Determinants of Corruption and its Relation to GDP: (A Panel study)

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Abstract

This paper investigates the determinants of corruption, and highlights its relation to the growth. The corruption index is taken from Transparency International. We used the more recent data set from 1995 to 2005. First part of the study is based on determinants of corruption. The empirical results indicate that real GDP per capita, secondary school enrolment, public spending on education, FDI, and unemployment rate are important determinants of corruption. Through combination of these variables we can change the level of corruption. Second part of the study is based on the relationship between corruption and level of GDP per capita and growth of GDP in Barro regression. The results indicate that corruption is more relevant to level of GDP per capita.

Section 1: Introduction

Corruption has been around for a very long time and will remain in the future unless governments can figure out effective ways to combat it (Mauro 1997). This is not going to be easy. Although the study of the causes and consequences of corruption has a long history in economics, and most of the developed countries have controlled it, but still its effects are large in developing countries.

In recent years, the detrimental effects of bureaucratic corruption gained attention from development economists as well as international financial institutions and policymakers.

Corruption, which was previously ignored and mentioned only with caution, has taken a center stage. Nonetheless, corruption is not a new phenomenon. It is as old as government itself. The current literature on corruption highlights its harmful effects on growth (see Klitgaard 1988, Shleifer and Vishny 1993, Mauro 1995, Cheung 1996, and Bardhan 1997). Some studies found the determinants of corruption[1]. The relevant analytical problem is not to assess the harmfulness of corruption but to explore why different political systems foster different levels of corruption. Recent years have seen a renewed interest in studying corruption. There is a long history of models attempting to identify its causes, yet its empirical analysis is complicated. These complications are due to difficulties of obtaining the data and also some estimation complexities are involved.

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So in this paper an effort is made to identify the major determinants of corruption, and also examine the relationship between growth and corruption. For its relation with growth this paper also tries to examine the relation between GDP per capita and corruption. In order to achieve the objective of the study we used the data for corruption, which is available for 11 years (1995-2005). Then we used averaged values for all variables in our study[2]. This paper found some important determinants through which, we can control the level of corruption. The main determinants found by this study are, real GDP per capita, secondary school enrolment, public spending on education, unemployment rate, and FDI.

Our results are different from other studies due to the effect of three important variables, which are secondary school enrolment (SED), public spending on education (PSED) and unemployment rate (UNEMP). No other study found these relationships significantly with corruption[3]. In the second place we analyzed the relationship between corruption and growth. For this purpose we used Barro type equation[4], by using fixed effect and also with the set of control variables. According to results of this paper, it is found that in growth model the corruption does not affect the growth of GDP per capita, while corruption does affect the log of GDP per capita. So the relationship between corruption and level of real GDP per capita is important and same results are found by Paldam (2002). The paper is further divided as following.

1.2: Organization of the Study

Further paper is continuing from section 2, which describes some empirical and theoretical literature and also some discussion on objectives and variables used in the study. Section 3 introduced the model used in the study, while results are reported in section 4. Concluding remarks are given in section 5.

Section 2: Review OF Literature

2.1: Background

A sustained economic growth requires good governance and equity system under control (Tanner and Liu 1994). The question is whether the governance and/or equity system are good predictor for economic growth[5]. Despite its increased recognition, however, this important prerequisite is often difficult to meet by developing and developed countries. Understanding this is important for several reasons. Government officials may use their authority for private gain in designing and implementing public policies[6]. Corruption has been blamed for the failures of certain developing countries to develop, and recent empirical research confirms a link between higher perceived corruption and lower investment and growth (Mauro, 1995, World Bank 1997, Tanzi 1995).

But before going into detail, it is important to explain that what corruption is? Corruption is a result of weak state management and exists when individuals or organizations have monopoly power over a good or service, discretion over making decisions, limited or no accountability, and low level of income[7]. The frequently cited World Bank definition of corruption is the abuse of public office for private gain (World Bank 1997). From the point of view of a developing country, the corruption in public sector is more important because public sector is involved in corruption activities. If it

is corruption that causes growth to slow down then what causes corruption to be higher in one place than another and which variables are affected by corruption. The benefits from corruption are likely to accumulate by better-connected individuals in society, who belong mostly to high-income groups (Tanzi, 1995). Thus, corruption would affect not only broad macroeconomic variables, such as growth, and investment, but also income distribution. It has been further explained by United Nation Development Program (1997) that corruption increases poverty by creating incentives for higher investment in capital-intensive projects and lower investment in labor-intensive projects. Such corruption causes poverty and income inequality. There exists a detailed literature on theoretical debates on corruption and also empirical research on corruption with different set of variables. A brief review of the literature is presented in next section.

2.2: Theoretical Literature

As illustrated earlier that in the literature many studies have examined the relationship between corruption and growth, and mostly it is reported that corruption is harmful for growth. But the theories regarding the impact of corruption on efficiency have been contradictory. Some studies have advocated that corruption promotes business and commerce and thus facilitates growth and investment, while others have claimed that corruption really slows down the promotion by institutionalizing itself through its continual persistence. Shleifer and Vishny (1993) explains the two types of corruption '*Corruption with theft',* when investors reap the benefits of corrupt state machinery by forging patron-client relationships with that machinery and realize windfall gains, although the state loses revenue and '*Corruption without thef't* occurs where the unstated collusion is absent, but officials extract extra payments from their clients, in addition to official charges, because of their discretionary powers. In the literature, the debate on the effect of corruption has led to two opposing strands. One strand, which can be labeled as the *efficiency-enhancing strand,* views corruption as increasing efficiency. The opposing strand, labeled as *efficiency reducing,* views corruption as having a damaging impact on efficiency.

The efficiency enhancing school of thought claims that corruption increases economic growth for a number of reasons (Leff (1964) and Huntington (1968)). First, acting as "speed money", bribes enable entrepreneurs to avoid bureaucratic delay. Second, while the poor pay structure does not motivate the bureaucrats to work, lack of accountability further enables them to be inert, as they are not compelled to show cause to the people for their lethargy. Thus, bribe, in this circumstance would induce the bureaucracy to function efficiently. Third, from the point of view of welfare economics, in a "second best" world of pre-existing policy-induced distortions, additional distortions in the form of black-marketeering, smuggling, etc. may actually improve welfare[8], the efficiency improving argument of corruption is an extension of this idea of second-best principle.

Moving away from the rather extreme efficiency-enhancing strand, some studies have taken a more moderate view and argue that corruption does not necessarily hamper allocation efficiency. For instance, allocative efficiency is maintained even if a corrupt bureaucrat ignores principles of competitive bidding and awards contracts to the highest bidder, because it is the lowest cost firm that can afford to pay the highest

bribe. Allocative efficiency exists in such a competitive bidding process, even under incomplete information (Beck and Maher 1986, Lien 1986).

Another view about corruption is that it reduces growth. Myrdal (1968) claimed that rather than speeding up the process, corrupt officials actually caused severe administrative delays in order to attract more bribes. When corruption is pervasive, the person paying the bribe is often forced to engage in more malpractice by bribing others and those in higher authority, which further increases transaction costs.

In a weak state of governance failure and weak institutions, there is no guarantee that the corrupt official would award the bid to the most efficient firm that is also willing to pay the highest bribe, as discussed above. As observed in many developing countries like Pakistan, Bangladesh, nepotism and perverse client-patron relationships dominate business transactions. As a result, corrupt officials are more likely to be influenced by these relationships, than by monetary incentives alone. The existence of extensive client-patron relationships could result in contracts being diverted to friends and relatives in anticipation of future favors being granted[9].

2.3: Empirical Literature

The literature presented here is based on the interaction between corruption and other indicators with references to the consequences and causes of corruption.
Corruption causes other variables and sometimes it is affected by other variables and it is difficult to assess what the situation is. Some variables move together with corruption such as poverty, government involvement, inequality and absence of competition. For example involvement of government in private markets is commonly seen as a source of corruption. LaPalombara (1994) find the positive relation between corruption and government budget relative to GDP. Another opposite correlation is presented by Elliott (1997) for a sample of 83 countries, in which Elliott reports that the size of the government budget relative to GDP decreases with levels of corruption. She concluded that types of activities might be more important than a government's size in causing corruption. Another study opposite to LaPalombara by Husted (1999) explains that governments are larger in societies characterized by a greater acceptance of authority. In simple conclusions with respect to government involvement and corruption are hard to find.

Government institution also play an important role in corruption analysis. There are two school of thought about debate on corruption, that is whether corruption "greases the wheels" by enabling individuals to avoid bureaucratic delays, or whether it "sands the wheels" mainly by lowering the protection of property rights and misallocating resources ((Lambsdorff 1999). A study of Kaufmann and Wei (1999) and Johnson, Kaufmann and Zoido-Lobaton (1998) oppose the view about "greases the wheels" by finding the positive correlation between corruption and the size of the unofficial economy. Treisman (2000) finds a positive impact of state intervention on corruption. Another study by World Development Report (1997) explains the correlation between corruption and a measure of policy distortion for 39 countries. But the robustness of the results is not tested by including further explanatory variables. Institutions play important role in corruption analysis and it is quite often the case that policy distortions and corruptions are two sides of the same coin. As pointed out by Lambsdorff (1999), some studies focused on poor institutions being the cause of corruption. The answer

is difficult for the question where corruption has negative impact on institutions or corruption is affected by policy distortions.

