The Relationship between Infrastructure Investment and Economic Growth

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ABSTRACT

The principal motivation in this study is to investigate the relationship between economic growth and different types of infrastructure investment for selected samples among developing countries and emerging countries.

Gross domestic product (GDP) is generally considered as the most important index and comprehensive measure of the size of economy. The intended model of economic growth to be investigated, includes an explanatory variables such as Energy use (kg of oil per capita), share of gross capital formation in GDP, share of gross saving in GDP, Inflation, GDP deflator (annual %), share of trade in GDP, investment in energy with private participation (% of GCF), investment in transport with private participation (% of GCF) and investment in telecoms with private participation (% of GCF). The employed method for the analysis is panel regression with fixed effect model. The data collected from thirteen emerging countries include Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Russian Republic and Turkey between 2000 until 2010.

Finally, through analyzing the E-VIEWS results, the variables with positive or negative effects on GDP growth (annual %) and also the significant and insignificant effects of the variables will be clarified accordingly.

Keywords: Growth Rate of GDP, Infrastructure Investment, Growth Capital Formation, Inflation Rate, Trade

ÖZ

Bu çalışmanın amacı örnek olarak seçilmiş gelişmekte olan ülkelerde ekonomik büyüme ve farklı altyapı yatırımları arasındaki ilişkiyi incelemektir.

Gayri safi yurtiçi hasıla (GSYİH) ekonomi büyüklüğünün göstergesi ve kapsamlı ölçümü olarak kabul edilir. Bu çalışmada amaçlanan ekonomik büyüme modeli incelenecektir ve bu modelde açıklayıcı değişkenler olarak enerji kullanımı (kg cinsinden kişi başına düşen petrol), GSYİH içindeki brüt sermaye oluşumunun payı, GSYİH içindeki brüt tasarruf payı, enflasyon, GSYİH deflatörü (yıllık %), GSYİH içindeki ticaretin payı, özel sektörün enerji yatırımı, özel sektörün ulaşım yatırımı ve özel sektörün telekom yatırımı kullanılmıştır. Yapılan analizlerde kullanılan yöntem sabit etkili panel regresyon modelidir. Veriler 2000-2010 yılları kullanılarak 13 gelişmekte olan ülkeden toplanmıştır. Bu ülkeler sırasıyla; Arjantin, Brezilya, Şili, Çin, Kolombiya, Hindistan, Endonezya, Malezya, Meksika, Peru, Filipinler, Rusya Cumhuriyeti ve Türkiye'dir.

Son olarak E-views sonuçlarını analiz ederek değişkenlerin GSYİH büyümesine pozitif veya negatif kayda değer bir etkisi olup olmadığı açıklık kazanacaktır.

Anahtar Kelimeler: GSYİH Büyüme Hızı, Altyapı Yatırımı, Büyüme Sermaye Oluşumu, Enflasyon Oranı, Ticaret

I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my loving parents Rita and Akbar Biniyaz Whose words of encouragement and push for tenacity ring in my ears. My sisters Azita and my brother Mehrdad have never left my side and are very special.

I also dedicate this dissertation to my best friend who has supported me throughout the process.

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Chapter 1

INTRODUCTION

The increase in the amount of produced goods and services by an economy over a period of time is called Economic growth. It is generally calculated as a percentage rate of increase in real Gross Domestic Products or GDP.

The economic growth has to be calculated in real conditions, it means that the inflation is adjusted generally in economic in order to eliminate the inflation distorting effect on final price of produced goods and services. Economic growth and economic growth theory are usually referred to increase in potential output which is defined as production with full employment.

Economic growth is mainly focusing on performed tasks for improving the standard of living in a country which is the availability of goods and services to individuals for purchasing within the country or performed tasks to decrease the poverty level of individuals of a country. And as a result of such relationship between economic growth and individuals within the country, the economic growth is usually defined on per capita basis.

Moreover, individual's higher saving rate has a direct effect on the standard of living. As the capital accumulation is increasing per individuals, long term higher savings lead to permanently higher per capita output (income).

Economic growth is under influence of different variety of factors and variables as like as investment rate, financial development, saving rate and deposit insurance. The deposit insurance may affect the financial development, innovation, technology and liberalization. Liberalization in turn, may affect on trade openness, competition among countries and foreign direct investment. Infrastructure investment can also have a positive effect on economic growth.

Regarding the infrastructure, various definitions are applied for what infrastructure is consisted of, but generally speaking, infrastructure is considered as any public services and facilities within a country which are absolutely a necessity of economic activities for the individuals of the country. The infrastructure also can be categorized as economic infrastructure and social infrastructure. The economic infrastructure is mainly consisted of running water facilities, sewerage facilities, roads and highways, energy distribution and networks of telecommunication within a country. On the other side the social infrastructure is mainly consisted of public housing, hospitals, prisons, schools and universities. So particularly in developing countries as one of the main determinants considered in economic growth is usually the total amount of investment in both economic infrastructure and social infrastructure. Direct infrastructure investment causes the creation of production facilities and improvement in economic activities. It also

causes the reduction in costs of transaction and trades, improving competitiveness in society and availability of job opportunities to individuals live in poverty.

In contrast unavailability of infrastructure causes various problems for sustainable growth in economy and reduction of poverty in society.

Infrastructure development also causes the productivity and efficiency increscent through acting as a bridge between resources and factories, individuals and jobs and finally products and markets. Therefore investment and growth can be contributed by infrastructure development.

So as it is perceived, the importance and effects of infrastructure development on economic development and improvement of trade and business are rarely needed to be discussed and emphasized.

The main aim of this study is to find out the effect of infrastructure investment on economic growth. So for the study, subsets of infrastructure investments have been used as main indicators of growth in economy.

The model of economic growth includes the explanatory variables like share of gross saving in GDP, share of gross capital formation in GDP, Inflation, GDP deflator (annual %), share of trade in GDP, Energy use (kg of oil per capita), investment in energy with private participation (% of GCF), investment in transport with private participation (% of GCF) and investment in telecommunication with private participation (% of GCF).

The panel data analysis for a group of developing countries including Argentina, Brazil, Colombia, Chile, China, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Russian Republic and Turkey have been done in order to find out the thesis related results.

Except for the section of Abstract, the thesis consists of six chapters: chapter 1 as introduction, chapter 2 illustrates literature review which explains pervious researches regarding the subject. Chapter 3 includes Data, Methodology and Hypothesis that examined in the thesis. Chapter 4 presents historical analysis about the related countries. Chapter 5 considers panel regression results and interpretations of various cases. And finally the sixth chapter covers the conclusion of the research.

Chapter 2

LITERATURE REVIEW

The total amount of services and goods which are produced within an economy over time is called economic growth. Usually the measurement used for economic growth is the percent rate of increase in real gross domestic products (GDP). GDP is usually explained as total market value which is total goods and services produced by the individuals within a country over period of one year. GDP is an important element in measurement of the country economic power. In order to compare the economic growth per capita among different countries is to declare the total sales of the countries in one chosen currency.

2.1 Economic Growth

Economic growth theory generally refers to the growth of production capacity at full employment. There have been various economic theories since last centuries and the two most important ones are the classical growth theory model and neo-classical growth theory model**.**

2.1.1 Classical Growth Model:

This model is the output of the jobs done economists through eighteenth and nineteenth centuries. During this period the study in classical economics was mainly focused on dynamics of economic growth. The theories developed in this era were mostly concentrated on the function of market economies.

Adam Smith, David Ricardo and Robert Malthus [1] were the famous economists whose thoughts and viewpoint were generalized as classical theory in growth and stagnation. It means that the theory has been the result of the aggregation of common viewpoints of each of these well known economists growth theory.

According to economist Adam Smith, there are three major sources for growth:

(i) Growth both in the force of labor and stock of capital;

(ii) Improvement in the efficiency with which capital is used in labor through greater division of labor and technological progress;

(iii) Promotion of foreign trade that widens the market and reinforces the other two sources of growth. [1]

Economists in classical growth theory believed increase in real GDP per capita temporarily would cause explosion in population which in turn decrease real GDP.

Economists active in this theory developed the idea of "subsistence level" to model this theory which is meant in detail that rise in GDP above the subsistence level of income would be the reason for the increase in population and so the result would be the

decrease in GDP back to subsistence level. It is such an equilibrium level in which real GDP would always return to its former state in the theory. Moreover whenever the real GDP fell beneath the subsistence level, it would cause part of the population to die off and as a result the real income revert to subsistence level.

