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An analysis of linkage between foreign direct investment and GDP per Capita in Pakistan

A time series analysis

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Abstract

This study aims to investigate the relation between foreign direct investment (FDI) and per capita gross domestic product (GDP) in Pakistan. The study is based on a basic Cobb-Douglas production function. Population over age 15 to 64 is used as a proxy for labor in the investigation. The other variables used are gross capital formation, technological gap and a dummy variable measuring among other things political stability. We find positive correlation between GDP per capita in Pakistan and two variables, FDI and population over age 15 to 64. The GDP gap (gap between GDP of USA and GDP of Pakistan) is negatively correlated with GDP per capita as expected. Political instability, economic crisis, wars and polarization in the society have no significant impact on GDP per capita in the long run.

Keywords: GDP Per capita, FDI, Gross capital formation, GDP gap, Time series and Pakistan.

Table of contents

1. Introduction

There are many factors which play key role in the capital formation and economic growth. These factors might be different across countries with respect to the geological, geographical, political, technological enhancement and with respect to institutional framework. The purpose of this thesis is to analyze the relation between foreign direct investment (FDI) and GDP per capita in Pakistan. FDI may play an important role in the development of poor and underdeveloped countries. One reason for it is that FDI helps in transferring updated technological know-how and adequate employment opportunities to the host country (Mottaleb and Kaliragen, 2010). The other benefits which underdeveloped countries may gain from the foreign direct investment is that it provides a viable path to increase the savings of these countries which can be used for further development to achieve the goal of economic growth. Foreign direct investment transfers the state-of-the-art technological knowledge and capital stock from developed countries to the underdeveloped countries. This diffusion of technical knowledge enables the local societies of underdeveloped countries to stand on their own feet by its spillover effects (Borensztein et al., 1998). This paper is an attempt to investigate the effect of FDI on per capita GDP for Pakistan. In doing that time series data from 1971-2012 are used in the empirical analysis.

Görg and Greenaway (2004) note that foreign direct investment may be potentially fruitful for the host countries as well as for the investing capitalists. But the question is why do countries need foreign investment? And why are firms willing to invest in other countries? The answer to first question is that underdeveloped countries are characterized with low productivity, more labor and less capital intensive production, and low literacy rate. A country with such impeding characteristics cannot achieve its objective of steady development alone. Also to motivate and increase competition among local investors, countries look forward to foreign direct investment which may pave a path for their growth by bringing modern methods of production and job opportunities in their countries. FDI also provides a chance to train the local manpower to coup with the development challenges in future. The answer to the second question is that foreign firms seek various advantages such as cheap raw material and cheap labor of the underdeveloped countries and maximize their profit. Some multinationals look access to the potential markets to produce and sell in the same area and in this way save transportation costs and custom tariff on importing raw material and freight on exporting finished goods. Therefore different firms seek different advantages to invest their capital. Some might seek more efficiency in productivity and some

look for a strategically better region i.e. where to produce and where to sell (Hussain and Kimuli, 2012).

This paper analyzes the linkage between FDI and GDP per capita in a developing economy. Pakistan is chosen as case country partly because of particular interest for the author coming from the country. However, it can be an interesting case because of its turbulent

Pakistan came to being in existence in 1947 and has been facing big economic and political problems right from the beginning. The country was not provided with the resources and skilled manpower as according to per proportionate quota from India. There was no organized institutional framework, such as State Bank, institutions of civil and arm forces etc. Moreover the country fell into political disturbance after the demise of Muhammad Ali Jinnah, the founder of Pakistan, in 1948. The war over Kashmir in 1948 pushed the country to join military accords for defense sake (Cohen, 2013).

The history of Pakistan can be divided into two periods. First period, belongs to 1947 to 1971. During this period Pakistan experienced two military coups and two devastating wars, losing half of its resources and East Pakistan. The second phase belongs to 1972 to onward. Like the first phase country again experienced two coups, severe impact of long continual Afghan war which now has been converted into the war on terrorism. The Afghan war has had profound negative effect on the economy in general and investment activities in particular. The embargos in response of tests of nuclear device and conflict over Kargil war also the harming shock for the economy during this period [1](Tarling and Nicholas, 1992). So it will be interesting to examine the effect of foreign direct investment of a country which has been suffering from a series of natural and political shocks. In this paper we make an analysis of time dependent relation between FDI and GDP per capita using time series data from 1971-2012 for Pakistan. The time series are tested for stationarity and the main relationship is tested for cointegration.

The rest of the thesis is organized as follows. Chapter two contains a history of FDI inflow, discussion on government policies for FDI and FDI inflow in Pakistan from different countries. Chapter three contains a literature review on the issue at hand. Estimation issues and results are presented in Chapter four. Chapter five concludes the thesis.

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[1] A list of historical events of political instability is provided in appendix in Table A.1.

2. Foreign direct investment in Pakistan

Pakistan has had a FDI history since its creation in 1947. The German firm Siemens was the first one working in telecom industry. The British firm ICI was the second which came in Pakistan in the sectors of the chemical and pharmaceutical manufacturing. Later the Lever brothers (currently Unilever), Imperial tobacco company, Shell and Burma oil was among several companies which established their business in early years of Pakistan.

In the 50s and 60s Pakistan's economy showed a significant growth. But at the same time country followed a policy of restricting trade and investment, which discouraged the inflow of FDI to Pakistan. Sahoo (2006) shows that the aim of initial policy for FDI is that majority of stakes remained with the domestic firms. Mughal (2008) describes that the saving rate in Pakistan was below 15 percent and investment rate was almost seventeen percent. So there was a gap between savings and investment, in such a situation the country was relied on foreign capital to fill this gap. Further, in the decades of 1950s, 1960s and 1970 Pakistan pursued a policy of self reliance by boasting import substitution goods in the country and depended only on foreign assistance to cover the investment and savings gap.

Khan and Khilji (1997) mention that in the 1960s the government of Pakistan adopted more liberalized policy for industrial investment by opening twenty four key industries for private investors. The decade of 60s was entirely dominated by the private sector, but the FDI was not allowed to in the sectors of banking, finance and other service sectors, these sectors remained reserved only for the domestic investors (Zakaria, 2008).

