

**“Impact of Corruption on Economic Growth; Evidence from
South Asia”**

Thesis



Dated: 05 August, 2019

Ateeq Ullah

MSc Economics (2017-2019)

Supervisor

Dr. Karim Khan

Associate Professor, PIDE

**Department of Economics
Pakistan Institute of Development Economics
Islamabad**



Pakistan Institute of Development Economics

CERTIFICATE

This is to certify that this thesis entitled: **“Impact of Corruption on Economic Growth; Evidence from South Asia”** submitted by Mr. Ateeq Ullah is accepted in its present form by the Department of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree of **Master of Economics**.

External Examiner:

Dr. Anwar Shah
Assistant Professor
Quaid-i-Azam University
Islamabad

Supervisor:

Dr. Karim Khan
Associate Professor
PIDE, Islamabad

Head, Department of Economics:

Dr. Karim Khan
Associate Professor/Head
Department of Economics
PIDE, Islamabad.

Dedication

My humble effort I dedicate to my sweet and loving

Father & Mother

*Whose affection, love, encouragement and prays of day and night
make me able to get success and honor.*

Along with all hard working and respected

Teachers

Table of Contents

Abstract	01
Chapter 01	
Introduction	02
1.1. Defining Corruption	02
1.2. Causes of Corruption	03
1.3. Consequences of Corruption	04
1.4. Motivation of the Study	05
1.5. Objective of the Study	05
1.6 Organization of the Study	05
Chapter 02	
Literature review	06
2.1. Introduction	06
2.2. Corruption Adverse Economic Growth	06
2.3. Corruption Enhance Economic Growth	08
2.4. Ambiguous impact of Corruption on Economic Growth	09
2.5. Corruption and Economic Growth Level in South Asia	09
Chapter 03	
Theoretical Framework	11
3.1. Theoretical Framework about corruption and economic growth	11
3.2. Economic growth and different theories about economic growth	12
Chapter 04	
Data and Methodology	15
4.1. Data	15
4.2. Methodology	18
Chapter 05	
Empirical Results	21
5.1. Introduction	21
5.2. Descriptive Statistics	21
5.3. Interpretation of Regression Results	22
5.4. Conclusion	24

Chapter 06	
Conclusion and Policy Recommendation	25
6.1. Conclusion	25
6.2 Policy Recommendation	25
References	26
Appendix	30

List of Tables

Table 01: Corruption and growth rate In South Asia	10
Table 02: The Variables and Data Sources	15
Table 03: Descriptive Statistic (common sample)	21
Table 04: Correlation Matrix	22
Table 05: Fixed Effect Model	23
Table A1: Pooled OLS	30
Table A2: Random Effect Model	31
Table A3: Hausman Test	32
Table A4: Wald Test	33

Abstract

This study inspected the influence of corruption on economic growth of South Asia incorporated panel data from 2002 to 2017 using Pooled OLS, Fixed effect and Random effect model. Hausman and Wald test was employed for choosing appropriate model. The appropriate model was fixed effect which show that corruption have adverse effect on economic growth of South Asia. Increase in level of corruption will decline the economic growth of the region.

Chapter 01

Introduction

Corruption is not a nascent concept for it is an ancient concept that remained under consideration and was matter of apprehension for almost every passed kingdom. It is very old phenomena. About two millennial years back Kautilya the prime minister of Indian king, wrote about corruption in his famous book Arthashastra. In order to demonstrate the medieval distrust and distaste for the illicit and extortive acts Seven years ago, Dante dumped the bribers in the abysmal parts of hell. Corruption have prominent role in some plays of Shakespeare. But today corruption is center of attraction for the whole world.

Bayley (1966) observe that corruption is positively correlated to economic proliferation . Corruption improves administration services through improving the quality of public officers, thereby enhance economic growth. Leite and Weudmann (1999) theoretically in literature found a positive role being played by corruption in economic growth depends on static efficiency argument, essentially considering bribing as a type of Coasean bargaining process. Mauro (1995) find that corruption reduce private investment due to which economic growth become lowers. Both economical and statistical sense approbated the findings. Swaleheen (2011) used panel data from 1984-2007 to examine how corruption and economic proliferation are related each other. He witnessed that corruption and economic growth are related linearly and significantly. Corruption effects the economic growth adversely. Increase in level of corruption lower GDP per capita by declining economic growth and vice versa.

1.1. Defining Corruption

The phenomena of corruption is a composite and multiplex. It is hard to define it in a single statement. According to Transparency International it is “the abuse of entrusted power for private use” this definition is the result of Corruption Perceptions index of Transparency International. They further divide corruption into grand, petty and political. Grand corruption is the misappropriation of high level of power to change the functional structure of state for benefiting the leaders. Political corruption occurs by elite through manipulating policies, legislation and institutions according to their own interest. Petty corruption appear between the interaction of citizen and administration at institute like hospital, school and policies department (Jain, 2001).

The world bank define corruption as “ the abuse of public power for private benefits”. According to this definition it does not mean that corruption exist only in public sector. Corruption exist both in public and private sectors (Tanzi, 1998).). Broadly corruption is the abuse of public office for private benefits. In corruption public officer make unilateral abuses like embezzlement and nepotism. Corruption exist both in politician and bureaucrats and it can be organized or unorganized, petty or grand.

1.2. Causes of corruption

The three important causes of corruption are opportunities, salaries and Policies. Opportunities depend on the level of involvement of public officer in the administration. Low salaries is also the cause of corruption because officer need high money for maintaining his/her status. Policies depend on the chances of detection and punishment.(Palmier, 1985). Mostly corruption occur in those countries where there is low income, countries having close economy, low freedom for media and relative low level of education. The most common element which influence the development of corruption are political and economic environment, professional ethics, legislation, customs, traditions and habits. (Svensson, 2005).

Paolo Mauro (1997) stated that low-level corruption arise when public officer received low wages compare to private officers. Natural resource endowment (oil, gold, exotic lumber) contribute to corruption when public officers sale these goods it far exceeded price compare to the cost of their extraction. Sociological factors like ethnic, linguistic and religion correlated with corruption. Public officers favours those people who belong to their ethnic, linguistic or religion.