2.1.2 Non-Classical Growth Model:

The well known Robert Solow [2] who was a Nobel Prize winner in 1987 in the economics improved the neo-classic theory in economy growth. He made a use of Cobb-Douglas production function to develop the theory. The theory discusses the growth as new idea and technology and also adding more inputs of capital and labor. Also as the first economist he developed a growth model with different outputs of capital. In Solow's idea, the new or recent capital is considered more efficient and valuable in compare to former or old capital and the reason is the high technology which causes new or recent capital [2].

2.2 Infrastructure Investment and Economic Growth

In economic theory, there are five channels where infrastructure can have positive effects on economic growth. Infrastructure might act as follow

(i) Be regarded as a direct input into the production process and hence serve as a factor of production

(ii) Be regarded as a complement to other inputs into the production process, in the sense that its improvements may lower the cost of production or its deficiency may create a number of costs for firms

(iii) may stimulate factor accumulation through, for example, providing facilities for human capital development

(iv) can boost aggregate demand through increased expenditure during construction, and possibly during maintenance operations; and finally

(v) can serve as a tool to guide industrial policy which government might attempt to activate this channel by investing in specific infrastructure projects with the intention of guiding private-sector investment decisions (Fedderke and Garlick, 2008)[3].

The research based on observation and experiment to find out the role of infrastructure on economic growth was started by Aschauer (1989) when he discussed that public expenditure can be quite productive (ranging from 0.38 to 0.56) and the US productivity decelerate caused by decrease in investment on public infrastructure[4].

Afterwards Munnell (1990) and Garcia-Mil`a and McGuire (1992), Uchimura and Gao also found fairly high output elasticity of investment on public infrastructure although they were lower in compare to what Aschauer had mentioned [5].

Later on too many empirical researches and tests were commenced in order to criticize the relation between economic growth and infrastructure while controlling growth affecting variables.

Aschauer (2000) also estimated the growth-maximizing ratio for public to private capital through using data related to 48 US states over the period 1970–1990. He found that for

most of the US states, the actual levels of public capital has been beneath the growth-maximizing level Sahoo and Das (2008) obtained a long-run equilibrium link between output and infrastructure in four South Asian countries in addition to India [7].

Moreover, infrastructure development significantly contributes to output growth in South Asia. Furthermore, the panel causality analysis defined that there has been mutual feedback between overall output and infrastructure development and there is a one-way causality from infrastructure to per capita income.

Although the effect of fixed investment on economic growth is highly robust and positive (e.g. Barro, 1991; De Long and Summers, 1991; Wolff, 1991; Levine and Renelt, 1992) but the effect of investment on public infrastructure on growth has remained rather contentious.

2.2.1 Telecommunication

Investment on Telecommunication is highly identified as a main factor that has a strong ability to improve productivity and growth in economic. Leff (1984) discusses that development in networks of telecommunications causes cost savings in other markets through decreasing search and transaction costs, improves the information flow and arbitrage capabilities [8]. Telecommunications creates possibility for the firms to take on flexible structure and locations, causing the evolution in complex or large organizations (Wellenius, 1977) [9].

An early study established by Hardy (1980) regarding 60 developed and developing countries shows that telephones per capita has a significant effect on GDP but the increase in radio stations does not [10]. However, the results were not significant when the regression estimation was done separately for each developed or developing countries.

Norton (1992), also examined the argument of reduction of transaction costs through improvement in telecommunications infrastructure (Leff, 1984), via cross-section data for 47 developed and developing countries [11]. The results show that the telecommunications infrastructure has positive and significant effect economic growth.

Another recent study done by Roller and Waverman (2001), both estimates a micro-model for telecommunications investment through a macro production function for the countries of OECD (Organization for Economic Co-operation and Development) [12]. The study defines a highly causal relationship among telecommunications infrastructure and productivity, and in addition indicates that it occurs whenever telecommunications services rise to a certain threshold, approximately near universal levels.

Since Jipp's (1963) work, several studies have taken a look to the relationship between investment in telecommunications infrastructure and economic growth. Some studies investigate a cross-section of countries over a time period, while others concentrated on national and or sector specific time-series. Found experimental evidence implies a strong positive relationship among investment in telecommunications infrastructure and

economic growth, while the investment returns are generally greater for developing countries (Dholoakia and Harlam, 1994) [13].

In particular, Cronin et al. (1991) and Lee (1994) investigated if growth in telecommunications infrastructure affects economic growth or economic growth affects the telecommunication sector to grow. Lee tested this relationship for main lines growth in South Korean, telephone sets per capita, gross capital investment expenditure (land and buildings), and gross investment for 1963 through 1988[14]. A rigid positive effect on the economic growth was found. The indicated process was that increased telecommunications infrastructure encouraged economic growth through providing necessary infrastructure needed for business. Cronin et al. (1991) apply Granger, Sims and modified Sims researches to US economic growth and telecommunications investment data for 1958 through 1988. A feedback process is indicated that by means of telecommunications investment encouraged economic growth and the growth causes increscent telecommunications infrastructure demand [15].

Madden and Savage (1998) researched the relationship between telecommunications infrastructure and economic growth for transforming Central and Eastern European (CEE) economies. They found a two-way causal relationship between telephone-density and economic growth at the aggregate level [16].

Zhao and Junjia (1994) discussed that increased investment in telecommunications in China has caused reduction in time and space in production process, distribution,

exchange and finally consumption. Such externalities have led to a more efficient use of energy, labor and capital [17].

2.2.2 Transportation

Empirical researches at international level by means of cross sectional and panel datasets has also been reviewed, as these studies help us both in the econometric specification and interpretation and they also allows us to make important comparison. Aschauer (1989c) studied the economic role of public investment, of which transport capital forms part for the G7 (group of seven industrialized nations finance ministers) countries using panel data over the period of 1966-1985 [4]. He attempts a Cobb-Douglas function and reaches an output elasticity of 0.34 to 0.73 which shows the importance of public investment in productivity and growth clearly. In a subsequent study, Aschauer (1995) also employed an entire productivity growth function with fixed country and time effects to study the similar effect for 12 OECD countries for the years 1960-1988. He has reported allocation between 33 – 55% of the non-military public capital stock into output growth [4].

However it should be also noticed that various studies at international level have defined the insignificance and diverse results of public investment on productivity and also output growth. For example, Ford and Poret (1991), by means of data on non-military public capital stock, and including infrastructure services provided by private sector as well, for 11 OECD countries for the years 1960-1988, they found that their wide definition of infrastructure (including any structures in water, electricity and gas and also structures in transport and communication) had significant impact on productivity and

output for 5 of the 12 countries, namely, US, Germany, Canada, Belgium and Sweden. He attempted an entire factor productivity growth and Autoregressive of order 1 and 2 models for his estimations [18].

It is also necessary to find out the relationship among transport infrastructure development and economic growth because of the massive investments in infrastructure project. Through establishing the theory, the authenticity of the analyzed topic is proved by many authors effective in this field. Most of the empirical researches are assigned on production function approach and have reached positive relationship between investment in transportation infrastructure and economic growth.

Cobb-Douglas production function was not only aggregated national time series data of USA but also was used to find out the relationship between public infrastructure capital and the level of total output of the private sector. He found that a significant linkage exists between these two variables. The output elasticity in regard to the public capital is 0.39, meaning that 1 percent increase in infrastructure capital stock causes 0.39 percent increase in the private sector output [19].

Sanchez-Robles (1998) finely indicated some new indicators for investment in infrastructure through employing physical units of infrastructure. He established that the physical units of infrastructure are positively and significantly correlated with growth [20].

Some researches discover the effect of public capital on the output growth rate. Canning, et al.(2004) used physical measures, kilometers of paved roads, instead of constructing stock of monetary investment in infrastructure in order to investigate "the extended consequences of infrastructure provision on per capita income in a panel of countries" covering the years 1950 and 1992 according to the growth model of Barro (1990, cited Canning, 2004,p.1) [21] . His measured results suggested that for the impact of paved road increase in provision on GDP per capita differs across countries. They found witness of over-supply in public capital in some of the developing countries.

Herranz-Loncán (2007) studied the impact of infrastructure investment on economic growth between in Spain over the period of 1850 and 1935[22]. By mean of new infrastructure data, he shows that the growth effect of local-scope infrastructure investment measured positively, but returns to investment in large national networks were not significant and it was approximately zero. He prepared two complementary explanations for the recent result. On the one hand, public involvement and the non-efficiency investment criteria were very strong in large network construction however returns to new investment in large networks might have fall down significantly while the basic links were constructed.

Furthermore, statistical researches done for United States defined that a direct positive link exists between infrastructure investment and GDP. For example, for the years 1950-79, growth in public infrastructure caused approximately a one to one for economic growth. During the period infrastructure investment in important areas such as transportation, water management and electricity generation rose at an average rate of

4% while the entire economic or GDP growth had an average of 4.1% during the same period. On the other hand, during the years 1980-2007 growth in public infrastructure investment dramatically fell down to 2.3% while average annual GDP growth fell down to 2.9 percent over the same period (Heintz et al. 2009) [23].