In the 1970s the government switched over from the liberalized policies of 1960s to the policy of nationalization under the slogan of promoting socialism which greatly discouraged the FDI inflow into Pakistan (Khan and Khilji, 1997, Zakaria, 2008). After visualizing the unsatisfactory performance of nationalized units and other institutions the government modified its policy for domestic private and foreign private investment. The foreign investment act of 1976 was enacted to promote foreign investment, this act guaranteed the foreign investors to transfer of their capital and profits any time.

In 1980 the government introduced the public- private sector partnerships by auctioning of a percentage of public shares in some institutions. At the same time government also made

its policy more liberal to attract foreign investment. The control over exchange rate was abolished and establishment of export processing zone (EPZ) were introduced for this sake. The EPZ includes the tax holiday for a period of five years and duty free imports and exports were allowed (Zakaria, 2008).

Anwar (2002) describe that in 1990s the government of Pakistan further undertook some regulatory measures to attract FDI. The restrictions on mobility of capital were lifted up gradually. The investors from abroad were allowed to keep hundred percent equity of the business without prior approval. The transfer of dividend earnings, transfer of shares to non residents and disinvestment were allowed without the prior approval of the State Bank of Pakistan (Khan, 2008). In 1997 to attract FDI the government also opened the agricultural and service sectors for foreign companies, traditionally which were restricted for foreign investors after the independence (Sahoo, 2006). The other incentives such as reduction in taxes were been granted and transfer of profits, dividends, royalties and even full invested capital was also allowed.

After 2000 and onward the main focus of the government investment policy in Pakistan was privatization and deregulation of the economy and providing of other incentives to attract FDI (Zakaria, 2008). Khan (2007) also described that yet to day the government had opened up all sectors for FDI including the service sector which was traditionally banned before for foreigners. The government provided the guarantee that foreigner owned organizations neither be nationalized and nor be taken under control by other means. The requirement of obtaining no objection certificate from the local authority was abolished, now anyone can locate a project at any place within the country.

The steps mentioned above had been taken by the government of Pakistan at different time level during the last three decades were aimed to attract FDI in each sector of the country. But FDI inflow remained hindered due to some other factors such as political disturbance, corruption, inefficiency in legal system, weak diplomatic relations at abroad and etc.

Table 1 shows that the inflow of FDI in Pakistan from different countries for the fiscal years (FY) of 2001-02 to the fiscal year (FY) 2010-11.[2] The data in the table describe that the inflow of FDI was accelerated after the introduction of the liberalization policies and

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[2] FY = Fiscal Year. A fiscal year in Pakistan runs from July 1st to the June 30th next year.

development of close relationship with United States and European countries. United States, United Kingdom and UAE were at the top of the list as investors of FDI in Pakistan during this period. The table also describes that Pakistan has had an increasing trend of FDI inflow for the period FY 2001-02 to FY 2007-08. The FDI inflow in the period FY 2001-02 was recorded 487.7 million dollars which was increased to 5152.8 million dollars at the end of the FY 2007-08. In the FY 2008-09 and onward a decrease in FDI inflow was recorded due to the financial crisis in the United States and Europe, security conditions within Pakistan, political changes and war against terrorism.

Table 1. Country wise FDI Inflow in Pakistan (million Dollars)

	2001[3]	2002	2003	2004	2005	2006	2007	2008	2009	2010
USA	326.4	211.5	238.4	325.9	516.7	913.1	1,309.3	869.9	468.3	238.1
UK	30.3	219.4	64.6	181.5	244.0	860.1	460.2	263.4	294.6	207.1
UAE	21.5	119.7	134.6	367.5	1424.5	661.5	588.6	178.1	242.7	284.2
Japan	6.4	14.1	15.1	45.2	57.0	64.4	131.2	74.3	26.8	3.2
Hong Kong	2.8	5.6	6.3	32.3	24.0	32.6	339.8	156.1	9.9	125.6
Switzerland	7.4	3.1	205.3	137.5	170.6	174.7	169.3	227.3	170.6	110.5
Saudi Arab.	1.3	43.5	7.2	18.4	277.8	103.5	46.2	92.3	133.8	6.5
Germany	11.2	3.7	7.0	13.1	28.6	78.9	69.6	76.9	63.0	21.2
S. Korea	0.4	0.2	1.0	1.4	1.6	1.5	1.2	2.3	2.3	7.7
Norway	0.1	0.3	146.6	31.4	252.6	25.1	275.0	101.1	0.4	48.0
China	0.3	3.0	14.3	0.4	1.7	712.0	13.7	101.4	3.6	47.4
Others	76.6	173.9	108.6	369.3	521.9	1512.2	1748.7	1964.2	1019.6	631.3
Total	**484.7**	**798.0**	**949.0**	**1523.9**	**3521.0**	**5139.6**	**5152.8**	**3719.9**	**2150.8**	**1634.8**
Privatization proceed[4]	127.4	176.0	198.8	363.0	1540.3	266.4	133.2	0.0	0.0	0.0
FDI Excluding Prvt. Proceed[5]	357.3	622.0	750.2	1160.9	1980.7	4873.2	5276.6	3719.9	2150.8	1634.8

Source: State Bank of Pakistan, Board of Investment Pakistan.

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[3] The years are fiscal years so 2001 indicates the FDI-flows in the fiscal year 2001-2002 and so on.
[4] Privatizations proceeds are receipts of foreign exchange from the sale of a public enterprise to a firm or residents from abroad.
[5] FDI subtracting the receipt from privatization proceed.

3. Literature review

There has been a considerable amount of research on the effect of FDI on GDP. Each attempts to answer this issue in different ways. These studies can be categorized into two kinds of literature. One category is the surveys from the World Bank and other organizations about the FDI related issues. The second category is the academic papers which provide in-depth analysis of the concerned topic.

The World Bank (2013) conducted surveys from investment and corporate firms to know the investors trends and flow of foreign direct investment in future. In May/June 2012 the World Bank conducted a survey from 69 Chinese companies on their business in Ethiopia. The survey covered different aspects of foreign direct investment in Ethiopia with 95 questions. The survey findings show that potential opportunity, limited market competition, cheap land and labor are the major attractions for their investments in Ethiopia. The other motives behind their decisions are difficulties in carrying on business in China because of increased taxes and tariffs at home, comparative advantage against low productive Ethiopian industry and a rapid market expansion.