Gialt de Graaf (2007) divide the causes of corruption into six different theories which are **Public choice theory** tell that people are rational and they want to maximize his/her utilities. Public officers make rational decision and do corruption if the advantage of corruption is overweight to the disadvantage of corruption. If disadvantage overweight the advantage of corruption than they do not make corruption. **Bad Apple Theory** look the cause of corruption in individual agent. Causes of corruption depend on the individual moral level. That how he/she see the corruption morally that it is good or bad for him/her. People are assume to act according to their moral values. The main cause of corruption is greed. **Organizational Culture Theories** assume that “a certain culture - leads to a certain mental state”. They look cause of corruption

in the culture and in organization where officers are working. People have a certain mental state due the influence of culture and organization which leads to corrupt behaviour. ***Clashing Moral Theories*** finding the distinction between one's private and one's public roles. As the norm of the societies directly influence the norm of individual so people become corrupt. Like in private sector people gave gifts for getting jobs for their friends and relative. In these theories we looking cause of corruption at the society level. ***The Ethos of Public Administration Theories*** focus on the morality level of society. The moral value of society may be wrong which leads to corruption. Political and economic structures are studied in these theories. Absence of moral judgment, lack of societal pressure and influence of power on the society lead to corruption. ***Correlation Theories*** mainly focus on the common characteristics of causes of corruption at all level. In these theories researcher find the relationship of different factors to corruption. The most important categories are historical, cultural variables, urbanization and education which have strong influences on corruption.

1.3. Consequences of corruption

The economically, politically and morally consequences of corruption have been widely studied. The consequences of corruption find by different scholar , researchers and international organization are to be numerus , devastating and diverse. Ban Ki-moon on Anti-corruption Day 2011 state that “corruption afflicts all countries, undermining social progress and breeding inequality and injustice”. Empirical results show that corruption reduce total investment (public investment and private investment) Impact of corruption on public investment is predominantly disputed while on private investment it is quite simple. Private investor bribe the officers for getting licenses and permits which make the project costly and not attractive (Enste and Heldman, 2017). The same result is also find by (Mauro, 1995) that is negatively associated with investment rate.

Increase in corruption level reduced inward foreign direct investment in the host country. High corruption in host country may arise high level of uncertainty and risk for the investor (Wei, 2000a). Corruption also effect distribution of income. Corruption significantly increase income inequality. There is positive relationship between income inequality and corruption (Gupta, Davoodi and Alonso-terme, 2002). Corruption lowering government revenue which ultimately reduce growth because government need finance for productive

spending (Tanzi and Davoodi, 1997). The tax revenue become decrease when the bribes took place between taxpayer and tax inspector (Hindriks, Keen and Muthoo 1999).

1.4. Motivation of the study

The motivation behind this study is that South Asia is abounded with natural endowments, having geographic advantage, large number of labor force and accumulated high capital and technology but still unable to join the group of developed nation. Is there any other factor which effect economic growth of South Asia ? Different study has been conduct on the effect of corruption on economic growth at individuals level. But there is still need to study the effect of corruption in South Asia on economic growth.

1.5. Objective of the study

The objective of this paper is to investigate that evidence support null hypothesis or alternative hypothesis

H_0 = Increase in level of corruption will adverse economic growth

H_1 = Increase in level of corruption will enhance economic growth

1.6. Organization of the study

The study is organized into 6 chapters. In Chapter 2 we write the literature review of the study. Chapter 3 deals with theoretical frame work of the study. Data and Analytical frame work of the study is discuss in chapter 4. In Chapter 5 we do empirical analysis of the study. Finally, chapter 6 is about concludes and policy implications.

Chapter 02

Literature Review

2.1. Introduction

Plethora of studies are being conducted to scrutinize the relationship between corruption and economic growth. The studies demonstrate different results. The reason for this heterogeneity of findings is that different methods are being adopted by the different countries to find the relationship between the corruption and economic growth coupled with different techniques adopted for estimation and time period. Some studies exhibit the positive relation between economic growth and corruption while antithesis to this other studies suggest that the aforementioned variables are negatively related. Positive results show that corruption act as a lubricant for the economic wheel of the economy while the adherent of the negative studies say that it halts the economic growth and retards the economic growth and thus affecting adversely economic growth of the country. Some papers also of the view that corruption have ambiguous effect on the economic growth.

2.2. Corruption adverse economic growth

Swaleheen (2009) by using panel data from 1984-2007 to scrutinize the fact that how corruption affects the economic growth the impact. The dependent variable of his study is GDP per capita while explanatory variable is corruption (ICRG index), other explanatory variables are net primary enrollment rate, secondary enrollment rate, openness, political stability, population increment rate, investment and government expenditure. Genialized Method of Movement (GMM) method is used to control endogeneity of investment and corruption. This is significantly proved that GDP per capita is negatively affected by the corruption. There is non-linearity between Corruption and economic growth.

Corruption can abate and retard the economic hike through different channels. Investment plays a very crucial role in the productivity of capital. How corruption affects the public investment Tanzi and Davoodi (1997) used Corruption index of Business International (BI) and Political Risk Services (PRS). They conclude that higher corruption leads to higher public investment, reduction in the revenue of government and low quality of public infrastructure. All these effect will automatically decline the economic growth rate.

(Aman and Ahmad, 2011) used panel data to estimate the linear quadratic association in between economic hike and corruption because the exacting chronology on linear tie-up between corruption and economics growth has failed to differentiate that corruption reduce or enhance growth. The corruption clue of International Country Risk Guide (ICRG) is utilized in this paper. Genialized Method of Movement (GMM) is used to deal with endogeneity problem. Negative association in between corruption and economic growth is being founded in their study and study also demonstrates abatement in corruption rate causes hikes in the economic growth.

(Mauro, 1995) find in that corruption reduce private investment due to which economic growth become lowers. Both statistical and economic sense approbates the significance of the result . They used both OLS and 2SLS techniques to analyse that how the corruption affects investment. “A one-standard-deviation increase (an improvement) in the corruption index is associated with an increase in the investment rate by 2.9 percent of GDP”.

Lauritzen (2012) used panel data from 1995-2009 for 29 former soviet states to investigate that how the corruption affects the economic growth. For estimation Pooled OLS, Fixed effect and Random effect is being used. In which no direct effect is found between corruption and economic hikes , however the conditional effect was there of corruption on economic increment . In conditional effect he find that corruption lower the economic hikes assuming the linear association between corruption and investment. Higher corruption is confluence with little investment which will ultimately slow down the economic growth rate.