Chapter 3

METHODOLOGY, DATA AND HYPOTHESIS TO BE TESTED

In this chapter firstly the methodology which is used for hypothesis analyzing and the relationship among selected indicators of GDP growth (annual %) in a selected sample of emerging countries is brought into consideration. Secondly the data and different variables which are used in this study is mentioned and finally various hypothesis used for the research is considered.

3.1 Regression Analysis Methodology

One of the main methods used for estimating the variables relationship is regression analysis. Usually there exists a dependent variable in addition to one or even more independent variables. In more detailed, regression analysis contributes to find out the method that variations of a dependent variable have effects on the related variation of independent variable as the independent variables are not changed. Regression analysis mainly aims to find out a function in which the relationship among different variables can be shown. This function is named as regression function.

The other important usage of regression analysis is to predict the dependent variables behavior. Also the technique of least squares is known as the basic type of regression.

The technique has been published by Legendre (1805) and Gauss **(**1809). In 1921 Gauss also has established an expansion over the theory which in fact was an edition of the Gauss-Markov theory. In 19th century the term of regression was first used by Francis Galton to explain a natural phenomenon. The model of linear regression is also used for modeling the relationship among the scalar dependent variable named as Y and one or even more explanatory variable named as X. Linear regression is used to solve regression problems assuming the dependent variable as a linear function for independent variables. The following equation clarifies the clue:

$$y = \beta_0 + \beta_1 X + \varepsilon$$

As it can be perceived the equation has a linear form through considering the two factors of β_0 and β_1. Regarding the model of simple linear regression, it can be assumed:

- The mean value of y for any value of x can be found by the:

$$E(y|x) = \beta_0 + \beta_1 x$$

- For any value of x, any values of y are distributed around their mean value

$$VAR(y|x) = \sigma^2$$

- There is no correlation among the values of y and the covariance is zero so there is no linear correlation among y values. $COV(y_i|y_j) = 0$

- The x must at least get two various values and cannot be a random variable.
- But ε is considered as a random error and so:

$$E(\varepsilon) = 0 \quad \Longrightarrow \quad E(y) = \beta_0 + \beta_1 x$$

$$VAR(\varepsilon) = \sigma^2 = VAR(y)$$

- The covariance between any pairs of errors is:

$$COV(\varepsilon_i, \varepsilon_j) = 0$$

- Both y and also ε are generally distributed around their mean

$$Y \sim N\{(\beta_0, \beta_1 x), \sigma^2\}$$

$$\varepsilon \sim N(0, \sigma^2)$$

Various methods are used in regression analysis. The ordinary least square (OLS) or linear least square is the most famous and applicable.

Generally in statistics, the unidentified factors can be calculated through ordinary or linear least square. The approach causes the minimization of the squared vertical spaces of summation among the answers within the data and the predicted answers by linear estimate.

Using OLS approach has various benefits as like as:

I. There is no complexity in applying on a computer through usage of accessible algorithm exists in linear algebra.
II. The new applications in modern computers can be used effectively because the approach can be applied so fast to solve the problems with too many features and too many collected data.
III. In compare to other regression models, this approach is much easier in analyzing mathematically.
IV. It's much more easier to be understood for the individuals with basic level information in mathematics
V. And in some certain cases it's the most ideal process.

Unfortunately there are also some disadvantages in applying linear least square:

I. Outliers: For the data which are extremely small or large in compare with other data within the dataset, applying the method result in false response.
II. Non-Linarite: In reality, almost none of the systems operate in linear style, but this method as like as all other kind of linear regression tends to assume the act of system linear and so it attempts to create a linear relationship among variables to make some linear model suitable to their relations.
III. Dependence among variables: through applying least square method, if there are correlations among the independent variables, then the prediction will not be always accurate.

3.2 Pooled Regression Analysis

Pooled regression which is usually named as panel data is a technique in statistics which mainly apply panel data with two dimensions.

Panel data is in fact a mixture of time series in addition to cross-sectional data. Whenever the collections of data or datasets are going to be homogenous or pooled, the method is applicable.

For applying panel regression, data must be collected over time and over same individuals and after that the regression applies over these two dimensions. Panel regression model can be shown as:

$$Y_{it}=a + bX_{it}+\varepsilon_{it}$$

Where:

X is independent variable

Y is dependent variable

i is individual index

t is time index

ε_{it} is the error

a, b are coefficients

The term of error has an important role in the analysis. Regarding the error effect through different assumptions, two types of fix effect and random effect can be considered.

Generally, there have been different sets of data which can be used in economics analysis mainly classified as follow:

1) Time series: These are the most common and easily available sets of data.

2) Cross section: These are the type of data that is provided over various geographic zones or demographic groups.

3) Panel data: These are the combination of time series data and cross sectional data.

There are three approaches in panel data analysis which are more or less independent.

1- Random effect models where there are individuals with time constant and unique attributes which are caused by random variation.
2- Fixed effects models where the individuals have unique attributes but they are not caused by random variation and do not changed during the period of time.
3- Independently pooled panels where the individuals have no unique attributes and there are no universal effects during the period of time.

The preferred method or models used in any analysis mostly depends on the goals of the study, for the intended analysis the fixed effect model has been chosen which will be explained more here after:

3.2.1 Fixed Effect Model:

In fixed effect each individuals is assumed to have a unique intercept value and it suggests the existence of heterogeneity among individuals. Moreover another feature given to the model by fixed effect is time invariant which means even if the intercepts are different but changes has not occurred within period of time. So in such cases because of correlation of explanatory variables and the intercept, there could be no exogenous problem and as a result the estimation will be more consistent.

In statistic and econometric, a fixed effect model is a statistical model.

In the cross- section fixed effect model, the key is that by looking at the equation of

$$Y_{it} = a_i + bX_{it} + \varepsilon_{it}$$

The econometric specification is such that the intercept (a_i , constant) term over time is fixed. (Does not change from one period of time to another), but vary between cross-sections (countries) that is why a_i is different for each country constant term.

3.3 Data:

Data used in this thesis is originated from Electronic World Bank Database of the World Development Indicators. Economic indicators that are chosen as variable for conducting regression analysis are Energy use (kg of oil equivalent per capita), Gross saving (% of GDP), Trade (% of GDP), Gross capital formation (current US$), Gross capital formation (as a % of GDP), Inflation GDP deflator (annual %), GDP growth (annual %),

investment in energy with private participation (as a % of GCF), Investment in transport with private participation (as a % of GCF) and Investment in telecoms with private participation (as a % of GCF).

The data belong to 2000-2010; it is annual for thirteen countries (emerging economic) include Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Russian Federation and Turkey.

3.4 Hypothesis to be Tested:

1- Dose Energy use (kg of oil equivalent per capita) has positive effect on GDP growth (annual %) or it has negative effect?
2- Does Gross capital formation (as a % of GDP) has positive effect on GDP growth (annual %) or it has negative effect?
3- Dose Inflation, GDP deflator (annual %) has positive effect on GDP growth (annual %) or it has negative effect?
4- Dose Gross saving (% of GDP) has positive effect on GDP growth (annual %) or it has negative effect?
5- Dose Trade (% of GDP) has positive effect on GDP growth (annual %) or it has negative effect?
6- Dose investment in energy with private participation (as a % of GCF) has positive effect on GDP growth (annual %) or it has negative effect?
7- Dose Investment in transport with private participation (as a % of GCF) has positive effect on GDP growth (annual %) or it has negative effect?

8- Dose Investment in telecoms with private participation (as a % of GCF) has positive effect on GDP growth (annual %) or it has negative effect?

Chapter 4

HISTORICAL ANALYSIS

4.1 Argentina

Economy of Argentina is the third largest economy in Latin America and based on World Bank report it is upper middle income which is mainly based on export, because of high natural resources, the economy is mainly including export of agricultural products. Argentina economy growth has lots of ups and down is often followed by a recession, it has been the richest country in the beginning of Twentieth but now it's a middle income country although it is a G20 member and has a fairly high GDP per capita and people have high life quality.