A.T. Kearney is a global management consulting firm that publishes a yearly so called FDI-index. Every year they conduct a survey from the potential investor to know their thoughts for future FDI strategies. The respondents are the most senior executives of the world leading corporations. The survey of 2013 cites that the underdeveloped markets have roughly the same level of risk as developed markets. According to survey the only category which put the developing countries as riskier is the political volatility. According to the survey "the perception that developing markets are inherently riskier may be the thing of the past" A.T. Kearney (2013, p. 9).

There are many academic studies on the relationship between FDI and GDP. The finding of each of the studies is different from the other one. It means that there is no consensus in outcomes of different studies about the impact of FDI on GDP.

Barrel and Pain (1997) investigated the role of FDI and its diffusion and spread over effects in Europe. This paper analyzed the factors behind the increasing growth of FDI and its consequences at home and host economies. "The changing pattern of demand for production inevitably changes the pattern of locational advantages" (Barrel and Pain, 1997, P. 1784).

Moreover the new technologies may arrive by trade and by FDI. In both of the cases the role of host country institution is very crucial as well as workforce attributes to adopt new ideas of working with new technologies. Study proves that the FDI is positively correlated with growth and production. Further, it is a medium of diffusion of new innovations even among the developed economies.

The empirical findings of de Mello (1997) describe that the ultimate impact of FDI on growth depends upon spillover efficiency scope of domestic firms, which later results in boasting of domestic production. He used dynamic effect model for seven regions. The data was belonging to period 1980-94.

De Mello (1999) uses both time series and panel data approaches to analyze the linkages between FDI, output and total factor productivity using a dataset of 33 countries for the period of 1970-90. One of the finding of this study is that the impact of the foreign direct investment inversely depend upon the technological gap between the donor and the recipient. In other words how much strong relationship FDI have with growth is depend on the degree of the complimentarily and substitution between the FDI and local capital stock.

Shatz and Venables (2000) reveal in 1980's the market size and distance are uniquely important to decide where firms would establish their foreign affiliating units. Where the market size matters it is adjusted in a way that large share of investment stays closer home and where the distance matters, it is adjusted by diverting large share of investment towards the countries with the biggest markets. In the 1990's larger share of FDI directed towards the developing countries. And currently there is fierce competition among the developing countries to attract FDI. The technology advancement and open trade regime enables the multinationals to split their production process more easily to get optimal advantage and benefits.

Zhou et al. (2002) investigates whether FDI affects productivity of domestic firms in china. The study concludes that the domestic firms are also delivering high productivity in those regions where majority of foreign firms are carrying out their operation since a long period; as compare to the domestic firms within an industry which have high percentage of FDI since long period are prove to inefficient in catching the spillover effect. The reason of this difference is that there are some externalities which came with the FDI such as managerial skills, marketing tactics, incentives schemes and competitiveness. These cause the

domestic firms in the first category to adopt these strategies and become efficient in their production. On the other hand, the industry having a history of long FDI picked up the efficient employees from the respective domestic firms which hurt their production efficiency. Thus low capital and low productivity cause contraction of their market share. The reason of this difference between two categories of domestic firms is that one group absorbs the spillover effects quickly and the other does not. Thus, the first kind of domestic firms who adopt changes quickly and become efficient should be the role model for the second group of domestic firms.

Carkovic and Levine (2002) conducted a study by using a dataset of 4,50,000 firms in China for the period of 1992-95. They conclude that FDI does not play a crucial and positive impact on growth by using a dynamic panel approach and generalized- Method-of-Moments.

Onyeiwu and Shrestha (2004) used fixed and random effects model to explore the stylized determinants and general effects of FDI inflow to Africa using panel data approach for 29 African countries. The study belongs to the period of 1975-99. The paper concludes that the economic growth, openness of the economy, international reserves and natural resources are main determinants of FDI inflow in Africa.

Ozturk and Kalyoncu (2007) study the relationship between FDI and economic growth of Pakistan and Turkey by using Engle-Granger cointegration and Granger causality tests to identify the impact of FDI on GDP and vice versa for both countries. The study indicates that in case of Pakistan it is unidirectional, i.e. the increase in GDP is associated with an increase in FDI and in case of Turkey it is found to be bidirectional.

Basu et al. (2007) investigated the relationship between FDI and GDP using a dataset of 23 countries for the period of 1978-96 .They find that there is a two-way linkage between FDI and GDP causing permanent changes in the long run based on cointegration relationships between FDI and GDP.

Busse and Hefeker (2007) investigate to trace linkages between FDI, political risk and institution using a dataset of 83 countries for the period of 1984 to 2003. Their results show that a stable regime, internal and external conflicts, ethnic and religious tensions, law and order and democratic accountability are highly significant determinants of FDI. A stable regime and conflict free society is ideal for the inflow of FDI.

Chakerborty and Nunnenkamp (2008) conducts Granger causality test using a panel data cointegration approach. They used a dataset of 15 firms in India for the period of 1987-2000. They find twofold impact of FDI on industrial sector; a direct increase in growth from FDI injected in industry, and a spillover demand impact of FDI invested in service sector also contributed the growth of industrial sector. Usually the FDI impact in an economy is country specific, but FDI is likely to be more effective for the countries who adopt a policy of liberalization, believe on open trade regime and an improved education as well as good human capital conditions (Zhang, 2001; Bengoa and Sanchez-Robles, 2003).

Foreign direct investment involves two stakeholders, the investing firms and the countries which receive the foreign investment. The prime objectives of the investing firms are the maximization of their profit from their investment they made abroad. On the other hand, countries are willingly interested in attracting more and more investment to develop their respective economies and creation of new job opportunities as its result to eradicate unemployment and stabilization of their respective economies (Hussain and Kimuli, 2012). For that reason every country formulates some strategies and facilitating procedures for the investor firms to carry on their business activity in their country without any fear. "The investor firms can maximize their profit either by a plan to increase their production or by a plan to reduce their production cost" (Hussain and Kimuli, 2012, p. 19). So for the first case the investment firms prefer to invest in a country with big market. And in preceding case it will compare the production cost and take ease of business among different countries into consideration. How much investment a particular country succeeds to attract also depends upon the legal framework, policy implication and interaction with the world.

Gohou and Soumare (2012) also examine relationship between FDI and poverty reduction in 52 African countries by human development factor. They find strong positive effect on welfare for whole African countries and a significant improvement in poverty reduction. But the degree of welfare varies across the countries because of difference in respective internal factors of each country.