Corruption is also affected by the economic freedom or level of competition. Henderson (1999) explains that corruption is negatively correlated with different indicators of economic freedom. Same results supported by Paldam (2002) in multivariate regressions that include further explanatory variables. Treisman (2000) also reported insignificance of these variables by using same index for democracy. But for a selection of 64 countries, a small but significant influence is found when testing for countries, which have been democracies without interruption since 1950. It is argued that while the current degree of democracy is not significant, a long period of exposure to democracy lowers corruption.

Some studies also used openness as an indicator of competition and freedom. For example Ades and Di Tella (1995 and 1997) found a negative association between openness and corruption. They concluded that economic competition as measured by the degree of a country's openness reduces corruption. This idea also has been supported by Brunetti and Weder (2003). However, Treisman (2000), using the TI index, did not find significant evidence for such an impact. But Lambsdorff (1999) has a question about openness measure (import to GDP ratio), and argues that this variable depends on the size of a country, measured for example by its total population. This is because large countries can compensate for a low ratio of import to GDP by more competition within their own country. The usefulness of this variable is therefore questionable here.

Different authors are also investigated another important connection between corruption and poverty[10]. Connection between poverty and inequality explained by Gupta, et, al. (1998), they argued that corruption increases income inequality, as measured by the Gini coefficient. It was concluded that deterioration in a country's corruption index of 2.5 points on a scale of 0 to 10 is associated with the same increase in the Gini coefficient as a reduction in average secondary schooling of 2.3 years. Worsening in the corruption index of a country by one standard deviation increases the Gini coefficient by 5.4 points. One standard deviation increase in the growth rate of corruption reduces income growth of the poor by 7.8 percentage points per year. Husted (1999) argues that inequality also contributes to high levels of corruption. This has also been suggested by Swamy et al.(1999). Paldam (2002) also used the similar kind of study by using Gini coefficient in estimation of variants of the economic model but Gini explains little of the variation in corruption.

An important effect of corruption is analyzed with total investment and GDP. Following Barro's (1991) pioneering work, there has been a remarkable expansion in the empirical literature on economic growth and investment. Mauro (1995) makes use of an older corruption index provided by Business International (BI), for 70 countries for the period 1980-83, found a significant negative relationship between corruption and the average annual economic growth rate over the 1960-85 period. He also found the same relationship between corruption and the investment-GDP ratio and other kinds of investments for 1960-85 and for 1980-85 as well. Interestingly enough, Mauro did not find any empirical support for the "speed money" argument, which states that in the presence of a slow bureaucracy, corruption can get bureaucrats to work faster. Mauro also confirmed the negative relationship between corruption and investment. In

another study (Mauro, 1997) finds that corruption reduces expenditures on health and education. Paldam (2002) used the level and growth rate of real GDP with corruption in economic model and found significant negative relation between GDP level and corruption growth, while Gini and growth explained little of the variation in corruption.

Tanzi and Davoodi (1997), examined the effects of corruption on quality of investment and public finances, results indicates that corruption increases public investment at the expense of private investment. In this way, the productivity of public investment and of a country's infrastructure is reduced because of corruption. In contrast to increasing public expenditure, corruption reduces tax revenue as it encourages implicit collusion between tax and custom officials and their clients. Moreover, because of a corrupt bureaucracy, it is difficult for the government to raise tax revenue as firms go underground not necessarily to avoid tax but to avoid bureaucratic regulation (Johnson, Kaufmann and Zoido-Lobaton, 1998).

Corruption also affect the FDI (foreign direct investment) adversely, and this view is analyzed by Wei (2000). His results explain that corruption, acts like a tax, which reduces FDI. Another study by Wei (1997) finds that the less predictable the level of corruption (i.e., the higher is its variance), the greater is its impact on FDI as higher variance makes corruption act like an unpredictable and random tax that increases risk and uncertainty. Alesina and Weder (1999) concluded that impact of corruption on FDIs is mixed. Alesina and Weder (1999) also investigated whether corrupt governments attract or deter aid from OECD countries. The authors make use of a variety of different measures of corruption and investigate different samples of countries but do not find evidence that corrupt countries are discriminated against by foreign donors.

So many studies used corruption with pure economic and political models. But some studies also use cultural model with both economic and political models of corruption[11]. For example Treisman (2000) find the strong connection between religion and corruption. He regressed corruption on the percentage of Protestants in the total population in a sample of up to 64 countries and obtains a highly significant negative impact of this index on corruption, controlling for other variables such as GDP per head. A more comprehensive study of the impact of religion is provided by Paldam (2001). He identifies 11 different groups of religions and tests their impact on corruption, controlling for other variables. While in countries with a large fraction of Reform Christianity (Protestants and Anglicans) and Tribal religion corruption is lower, while higher levels of corruption can be found in countries with a large influence of Pre Reform Christianity (Catholics, Orthodox and others), Islam, Buddhism and Hinduism. However, the impact is only significant for Reform Christians. In another study, Paldam (2002) has done a similar kind of analysis and found that countries are more similar in GDP level than in the level of corruption within the same cultural area. Culture is thus an inferior explanation of the level of corruption. Swamy et al. (1999) investigated the impact of gender on corruption, which is treated here as a cultural dimension. They used two indicators for gender, the percentage of women in the labor force and in the parliament. Both indicators negatively impact on the level of corruption in a cross-section of up to 66 countries. The influence is large in magnitude, highly significant and robust throughout a large variety of regressions, controlling for various variables. These findings suggest that policies designed to increase the role of women may help in lowering the level of corruption.

In the above-cited literature the causes and consequences of corruption have been investigated. It can be concluded that corruption commonly goes along with policy distortion, inequality of income and lack of competition and freedom. But to derive clear arguments with respect to causality is rather hard to find (Lambsdorff, 1999). On the one hand, corruption may cause these variables but at the same time likely to be the consequence of them. On the other hand, cultural determinants may drive corruption and the variables in question at the same time. These empirical results are even so helpful in identifying areas which are parallel to corruption or which indicate its survival. So on the basis of above results an effort is made in this project to apply same kind of analysis again with recent data sets and broader range of countries.

2.4: Objective of the Study

The main objective of the study is based on previous literature to find out the relationship between corruption and other economic and cultural variables. For that purpose we further divide our objective in two parts

Part 1

In the first Part aim is to find out the main determinant of corruption, or which variables are more affecting to corruption.

Part 2

In the second place the study analyze the effect of corruption on growth, by using different variables, which are used by previous studies in Barro Growth model.

2.5: Data Sources of all Variables and Corruption Index.

The main variable used in this study is Corruption. So the data for corruption in this study is used from TI (Transparency International) that is CPI (Corruption Perceptions Index). This index is constructed as a 'poll of polls' by drawing on information and ratings from various sources. It measures perceived corruption rated on a scale from zero (most corrupt) to ten (no corruption), i.e. a higher rating implies less corruption. It has the advantage of being posted consecutively since 1995 for most countries in the sample[12].

Other variables that are used in this study are same as used in previous research. Two main variables GDP per capita level and growth are taken from WDI (World Development Indicator) CD Rom. GDP per capita in current US$, at purchasing power parity taken from WDI. Investment is yearly Gross Fixed Capital formation percentage of GDP from WDI. Most of the variables are taken from WDI, for example SED (gross enrollment rate in secondary schooling), PSED (Public spending on education), FDI (Foreign Direct Investment as a percentage of GDP), POP (Average annual population growth), Openness (measured as ratio of exports plus imports to GDP), Government Expenditure (general government final consumption expenditures percentage of GDP) and inflation (measured as, log of Consumer Price Index).

Some variables for cultural and regional affect are used as dummies. For example LA (Dummy variable taking the value of 1 for Latin American countries and 0 other wise),

SSA (Dummy variable taking the value of 1 for Sub-Saharan African countries and 0 other wise), SA (Dummy variable taking the value of 1 for South Asian countries and 0 other wise), EAS (Dummy variable taking the value of 1 for East Asian countries and 0 other wise), EU (Dummy variable taking the value of 1 for EU countries and 0 other wise), OECD (Dummy variable taking the value of 1 for OECD countries and 0 other wise) and MUS (Dummy variable taking the value of 1 for Muslim countries and 0 other wise).

Section 3: Basic Methodology and the Model

Empirically, in order to determine the quantitative magnitude of the impact of corruption on growth, one would normally apply traditional time series econometrics analysis. However, problems of data unavailability compel us to limit ourselves to Panel data analysis. We use the so-called "Barro cross-country regression" framework to investigate the impact of corruption with different economic and cultural variables.