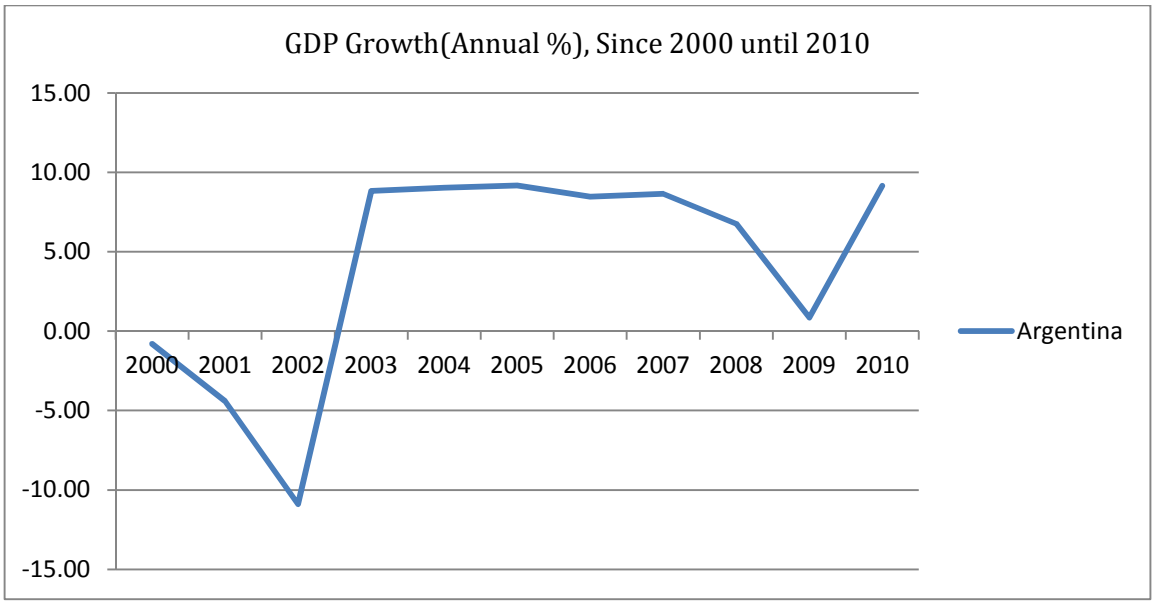

Figure 4.1: GDP Growth (Annual %) in Argentina

This figure illustrates that GDP growth in Argentina. At the first two years of the last decade has been negative effect, it means the curve has a negative slope. As the graph above display this indicator touched a maximum value of 9.18 in 2005 and a minimum value of -10.89 in 2002, because of this county has a crises in that years. Between 2003 and 2007 a small fluctuation can be observed. After 2007 till 2009 when started world depression also Argentina engaged an economic crises.

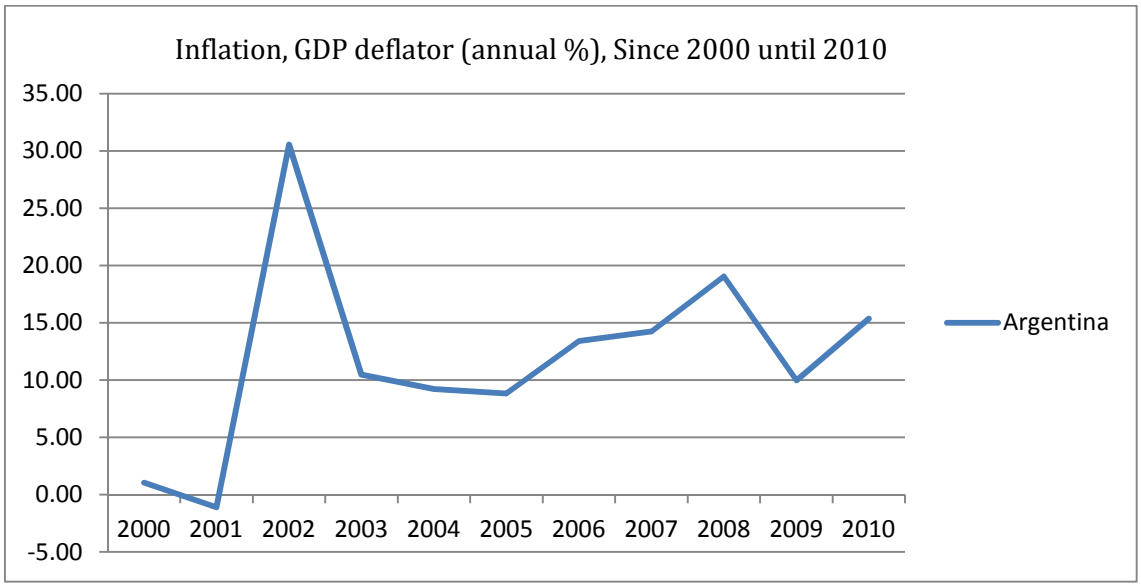

Figure 4.2: Inflation, GDP deflator (annual %) in Argentina

Inflation rate in Argentina before 2001 was negative. Between 2001 till 2003 has extremely fluctuated and highest amount can be recorded in 2002 but after 2003 this factor changed its pattern and more fluctuation cannot be observed. The minimum amount for this factor can be observed in 2001.

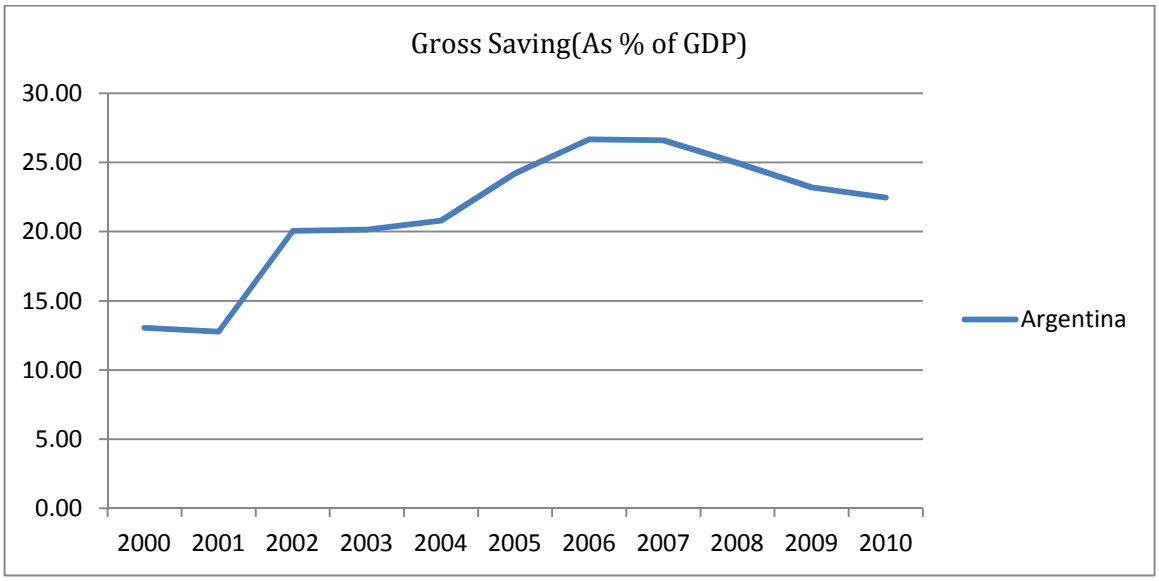

Figure 4.3: Gross Saving (As % of GDP) in Argentina

In Figure 4.3 there isn't too much change among the whole years. The maximum Gross Saving rate is in 2006 and after this year there is a small decrease in this factor.

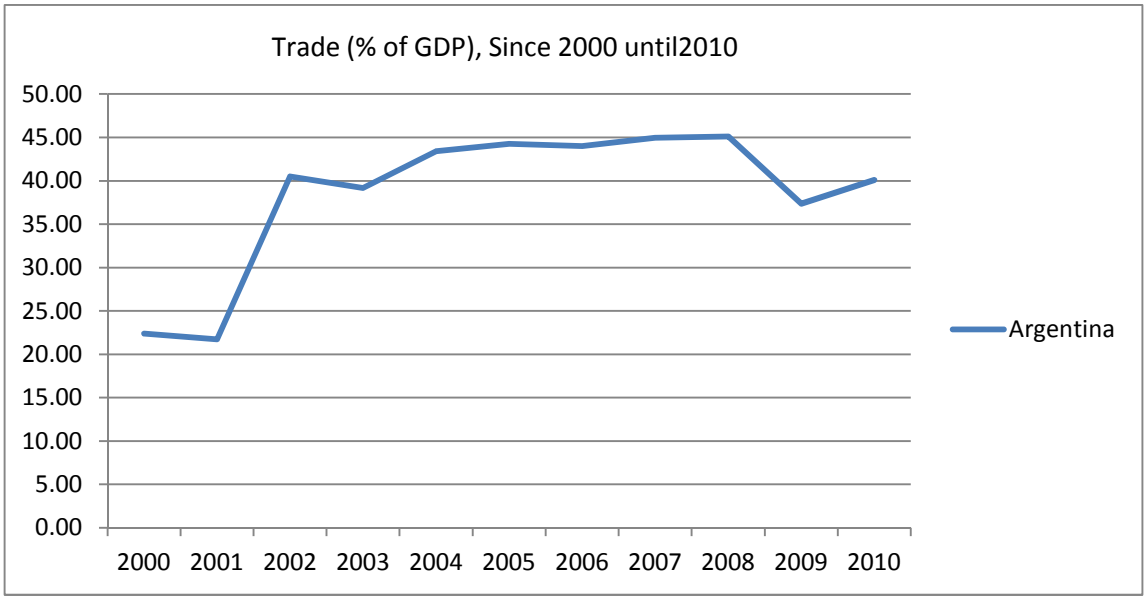

Figure 4.4: Trade (% of GDP) in Argentina

Figure 4.4 is showing the Trade as the percentage of GDP between 2000 and 2010. Around 2001 an extreme fluctuation can be seen which results in an increase in the amount of the factor. The minimum rate is also can be found in the same year 2001.