To summarize, the literature review gives some indication, that there can be a positive effect of FDI on GDP. However, it seems to depend on the conditions of the host country. A summary of the previous literature are given in the Table 2.

Table 2. Summary of Literature Review

Author (year)/ Econometric Method	Title of Article	Countries	Study Period	FDI Effect
Barrel and Pain (1997) Dynamic Effect Model	Foreign Direct Investment, Technological change and Economic Growth within Europe.	Germany, France , UK and Sweden	1980-92	FDI has positive impacts on growth of host countries economies but with introducing of new ideas and new technologies.
De Mello (1997) Granger Casuality Approach	Foreign Direct Investment in Developing Countries and Growth: A selective survey	Seven different Region	1980-1994	FDI positively correlated with economic Growth.
De Mello (1999) Time series analysis and Fixed Effect Model	Foreign Direct Investment Led Growth: Evidence from time series and panel data.	33 Country 16 OECD 17 Non-OECD	1970-90	FDI enhances the growth in the economy in the long run. It also depends upon the technology gaps among countries.
Zhang (2001) Cointegration and casuality tests for short run and long run.	Does Foreign Direct Investment Promote Economic growth? Evidence from East Asia and Latin America.	11 countries	1960-97	The FDI boast economic growth for those countries which adopt more liberalized policies, improved their education system and maintain investment friendly macroeconomic policies.
Zhou et al. (2002) OLS	The Impact of FDI on the Productivity of Domestic Firms: The Case of China	China	1992- 95 Use data 4,50,000 firms	Domestic firms(in the region unique for attracting high FDI), show higher productivity than the domestic firms(in particular industry, unique in attracting FDI)
Carkovic and Levine (2002) GMM Panel Estimator	Does Foreign Direct Investment Accelerate Economic Growth?	72 Country	1960-95	Foreign Direct Investment impact on growth proves to be insignificant.

Table 2. Continued (Summary of Literature Review).

Onyeiwu and shrestha (2004) Two way panel, Fixed effects, And Random effects models	Determinants of Foreign Direct Investment in Africa.	29 Countries From Africa	1975-99	Economic growth, openness of economy and resources are important to attract FDI. Wisdom, political rights and infrastructure prove to be unimportant in case of Africa.
Basu et al. (2007) Cointegration analysis approach	Liberalization, FDI and Growth in Developing countries: A panel cointegration approach.	23 Countries	1978-96	Long run cointegration relationship is found between FDI and GDP and bidirectional causality for more open economy. For Closed economy the causality is unidirectional and run from GDP to FDI.
Busse and Hefeker (2007) Cross country and country fixed effect Method	Political Risk, Institutions and Foreign Direct Investment.	83 countries	1984-2003	results show that a stable regime, conflicts among societies and countries, ethnic and religious tensions, law and order and democratic accountability are highly significant determinants of FDI
Chakerborty and Nunkump (2008) Panel cointegration and causality tests approach	Economic Reforms, FDI, and Economic Growth in India: A Sector Level Analysis.	India 15 industries	1987-2000	Growth impact of FDI is found very widely across the sectors, and causing permanent changes in the long run. The cross sector transitory spillover effect also found from the service sector to the manufacturing sector.
Gohou and Soumare (2012) Newey-West standard error for panel and cross sectional data.	Does Foreign Direct Investment Reduce Poverty in Africa and are There regional Differences?	52 countries of Africa	1990-2007	Positive relationship between FDI and welfare improvement. But this impact differs across the countries. The impact of FDI on poverty reduction is greater in poorer countries than richer.

4. Empirical analysis

4.1 The theoretical basis

An often employed theoretical framework for empirical analysis of output is the Cobb-Douglas production function, relating output to different inputs such as labour, capital, investment etc. (See for example, Chakraborty and Mukherjee, 2012; Holland, et al. 2013).

The basic production function is often written as

$$Y_t = AL_t^{\alpha}K_t^{\beta} \tag{1}$$

Where, Y = Output, A = Total factor productivity or state of technology, K = Capital,
L = Labor, and t = time. β and α are elasticities of output with respect to capital and labor.

However, the capital may be of two kinds, domestic capital and foreign capital. Desai et al. (2005) note that in the 1970's and before that, countries feared transferring or receiving much capital. The capital exporting countries felt that their capital moved abroad which might cause problems in their country while the host countries worried about macroeconomic instability as a result of heavy inflow of capital into their economies. Their study results show that in fact FDI has a positive relationship with domestic capital formation and stimulates it.

We can then rewrite equation (1) as:

$$Y_t = A \, L_t^{\alpha} \, K_{Dt}^{\beta_1} \, K_{Ft}^{\beta_2} \tag{2}$$

Where, K_{Dt} = Domestic capital and K_{Ft} = Foreign Capital

Equation (2) describes output as a function of both domestic and foreign capital, labor and technological knowledge. The parameters β's and α can be seen as elasticities of output with respect to the inputs. Their magnitudes decide whether output exhibits constant, increasing or decreasing returns to scale.

Taking natural logarithm of both sides of equation (2), we have:

$$\ln Y_t = \ln A + \alpha \ln L_t + \beta_1 \ln K_{Dt} + \beta_2 \ln K_{Ft} \qquad (3)$$

This equation (3) will be the basis of our econometric analysis later. However we will add couple of variables and an error term to it before evaluation.

4.2 Data and the econometric specification

This study is based on time series observation on GDP, FDI, Gross domestic capital formation, Population over the age 15 to 64 from 1971 to 2012 for Pakistan. All data are taken from the World Bank database of world development indicator. There are different phases of success and failure in Pakistan's economy during this period. There are events such as military coups, severe contention among political parties, religious and ethnic extremism, repeated mid-term elections, terrorism and natural disaster unique to this period that might be affected the economic activities in the country. So to control the effect of such political instability and other events, we introduce a dummy variable in the regression model. The dummy variable is created according to the Coup Data Codebook (Marshall and Marshall, 2007), and economic cycles in Pakistan presented by (Mahmood and Arby, 2012)[6]. Some negative events such as the impacts of 1971 war in the preceding year, major earthquake and a flood causing thousands of causalities also are considered in the dummy variable. Tables A.2.1 and A.2.2 in the appendix provide further details.