Typically, the Barro framework relates the dependent variable in question to two types of variables: a) the initial level of state variables that proxy for the initial stock of physical and human capital, and b) a vector of policy variables chosen by government and/or private agents. The initial level of real GDP per capita is used as proxy for the initial stock of physical capita (Barro and Sala-I-Martin, 1995), for which accurate data are not available. In this project we are using panel data and further discussion on panel data modeling is described in the next section.

3.1: Panel Data Modeling:

The model used in this study is Panel or longitudinal Model. This typically refer to data containing time series observations of a number of individuals, or if the same unit of observations in a cross-section sample are surveyed two or more times, the resulting observations are called a Panel or Longitudinal data set. Therefore, observations in panel data involve at least two dimensions; a cross-sectional dimension, indicated by subscript i, and a time series dimension, indicated by subscript t. However, panel data could have a more complicated clustering structure. So panel data set has cross-section and time series dimensions, the application of regression models to fit econometric models are more complex than those for simple cross-section data sets. Nevertheless they are increasingly being used in applied work and the aim of this section is to provide a brief introduction. For comprehensive treatments see Hsiao (2003), Baltagi (2001), and Wooldridge (2002). There are several reasons for the increasing interest in panel data sets.

- Its use may offer a solution to the problem of bias caused by unobserved heterogeneity, a common problem in the fitting of models with cross-section data sets.
- The use of panel data reveals dynamics that are difficult to detect with cross-section data.

- Panel data usually contain more degrees of freedom and less multicollinearity than cross-sectional data which may be viewed as a panel with T =1,or time series data which is a panel with N =1, hence improving the efficiency of econometric estimates.
- Panel data model have greater capacity for capturing the complexity of human behavior than a single cross-section or time series data.
- It controls the impact of omitted variables. Panel data contain information on both the inter-temporal dynamics and the individuality of the entities may allow one to control the effects of missing or unobserved variables.
- Panel data simplifies the computation and statistical inference. For example, in the analysis of non-stationary time series, if panel data are available, and observations among cross-sectional units are independent, then one can invoke the central limit theorem across cross-sectional units to show that the limiting distributions of many estimators remain asymptotically normal (e.g. Binder, Hsiao and Pesaran (2005), Levin, Lin and Chu (2002), Im, Pesaran and Shin (2004), Phillps and Moon (1999)),
- Measurement errors: Measurement errors can lead to under-identification of an econometric model (e.g.Aigner, Hsiao, Kapteyn and Wansbeek (1985)). The availability of multiple observations for a given individual or at a given time may allow a researcher to make different transformations to induce different and deducible changes in the estimators, hence to identify an otherwise unidentified model (e.g. Biorn (1992), Griliches and Hausman (1986), Wansbeek and Koning (1989)).
- Another attracton of panel data sets is that they often have very large numbers of observations. If there are “n” units of observations and if the survey is undertaken in “T” time periods, there are potentially “nT” observations consisting of time series of length “T” on n parallel units.
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Having some advantages of panel data modeling now we can described panel data as ***balanced*** if there are available observations for every units of observation for every time period, and as ***unbalanced*** if some

$$Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \sum_{p=1}^{s} \gamma_p Z_{pi} + \delta t + \varepsilon_{it} \qquad (1)$$

observations are missing. However, if one is using an unbalanced panel, one needs to take note of the possibility that the causes of missing observations are endogenous to the model. Equally, if a balanced panel has been created artificially by eliminating all units of observation with missing observations, the resulting data set may not be representative of its population. A standard Panel data specification is

Where Y is the dependent variable, the X are observed explanatory variables, and the Z are unobserved explanatory variables. The index “i” refer to the unit of observation, t refers to the time period, and j and p are used to differentiate between different observed and unobserved explanatory variables. ε is a disturbance term assumed to satisfy the Gauss-Markov conditions. A trend term t has been introduced to allow for a shift of the intercept over time. If the implicit assumption of a constant rate of change seems to strong, the trend can be replaced by a set of dummy variables, one for each

time period except the reference period. The X variables are usually the variables of interest and the Z represents unobserved heterogeneity and as such constitutes a nuisance component of the model. The following discussion will be confined to the special case where it is reasonable to assume that the unobserved heterogeneity is unchanged and accordingly the Z variables do not need a time subscript. Because the Z variables are unobserved, there is no means of obtaining information about the $\sum Z$ component of the model and it is

$$Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \alpha_i + \delta t + \varepsilon_{it} \qquad (2)$$

convenient to rewrite above equation as

Where

$$\alpha_i = \sum_{p=1}^{s} \gamma_p Z_{pi}$$

α_i is known as the unobserved effect, represents the joint impact of the Z on Y. henceforward it will be convenient to refer to the unit of observations as an individual, and to the (i as the individual specific unobserved effect, but it should be borne in mind that the individual in question may actually be a household or an enterprise, etc. if (i is correlated with any of the X variables, the regression estimates from a regression of Y on the X variables will be subject to unobserved heterogeneity bias. Even if the unobserved effect is not correlated with any of the explanatory variables, its presence will in general cause OLS to yield inefficient estimates and invalid standard errors. How can we overcome these problems? This discussion is discussed as follows.

First, however, note that if the X sets of controls are so comprehensive that they capture all the relevant characteristics of the individual, there will be no relevant unobserved characteristics. In that case the (i term may be dropped and a Pooled OLS Regression may be used to fit the model, treating all the observations for all of the time periods as a single sample. There are two main approaches to the fitting the panel data are know as Fixed Effect and Random Effect. The details are as given.

3.2: Fixed Effects Regressions

Fixed Effect Regression is utilized under three different kind of manipulation, in such a way that the unobserved effect is eliminated.

Within-groups Fixed Effects.

$$\overline{Y_i} = \beta_1 + \sum_{j=2}^{k} \beta_j \overline{X_{ij}} + \alpha_i + \overline{\delta t} + \overline{\varepsilon_{it}} \qquad (3)$$

Subtracting this from (2), we will get (4)

$$Y_{it} - \overline{Y_i} = \beta_1 + \sum_{j=2}^{k} \beta_j (X_{ijt} - \overline{X}_{ij}) + \delta(t - \bar{t}) + \varepsilon_{it} - \overline{\varepsilon}_{it} \quad (4)$$

And the unobserved effect disappears. This is known as the **within-groups regression.**

First-differences Fixed Effects

For individual *i* in time period *t* the model may be written as

$$Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \alpha_i + \delta t + \varepsilon_{it}$$

For the previous time period, the relationship is

$$Y_{it-1} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit-1} + \alpha_i + \delta(t-1) + \varepsilon_{it-1} \quad (5)$$

Subtracting (5) from (2) we get (6)

$$\Delta Y_{it} = \sum_{j=2}^{k} \beta_j \Delta X_{jit} + \delta + \varepsilon_{it} + \varepsilon_{it-1} \quad (6)$$

and again the unobserved heterogeneity has disappeared.

Least Squares Dummy Variable Fixed Effects

The model can be rewritten as

$$Y_{it} = \sum_{j=2}^{k} \beta_j X_{jit} + \delta t + \sum_{i=1}^{n} \alpha_i A_i + \varepsilon_{it} \quad (7)$$

3.3: Random Effects regressions

In this type of regression the first condition is that it is possible to treat each of the unobse`rved Z variables as being drawn randomly from a given distribution. This may well be the case if the individual observations constitute a random sample from given population. In this case the α_i may be treated as random variables (hence the name of this approach) drawn from a given distribution and we may rewrite the model as

$$Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \alpha_i + \delta t + \varepsilon_{it}$$

$$= \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \delta t + u_{it} \qquad (8)$$

where $u_{it} = \alpha_i + \varepsilon_{it}$

we have thus dealt with the unobserved effect by subsuming it into the disturbance term.

The second condition is that Z variables are distributed independently of all of the X_j variables. If this is not the case, α_i and hence *u* will not be uncorrelated with the X_j variables and the random effect estimation will be biased and insistent. We would have to use fixed effect estimation instead, even if the first condition seems to be satisfied. So if the two conditions are satisfied, we may use random effect regression, but there is a complication, u_{it} will be subject to a special form of autocorrelation and we will have to use an estimation technique that takes account of it[13].

3.4: Fixed Effects or Random Effect

However if either of the preconditions for using random effects is violated, we should use fixed effects instead. One preconditions that the observations can be described as being drawn randomly from a given population. This is a reasonable assumption in the case of the NLSY **(**National Longitudinal Survey of Youth)[14] because it was designed to be a random sample. By contrast, it would not be a reasonable assumption if the units of observation in the panel data set were countries and the sample consisted of those countries that are members of the Organization for Economic Cooperation and Development (OECD)[15]. These countries certainly cannot be considered to represent a random sample of the 200-odd sovereign states in the world.

So finally we are able to use fixed effect in our model and on the basis of above discussion we divide our project in two parts.