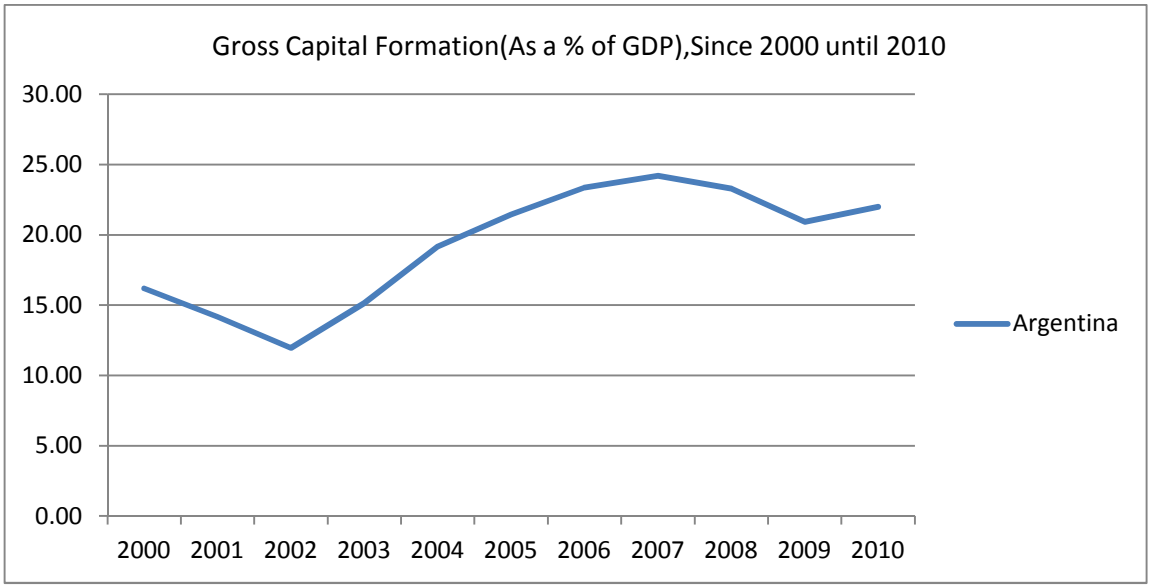

Figure 4.5: Gross Capital Formation (As a % of GDP) in Argentina

In Figure 4.5 it can be seen that the graph started with the negative slope which results in the minimum amount of Gross Capital Formation. After 2001 there's a smooth curve which continues with approximately same slope.

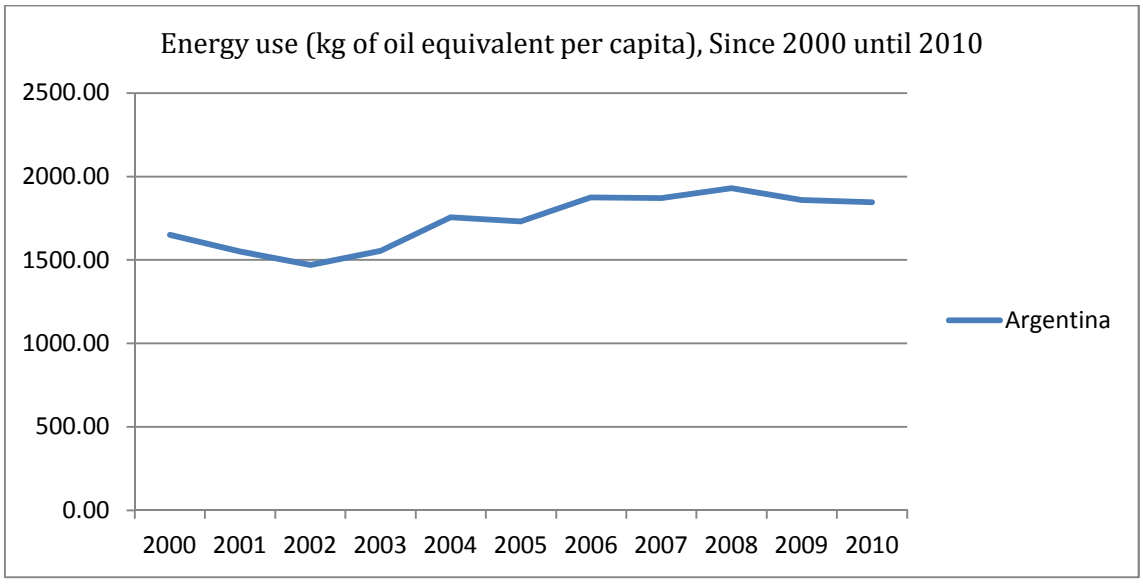

Figure 4.6: Energy use (kg of oil equivalent per capita) in Argentina

Figure 4.6 illustrates that the energy use between 2000 and 2010 did not change a lot and we have a constant curve.

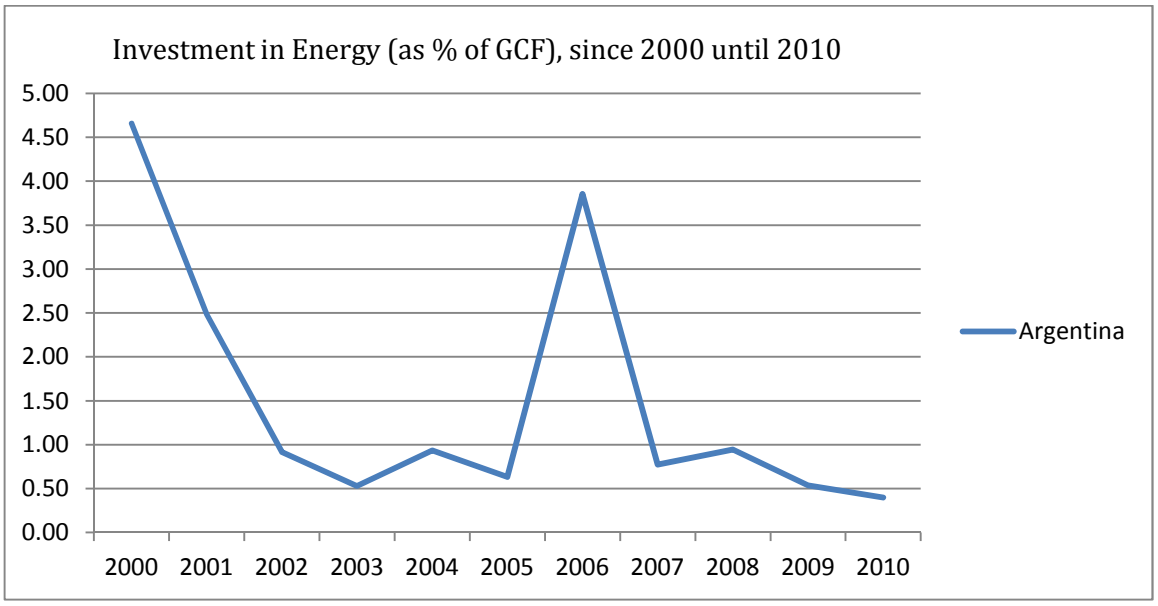

Figure 4.7: Investment in Energy with private participation (as % of GCF) in Argentina

In Figure 4.7 it is shown that the maximum value of Investment in energy is in 2000, and after that there's a significant decrease in this amount. In 2005, again there's a big rise in the amount of this factor which results in the significant increase.