As we described above that the equation (3) is the basis for the econometric analysis. However, we are adding couple of variables and an error term to it. The additional variables are a variable that measures relative GDP gap between the GDP of the United States and the GDP of Pakistan and a dummy variable for the aforementioned reasons in above paragraph. We also note that the inflow of foreign capital may depend on output but here it is assumed that the direction of an affect if any is from foreign capital to output.

We estimate the following modified equation (4) on the basis of equation (3) in the theoretical section. We use population data over age 15 years to age 64 years as proxy of labor, because we did not find enough data for the labor in Pakistan.

$$\ln Gpcap_t = \beta_0 + \beta_1 \ln GCF_t + \beta_2 \ln FDI_t + \beta_3 \ln POP_t + \beta_4 \ln USPKgap_t + \beta_5 DUMRetc_t + e_t \qquad (4)$$

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[6] Table A.2.1 and A.2.2 provide more details about the construction of the dummy variable.

Note that all the variables, except the dummy variable, are in logs. In this specification the dependent variable, output, is defined as GDP per capita constant in US dollars taking 2005 as the base year. This variable is measured in constant prices so it is real GDP per capita and is abbreviated with $Gpcap_t$. e_t is an error term containing omitted variables and measurement errors.

The explanatory variables are:

1) Gross capital formation (GCF_t) which is used as a proxy for the domestic capital. It is taken as percent of GDP

2) Foreign Direct Investment (FDI_t). It is measured in percentage of GDP

3) Population over age 15 to 64 (POP_t) is used as proxy for labor input since labor participation rate is unavailable for the required forty two years. It is measured as population over age 15 to 64 % of total population.

4) GDP gap ($USPKgap_t$) is measures the relative difference between GDP of the United States and the GDP of Pakistan. This technique was used by Li and Liu (2004) by describing it as the technology gap between the economies of United States and 83 selected countries in their panel data. The GDP gap is measured by subtracting the Pakistan's GDP from the United States GDP for year 1971 to 2012 and divide by the Pakistan's GDP.

5) A dummy Variable ($DUMRetc_t$) to control the possible impact of political instability as per Coup Data Codebook, (Marshall and Marshall, 2007) and other shocks of severe consequences such as racism, religious conflicts, natural disasters and war condition. It takes the value of 1 if there is "political instability" and 0 if not.

Table 3 provides the descriptive statistics of the variables in the model.

Table 3. Descriptive statistics of the variables (42 yearly observations).

Variables	Mean	Std. Dev.	Min	Max
Gpcap	535.269	142.634	325.258	802.450
GCF	17.808	2.340	12.522	22.556
FDI	0.792	0.890	0.009	3.904
USPKgap	60.877	4.218	52.664	68.399
POP	54.544	2.687	52.539	61.317
DUMRetc	0.666	0.477	0	1

There are forty two observations for each of the variable. The variable Gpcap contains a mean of 535.269, and a standard deviation of 142.634 seems to be higher. In the real life for some of the periods Pakistan had a considerably very high growth and for some periods a lower growth because of weather and other factors which are crucial for an agrarian based economy. As for as the FDI, its standard deviation is a bit higher than its mean. The dataset showed that for a number of periods there are very little or even no foreign investment and some periods contains considerably high figure of foreign investment. So it is logical to have higher standard deviation. The minimum and maximum values of both also show this indication.

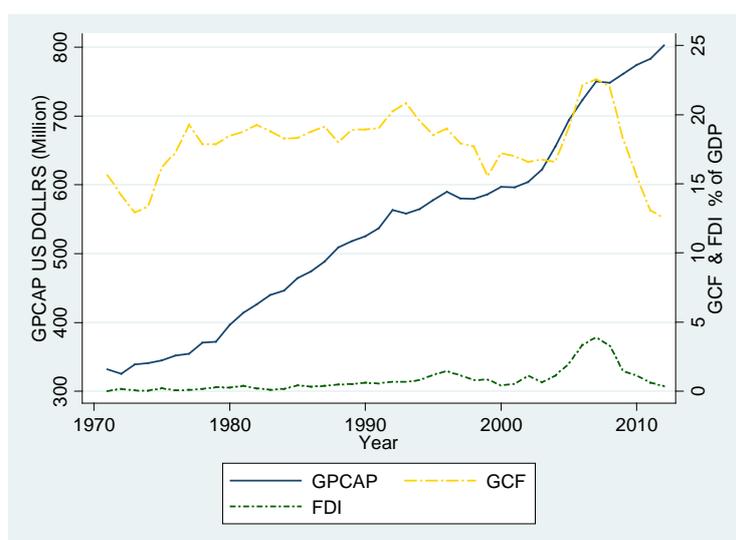Figures 1 and 2 shows the movements of the variables over time.

Figure 1 – The Plot of GPCAP, GCF and FDI

15

Figure 1 shows the trend of GDP per capita, FDI and GCF for the time period 1971 to 2012. The variable GPCAP shows a rising trend with some variations along the time line. The variable GCF has no obvious trend with some crests and troughs and in 2008 onward it has a sudden fall. The FDI has indicates a slightly rising trend along the time line. After the year 2000 it rises sharply and after 2007 it falls sharply.
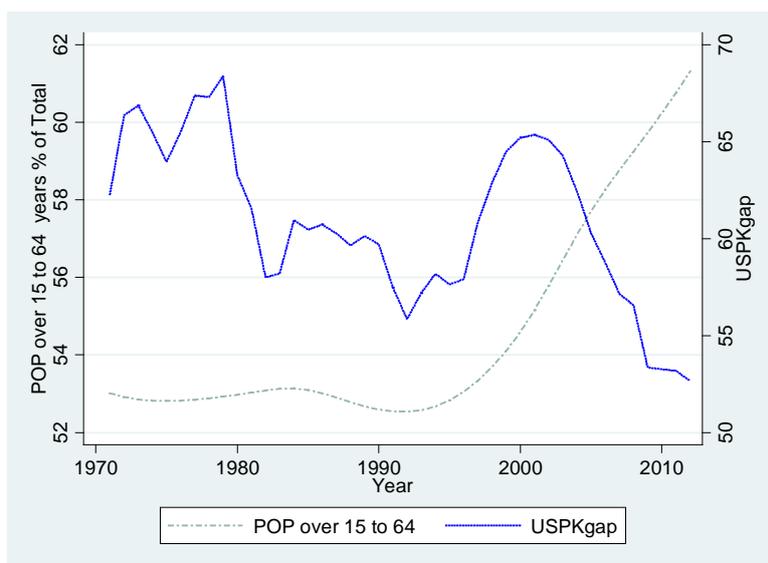

Figure 2 – The plot of POP and TG.