Boussalham (2018) tried to scrutinize the tie-up between economic growth and corruption in Mediterranean states , by utilizing the panel data from 1998 to 2007. Fixed effect model (FEM) and random effect model(REM) were adopted to find the impact. The most appropriate model in both of them was selected on the bases applying of different tests. GDP per capita is taken as dependent variable, measuring the economic hikes , while the explanatory variable is Corruption perception index of Transparency International (TI) . The result approbates that economic growth is being affected negatively by the corruption of concerned Mediterranean’s countries.

Meon and Khalid (2005) used Generalized Least Square method (GLS) to investigate that how the corruption effects the investment , governance quality and economic growth. They incorporate panel data from 1970 to 1998 for 63 to 71 countries. They found the

adverse and negative confluence between the corruption and economic hikes irrespective from corruption's impact on investment.

Ordinary least square (OLS) technique is being used by Lambsdorff (2002) to examine the tie-up between GDP/head and corruption. Dependent variable is corruption (TI corruption perception index) while independent variable is GDP per capita. The tie-up between corruption and GDP per head is negative and statistically significant. Lambsdorff (1999) also stated that A sample regression may not find causal link between corruption and economic boom.

2.3. Corruption enhance economic growth

Rahman, Kisunko and Kapoor (2007) used "Barro cross-country regression" method to sort out the association between the corruption and economic growth. The explanatory variable is GNP per capita while independent variable is corruption index of International Country Risk Guide (ICRG) . The coefficient worth of corruption index is 0.66 with t-statistic value is 1.92, which confirms that corruption is positively related to economic growth. Jumps up in the level of corruption will enhance the economic hikes in Bangladesh.

Acemoglu and Verdier (1998) proved that sometime corruption help in economic growth. To encourage investment contract is necessary in some economy. To enhance contract agents are require in public sector, paying rent to these agent can reduce corruption which is costly. To be optimal some corruption are required for not enforcing property right fully.

(Bayley, 1966) theoretically observe the favourable impact of the corruption on economic growth. Corruption improves administration services through improving the quality of public officers, increase the number of public officers, make changes in traditional societies and act is solvent for solving issues of interest and ideology, thereby enhance economic growth.

Ling and Nordahl (2011) run four regression for 123 countries over period of 2004-2008 using 8 variables to investigate the effect of corruption on economic growth. The 8 variables GDP per capita, initial GDP per capita, education, openness, population increment , capital formation and corruption perception index. The expected was that corruption has negative effect on economic growth. But the results of estimation was contradicts with expected outcome. It is statistically approbated that corruption has significant and positive impact on economic hikes. Countries having high level of corruption are mostly developing countries.

2.4. Ambiguous impact of corruption on economic growth

Drury, Krieckhaus and Lusztig (2006) scrutinized that how the corruption may effect the economic growth in democratic and non-democratic countries. Panel data was being utilized by them for 100 states over time period of 16 years. Two different regression was run for both states adherent of democratic type and advocates non-democratic norms . The result of regression exhibit that economic growth is not effected by the corruption of democratic countries while in case of non-democratic states it is negative.

Shabbir, Anwar and Adil (2016) analyse the sort of impact of corruption and political stability on economic growth rate. Additional explanatory variables that are used are government expenses , population growth rate, education and investment. The panel data is used for eight countries from period 1995 to 2013 applying GMM method. It is being concluded by them that corruption is negatively associated with economic growth in highly politically stable country and while in case of the country with relatively low political stability corruption is positively and favorably related to economic growth.

2.5. Corruption and Economic Growth level in South Asia

South Asia is a developing region. South Asian countries are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka . Afghanistan is the most corrupt country in south Asia. According to corruption perception index of Transparency international the total score of Afghanistan is 16 out of 100 and its rank is 172 out of 180. “War on terror” create a wide opportunities for public officers to abuse his power in Afghanistan. Bhutan is on the other side of spectrum, the least corrupt country in south Asia. Its ranked 25 and having score 68. Maldives and Nepal have the same rank 124 and having score 31 out of 100. Pakistan and India having rank 117 and 78 with CPI score 33 and 41 respectively. Both countries have done much in the recent decade to reduce corruption. Fight against corruption was the main manifesto for politicians of both countries. Bangladesh is the second most high corrupt country after Afghanistan in south Asia with rank 149 having score 26. Sri Lanka having rank 89 with CPI score 38.

The best way to measure economic growth is Gross domestic product. It includes all goods and services that a country has produce for sale. World bank use Gross national product for measuring of economic growth. South Asia recorded highest growth rate in the

region and need to increase export to sustain highest growth rate. According to World Bank estimation in 2017 Nepal had achieved the highest GDP growth rate in South Asia. Afghanistan had the lowest GDP growth Rate in south Asia. The GDP growth rate was low in Afghanistan in 2017 due to the security, political challenges and low rainfall. Growing industrial production, investment and remittances remains the growth rate of Bangladesh high. Tourism and construction had very important role in economic growth of Maldives in 2017. Economic growth increase in Pakistan from 4.6 percent in 2017 to 5.4 percent in 2018 due major infrastructure projects and low interest rate.

Table 01

Corruption and growth rate In South Asia

Transparency international 2018 and World Bank 2017

<i>Country</i>	<i>Rank</i>	<i>Corruption Perception Index</i>	<i>GDP Growth Rate (%)</i>
Afghanistan	172	16	2.6
Bangladesh	149	26	7.3
Bhutan	25	68	5.8
India	78	41	6.7
Maldives	124	31	6.2
Nepal	124	31	7.5
Pakistan	117	33	5.4
Sri Lanka	89	38	3.1

Chapter 03

Theoretical Framework

3.1. Theoretical Framework about corruption and economic growth

In previous literature review chapter we observe that corruption enhance or adverse economic growth. Mostly literatures is about the adverse effect of corruption on economic growth. Corruption diverting the resources from public gains to private ones which ultimately reduce economic growth. It reduced private investment by increasing the cost of project approval and creating political instability [Mauro (1995), Tanzi (1997)]. Corruption reduced both domestic and foreign investment in two ways. First, bribe become costly to the investors when detected. Secondly, the investors considers bribe as extra tax on the investment Pellegrini and Gerlagh (2004).