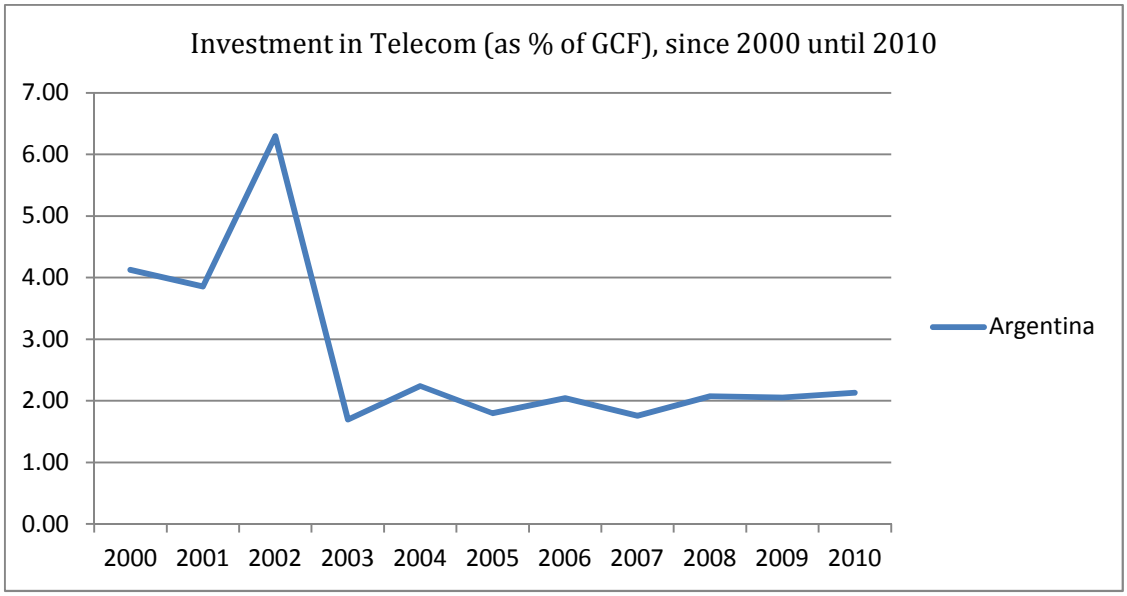

Figure 4.8: Investment in Telecoms with private participation (As a % of GCF) in Argentina

Figure 4.8 shows that after a huge decrease in the amount of investment in Telecom in 2003, a smooth curve then reflects that there was no significant change in the amount of this factor from 2003 until 2010.

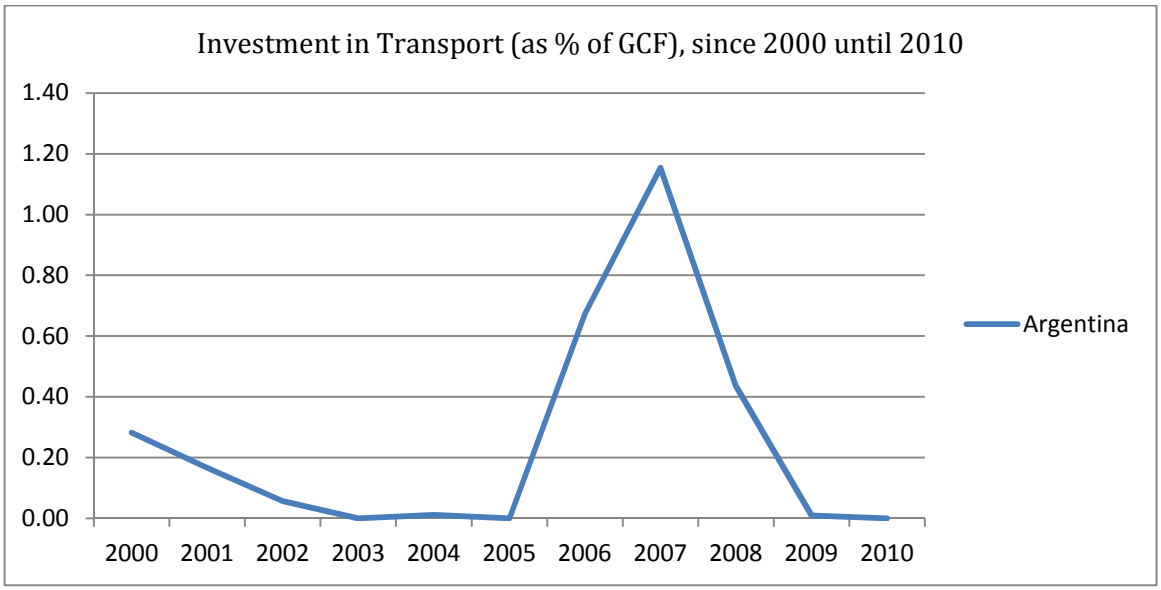

Figure 4.9: Investment in Transport with private participation (As a % of GCF) in Argentina

In Figure 4.9 it can be seen that the maximum amount of investment in transport belongs to a year between 2006 and 2007. The zero amounts in some years illustrate the lack of exact data in the corresponding years.

4.2 Brazil

Brazil's economy is in the seventh place of the largest world's countries by nominal GDP which has fairly free markets and an inward-oriented economy. Its economy can be determined as the largest one in South American nations and the second largest in the western hemisphere.

This country is one of the major economies with the fastest-growing rate in the world, which the average annual GDP growth rate of it is over 5 percent.

Brazil is top country with the growing evolution of competitiveness based on the World Economic Forum in 2009. It was ahead of eight other countries and also overcame Russia for the first time. Its place was close to two other countries (India and China) based on the BRIC economics. Significant steps taken since the 1990s in the case of economic sustainability have particularly increased the country's competitiveness fundamentals and provided a better situation for private-sector development.

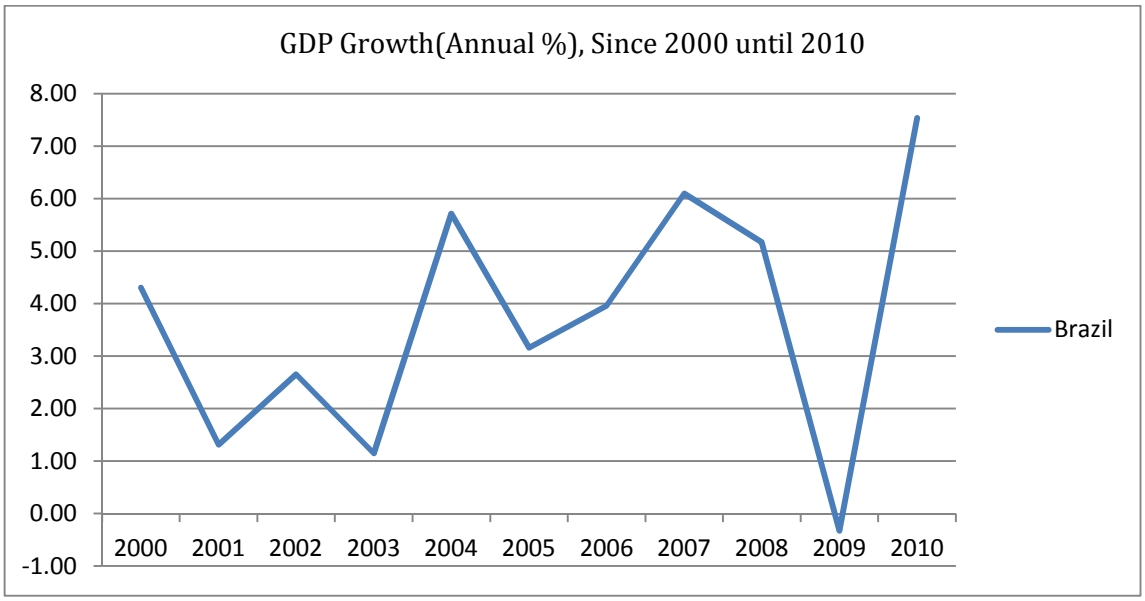

Figure 4.10: GDP Growth (Annual %) in Brazil

GDP is monetary value of all the final good and services produced by citizens of country in one year. The figure illustrates that the maximum growth rate of GDP in Brazil belongs to after 2009, and the minimum amount of GDP growth belongs to 2009. Also, it can be observed a fluctuation among 2000-2008. By passing the year 2007 with the beginning of the economic depression, changes has influenced the GDP Growth which is extremely decreased its rate (about 5%) in nearly one year.