In Figure 2 the lines for population over age 15 to 64 and USPKgap are drawn. The population over 15 to 64 curve shows that the mentioned category of the total population of Pakistan is about 52% to 53% from 1971 to 1992. After that it increases sharply. One possible reason is that birth rate in Pakistan has considerably dropped. The USPKgap curve shows the difference between Pakistan and US GDP (technology difference) over time. The separate figures of all the variables in time series are given in appendix (Figure A1 to A5).

4.3 Estimation results

Before running the regression for equation 2, we need to check for stationarity issues in our time series data. As is known under certain conditions we may have a case of spurious regression (Granger and Newbold, 1974).

There have been different kinds of tests developed by econometricians to check the stationarity of time series. The most commonly used test for time series data is the Dickey-

Fuller test (Dickey and Fuller (1979)) which is used here. The null hypothesis of the test is that the time series variables have a unit root and alternative hypothesis is that time series variables are stationary i.e. no unit root:

$$H_0: \quad \text{Unit root}$$
$$H_A: \quad \text{No unit root}$$

The results of the unit root tests are presented in table 4.

Table 4. Dickey Fuller unit root test results

| Variable name | First difference | |
	T statistics	P.values
lnGpcap	-5.867	0.000
lnGcf	-4.237	0.0006
lnFDI	-7.360	0.0000
lnUSPKgap	-4.943	0.0000
lnPOP	-2.848*	0.0517*

*The Variable is marginally stationary in first difference.

Critical values at 1 %, 5% and 10% level of significance are – 3.648, -2.958 and -2.612 respectively.

While the variables (in logs) were non-stationary in levels Table 4 shows that they are stationary in first difference. On the basis of the results given in Table 4 we reject the null hypothesis. We can reject the null hypothesis of a unit root (time series are stationary) at any reasonable significance level except lnPOP which is significant at 10% level of significance and marginally at 5 %. Based on these results we may say that the time series are integrated of order (1). If we then estimate our model (equation 2) by Ordinary Least Squares (OLS) and the residuals from that regression are stationary the results can be meaningfully interpreted in the sense that they are not spurious. In particular we can test the effect of log of FDI on log of GDP (i.e. elasticity of GDP w.r.t FDI) at least in a long term relationship sense.

Table 5 provides the results of regression analysis for lnGPCAP. These results show that the variables lnFDI, lnUSPKgap and lnPOP are highly significant at 1 % and 5% level. The lnGCF and dummy variable DUMRetc are insignificant. Note that Newey - West (Heterosskedasticity and autocorrelation consistent standard errors are reported).

Table 5. Regression results (with Newey - West standard errors).

Dependent Variable: lnGpcap

Variable name	Coefficients	Newey - West Standard Error	t	P> ltl
lnGcf	-0.208	0.152	-1.36	0.182
lnFDI	0.133	0.019	6.96	0.000
lnUSPKgap	-0.980	0.258	-3.80	0.001
lnPOP	1.803	0.359	5.01	0.000
DUMRetc	0.009	0.033	0.29	0.777
Cons	3.765	2.002	1.88	0.068

Obs = 41	Prob > F =0.0000	R squared = 0.8902	Adjusted R squared = 0.8764

The Coefficient of lnFDI indicates that one percent increase in foreign direct investment is associated with a 0.13 percent increase in GDP per capita as expected keeping the other independent variables constant. In analogous way a one percent increase in population of age 15 to 64 is associated with a 1.8 percent increase in GDP per capita keeping rest of the variables constant. Output per capita is much more elastic with respect to labor than FDI. Our results are consistent with the results of previous researches of Barrel and Pain (1997), de Mello (1997), and Carkovic and Levine (2002). They also find a positive and statistically significant linkage between FDI and GDP. The coefficient for the variable lnUSPKgap (log of GDP gap between Pakistan and USA) is - 0.98 as expected the larger the less output ceteris paribus. Our result for USPK gap is also consistent with the findings of Li and Liu (2004). They also find a significant but negative impact of GDP gap (technology gap) on the GDP of the host countries. All the so far mentioned effects are significant at any reasonable significance levels. The dummy variable is insignificant indicating that output is not significantly different during political instability or in"good" and "bad" times in Pakistan. The coefficient for the variable lnGcf (log of gross capital formation) is actually negative but insignificant. This variable was used as a proxy for domestic capital. A conjecture for the insignificant effect is that the domestic capital is not as important as the labor input. The results seem to be in line with the scenario that the Pakistan economy is labor intensive.

As mentioned before the interpretations and the discussion above are only relevant if the residuals are actually stationary. So we test that by a Dicky-Fuller test. The results are given in the Table A.3 in the appendix. We can reject the null hypothesis of unit root at all level of significance and conclude that the residuals are stationary.

The appendix Table A.4 of the thesis contains the result of another test, the so called Johansen's cointegration test to check that the variables are cointegrated. The test result indicates that is the case. The appendix also contains autocorrelation analysis of the residuals of the model in the Table A.5. No serious autocorrelation problems were detected. These tests verify the reliability of our estimation.

5. Discussion and Conclusions

In this study, we analyzed the effect of FDI on per capita GDP in Pakistan. A time series analysis for forty two years (1971-2012) was conducted. The Ordinary least square method was used to investigate the association of FDI with GDP per capita in Pakistan.

There are many factors important for a country to increase its production and income level. An important factor is high level of capital and technology. Foreign direct investment is a complement to domestic capital. In the best case scenario FDI also improves the level of technology through spillover effects and transfer of knowledge.

A positive linkage between FDI and GDP per capita for Pakistan was found. The elasticity of GDP per capita with respect to FDI was estimated to be 0.13. A reason might be that FDI inflow in the country brings highly advanced technology which booms the GDP in the long run. On the other hand domestic capital as measured by gross capital formation was not significantly correlated with GDP per capita in Pakistan.

Gap between GDP of USA and GDP of Pakistan was significantly negatively correlated with GDP per capita while population share aged 15-64 was positively correlated with GDP per capita in the country. This variable was used as a proxy for labor input.