Corruption lowering government revenue which eventually reduce economic growth because government need finance for productive spending (Tanzi and Davoodi, 1997). The tax revenue become decrease when the bribes took place between taxpayer and tax inspector (Hindriks, keen and Muthoo 1999).

Mo (2000) investigate the adverse effect of corruption through three transmission channels which are human capital, investment and political instability. The political instability transmission channel has the most important role in reducing economic growth compare to others two channels. High political instability leads to uncertainty and risk which reduced investment and productivity. Wei (1999) study the adverse effect of corruption on economic growth through the cannal of openness. Bribe create trade barriers and reduced economic freedom. The author also suggest that countries having less open economy and trade restriction tend to be highly corrupt.

(Bayley, 1966) theoretically discuss that corruption decline economic growth by loss in revenue through tax, inefficiency of government by hiring incompetent person and lowering the power of government institutes. Private investor bribe the officers for getting licenses and permits which make the project costly and not attractive (Enste and Heldman, 2017).

On the other side, corruption enhance economic growth by surmounting the government inefficiencies. Acemoglu and Verdier (1998) proved that sometime corruption help in economic growth. In some economy contract is necessary for high investment. To enhance contract agents are require in public sector, paying rent to these agent can reduce corruption which is costly. To be optimal some corruption are required for not enforcing property right fully. Paying bribe can solve the issues between investors and public officers which was arise due to the rigidities and behavior of public officers. These unresolved issues reduce investment and act as a constraint on economic growth. Furthermore bribe also create certainty and suitable environment for investor by controlling and affecting the decision of public officers Leff (1964). Corruption increase investment by avoiding delay from public officers Huntington (1968).

Paying bribe can help in achieving social optimal equilibrium Lui (1985). (Bayley, 1966) also theoretically observe the positive effect of corruption on economic growth. Corruption improves administration services through improving the quality of public officers, increase the number of public officers, make changes in traditional societies and act is solvent for solving issues of interest and ideology, thereby enhance economic growth.

3.2. Economic growth and different theories about economic growth

The Noble Prize winner of 2018 Paul Romer says that Economic growth “is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another”. It occur when people take resources as a input and rearrange then in such a way which become more valuable. According to Foley (2012) Economic Growth is the expansion of expenditure and income, which is distributed among people and allow them to access good, services and economic security. Economic growth is also known as the expansion of employment, production, resource use and environmental damage.

(Palmer, 2012) refer economic growth to the intensification of the production capacity of a country as a result the country become able to produce more units of goods and services. Economics growth is the synonymous for increases in standard of living because we normally measure standard of living from the availability of goods and services which people have to use. He further divide economic growth into two types potential growth and actual growth. In potential growth we are looking to the supply side of an economy, that how much

the economy is capable of producing more goods and services or improving the existing version of the process while actual growth occurs through an increase in demand.

To know about the impact of corruption on economic growth it is necessary to study about the history of economic growth, that is, is there any important role of corruption in economic growth?

Mercantilism: In real mercantilism is not the theory of economic growth but it put some base for economic growth. It became popular at the start of industrial revolution. The literature about economics written from 1500 to 1750 is known as mercantilism. The most important mercantilists were Thomas Mun, James Stewart, Giovanni Botero, Antonio Serra, Jean Bodin and Colbert. They argue that the economy of a country would grow if they accumulate precious metal and gold through increasing exports and decreasing imports.

Classical Theory: Adam Smith wrote in "Wealth of Nations (1776)" that to increase economic growth there should be a role for the market in determining supply and demand, labor would be specialized, land would be fully utilized and agriculture should be in surplus.

David Ricardo divided the economy into agriculture sector and industrial sector. Agriculture sector is subjected to law of diminishing returns of labor and capital. Labor should be applied up to that level which has high marginal productivity. Due to which there would be labor surplus and capital accumulation as a result the economy will grow rapidly. The surplus labor will then be applied to industrial sector which is subjected to constant returns to scale which ultimately helps in economic growth because the economy is working under the law of comparative advantage.

In "An Essay on the Principle of Population" Malthus wrote that population grows exponentially while the supply of food grows arithmetically. He predicted that a time will come when there would be no food to feed itself, so we should increase the yield of food through improvement in technology and control population.

Neo-Classical theory: In new-classical economics the most famous model of growth is the Solow-Swan model. It explains long-run economic growth by looking at the accumulation of capital, productivity of labor and technology. They believe that a sustained rise in capital investment will temporarily increase the growth rate. Change in the economy will occur over time as a result of change in population rate, saving rate and technology progress. To increase the growth rate

country should acquire high supply of labor, efficient productivity of labor and capital and technology progress.

Harrod Domar model stated that economic growth rate depend on the function of saving rate. Saving is necessary to finance investment, which further create more growth. In Asia saving is the important factor behind investment. Saving and investment are the key determine of growth rate.

Endogenous Growth Theory: Paul Romer and Robert Lucas developed endogenous growth theory. They focus on the concept of human capital. Worker with skill , knowledge , education and training can help to increase rates of technology progress. The governments should encourage innovation to increase economic growth. It is not necessary that Increasing labor productivity will have always diminishing return, it may be increasing return. Free market, reducing regulation and subsidies are also necessary for economic growth.

Chapter 04

DATA AND METHODOLOGY

4.1. DATA:

The study is based on a panel data set from 2002 to 2017 for seven countries of south Asia which are Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. The important feature of panel data is that it cover both cross-section and time-series change in variables. All data points are taken from the website of World Development Indicators (WDI).