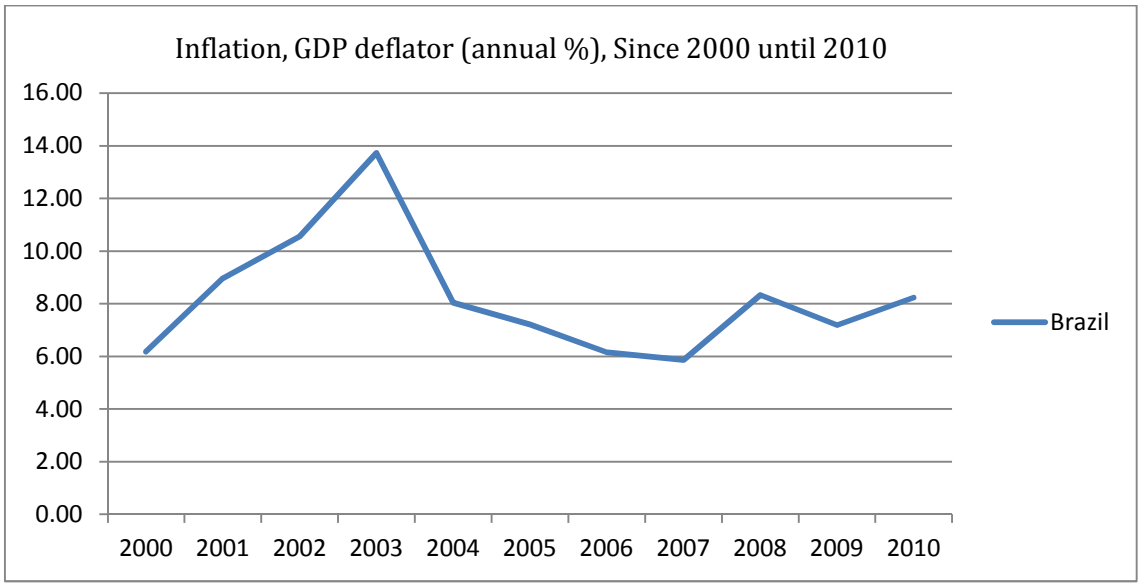

Figure 4.11: Inflation, GDP deflator (annual %) in Brazil

There's a rising trend after 2000 till 2004; this trend is likely to peak at 2003; there's the normal volatility in recent years. It is obvious that in the year with recession there's no extreme fluctuation but Inflation has been changed from its lowest in decades. Control of inflation rate, combined with other macroeconomic variables, was responsible of performance of Brazilian economy in recent year. Brazil was one of the few emerging economies to maintain inflation roughly in line with its targets throughout the 2008–09 commodity price boom and bust.

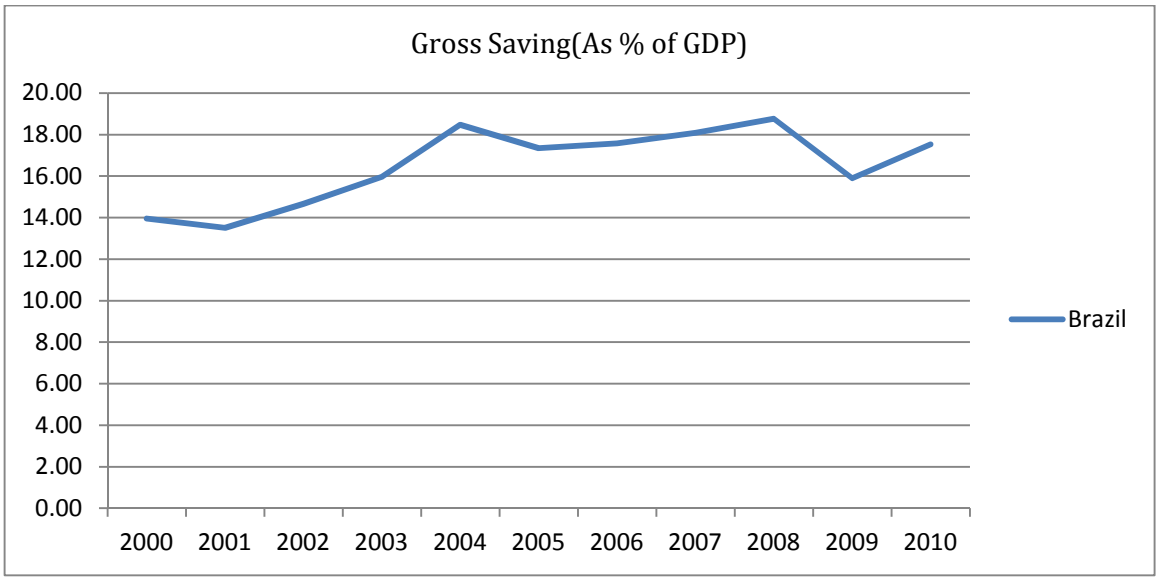

Figure 4.12: Gross Saving (As a % of GDP) in Brazil

Gross savings are estimated as gross national income plus net transfers and less total consumption. Gross Saving (As a % of GDP) for Brazil varies between its lowest point 13.51 in 2001 and its highest point 18.77 in 2008. After 2008 gross saving (as a % of GDP) started to decrease until 2009 and this trend changed and shows an upward tendency until 2010.

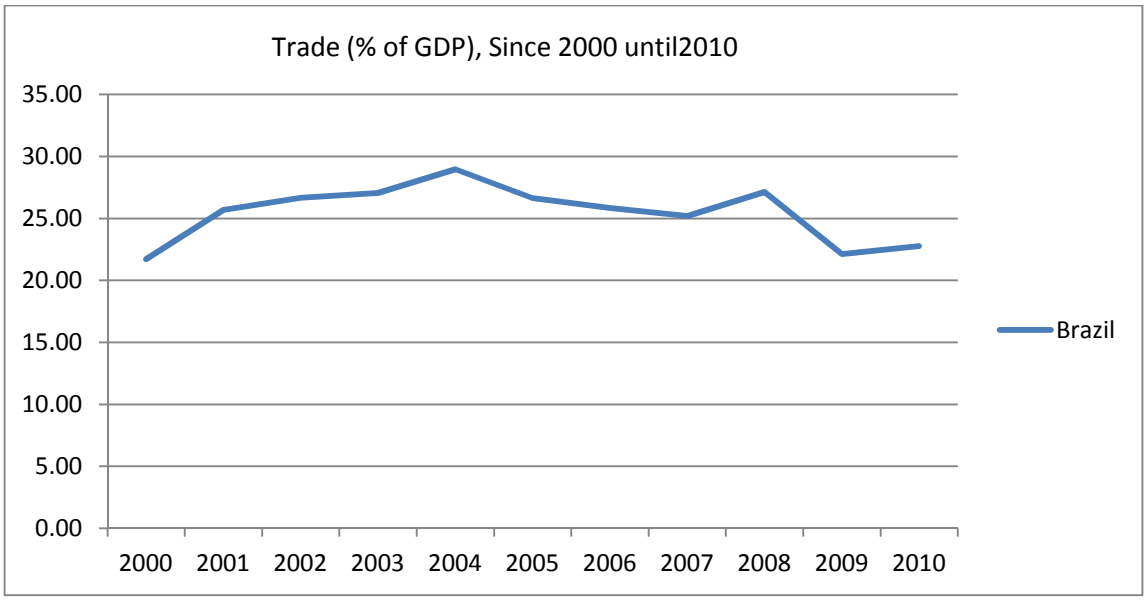

Figure 4.13: Trade (% of GDP) in Brazil

This figure shows that trade's curve fluctuate between 20% up to 30% during last decade. It has not extremely fluctuation and this means that Brazil has a constant policy in trade with other partners. The maximum value happens at 2004.

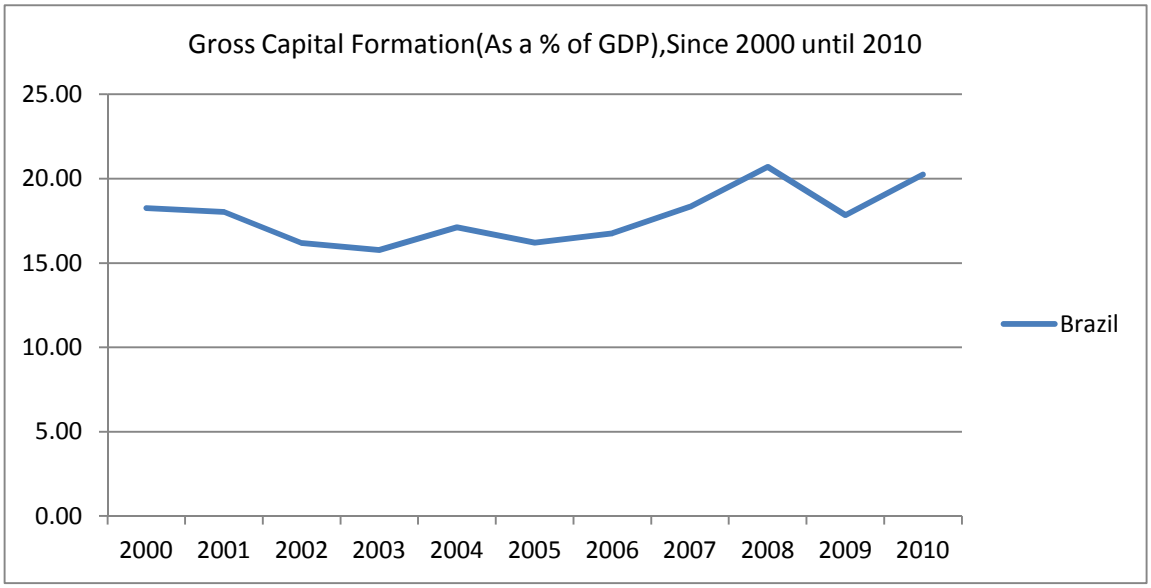

Figure 4.14: Gross Capital Formation (As a % of GDP) in Brazil

It can be seen in figure 4.2.5 that there is a growing trend in gross capital formation (as % of GDP) and investments haven't negative effect in this country when world depression is started at 2007 until 2008 but after this year the trend was decreased until 2009. Since 2009 gross capital formation is increase again in Brazil.