We think that the results indicate that the country is still struggling to develop from a labour intensive production to a capital intensive. As mentioned before many factors are important for a developing country to increase output and income levels. Education, research and development, proper institutions and a non-corrupt state are examples of such important factors that have not been considered in this study because of the issue of availability of data.

The goal of this paper was to explore associating relation between the FDI and GDP. But it is also of great importance to know what the key factors that multinationals taking into consideration to locate a place for their future projects are? As mentioned before, Busse and Hefeker (2007) point out that political risk and quality of institutions in the host country matter most for the multinational companies in making decision about where to invest in developing countries. The countries with democratic stability are more likely to be attractive for multinationals and opposite to it countries with higher political risk attract small FDI. The government stability, absence of religious and ethnic conflicts and democratic accountability

processes are more closely to be associated with the inflow of the FDI. Unfortunately, Pakistan is lacking these characteristics of stable governments, religious and ethnic tolerance and democratic accountability since decades. So it has received less FDI as compared to the other countries in the region.

There might be some important variables omitted in our regression. The difficulties in collection of data about corruption, religious and ethnic tensions, violation of law and order, quality level of bureaucracy and accountability of the government are major hindrance to isolate the effect of political instability on GDP and more broadly on the inflow of FDI.

A future study can be done with proper data collection of all causes of political instability to isolate its impact on society as a whole such as to determine a cost which a society pay (in form of poverty and lower education and health, because of the lower growth and lower inflow of FDI) in the absence of a stable regime and political accountability. Moreover, it would be of research interest to investigate the factors which may have influenced the inflow of foreign direct investments in developing countries.

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Appendix

Table A1. List of Events of Political Instability in Pakistan

Year	Events	Consequences	Reference
1971	Civil War in the East Pakistan	------	
1971- Dec	War with India	Lose of East Pakistan and half of resources	Coup Data Codebook
1971- Dec	Resignation by president	First Civilian Martial Law Adverse regime	Coup data Codebook
1977-May	Political instability Coup D'état by army	Martial Law rule for 11 years, Protest and violation by the affected political party	Coup Data Codebook
1979 –Dec	USSR came in Afghanistan	Un-official war against USSR regime in Afghanistan with foreign support, hosting 3.5million refugee	
1985	General Elections	Weak democracy under Martial law	
1988- Aug	Mid-term Elections, President Plain crash with 29 senior army officials and with US diplomats	Regime change , Change in Afghan policy	
1990	Mid-term elections	Opponents form the Government	
1993	Mid-term elections	Opponents form the Government	
1996	Mid-term elections	Opponents form the Government	
1998- May	Nuclear Device tests	Embargos, trade restrictions and etc	
1999	Kargil War with India	Causing conflict with civilian regime and army institution, Relations with world affected.	
1999- Oct	Coup D'état by army	Regime change, change in policies, relation with world affected	Coup Data Codebook
2001- Nov	9/11 happened	World peace at threat, a front line state for War against terrorism.	Coup Data Codebook
2001- Dec	War against terrorism	Front line state, as its response terrorism boasted in the country	Coup Data Codebook
2005- Oct	Major Earthquake	Causing 82,000 deaths, causing a huge loss of infrastructure and property	
2007	Severe terrorism start in the country	Suicide bombing, law and order issues, over 50,000 thousand people have been killed after 2007.	
2007-	Judiciary crisis	Lawyer Movement for the restoration of ousted Judiciary and revoke of emergency in the country.	
2008	Bombay terrorist attacks in India	Tension with India heightened, Threat of attack from India.	
2010	Major flood of Pakistan history	Affecting 2/3 of whole land of the country, causing a great loss of crops infrastructure and property.	

Business cycle time frame in Pakistan

Table A.2.1 Time Frame of Business Cycles in Pakistan

Business Cycle	Recession	Trough	Recovery	Peak
First cycle: 1949-1965 (16 years)	1949-58 (9 years)	1958	1959-65 (7 years)	1965
Second cycle: 1966-1985 (20 years)	1966-75 (10 years)	1975	1976-85 (10 years)	1985
Third cycle: 1986-2005 (20 years)	1986-97 (12 years)	1997	1998-2005 (8 years)	2005
Fourth cycle: 2006	2006-12*	2012*		

Mahmood, T. and Arby, M.F. (2012). Business Cycles in Pakistan. *International Journal of Business and Social Science Vol. 3 No. 4 [Special Issue - February 2012]. The Special Issue on Behavioral and Social Science © Centre for Promoting Ideas, USA www.ijbssnet.com*
http://www.ijbssnet.com/journals/Vol_3_No_4_Special_Issue_February_2012/31.pdf

Table A.2.2 DUMRetc Explanation

year	DUMRetc code	Event Events having possible impact on economic activity	Year	DUMRetc code	Events having possible impact on economic activity
1971 Dec.	0	1971 war, Pol. Instability, Regime change	1991	1	
1972	0	War impacts continued	1992	1	
1973	1		1993	0	****Mid-term election, due to pol. Instability regime change,
1974	1		1994	1	
1975	0	*Earthquake, **Business cycle trough	1995	1	
1976	1		1996	0	****Mid-term Election due to pol. Instability regime change,
1977	0	Pol. Instability, ***coup by army	1997	0	**Business cycle trough
1978	1		1998	0	Nuclear tests, Embargo
1979	1		1999	0	Pol. Instability ***Coup by army
1980	1		2000	1	
1981	1		2001	1	9/11 war
1982	1		2002	0	Impact of 9/11 General election
1983	1		2003	1	
1984	1		2004	1	
1985	1	G. Election	2005	0	*October Earthquake
1986	1		2006	1	
1987	1		2007	1	Extreme terrorism, Judiciary crisis (Imp in 2008)
1988	0	****Mid-term election due to pol. Instability regime change, *****Flood,	2008	0	G. Election, Bombay attack, Threat of Indian attack
1989	1		2009	1	
1990	0	****Mid-term election due to pol. Instability regime change	2010	1	*****Dec. Flood[7]
			2011	0	*****Dec. Flood affecting 2/3 Land
			2012	0	**Business cycle trough

*Earth quack causing casualty over 50,000
** Business cycle tough see Appendix Table 1
***Political Instability Coup data Codebook (Marshall and Marshall, 2007)
****Mid-Term Elections taken place because of political instability by dissolving the sitting parliament before completing her tenure.
*****Flood affecting 20% Land or Population of 1 million and over.