Part I

In the First part we will find the causes of corruption, means which variables are causing corruption. This section will analyze how we can overcome the problem of corruption and which variables help to increase the honesty level. For that purpose we will use different economic and cultural variable, as independent and Corruption variable will be as a dependent variable[16].

The Economic Model

$$COR = f(y, gy, \text{inf}, open, FDI, sed) + u \quad (9)$$

The Cultural Model

$$COR = f(LAM, SSA, EU, EAS, OECD, MUS) + u \quad (10)$$

Where *COR* used for corruption, y for *GDP* level and g for growth. *Open* is used for Trade openness, *sed* for secondary school enrollment; *inf* for inflation and *LA, AF, SC, MUS* used dummies for Latin America, Africa, Scandinavia, and Muslims countries respectively.

Part II

In the second part we will analyze the effect of corruption on growth in the presence of various policy, geographic and demographic variables that are widely used in the empirical literature. We will use different set of variables, which are affecting the growth.

More specifically our model looks like as following

Growth Model:

$$g = a + b_1(initial\ \ level\ \ of\ \ real\ \ GDP\ \ per\ \ capita) + b_2 Corruption + \beta_1 X + \beta_2 Z + u \quad (11)$$

Where, *g* imply average annual GDP growth rates and *X* is a vector of regional dummies, *Z* is a pool of policy, geographic and demographic variables that are widely used in the literature, and *u* is the error term. Growth equation is Barro (1991) type of equation.

3.5: Addressing Endogeneity

It is possible that corruption and growth respond simultaneously to an omitted factor. Such factor could be a cultural disposition towards leisure or morality, the legal framework, the historical evolution of the nation in question, etc. And one may think that the incidence of corruption is directly affected by the rate of economic growth; as for example, it could be the case that rich, fast-growing countries have more resources to combat and control corruption. In either case, corruption would be correlated with the error term in the OLS regression and the estimates would be biased.

Many studies in the past have used instrumental variable techniques in an attempt to correct this potential bias. The main instrument in the literature has been the Ethno linguistic Fractionalization (ELF) index. This variable, however, has been shown to be directly and indirectly correlated with economic growth (Easterly and Levine, 1997) and thus, it cannot be considered as a valid instrument in our regressions. Another method is widely used by different previous studies by taking averages of the

variables. The use of averages reduces short run fluctuations and allows us to concentrate on the relationships of interest for this study[17].

So in this study we used fixed effect regression where the variables are averaged over three-year period: 1995-1997, 1998-2000, 2001-2003, and 2004-2005. Four observations are for each country. The last observation is average of two year because of data availability.

Section 4: Empirical Results

In this section we have presented some empirical results, based on the model development in previous section. As we defined earlier that the main purpose of the analysis is to investigate the causes of corruption and specifically its relation with growth. So we divide our results section in two parts, first part is based on the results pertaining to causes of corruption, or which economic and cultural variables are affecting corruption index. And the second part is based on the Barro (1991) type equation by using fixed effect and analyze the effect of corruption on growth including some economic and cultural variables with corruption. One more important thing is that we divided our data set into two parts with respect to countries. First for all 104 countries with unbalanced data set and second with 38 countries for corruption data set is complete but other variables are same as unbalanced. So the results for 104 countries are reported in this section and the results for 38 countries are reported in the appendix.

4.1: Part1: Sources of corruption

This section is based on the causes of corruption or which variable is affecting more towards the corruption index. The dependent variable is corruption index, which is taken from Transparency International, and a number of independent variables are used. This part is also further divided into three types of estimation model. In the first model, just economic variables are used, in the second model cultural variables are used, while in the third model both mix economic and cultural variables are used.

Table 4.1 reports all the coefficients of economic variables but not constant and time dummies. In this table about 8 regressions are reported with different combinations of independent variables. Actually we estimate a lot of regressions, so all are not reported here. We used PcGive to estimate our models. We used GLS by using OLS residuals. We estimated our model two times first with time dummies and second without time dummies. The results reported here in table 4.1 are with time dummies and constant but time dummies and constant are not shown in the table. While the results without time dummies are reported in appendix[18]. In table 4.1 the main important economic variables are Log of GDP (LnGDPpc), GDP growth (GDPgr), secondary education enrolment (SED), public spending on education (PSED), FDI, Government consumption expenditure (GEXP), investment (INV), Openness (OPEN), inflation (INFL), population growth (POPgr), unemployment rate (UNEMP), and tax revenue (TR).

In table 4.1 the result shows that all regressions have significant positive coefficient for log of GDP per capita. It has positive sign, it means as GDP per capita increases the corruption index also increase means countries become less and less corrupt.

Corruption is higher in less developed and developing countries. It become less and less when they go through grand transition to become high-income countries. Same results are found by Brunetti and Weder (2003), and Paldam (, 2001, 2002). This empirical result is quite consistant with the graphical analysis discussed earlier. The other important variable, which is found to be significant, is secondary education enrolment. It also has positive relation with corruption index, which indicates that as the enrolment of secondary education increases the corruption become less and less.

Table 4.1
Economic model (Determinants of Corruption)

Variables	**Dependent Variable is Corruption Index by Transparency International**							
	1	2	3	4	5	6	7	8
LnGDP	**0.137** **0.068**	**0.371*** **0.111**	**0.129**** **0.067**	**0.174**** **0.092**	**0.110***** **0.060**	**0.332*** **0.099**	**0.336*** **0.105**	**0.225*** **0.08010**
GDPgr	0.176 0.128	-0.073 0.063	0.135 0.126			-0.084 0.0584	-0.077 0.060	-0.035 0.045
SED	**0.008***** **0.005**	**0.010*** **0.005**				**0.011*** **0.004**	**0.011*** **0.004**	**0.048*** **0.019**
PUBSED	**0.612*** **0.143**		**0.677*** **0.140**	**0.669*** **0.141**	**0.695*** **0.144**			
FDI	**0.078*** **0.024**	**0.078*** **0.024**	**0.079*** **0.024**	**0.076*** **0.025**	**0.064*** **0.025**	**0.077*** **0.023**	**0.077*** **0.022**	
GEXP	0.014 0.028	0.04*** 0.025	0.016 0.027	0.017 0.028	0.013 0.025		0.044*** 0.024	0.03*** 0.018
INV	0.032 0.022	-0.004 0.020	0.029 0.021	0.027 0.021	0.026 0.019			
OPEN	0.004 0.003	0.001 0.003	0.004 0.003	0.004 0.004	0.003 0.003			
INFL	0.038 0.156	-0.081 0.144	-0.033 0.152	-0.002 0.155	-0.049 0.133			
POP	0.138 0.198	-0.234 0.184	0.134 0.198	0.192 0.198	0.129 0.212		0.232 0.180	0.067 0.157
UNEMP	**-** **0.053***** **0.031**	**-** **0.058***** **0.033**	**-** **0.062***** **0.035**	**-0.051** **0.035**	**-0.06***** **0.033**	**-0.053***** **0.032**	**-0.061**** **0.032**	**-0.029** **0.025**

Note: Each equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP (Log of GDP per capita), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INV (Investment), GEXP (Government Expenditure), OPEN (Trade Openness), INFL (Inflation), POP (Population Growth), and UNEMP (Unemployment).

Higher levels of education foster a sense of nationalism and give confidence to the community. It also raises the public's awareness of their rights for the services of the bureaucrats. Generally, most of the citizens in LDCs are not aware that they are entitled to the services of the bureaucrats. Scott (1972: 15) briefly described this lack of awareness in developing countries[19].

"*The bureaucrat is a high school or university graduate . . . who deals often with illiterate peasants for whom government, let alone its regulations, is a mystifying and*

dangerous thing. In approaching a civil servant, the peasant is not generally an informed citizen seeking a service to which he is entitled, but a subject seeking to appease a powerful man whose ways he cannot fathom; where the modern citizen might demand, he begs or flatters."

Another study by Mauro (1995), Rajkumar and Swaroop (2001) show that expenditure on health and education reduces the corruption because of less chances to rent seeking in these type of investment. So it is significantly affecting the corruption in our models, the reason could be that when peoples are educated, have good understanding and better knowledge about the drawbacks of corruption. Another reason against our result could be that the more educated person can cheat the public or nation affectively. But if we see the OECD and EU countries, they are less corrupt and their education level is higher-level compare to developing countries[20]. The same variable public spending on education is also proved as a significant coefficient in our model.

Another variable that has significant coefficient in table 4.1 is Unemployment rate, which is proved to be significant and has negative sign, implies negative relation with corruption index. If unemployment rate decreases it will increase the corruption index, which is an indication of movement from high corrupt society towards less corrupt society. So unemployment is important factor, which affects corruption index. Inflation has negative sign that means high inflation associated high level of corruption but this variable is insignificant[21].