Table 02

The Variables and Data Sources

Variables	Explanation	Source
<i>Log(GDP/capita)</i>	<i>GDP per capita (thousands)</i>	<i>World Bank World Development Indicators (WDI)</i>
<i>CC</i>	<i>Control of Corruption Index (-2.5 to 2.5)</i>	<i>World Bank World Development Indicators (WDI)</i>
<i>Log(FDI)</i>	<i>Foreign direct investment (millions)</i>	<i>World Bank World Development Indicators (WDI)</i>
<i>PG</i>	<i>Population Growth rate (percentage)</i>	<i>World Bank World Development Indicators (WDI)</i>
<i>GSE</i>	<i>Gross secondary enrollment (percentage)</i>	<i>World Bank World Development Indicators (WDI)</i>
<i>Log(GE)</i>	<i>Government expenditure (millions)</i>	<i>World Bank World Development Indicators (WDI)</i>
<i>INF</i>	<i>Inflation Rate (percentage)</i>	<i>World Bank World Development Indicators (WDI)</i>

Dependent Variable:

GDP per capita is our dependent variable on which we will check the effect of other independent variable. GDP per capita is the total output of country divide by its population. We will check direct impact of control of corruption, foreign direct investment (fdi), population growth, gross secondary enrollment, government expenditure and inflation on GDP per capita.

Independent Variables:

In this study we include total six independent variables which are Control of Corruption index, Foreign direct investment, population Growth Rate, gross secondary enrollment, government expenditure and inflation. Control of Corruption is our main variable and others all are explanatory variables.

Control of Corruption Index:

Control of corruption index is one of the six world governance indicators constructed by world bank to capture corruption. It scale from -2.5 to 2.5. where there is low value of index show high corruption and having high level of index show low level of corruption.

This indicators measures petty corruption, grand corruption, effectiveness of state's polices, institutional framework to prevent corruption, irregular payment, Nepotism, cronyism, patronage, public trust on politician in financing and involvement of elected officials, border officials, tax officials, judges, and magistrates in corruption,

Foreign direct investment:

It is the investment of individual or firm of home state in other foreign state for business determination. Foreign direct investment is beneficial for both home and foreign state. The advantages of foreign direct investment is comparative low cost of worker, incentives like taxes and subsidies, improvement of human capital, diversification of market, favored tariffs, economic encouragement and access to management proficiency, skills, and technology.

Population Growth rate:

It is the rate of increase in the number of people in a country in a given period of time. Positive growth rate show that population is increasing and negative growth rate show that the population is decreasing. Zero population rate mean that there is no change in population , number of individuals are same in both time periods.

Gross secondary enrollment:

Secondary education is basic education which start from primary level and end off at 10th grade. Gross secondary enrollment ratio is the ratio of total enrollment of students to that specified level of education regardless of their ages.

Government expenditure:

Government expenditure include the purchase of good and services, transfer payment, national defense and social security. The relation of government expenditure with economic growth is ambiguous.

Inflation Rate:

Inflation is the persistent increase in general price level. The percentage change in the price level due to devaluation of currency in specified period is known as inflation rate. The most useable indicator for measuring inflation is consumer price index(CPI), Producer price index (PCI) and GDP deflator.

4.2. Methodology

We use panel data in our study because panel data have advantages like it is more informative compare to other types of data, there is less linear relation among variables, high variability and high degree freedom. To find the influence of corruption on economic growth we use three different panel analytic models: Pooled OLS model, Fixed and Random effect model.

In pooled OLS method we assume that there is no difference among the cross-sectional data. There is a common intercept and slope for all countries. Individuals have no unique characteristic within the measurement set.

$$\begin{aligned} \text{Log(GDP/capita)}_{it} = & \alpha + \beta_1 \text{CC}_{it} + \beta_2 \log(\text{FDI})_{it} + \beta_3 \text{PG}_{it} + \beta_4 \text{GSE}_{it} + \beta_5 \log(\text{GE})_{it} \\ & + \beta_6 \text{INF}_{it} + \mu_{it} \end{aligned} \quad (1)$$

Cross-sectional (i) = 1, 2 ... 7

Time period (t) = 1, 2, 3. . . 15

CC is control of corruption

FDI is foreign direct investment

PG is population growth

GSE is gross secondary enrollment

GE is government expenditure

INF is inflation

μ is the error term

In fixed effect model we have different intercept for all countries to capture unique characteristic of all countries. This method is also known is least square dummy variable (LSDV) estimator , because we using dummy variables in this model for each countries. Fixed effect method capture all effects which are specific to particular country.

$$\begin{aligned} \text{Log(GDP/capita)}_{it} = & \alpha_i + \beta_1 \text{CC}_{it} + \beta_2 \log(\text{FDI})_{it} + \beta_3 \text{PG}_{it} + \beta_4 \text{GSE}_{it} + \beta_5 \log(\text{GE})_{it} \\ & + \beta_6 \text{INF}_{it} + \mu_{it} \end{aligned} \quad (2)$$

We need to apply tests to check fixed effect model against pooled OLS model. Standard f-test and Wald test will be used to check fixed effect model against pooled OLS model. The null hypothesis is that there is homogeneity in all constant while alternative hypothesis is that all constant are heterogeneous. If the value of f-statistics is greater than the value f-critical we will reject the null hypothesis.

$$H_0 : \alpha_1 = \alpha_2 = \alpha_k$$

In Wald test our null hypothesis is that pooled OLS model is the suitable model while the alternative hypothesis is that fixed effect model is the suitable model. We will reject the null hypothesis if the probability value of Wald test is less than 5%.

$$H_0: \text{Pooled OLS } (p > 0.05)$$

$$H_1: \text{FE } (p < 0.05)$$

The third model which we will use is Random effect model, In which the constant is not fixed for each but it is a random parameter.

$$\alpha = \alpha + v_i$$

where v_i is the zero mean standard random variable, For Random effect model the equation (2) will take the following form.

$$\begin{aligned} \text{Log(GDP/capita)}_{it} = & (\alpha_i + v_i) + \beta_1 \text{CC}_{it} + \beta_2 \log(\text{FDI})_{it} + \beta_3 \text{PG}_{it} + \beta_4 \text{GSE}_{it} \\ & + \beta_5 \log(\text{GE})_{it} + \beta_6 \text{INF}_{it} + \mu_{it} \end{aligned} \quad (3)$$

$$\begin{aligned} \text{Log(GDP/capita)}_{it} = & \alpha_i + \beta_1 \text{CC}_{it} + \beta_2 \log(\text{FDI})_{it} + \beta_3 \text{PG}_{it} + \beta_4 \text{GSE}_{it} \\ & + \beta_5 \log(\text{GE})_{it} + \beta_6 \text{INF}_{it} + (\mu_{it} + v_i) \end{aligned} \quad (4)$$

In this study we have panel data for seven cross sectional countries over period from 2002-2017. The cross sectional sample is relatively small so it would be better to use fixed effect model however we will consider the other two models for comparison. To

statistically decide that the suitable model is fixed effect or random effect we have to look Hausman test.

