufmann, D., Kraay, A., and Zoido-Lobaton, P. (1999). Governance matters. *Policy Research Working Paper No. 2196*. Washington, DC: World Bank.
- Kaufman, D., and Wei, S. (2000). Does 'Grease Money' Speed Up the Wheels of Commerce? *IMF Working paper No.164*. Washington: International Monetary Fund.
- Krueger, A. O. (1974). The political economy of the rent-seeking society. *American Economic Review* 64(3), 291–303.
- Krueger, A.O. (2006). "Stability, Growth, and Prosperity: The Global Economy and the IMF", Speech delivered at Conference De Montreal, June 7th, Montreal, Canada.
- Eggertsson, G. and Le Borgne, E. (2004). A Political Agency Theory of Central Bank Independence. *Mimeo*.
- Leite, C., and Weidmann, J. (1999). Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth. *IMF Working Paper*, WP/99/85.
- Maddala, G.S. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge University Press, New York.
- Mauro, P. (1995). Corruption and Growth. *Quarterly Journal of Economics* 90, pp. 681-712.
- _____.(1998). Corruption: Causes, Consequences, and Agenda for Further Research. *Finance and Development*, March, pp. 11-14.
- Mauro, P. (1995). Corruption and Growth. *Quarterly Journal of Economics* 110 (3), pp.681-712.
- _____.(1996). The Effects of Corruption on Investment, Growth and Government Expenditure. *IMF Working Paper No. 98*. Washington: International Monetary Fund.
- _____.(1998). Corruption and Composition of Government Expenditure. *Journal of Public Economics* 69, pp.263-79.
- Maxfield, S. (1998). *Gatekeepers of Growth: The International Political Economy of Central Banking in Developing Countries*. Princeton University Press, Princeton, NJ.
- Mendez F., and Sepulveda, F. (2006). Corruption, growth and political regimes: Cross country evidence. *European Journal of Political Economy* 22, pp. 82-98.
- McMullan, M. (1961). A Theory of Corruption. *Sociological Review* 9 (2), pp.181-201.
- Mo, P. H. (2001). Corruption and Economic Growth. *Journal of Comparative Economics* 29, pp. 66-479.
- Mookherjee, D. and Png, I. (1989), Optimal auditing, insurance and redistribution. *Quarterly Journal of Economics* 104(2), 399–415.
- Morse, S. (2006). Is Corruption Bad for Environmental Sustainability? A Cross-National Analysis, *Ecology and Society* 11(1): 22. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art22/>

- Myrdal, G. (1989). *Corruption: its causes and effects. Political Corruption: A Handbook*. Transaction Books, New Brunswick N.J., pp. 953– 961.
- Miguel, B. and Di Tella, R. (2004). Inflation, Inflation Variability, and Corruption. *Economics and Politics* 16 (1), pp.77-100.
- Powers, D.A., Xie, Y., (2000). *Statistical Methods for Categorical Data Analysis*. Academic Press, New York.
- Rijckeghem, C. van and Weder, B. S. (2001). Corruption and the rate of temptation: do low wages in the civil service cause corruption? *Journal of Development Economics* 65, pp. 291–307.
- Rose-Ackerman, S. (1975). The Economics of Corruption. *Journal of Public Economics* 4, pp. 187–203.
- _____. (1978). *Corruption: A Study in Political Economy*. New York: Academic Press.
- _____. (1999). *Corruption and Government, Causes, Consequences and Reform*. Cambridge, UK:
- Sargent, T.J. and Wallace, N. (1981). Some Unpleasant Monetarist Arithmetic. *Federal Reserve Bank of Minneapolis Quarterly Review*, Fall 1981.
- Serra, D. (2006). “Empirical determinants of corruption: A sensitivity analysis” *Public Choice*, Vol. 126(1-2), pp.
- Shleifer, A., and Vishny, R.W. (1993). Corruption. *Quarterly Journal of Economics* 108(3), pp. 599-617.
- Svensson, Lars E.O. (1999). “How Should Monetary Policy Be Conducted in an Era of Price Stability?” Prepared for the symposium *New Challenges for Monetary Policy*, Federal Reserve Bank of Kansas City, 26-28 August.
- Syklos, P. (2002). *The Changing Face of Central Banking: Evolutionary Trends since World War II*. Cambridge University Press.
- Tanzi, V. and Davoodi, H. (1997). Corruption, Public Investment and Growth. IMF Working paper No. 139. Washington: International Monetary Fund.
- Tanzi, V. (1997). Corruption around the world: Causes, consequences, scope and cures. IMF Staff papers 45 (December), pp. 559–94.
- Tanzi, V. (1998). Corruption around the World: Causes, Consequences, Scope, and Cures. *IMF Staff Papers* 45(4), pp. 559-94.
- Transparency International. (2005). *Internet corruption perception index — home page*. <http://www.transparency.de/documents/cpi/index.html>.
- Treisman, D. (2000). The Causes of Corruption: A Cross-National Study. *Journal of Public Economics* 76, pp. 399-457.
- Vaona, A. and Schiavo, S. (2007). Nonparametric and Semiparametric Evidence on the Long-run Effects of Inflation on Growth, *Economic Letters* 94, pp. 452-458
- Wei, S. (1997). How Taxing is Corruption on International Investors? *NBER, Working Paper* #6030.
- Wilhelm, P. G. (2002). International Validation of the Corruption Perceptions Index: Implications for Business Ethics and Entrepreneurship Education. *Journal of Business Ethics* 35(3), pp.177-189.
- Wilhelm, P. G. (2002). International validation of the Corruption Perceptions Index: Implications for business ethics and entrepreneurship education. *Journal of Business Ethics* 35(3), pp. 177-189.

Appendix A: Correlation matrix

	OPENESS	TOR	CORRUP
OPENESS	1		
TOR	-0.1987	1	
CORRUP	0.1094	-0.2307	1