[7] If an event happened in last month of year, the impact shall be shifted to the next year.

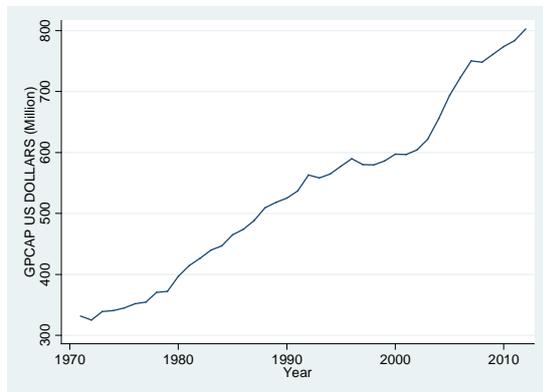**Movements over time of the time series used in the study.**
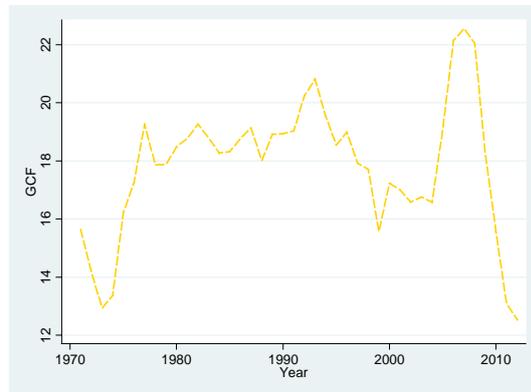

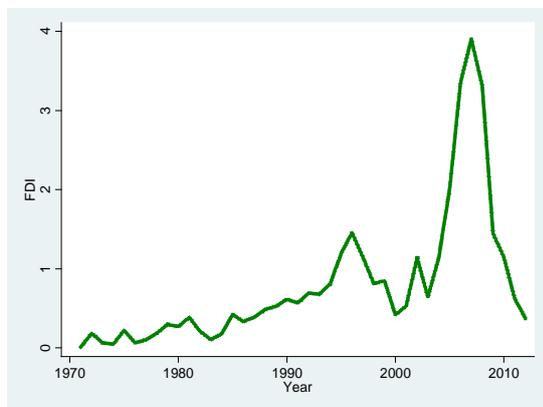**Figure. A1** Plot of GPCAP constant US$

Figure. A2 Plot of GCF % of GDP

Figure. A3 Plot of FDI % of Annual GDP
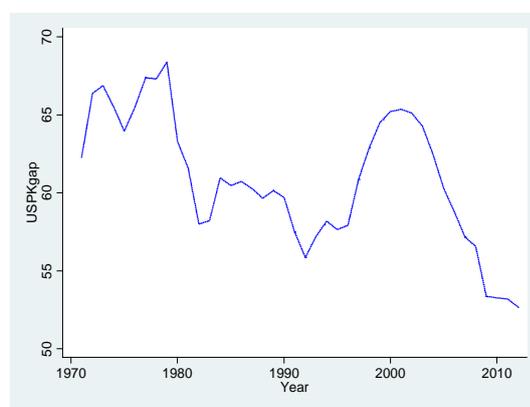

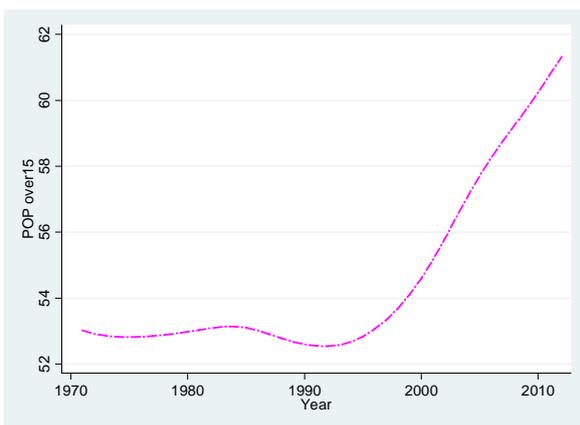**Figure. A4** Plot of USPKgap

Figure. A5 Plot of Population over 15 years % of total

29

Testing the stationarity of Residual

Table A.3 Dickey-Fuller Unit root test of the residuals.

Variable name	At level		First difference	
	T statistics	P.value	T statistics	P.value
Residual	-3.954	0.0017	-11.093	0.0000

*The Residual is stationary at level.

Critical values at 1 %, 5% and 10% level of significance are – 3.645, – 2.955 and –2.611respectively

As we describe in the main text that our interpretation and discussion is only relevant if the residuals are stationary. So we test that by a dickey-Fuller test. The results are given in above Table A.3. On the basis of test results we can reject the null hypothesis of unit root at all level of significance at level as well as with first difference and concluded that the residuals are stationary.

Testing for cointegration

Table A.4 Cointegration test output.

Trend: constant					Obs = 40
Sample: 1973 – 2012					Lags2
MAX Rank	Parms	LL	Eignvalue	Trace statistic	5% crit. value
0	30	479.47718	.	106.1863	68.52
1	39	505.68274	0.73025	53.7752	47.21
2	46	519.6628	0.50292	25.8151*	29.68
3	51	528.08245	0.34360	8.9758	15.41
4	54	532.07701	0.18105	0.9866	3.76
5	55	532.57033	0.02436		

We check the cointegration of our time series with the Johansen time series cointegration test with a null hypothesis that cointegration rank is equal to zero.

$$H_0: \quad rank = 0$$

$$H_A: \quad rank \geq 1$$

We found that all the variables in the time series are cointegrated with a test statistics value of 25.815 against critical value of 29.68 at 5% level of significance.

Autocorrelation analysis of the residuals

To check the autocorrelation we use Durbin Watson test develop by Durbin and Watson in (1971). The null hypothesis is that there is no serial correlation among the observation of the error term. The alternative hypothesis is that the error term is serial correlated.

$$H_0: \text{No serial correlation}$$
$$H_A: \text{Serially correlated}$$

Table A.5 Durbin Watson alternative autocorrelation test

Lags(p)	chi2	df	P values
			Prob> chi2
1	0.021	1	0.8834
Number of lags in sample: 1		Durbin-Watson d-statistic(6, 39) = 1.849858	

The calculated P-value is greater than 5% so we cannot reject the null hypothesis of no autocorrelation.