The Hausman test is also known as test for model misspecification in panel data estimation. It help us whether to select fixed effects model or random effects model. We have the null hypothesis is to select random effect while alternative hypothesis is to select is fixed effect model. The null hypothesis will be rejected if the p-value is less than 5%.

$$H_0: RE (\rho > 0.05)$$

$$H_1: FE (p < 0.05)$$

The main hypothesis of our study was to examine the influence of increase in level of corruption on economic growth.

H_0 = Increase in level of corruption will adverse economic growth

H_1 = Increase in level of corruption will enhance economic growth

Chapter 05

Empirical Results

5.1. Introduction

We use panel data from 2002 to 2017 for seven cross-sectional countries to investigate that whether corruption enhance or adverse economic growth of South Asia. Our main model is fixed effect model because of the small cross-section identities. We used F-statistic and Wald test to select between pooled OLS model and fixed effect model, and Hausman test for choosing between fixed and random effect model.

4.2. Descriptive Statistics

The purpose of descriptive statistics is to understand overall level of corruption, GDP per capita, foreign direct investment, population growth, secondary education, government expenditure and inflation in South Asia. The mean value of control of corruption index shows that there is a high level of corruption in South Asia. More than 50% of the students are enrolled at the secondary level of education. Population growth rate is positive.

TABLE 03

Descriptive Statistic (common sample)

	GDP per Capita	Control of Corruption	FDI	Population Growth	Secondary Enrollment	Government Expenditure	Inflation
Mean	1221.670	-0.555704	4.43E+09	1.713624	57.87100	13.09085	7.213066
Median	933.0454	-0.722983	4.53E+08	1.491066	53.97264	10.72284	6.257798
Maximum	4104.631	1.568301	4.45E+10	4.818041	99.69372	28.10227	22.79926
Minimum	179.4265	-1.638287	417346.4	0.539927	12.88255	5.022649	-
Std. Dev.	934.1220	0.750706	1.06E+10	0.855657	21.62576	6.541576	4.463031
Skewness	1.421042	0.954286	2.751938	1.397462	0.328708	0.834297	1.412030
Kurtosis	4.325015	3.344456	9.235639	5.244046	2.550600	2.542702	5.521837
Jarque-Bera	45.88785	17.55272	322.8207	59.95427	2.959400	13.96885	66.89655
Probability	0.000000	0.000154	0.000000	0.000000	0.227706	0.000926	0.000000
Sum	136827.0	-62.23880	4.96E+11	191.9259	6481.552	1466.175	807.8634
Sum Sq. Dev.	96856806	62.55503	1.24E+22	81.26858	51911.78	4749.936	2210.969
Observation	112	112	112	112	112	112	112

The correlation matrix is included for the purpose to know the correlation among all variables and to compare these values with the coefficients of our models. The control of

corruption index have positive relationship with GDP per capita. In our fixed effect model estimation this relationship is negative. Foreign direct investment and secondary education have positive relationship with GDP per capita. The relationship of inflation and government expenditure are negative with GDP per Capita.

TABLE 04

Correlation Matrix

	GDP per Capita	Control of Corruption	FDI	Population Growth	Secondary Enrollment	Government Expenditure	Inflation
GDP per Capita	1.000000	0.625827	0.237511	-0.516001	0.737595	-0.049288	-0.041982
Control of Corruption	0.625827	1.000000	-0.265840	-0.269168	0.413531	0.218345	-0.125280
FDI	0.237511	-0.265840	1.000000	-0.238497	0.106729	-0.403534	0.105860
Population Growth	-0.516001	-0.269168	-0.238497	1.000000	-0.714303	0.621845	0.001321
Secondary Enrollment	0.737595	0.413531	0.106729	-0.714303	1.000000	-0.090978	-0.040833
Government Expenditure	-0.049288	0.218345	-0.403534	0.621845	-0.090978	1.000000	-0.002504
Inflation	-0.041982	-0.125280	0.105860	0.001321	-0.040833	-0.002504	1.000000

5.3. Interpretation of Regression Results

We had run regression of all three models (pooled OLS, fixed effect model and Random effect model). Fixed effect is our main model while other two model is for comparison. On the bases of f-statistic, R-squared and adjusted R-squared we decided that fixed effect model is more appropriate than pooled OLS. The value of R-squared and adjusted R-squared of fixed effect model are greater than the values of pooled OLS, which show that fixed effect model is best fitted and appropriate. The value f-statistic is 0.000 which also indicate that fixed effect model is preferable model. We also do Wald test to decide between fixed effect model and Pooled OLS model. Our null hypothesis was that pooled OLS is the appropriate

model assuming that all dummy variables is equal to zero. The value of Wald test is 0.000 which is less than 5%, so reject the null hypothesis and conclude that fixed effect model is appropriate model.

Hausman test is used to decide between fixed effect and random effect. We set null hypothesis that random effect will be appropriate model if the p-value of Hausman test is greater than 5%. In our regression the p-value of Hausman test is 0.0000. which is less than 5% so we reject the null hypothesis and accept the alternative hypothesis that fixed effect is an appropriate model.