Another variable which has significant coefficient FDI, it has positive sign. The corruption level goes down as foreign direct investment goes up, while investment is appeared to be insignificant variable in our model. Wei (2000) found that corruption has a negative impact on investments conducted by foreign firms. And Felipe (2004) found that FDI strongly reduces corruption. Trade openness, is not a significant variable in the model. As pointed out by Treisman (2000), openness to trade is clearly endogenous, exposure to imports may reduce corruption, but corrupt officials are also likely to create rent-generating barriers to trade. One reason could be that it is very easy to transfer the illegal money from outside the country when there are fewer barriers to trade. The connection between the government expenditure and corruption is also analyzed. The coefficient of government expenditure is turns out to be significant in the model. So if government expenditure is towards productive side then it affects corruption index positively through bureaucratic efficiency. As pointed out by Mauro (1995) investment or expenditure in education and health strongly reduce the corruption.

Population growth is also not affecting significantly to corruption index. Another important variable is GDP growth but it does not prove to be a significant variable in the model[22]. It means log of GDP per capita level is important for corruption but growth itself does not affect the corruption.

After this we estimated the corruption variables with cultural dummies and the results are reported in appendix table A2. The results of cultural models are not so convincing. And the cultural division of countries does not seem to have reasonable affect on corruption index. We tried a new cultural variable, MUS (dummy for Muslim countries) but no reasonable results were established in the model. The sign is

negative for Muslim coefficient, which reflects the Muslims countries are more corrupt than non-Muslims; the reason could be that most of the Muslim countries are poor, but coefficients are not significant. OECD and EU countries have significant positive relation with corruption index, which indicates, a less corrupt societies. The results of LAM (Latin America) coefficient found to be negative and significant. Paldam (2002) found same results for LAM, which indicates the negative relationship between corruption index and countries, belong to Latin America.

And then in the third place we estimated both economic and cultural model combined by using time and without time dummies. The results of model without time dummies are reported in appendix and the results with time dummies are reported in table 4.2. When both models are estimated the most significant variable is log of GDP per capita. The results indicate that the variable log of GDP per capita is still significant and positive Coefficients, which confirms the results of table 4.1 and also consistent with previous studies.

The other variables for education i.e., secondary education enrolment and public spending on education are prove to be important determinants of corruption index. FDI and Unemployment rate are also significant and consisted with table 4.1. In cultural dummies the coefficient for MUS (Muslim Countries dummy) is negative but again insignificant. The coefficients for OECD counties are positive and significant, while for sub-Saharan African countries it is negative and significant in two regressions. According to these results the OECD countries and Sub-Saharan African countries have opposite effect on. For East Asian countries the coefficient is also negative and significant in one regression out of five regressions.

So we can say that variables, which are important in, economic model, are log of GDP per capita, Secondary education, public spending on education FDI and unemployment rate. While in the cultural model the signs of Muslim variable have same sign as in previous table but still insignificant. And Latin America is proved to be negative and significantly related with corruption index. Latin America is

Table 4.2
(Determinants of Corruption)

Variables	**Dependent Variable is Corruption Index by Transparency International**							
	1	2	3	4	5	6	7	8
LnGDP	**0.109*** 0.060**	**0.105** 0.05**	**0.109*** 0.066**	**0.022 0.033**	**0.002 0.032**	**0.283* 0.078**	**0.113*** 0.068**	**0.12*** 0.068**
GDPgr	-0.040 0.051	-0.038 0.051	0.004 0.038	0.006 0.017	0.004 0.016	-0.074 0.048	-0.019 0.042	-0.021 0.042
SED	**0.005 0.004**	**0.004 0.004**	**0.005*** 0.003**			**0.011* 0.004**	**0.006*** 0.003**	**0.007** 0.003**
UNEMP	**-0.065** 0.030**	**-0.067** 0.031**						
GEXP	0.010 0.020							
FDI	**0.03*** 0.020**	**0.04** 0.020**				**0.067* 0.020**	**0.032*** 0.018**	**0.032*** 0.018**
POP	0.388 0.293							0.201 0.157
MUS	-0.684 0.78				-0.603 0.425		-0.632 0.531	-0.710 0.548
OECD	**2.251***	**2.547***	**2.885***	**3.189***	**1.610***		**2.575***	**2.527***

	0.470	**0.464**	**0.386**	**0.355**	**0.432**		**0.396**	**0.386**
LAM	**-1.05*** 0.624**	0.062 0.518	-0.018 0.455	-0.228 0.406	-0.479 0.408	**-1.028** 0.452**	-0.115 0.461	-0.659 0.497
SSA	1.203 1.544	-2.571*** 1.556	-0.415 0.474	-0.577 0.415	-0.518 0.415	-0.404 0.551	-0.294 0.518	-1.005*** 0.582
EAS	-1.33*** 0.801	-0.557 0.738	-0.522 0.631	-0.588 0.624	-0.206 0.612			

Note: Each equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP (Log of GDP per capita), GDPgr (GDP growth), SED (Secondary school enrolment), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

relatively corrupt. OECD dummy is also significant in most of the regressions and having positive coefficients[23]. African countries also have negative affect on corruption index.

To illustrate the quantitative effect of important determinants of corruption, following Wei (1998), for example if we take the average coefficient of log GDP per capita 0.33 (table 4.1 column 6). This would mean the increase in log of GDP per capita 1 percent would affect the corruption index by 0.33 percent. It means 3 percent increase in log of GDP per capita will increase corruption index to 1 point, which is quite significant. Another variable is FDI, which is positive and significant. The average coefficient is about 0.065 (table 4.1 and 4.2). It means 1 percent increase in FDI will increase the corruption index about 0.065 percent; so marginal affect is very small. Secondary education enrolment has the coefficient about 0.010 and public spending on education has the coefficient about 0.66 (table4.1 column 4). The coefficient of public spending on education indicates that there is 100 percent increase in public spending on education then it will affect the corruption index by 66 percent. Government expenditure has the coefficient about 0.04 and it indicates that 1 percent increase in the government expenditure will increase the corruption index by 0.04 percent that is also very little affect on corruption index. Same is the case with unemployment rate. If we reduce the unemployment rate by 1 percent that will increase the corruption index (decrease the corruption level) by 0.06 percent. So individually these variables have little effect on corruption level but combination of these factors may have significant effect on corruption level.

4.2: Part 2: Effect of corruption on growth

In this part we will analyze the effect of corruption on growth. The results are based on Barro type equation by using fixed effect and set of control variables. The data is also unbalanced here like previous section. The typical empirical studies of corruption and growth, like Mauro (1995), Knack and Keefer (1995) and Li et al. (2000) etc, generate cross-sectional regressions for which the average rate of economic growth is the dependent variable and a standard list of regressors are used as independent variables. This standard list includes the initial level of income per capita, the rate of population growth, the secondary school enrolment ratio, trade openness, government consumption expenditure, and investment ratio to GDP. And additional dummy variables for regions, like Latin America, East Asia, Africa, EU and OECD countries. So in the first place the dependent variable is log of GDP per capita, while in the

second place dependent variable is GDP per capita growth. And independent variables are initial GDP per capita, corruption index and a number of economic and cultural dummy variables used in the literature as a set of control variables[24].

Table 4.3 shows the result of fixed effect and with set of control variables with constant and time dummies by using log of GDP per capita as a dependent variable[25]. In this table result of both economic and cultural variable are reported. We estimated a lot of regressions but the main regressions are reported in the tables. And again these results are based on 104 countries. The coefficients of initial GDP have positive sign but

Table 4.3
(Growth Model)

Variables	**Dependent Variable is log of GDP per capita** (Barro Equation with Set of Control variables)								Fixed Effect
	1	2	3	4	5	6	7	8	
LnGDP-1	0.177 (0.088)	0.167 (0.09)	0.165 (0.112)	0.079 (0.103)	0.0573 (0.101)	0.032 (0.098)	0.101 (0.118)	0.086 (0.084)	-0.378 (0.0662)
CRP	**0.311* (0.059)**	**0.307* (0.063)**	**0.162** (0.069)**	**0.285* (0.061)**	**0.216* (0.073)**	**0.197* (0.067)**	**0.107 (0.083)**	**0.245* (0.067)**	-0.194 (0.134)
SED	0.001 (0.003)	0.0008 (0.003)		0.004 (0.003)	**0.005*** (0.003)**			0.002 (0.003)	
PUBSED			0.101 (0.096)				0.059 (0.105)		
INFL				-0.123 (0.118)					
UNEMP			-0.030 (0.024)	-0.022 (0.023)	-0.025 (0.026)	-0.020 (0.025)	-0.040 (0.029)		
GEXP		0.006 (0.016)		0.041** (0.019)	0.035*** (0.019)	**0.032*** (0.018)**	0.028 (0.022)	0.013 (0.015)	
FDI	0.003 (0.017)	0.006 (0.018)							
POP			-0.088 (0.125)	-0.033 (0.120)				-0.137 (0.123)	
OPEN	0.002 (0.002)	0.001 (0.002)							
MUS							-0.773 (0.766)		
OECD					0.469 (0.361)	0.426 (0.340)	0.408 (0.395)	**0.652** (0.324)**	
LAM					0.083 (0.340)	0.067 (0.325)	0.146 (0.390)	**0.548 (0.347)**	
SSA					0.262 (1.089)	0.087 (1.077)	0.314 (1.118)	**-0.897** (0.392)**	
EAS					-0.363 (0.496)	-0.441 (0.490)	0.332 (0.750)	-0.010 (0.461)	