TABLE 05

FIXED EFFECT MODEL

Dependent Variable: GDP per capita

Method: Panel least squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.558187	0.455375	5.617756	0.0000
CONTROL OF CORRUPTION	-0.110081	0.054321	-2.026475	0.0454
FDI	0.125433	0.020796	6.031532	0.0000
POPULATION GROWTH	0.055816	0.031620	1.765170	0.0006
GROSS SECONDARY ENROLLMEN	0.014459	0.001178	12.27081	0.0000
GOVERNMENT EXPENDITURE	-0.536694	0.137605	-3.900246	0.0002
INFLATION	-0.000309	0.001970	-0.156854	0.8757
R-squared	0.939780	Mean dependent var		2.972763
Adjusted R-squared	0.932481	S.D. dependent var		0.319603
Prob(F-statistic)	0.000000			

The value of R-squared and adjusted R-squared show that fixed effect model is exceedingly fitted. Corruption have negative impact on economic growth. Increase in level of corruption will decline economic growth. (Mauro, 1995), (Swaleheen,2011) and (Aman and Ahmad, 2011) also find the same result that corruption slow down the economic growth rate. Increase in the corruption index by 0.110081 will reduced GDP per capita (in log form) of

south Asia by one units. The negative impact of corruption on economic growth is significant. Foreign direct investment have significant and positive impact on economic growth. Increase by 0.125433 units in foreign direct investment (in log form) will rise the GDP per capita (in log form) of south Asia by one unit. Foreign direct investment play very instrumental role in economic growth of developing countries. It create employment opportunities, increasing productivity efficiency by transferring the capital and technology, introducing new businesses in the existing market, rising the availability of financing funds for new industries and essential social services. The GDP per capita (in log form) will improve by one unit when the population growth rise by 0.055816 percent. Increase in population rise the supply of labor which is the main factor of production, high labor leads to high productivity which will automatically rise the economic growth rate. The impact of Gross secondary enrollment on GDP per capita is positive and significant. Education increase the quality and productivity of labor which ultimately leads to high growth. The effect of Government expenditure on economic growth is ambiguous. It can be negative are positive. In our study this effect is negative and significant. Increase in government expenditure (in log form) by -0.536694 will decline the GDP per capita (in log form) by one unit. (Ghura, 1995) (Hasnul, 2015) and (Barro ,1989) also found the same result that government expenditure have negative impact on the economic growth. Inflation have small negative and insignificant impact on GDP per capita.

5.4. Conclusion

We conclude that the appropriate model is fixed effect. Corruption have statistically significant and negative impact on economic growth. Foreign direct investment, population growth and secondary education have positive impact on economic growth. Government expenditure and inflation have negative impact on economic growth. All coefficients are statistically significant excluding inflation.

Chapter 06

Conclusion and Policy Recommendation

6.1. Conclusion

The objective of our thesis was to find corruption influence on economic growth of South Asia. In literature we find that the effect of corruption on economic growth can be positive, negative or insignificant. The different effect of corruption on economic is due to different measurement method of corruption, different countries, techniques used for estimation and different time period. From literature we expected that the impact of corruption on economic growth should be negative. We find statistically significant and adverse impact of corruption on economic growth of South Asia. Others explanatory variables which are used while running regression are foreign direct investment, population growth, secondary education level, government expenditure and inflation.

There is constructive effect of foreign direct investment, population growth and secondary education on economic growth. Government expenditure and inflation are negatively associated with economic growth. The coefficients of all variables are statistically significant excluding inflation.

6.2. Policy Recommendation

The main causes of corruption was opportunities, salaries and Policies. Opportunities depend on the level of involvement of public officer in the administration. Low salaries is also the cause of corruption because officer need high money for maintaining his/her status. Policies depend on the chances of detection and punishment. To lower level of corruption salaries of the public officers should be raised, opportunities of the corruption should be reduced and there should be strong and efficient policies for detecting corruption and punishing the culprit.

The should be stability in host country, rich resources, free markets and trades to attract foreign investor for raising the level of foreign direct investment.

The portion of GDP which are spending on education level should be raised, non-profitable government expenditure like deference budget should be decrease and inflation should be control.

References

- A. Cooper Drury, Jonathan Kriekhaus & Michael Lusztig. (2006). Corruption, Democracy, and Economic Growth. *International Political Science Review* 27, pp 121-136
- Al Gifari Hasnul. (2015). The effects of government expenditure on economic growth. the case of Malaysia. *Munich Personal RePEc Archive (MPRA) paper*.
- Aminur Rahman, Gregory Kisunko & Kapil Kapoor. Estimating the Effects of Corruption Implications for Bangladesh
- Arvind K. Jain. Corruption: A Review. *Concordia University*
- Carlos Leite & Jens Weidmann. (1999). Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth. *IMF working paper, WP/99/85*
- Daron Acemoglu and Thierry Verdier. (1998). Property Rights, Corruption and the Allocation of Talent: A General Equilibrium Approach. *The Economic Journal* 108(450), pp 1381-1403
- David H. Bayley. (1966). The Effects of Corruption in a Developing Nation. *The Western Political Quarterly* 19(4), pp 719-732
- David C. Nice. (1986). The Policy Consequences of Political Corruption. *Political Behaviours* 8(3), pp 287-295
- Dominik H. Enste & Christina Heldman. (2017). Causes and Consequences of Corruption – An Overview of Empirical Results. *Colonge Institute of Economics Report, IW-Report. 2/2017*
- David H. Bayley. (1966). The Effects of Corruption in a Developing Nation. *The Western Political Quarterly* 19(4), pp 719-732

Faezeh Ghazi. (2014). Corruption and Growth. *Submitted to the Graduate College of Bowling Green State University*

Gialt de Graaf. (2007). Causes of Corruption: Towards a contextual theory of corruption. *Public Administration Quarterly* 31(1/2), pp 39-86

Ghulam Shabbir, Mumtaz Anwar & Shahid Adil. (2016). Corruption, Political Stability and Economic Growth. *The Pakistan Development Review* 55, pp 689-702

Hicham Boussalham. (2018). The Consequences of Corruption on economic growth in Mediterranean countries: Evidence from Panel data analysis. *Published in Preprints (www.preprints.org)*

Johann Graf Lambsdorff. (2002). How corruption affects persistent capital flows. *Econ. Gov.* 4, pp 229–243

Johann Graf Lambsdorff,. (1999). Corruption in Empirical Research — A Review. *Presented in 9th International Anti-Corruption Conference, Durban, South Africa, 10-15 December, 1999*

Jon S T Quah. (2003). Causes and Consequences of Corruption in Southeast Asia: A Comparative Analysis of Indonesia, the Philippines and Thailand, *Asian Journal of Public Administration* 25(2), pp 235-266

Jon S. T. Quah. (1982). Bureaucratic Corruption in the ASEAN Countries: A Comparative Analysis of Their Anti-Corruption Strategies. *Journal of Southeast Asian Studies* 13(1), pp 153-177

Jon S. T. Quah. (1999). Corruption in Asian Countries: Can It Be Minimized? *Public Administration Review* 59(6), pp 483-494

Jakob Svensson. (2015). Eight Questions about Corruption. *Journal of Economic Perspectives* 19(3), pp 19–42

Julia Ling & Malin Nordahl. (2011). Corruption and Growth A cross-country study for 2004-2008. Submitted to Jonkoping International business School, Jonkoping University.

Leslie Palmier. (1982). The Control of Corruption in the Developing World. *India International Centre Quarterly* 9(1), pp 3-12

Mushfiq Swaleheen. (2011). Economic growth with endogenous corruption: an empirical study. *Public Choice* 146(1/2), pp 23-41

Michael Johnston. (1986). The Political Consequences of Corruption: A Reassessment. *Comparative Politics* 18(4), pp 459-477

Muhammad Aman Ullah & Eatzaz Ahmad. (2011). Does Corruption Affect Economic Growth? Presented in 27th Annual General Meeting and Conference Pakistan Society of Development Economists

Muhammad Yusuf, C.A. Malarvizhi, Mohammad Nurul Huda Mazumder & Zhan Su. (2014). Corruption, Poverty, And Economic Growth relation in Nigerian Economy. *The Journal of Developing Areas* 48(3), pp 95-107

Omar Azfar, Young Lee & Anand Swamy. (2001). The Causes and Consequences of Corruption. *The Annals of the American Academy of Political and Social Science* 573, pp 42-56

Pak Hung Mo. (2001). Corruption and Economic Growth. *Journal of Comparative Economics* 29, pp 66–79

Paolo Mauro. (1995). Corruption and Growth. *The Quarterly Journal of Economics* 110(3), pp 681-712

Paolo Mauro. (2004). The Persistence of Corruption and Slow Economic Growth. *IMF Staff Papers* 51(1), pp 1-18

Pierre-Guillaume Méon & Khalid Sekkat. (2005). Does Corruption Grease or Sand the Wheels of Growth? *Public Choice* 122(1/2), pp 69-97

Shang-Jin Wei. (1997). How taxing is Corruption on International investor?. *National bureau of Economic research, Cambridge*

Sanjeev Gupta, Hamid Davoodi & Rosa Alonso-Terme. (1998). Does corruption affect Income Inequality and Poverty?. *IMF working Paper, WP/98/96*

Vito Tanzi. (1998). Corruption Around the World: Causes, Consequences, Scope, and Cures. *Staff Papers (International Monetary Fund)* 45(4), pp 559-594

Vito Tanzi & Hamid Davoodi. (1997). Corruption, Public Investment, and Growth. *IMF working Paper, WP/97/139*

Appendix

Table A1: Pooled OLS

Dependent Variable: GDP per capita

Method: Panel Least Square

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONTROL OF CORRUPTION	0.189194	0.019374	9.765280	0.0000
FDI	0.137184	0.009944	13.79497	0.0000
POPULATION_GROWTH GROSS SECONDARY ENROLLMEN	-0.053004	0.029633	-1.788692	0.0751
GOVERNMENT EXPENDITURE	0.522706	0.046735	11.18445	0.0000
INFLATION	-4.55E-05	0.002758	-0.016496	0.9869
R-squared	0.687005	Mean dependent var	2.972763	
Adjusted R-squared	0.679826	S.D. dependent var	0.318886	

Table A2: Random effect Model

Dependent Variable: GDP per capita

Method: Panel EGLS (cross-section random effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.293004	0.198262	11.56551	0.0000
CONTROL OF CORRUPTION	0.231404	0.013128	17.62668	0.0000
LOG FDI	0.086839	0.007800	11.13269	0.0000
POPULATION GROWTH GROSS SECONDARY ENROLLMEN	0.098476	0.023315	4.223787	0.0001
GOVERNMENT EXPENDITURE	-0.218621	0.070950	-3.081340	0.0026
INFLATION	0.001352	0.001799	0.751510	0.4540
R-squared	0.768369	Mean dependent var		2.972763
Adjusted R-squared	0.755133	S.D. dependent var		0.319603
Prob(F-statistic)	0.000000			

Table A3: Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	281.795512	6	0.0000

** WARNING: estimated cross-section random effects variance is zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CONTROL OF CORRUPTION	-0.110081	0.231404	0.002778	0.0000
FDI	0.125433	0.086839	0.000372	0.0453
POPULATION GROWTH	0.055816	0.098476	0.000456	0.0458
GROSS SECONDARY ENROLLME	0.014459	0.009682	0.000001	0.0000
GOVERNMENT EXPENDITURE	-0.536694	-0.218621	0.013901	0.0070
INFLATION	-0.000309	0.001352	0.000001	0.0380

Cross-section random effects test equation:
Dependent Variable: LOG_GDP_CAPITA
Method: Panel Least Squares
Date: 07/23/19 Time: 23:36
Sample: 2002 2017
Periods included: 16
Cross-sections included: 7
Total panel (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.558187	0.455375	5.617756	0.0000
CONTROL OF CORRUPTION	-0.110081	0.054321	-2.026475	0.0454
FDI	0.125433	0.020796	6.031532	0.0000
POPULATION GROWTH	0.055816	0.031620	1.765170	0.0006
GROSS SECONDARY ENROLLME	0.014459	0.001178	12.27081	0.0000
GOVERNMENT EXPENDITURE	-0.536694	0.137605	-3.900246	0.0002
INFLATION	-0.000309	0.001970	-0.156854	0.8757

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.939780	Mean dependent var	2.972763
Adjusted R-squared	0.932481	S.D. dependent var	0.319603
S.E. of regression	0.083047	Akaike info criterion	-2.030050
Sum squared resid	0.682788	Schwarz criterion	-1.714510
Log likelihood	126.6828	Hannan-Quinn criter.	-1.902026
F-statistic	128.7480	Durbin-Watson stat	0.524786
Prob(F-statistic)	0.000000		

Table A4: Wald Test

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	6354.561	(6, 99)	0.0000
Chi-square	38127.37	6	0.0000

Null Hypothesis:

$C(1)=C(2)=C(3)=C(4)=C(5)=C(6)=0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	2.558187	0.455375
C(2)	-0.110081	0.054321
C(3)	0.125433	0.020796
C(4)	0.055816	0.031620
C(5)	0.014459	0.001178
C(6)	-0.536694	0.137605

Restrictions are linear in coefficients.