Note: Each equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

insignificant meaning no sign of convergence as expected. By visualizing the table 4.3 it is clear the variable, which is significant, is corruption index, it has positive sign. It means CRP corruption index has positive effect on log of GDP per capita and indicates that as corruption goes down (corruption index goes up), the level of GDP must increase. In the part 1, when CRP (corruption index variable) was dependent variable then log of GDP per capita was significant and now CRP is significant when log of GDP per capita is dependent variable showing the presence of reverse

causality. And by visualization of the graph also presents the positive relation between these two variables. So it reflects that the countries, which are less corrupted, have high level of per capita, and in the same time the countries that are poor are most corrupted. The quantitative effect of corruption index on log of GDP per capita can be measure by following Wei (1998). For example according to results table 4.3 column 4 the coefficient of CRP is 0.285, this would means that for Pakistan, a reduction in corruption from its current level (CRP averaged index 2.4) to a level of , say, Denmark (CRP averaged index 9.7) would increase Pakistan's annual average log of GDP per capita during the period 1995-2005 by 2.08 percentage points (0.285 * (9.7-2.4) = 2.08). Thus, in other words, if corruption in Pakistan could be reduced to levels existing in developed economy like Denmark, then during the period Pakistan could have increased its annual average per capita rate by more than 2 percent. The results of fixed effect are also reported and these are not robust with corruption index.

Secondary education variables is used in 5 regressions but only in one regressions this variable is significant at 10 percent level, while the sign of coefficient is positive, which indicates the positive impact on per capita. Second education variable is public spending on education, which is also insignificant in this regressions model. So here log of GDP per capita is not capturing the full effect of these educational variables.

Other explanatory variables are also having not explanatory power in the model except Government Consumption Expenditure (GEXP). This variable is significant and positively affecting the log of GDP per capita. The coefficient is about 0.035 in most regressions, its quantitative impact is not bigger but significant impact. Population growth and unemployment rate have negative sign but mostly insignificant, so there affect is miner. The result indicates that only CRP variable is important for log of GDP per capita when model is estimating with cultural variables. The cultural dummies are also reported in the same table. In cultural variables only OECD and SSA (African countries) are significant at one place. The dummy for Muslim culture has negative signs but insignificant. The other dummies EAS (East Asian countries) and LAM (Latin America) are also insignificant. In sum we can say, when dependent variable is log of GDP per capita then CRP variable is significant and has positive relation with GDP per capita.

The next results displayed in table 4.4 are based on the fixed effect and set of control variables that is using GDP per capita growth rate as dependent variables and the numbers of independent variables including corruption and initial GDP per capita. The results reported in table 4.4 explain corruption index variable, it is not prove to be significant variable here in each regression. There are 9 regressions and in all it is insignificant, meaning not different from zero. The sign of coefficient is also negative. The graph of these two variables, corruption and GDP growth is also not giving clear picture (figure 1 ch: 3). We also included a quadratic term for corruption that allows a test for a positive growth maximizing level of corruption. But this test fails to capture the maximizing level of corruption[26]. As we expand the list of explanatory variables the magnitude of the coefficient on corruption remains roughly the same. The most significant variables in growth equations are inflation rate, and unemployment rate. These two variables have negative sign and mostly are significant.

Secondary school enrolment (SED) has positive sign but all coefficients are insignificant. Public spending on education is also same as SED not proving a

significant variable. Government expenditure variable is also included in growth equation but it does not prove to be significant variable. And it means government consumption expenditure is not playing any significant role in growth. FDI variable has positive relation with growth but its coefficient is not significant. Population growth is negatively affecting the growth, and its signs is negative in the table 4.4, but only one coefficient is significant at 10 percent. Trade openness is also not proved as a significant variable in the model.

Table 4.4 presents the results of combined economic and cultural variables on growth. When we expand our model with cultural dummies the results are almost same, and the corruption variable is same as without cultural dummies. Among cultural dummies the OECD countries have positive coefficient, which indicates the positive impact on growth. MUS (Muslim countries dummy) are still insignificant as in table 4.3, but it has negative sign. This indicates the Muslims countries have lower growth. The LAM (Latin America) dummy has negative sign in all regressions and only one is significant, but their affect on growth is very low. Sub-Saharan Africa and East Asian dummies are insignificant.

If we summarize the results of above part 1 and part 2. Then we can say that the main sources of corruption are log of GDP per capita, secondary education enrolment, public spending on education, FDI and unemployment rate. These variables are affecting corruption index but the marginal effect is small and with combination of these variables we can change the existing corruption level. These are the important findings of this study with new data set, specially the results of unemployment rate, and educational variables are new and with recent data set.

In cultural dummies we used new variable MUS for Muslim countries but it did not prove to be significant. Other cultural variables EU, OECD, HY (high income countries) and LAM (Latin America) are significant in most of the regression for corruption index. In growth model the corruption does not affect the growth of GDP per capita, while corruption does affect the log of GDP per capita. So the relation with corruption and level growth is important and same result are found by Paldam (2002). In next section we will present the granger causality between corruption and growth and log of GDP per capita.

Table 4.4
(Growth Model)

Variables	**Dependent Variable is GDP per capita Growth** (Barro Equation with Set of Control variables)								Fixed Effect
	1	2	3	4	5	6	7	8	
LnGDP-1	-0.150 (0.156)	-0.053 (0.193)	-0.057 (0.192)	-0.106 (0.196)	-0.100 (0.216)	-0.194 (0.194)	-0.0760 (0.192)	-0.111 (0.182)	0.031 (0.143)
CRP	0.113 (0.121)	-0.129 (0.113)	-0.169 (0.120)	-0.151 (0.117)	-0.26*** (0.137)	-0.198 (0.132)	-0.023 (0.141)	-0.017 (0.133)	0.053 (0.292)
SED	**0.003 (0.006)**	**0.003 (0.006)**	**0.004 (0.006)**	**0.003 (0.006)**		**0.001 (0.006)**	**0.002 (0.006)**	**0.001 (0.005)**	
PUBSED					0.238 (0.191)				
INFL				**-0.448** (0.211)**	**-0.084 (0.245)**	**-0.403*** (0.217)**	**-0.385*** (0.211)**	**-0.407** (0.202)**	
UNEMP		**-0.074*** (0.043)**	**-0.070 (0.043)**	**-0.053 (0.043)**	**-0.060 (0.047)**	**-0.086*** (0.049)**	**-0.096** (0.047)**	**-0.094** (0.046)**	
GEXP	-0.028 (0.030)				-0.0157 (0.039)	-0.010 (0.036)	-0.011 (0.034)		
FDI			0.025 (0.034)	0.020 (0.0334)	0.034 (0.031)	0.016 (0.031)	0.018 (0.030)	0.023 (0.029)	

POP	-0.51*** (0.297)				-0.416 (0.239)	-0.223 (0.315)	-0.269 (0.349)		
OPEN		0.004 (0.004)	0.002 (0.005)	0.002 (0.005)					
EU	**2.351* (0.801)**						**2.397* (0.829)**	**2.001* (0.661)**	
MUS						-1.098 (1.058)	-0.037 (1.089)		
LAM	**-1.28*** (0.699)**					-1.206 (0.813)	-0.571 (0.818)	-0.237 (0.675)	
SSA	-0.181 (0.800)					2.111 (2.071)	2.452 (2.011)	2.780 (1.920)	
EAS	0.806 (0.951)					-0.184 (1.091)	0.202 (1.066)	0.489 (0.971)	

Note: Each equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

Section 5: Conclusion

As we defined earlier that the main purpose of this study was to find out the main determinants of corruption or through which variables we can control the corruption, and specifically the relationship between corruption and GDP growth. As Treisman (2000) mentioned that corruption is hard to study empirically, and its many likely determinants interrelate in complicated ways. Some can change quickly and may be caused by corruption as well as the reverse. As with other types of criminal activity, it is hard to observe directly, and so researchers must rely on surveys of corruption's victims, the accuracy of such is often difficult to assess. In this study, we used the data of Corruption from Transparency International. It is available for a recent time period (1995 to 2005). To achieve the objective of the study, we used cross-country data consisting of 104 countries and 11 years of time frame from 1995 to 2005. The main conclusion of this study is as follows.

According to the first objective of the study, the main determinants of corruption, we found some strong conclusions. By using different combinations of economic and cultural variables we found that real GDP per capita is the important determinants of corruption. From poor traditional country to rich and liberalized economy, corruption strongly decreases[27]. Two variables related to education strongly affect the corruption index that is secondary school enrolment and public spending on education. A higher level of education fosters a sense of nationalism, self-importance and public duty in the community. It also raises the public's awareness of their rights for the services of the bureaucrats. Another main determinant of corruption found in this study is unemployment rate. By controlling unemployment rate one can overcome corruption level. FDI also prove to be important source of corruption. Through FDI we can overcome the problem of Corruption. It creates the competitiveness in the economy and domestic organizations and firms also try to perform well. So the main determinants of corruptions are log of GDP per capita, secondary school enrolment, and public spending on education, FDI, and unemployment rate. These variables are affecting corruption index. In other words through combination of these variables we can change the existing corruption level. In cultural dummies we used new variable MUS for Muslim countries but is not proved to be significant. Other cultural variables EU, OECD, HY (high income countries) and LAM (Latin America) are significant in most of the regression for corruption index.

In the second place we analyzed the relationship between corruption and growth. For this purpose we used the Barro type equation by applying fixed affect and set of control variables. According to results presented in previous chapter, it is found that in growth model the corruption does not affect the growth of GDP per capita, while corruption does affect the log of GDP per capita. So the relationship between corruption and level of real GDP per capita is important and same results are found by Paldam (2002). We used Corruption index as a dependent variable in part 1 while, in second part we used log of GDP per capita and GDP growth as a dependent variable.

A central message of this study is that corruption can be controlled through the combination of determinants found in this study. For example, the transition from poor to rich country can decrease the corruption, but it is long run phenomenon. Increasing the level of FDI, effective policy to cope with unemployment, and policy design to promote education, through government expenditure on education can affectively compete with corruption level in developing countries.

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End Notes

[1] The new empirical research on the determinants of corruption attempts to determine the causes of corruption and concentrates mostly on cross-country analyses. See, for example, the studies by Ades and DiTella (1997); LaPorta et al. (1997); Treisman (2000); Fisman and Gatti (1999); and Swamy et al. (2001).
[2] Many other studies have used five-year averages for similar purposes. See, for example, Deinninger and Squire (1996), Li et al. (2000), Fabio and Sepulveda (2004), and Paldam (2001, 2002).
[3] Ali and Isse (2003) found secondary school enrolment as an important determinant of Corruption but he used the data set from 1995 to 1999. But in this study the data is from 1995 to 2005.
[4] We follow the specificantion of Barro and Sala-i-Martin (1995, Ch. 6).
[5] See, e.g., Bohn and Inman (1996).
[6] See, Gupta, Davoodi and Alonso-Terme (1998).
[7] Definition by Klitgaard, (1998).
[8] As pointed out by Bardhan(1997)
[9] For detail see, Aminur Rahman et, al. (2000).
[10] See, Gupta et al. (1998), Swamy et al (1999), and Husted (1999).
[11] For detail , see Paldam(2001, 2002), Treisman (2000), and Swamy et, al. (1999).
[12] For detail see, net source (http://www.transparency.org).
[13] For more detail about the conditions of error term see, Wooldridge, Jeffrey (2002).
[14] The **NLS** are a set of surveys designed to gather information at multiple points in time on the labor market activities and other significant life events of several groups of men and women. For more than 3 decades, NLS data have served as an important tool for economists, sociologists, and other researchers. For detail see home page http://www.bls.gov/nls/home.htm
[15] See, Hsiao, and Cheng (2003).
[16] Division of the model in two parts, "economic" and 'cultural' is inspired by the Paldam (2001, 2002).
[17] Many other studies have used five-year averages for similar purposes. See, for example, Deinninger and Squire (1996), Li et al. (2000), Fabio and Sepulveda (2004), and Paldam (2002, 20003).
[18] See Appendix table A1 to A3
[19] For detail see, Ali and Isse (2003) and same results are found by this study but he used the old data set from 1995 to 1999. but in this study the data is from 1995 to 2005.
[20] See World Bank Report (1997).
[21] Paldam (2001 and 2002) found it significant in economic model but when combined with cultural model it becomes insignificant. may be the difference in data period have different results

[22] Paldam (2000) find similar results for GDP growth
[23] Paldam (2000) found West Europe positive and significant, and Latin American negative and significant but not fully stable, our results are almost same with that study.
[24] The variables used as independent variables are same used in previous studies, see for example Mauro (1995), Fabio (2005), and Gupta et, all (1998) etc.
[25] The results of Fixed Effect with out time dummies are reported in Appendix table A4 andA5.
[26] Thre results for quadratic term of Corruption variable is reported in appendix table A5.
[27] Paldam (2000) found same results and defined that it follows a transition trend towards less corruption.

Abbreviation about Variables used in the study

LnGDP:	log of GDP per capita
GDPgr:	GDP growth rate
CRP:	Corruption Index from Transparency International, CPI)\
CPI:	Corruption Perception Index.
SED:	Secondary education enrolment rate
PUBSED:	Public Spending on Education
UNEMP:	Unemployment rate
GEXP:	Government Expenditure
FDI:	Foreign Direct Investment
OPEN:	Trade Openness % to GDP
LnGDP-1:	Initial GDP level
INV:	Investment
INFL: I	Inflation
POPgr:	Population Growth.
TR:	Tax revenue

Appendix
Table A1 (Determinants of Corruption 104 countries with out time dummies)

Variables	**Dependent Variable is Corruption Index by Transparency International**								
	1	**2**	3	**4**	**5**	**6**	**7**	**8**	**9**
LnGDP	0.205 (0.166)	**0.385** **(0.111)***	0.158 (0.125)	**0.332** **(0.075)***	**0.273** **(0.090)***	**0.293** **(0.090)***	**0.189** **(0.078)***	**0.175** **(0.047)***	**0.214** **(0.121)****
GDPgr	-0.173 (0.098)	-0.073 (0.063)	-0.107 (0.066)	-0.019 (0.046)	-0.048 (0.056)	-0.033 (0.057)	-0.009 (0.043)	-0.011 (0.023)	
SED	**0.014** **(0.006)****	**0.0102** **(0.005)****	**0.009** **(0.005)****	**0.014** **(0.004)***	**0.013** **(0.004)***				**0.009** **(0.005)****
PUBSED	**0.612** **(0.185)***		**0.608** **(0.148)***		**0.533** **(0.116)***	**0.621** **(0.116)***			**0.607** **(0.139)***

FDI	0.054 (0.045)	0.076 (0.025)							0.065 (0.022)**
GEXP	0.021 (0.04)	**0.043 (0.025)***	0.008 (0.026)				0.0213 (0.018)		-0.002 (0.026)
INV	0.036 (0.028)	-0.006 (0.020)							
OPEN	-0.007 (0.004)	-0.001 (0.004)	0.001 (0.003)					0.002 (0.0017)	
INFL	-0.061 (0.245)	-0.142 (0.135)							-0.038 (0.076)
POP	0.291 (0.276)	0.227 (0.187)							
UNEMP	-0.059 (0.048)	**-0.056 (0.033)***	**-0.077 (0.035)****				**-0.049 (0.024)****		-0.051 (0.034)

Note: Each equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countries), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

Cultural Model

Table A2 (Determinants of Corruption 104 countries with out time dummies)

Variables	**Dependent Variable is Corruption Index by Transparency International**					
	1	2	3	4	5	6
HY	**1.704 (0.568)***	**2.319 (0.624)***				**2.320 (0.386)***
OECD	1.185 (0.777)	2.217 (0.711)*	1.807 (0.401)*	3.360 (0.410)*	2.546 (0.388)*	1.794 (0.417)*
EU	**-2.167 (0.735)***		**-2.82 (0.424)***		**-2.103 (0.417)***	
LAM	**-1.585 (0.771)***		**-2.231 (0.487)***	-0.094 (0.472)	-1.351 (0.472)	
SSA	**-2.197 (0.876)***		**-2.697 (0.479)***		**-1.798 (0.461)***	
MDE			-0.543 ((0.814)	1.414 (0.943)	0.596 (0.829)	1.922 (0.799)*
EAS	-1.668 (1.231)	**0.332 (1.212)***	**-2.112 (0.665)***	-0.052 (0.740)		
SA	-1.699 (1.335)	-0.811 (0.896)	**-2.648 (0.788)***	-0.629 (0.905)		**-0.0368 (0.768)****
MUS	-1.428 (1.999)	-0.831 (0.510)	-1.409 (1.452)	-1.167 (1.555)	-1.752 (1.481)	-0.824 (0.763)

Note: ach equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)

Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

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Table A3. Economic and Cultural model combined
(Determinants of Corruption 104 countries with out time dummies)

Variables	**Dependent Variable is Corruption Index by Transparency International**							
	1	2	3	4	5	6	7	8
LnGDP	-0.0153 (0.097)	-0.001 0.099)	**0.013*** **(0.005)**	**0.021*** **(0.008)**	**0.175** **(0.064)***	**0.163** **(0.066)***	**0.159** **(0.066)***	0.049 (0.106)
GDPgr	-0.022 (0.055)	-0.025 (0.058)	-0.022 (0.05)	-0.009 (0.054)	0.027 (0.038)	0.046 (0.039)	0.007 (0.041)	-0.087 (0.056)
SED					**0.008** **(0.003)***	**0.007** **(0.003)****	**0.008** **(0.003)***	
PUBSED	**0.399** **(0.118)***	**0.463** **(0.114)***	**0.449** **(0.112)***	**0.447** **(0.117)***				**0.373** **(0.138)***
INFL	-0.025 (0.107)					-0.053 (0.08)		-0.041 (0.113)
UNEMP	**-0.060** **(0.03)****	-0.053 (0.032)		**-0.056** **(0.03)*****				**-0.075** **(0.031)***
GEXP						0.022 (0.016)		0.001 0.022)
FDI		0.037 (0.028)	0.039 (0.029)			0.026 0.017		0.036 (0.021)***
HY								2.557 (0.502)*
MUS	-1.415 (0.82)	-1.203 (0.774)			-1.04 (1.426)	-0.696 (0.442)	-0.776 (0.475)	
EU	**1.18** **(1.127)**		**1.569** **(1.430)**	**0.13** **(0.447)**		**1.505** **(1.346)**	**1.767** **(1.357)**	
OECD	1.35 (0.510)*	1.810 (0.388)*		2.036 (0.401)*	2.353 (0.353)*		2.079 (0.368)*	
SA							-1.162 (0.938)	
MDE		-1.333 (1.299)						
LAM	**-1.26** **(0.64)****				**-0.702** **(0.41)*****		**-0.829** **(0.43)****	
SSA	0.391 (1.501)	1.020 (1.415)	1.141 (1.41)	1.043 (1.486)		-0.680 (0.552)		
EAS	-1.03 (1.017)	-0.287 (0.910)	-0.974 (0.77)	-1.145 (0.826)	-0.882 (0.558)		-1.041 (0.570)**	

Note: ach equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

Table A4(Growth Model 104 countries with out time dummies)

Variables	**Dependent Variable is Log of GDP Per Capita** (Barro Equation with Set of control variables)								Fixed Effect
	1	2	3	4	5	6	7	8	
LGDPpc(-1)	0.195 (0.082)	0.093 0.111)	-0.105 (0.157)	-0.156 (0.147)	0.079 (0.084)	0.193 (0.094)	0.074 (0.060)	0.077 (0.095)	-0.378 (0.0662)
CRP	**0.312* (0.053)**	**0.193* (0.070)**	**0.224** (0.104)**	**0.185** (0.093)**	**0.245* (0.067)**	**0.271* (0.065)**	**0.297* (0.047)**	**0.215* (0.074)**	-0.194 (0.134)
SED	0.001 (0.003)	**0.006*** (0.002)**	0.002 (0.005)		-0.002 (0.003)	0.001 (0.003)			
PSEdu		0.060 (0.103)	0.086 (0.152)	0.099 (0.142)		-0.027 (0.087)		-0.011 (0.094)	
FDI			-0.021 (0.036)						
GovCons		**0.040** (0.020)**	**0.075* (0.030)**	**0.073* (0.027)**	0.016 (0.015)			0.031 (0.020)	
GCFinv			0.015 (0.022)	0.016 (0.020)	0.009 (0.013)			0.018 (0.015)	
LCPI			0.134 (0.205)						
POPgr			-0.126 (0.170)	-0.100 (0.160)	-0.135 (0.123)	**-0.244** (0.118)**		-0.212 (0.164)	
UNEMP		**-0.04*** (0.02)**	-0.008 (0.040)	0.006 (0.036)					
TR			0.019 (0.028)	0.013 (0.025)					
OECD					**0.66** (0.324)**			0.486 (0.355)	
EU							0.166 (0.255)		
LAM					**0.59*** (0.350)**		0.351 (0.259)	**0.81*** (0.438)**	
SSA					**-0.87** (0.396)**		**-1.002* (0.287)**	**-0.92*** (0.497)**	
EAS					-0.023 (0.461)		-0.089 (0.381)	0.655 (0.689)	

Note: ach equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

Table A5 (Growth Model 104 countries with out time dummies)

Variables	**Dependent Variable is GDP per capita Growth** (Barro Equation with Set of control variables)					
	1	2	3	4	5	6
LGDPpc(-1)	0.043 (0.142)	-0.025 (0.271)	-0.072 (0.260)	-0.076 (0.261)	-0.091 (0.262)	-0.26*** (0.15)
CRP		0.155 (0.171)	0.137 (0.175)	0.135 (0.177)	-1.635 (1.448)	-0.314 (0.867)

CRP^2					5.612 (6.312)	1.361 (3.837)
SED		**0.034* (0.009)**	0.0015 (0.013)	**0.019** (0.011)**	**0.010 (0.009)**	**0.014* (0.006)**
PSEdu		0.425 (0.263)	0.346 (0.265)	0.355 (0.263)	0.357 (0.265)	
FDI				0.041 (0.057)	0.052 (0.058)	
GovCons		0.041 (0.05)	0.042 (0.048)	0.034 (0.048)	0.043 (0.049)	-0.0005 (0.029)
GCFinv		0.028 (0.037)	0.017 (0.037)	0.019 (0.037)	0.013 (0.038)	0.078* (0.026)
TrOpen		0.004 (0.006)	0.003 (0.007)	0.004 (0.006)	0.006 (0.007)	
LCPI		-0.338 (0.329)		-(0.086) (0.293)		-0.281 (0.311)
POPgr			-0.122 (0.289)	-0.081 (0.293)	-0.070 (0.295)	-0.143 (0.20)
UNEMP		-0.001 (0.064)	-0.001 (0.065)	0.014 (0.067)	-0.009 (0.073)	

Note: ach equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).

Table A6 (Growth Model 104 countries with out time dummies)

Variables	**Dependent Variable is GDP per capita Growth** (Barro Equation with Control Set of control variables)								Fixed Effect
	1	2	3	4	5	6	4	8	
LGDPpc(-1)	-0.070 (0.127)	-0.072 (0.127)	-0.086 (0.126)	-0.150 (0.189)	-0.106 (0.187)	-0.016 (0.181)	0.008 (0.196)	0.023 (0.193)	0.031 (0.143)
CRP	-0.208** (0.089)	-0.21* (0.087)	-0.074 (0.099)	-0.195 (0.129)	-0.180 (0.128)	0.002 (0.133)	-0.067 (0.143)	-0.056 (0.141)	0.053 (0.292)
SED				0.030* (0.006)	0.021* (0.007)	0.019* (0.008)	0.006** (0.003)		
PSEdu							0.099 (0.182)	0.123 (0.178)	
GovCons				-0.0058 (0.0348) 7	-0.0001 (0.034)	-0.005 (0.033)	-0.010 (0.036)	-0.007 (0.035)	
TrOpen		**0.042* (0.012)**	**0.038* (0.014)**	**0.029* (0.013)**	**0.031** (0.016)**				
POPgr				-0.130 (0.320)	-0.173 (0.320)	0.366 (0.346)	0.510 (0.381)	0.446 (0.372)	
UNEMP				**-0.103** (0.049)**	**-0.11** 0.049)**	**-0.114* (0.046)**	**- 0.117** (0.051)**	**-0.127* 0.049)**	

EU			**1.434*** (**0.548**)			**2.554*** (**0.778**)	**3.085*** (**0.852**)	**2.994*** (**0.829**)	
LAM	-1.531* (0.493)	-1.552* (.479)	-0.760 (0.555)	-1.52*** (0.822)	-1.319 (0.809)	-0.773 (0.776)	-0.231 (0.802)	-0.220 (0.795)	
SSA	-0.800 (0.539)	-0.808 (0.536)	0.048 (0.615)	1.726 (2.126)	1.946 (2.125)	2.165 (1.994)	2.207 (1.961)	2.471 (1.931)	
MDE			0.975 (0.909)						
EAS	0.443 (0.761)	0.451 (0.758)	1.276 (0.801)	-0.033 (1.098)	-0.383 (1.067)	0.323 (1.022)	-0.713 (1.246)	-0.666 (1.235)	
MUS	0.095 (0.539)			-1.403 (1.080)					

Note: ach equation is estimated by GLS (using OLS residuals). Data starts from 1995 to 2005.
In parenthesis standard errors are reported. . (Using robust standard errors). (*=1%, **=5%, ***=10%)
Where, LnGDP-1 (Initial Log of GDP per capita), CRP (Corruption Index), GDPgr (GDP growth), SED (Secondary school enrolment), PUBSED (Public Spending on Education), INFL (Inflation), GEXP (Government Expenditure), POP (Population Growth), and UNEMP (Unemployment). MUS (Dummy for Muslim countries), OECD (Dummy for OECD countires), LAM (Dummy for Latin American Countries), SSA (Dummy for Sub-Saharan African Countries) and EAS (Dummy for East Asian Countries).