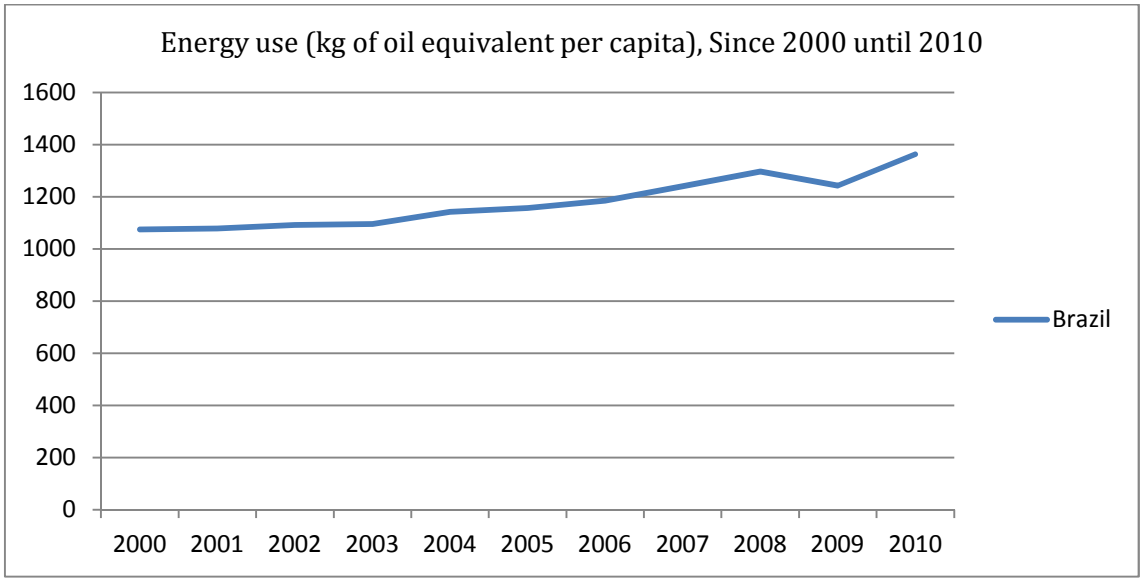

Figure 4.15: Energy use (kg of oil equivalent per capita) in Brazil

Figure 4.2.6 illustrate that Energy use (kg of oil equivalent per capita) in Brazil touched its lowest point in the first year between 2000 and 2010 and after that a positive slope of the curve shows an upward trend of the factor which leads to touch its maximum point in 2010.

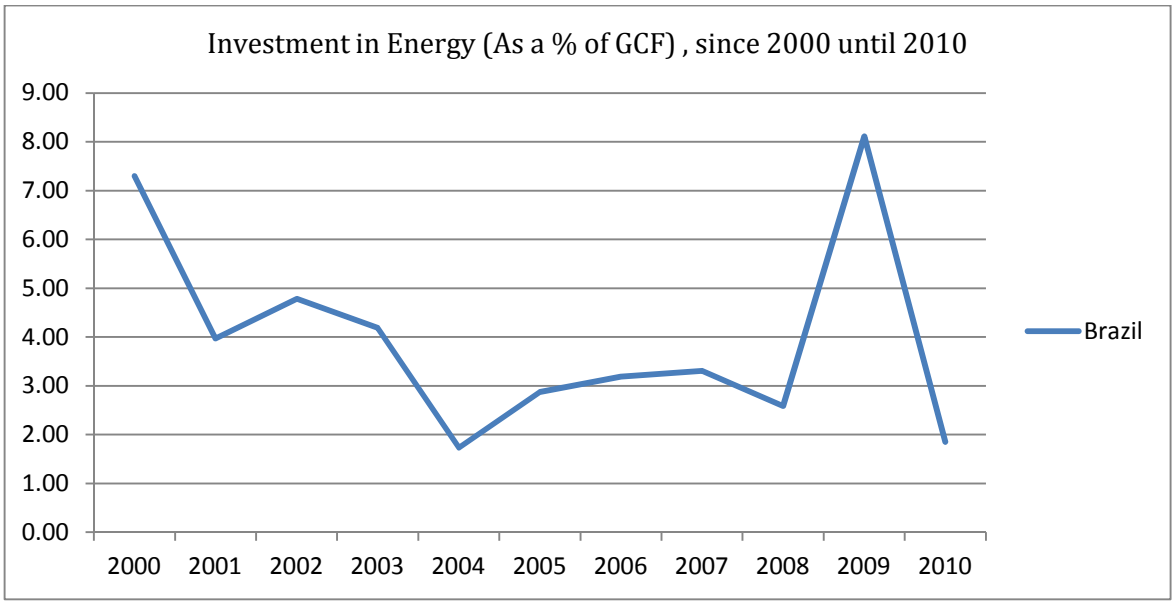

Figure 4.16: Investment in energy with private participation (As % of GCF) in Brazil

This figure illustrate that investment in energy with private participation (As a % of GCF) in Brazil in last decade has fluctuate. As it can be seen, it looks to its lowest level in 2004 and its highest level in 2009. At the year 2010 the amount is reduce up to 8,036,400,000$ and this sector's of infrastructure lost the amount of 15,440,000,000$ till the end of year.

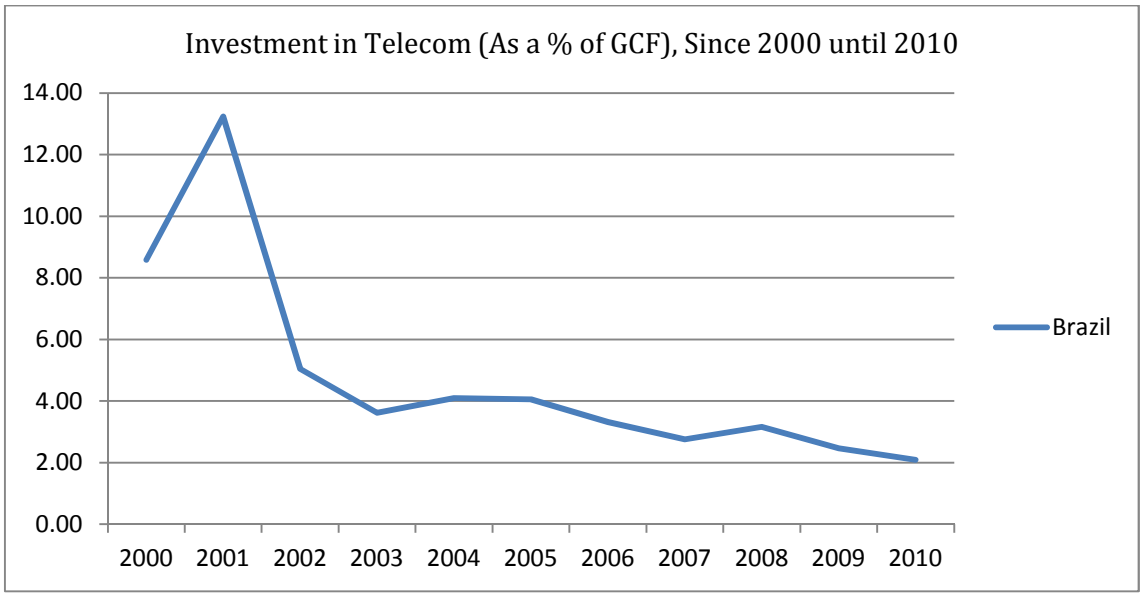

Figure 4.17: Investment in telecoms with private participation (As % of GCF) in Brazil

The investment is started at 2000 and it can be seen an increase trend till 2001 that this amount is maximum amount in last decade. After 2001, this amount was decreased dramatically. Then at the beginning of 2004 again the trend increase till 2008.

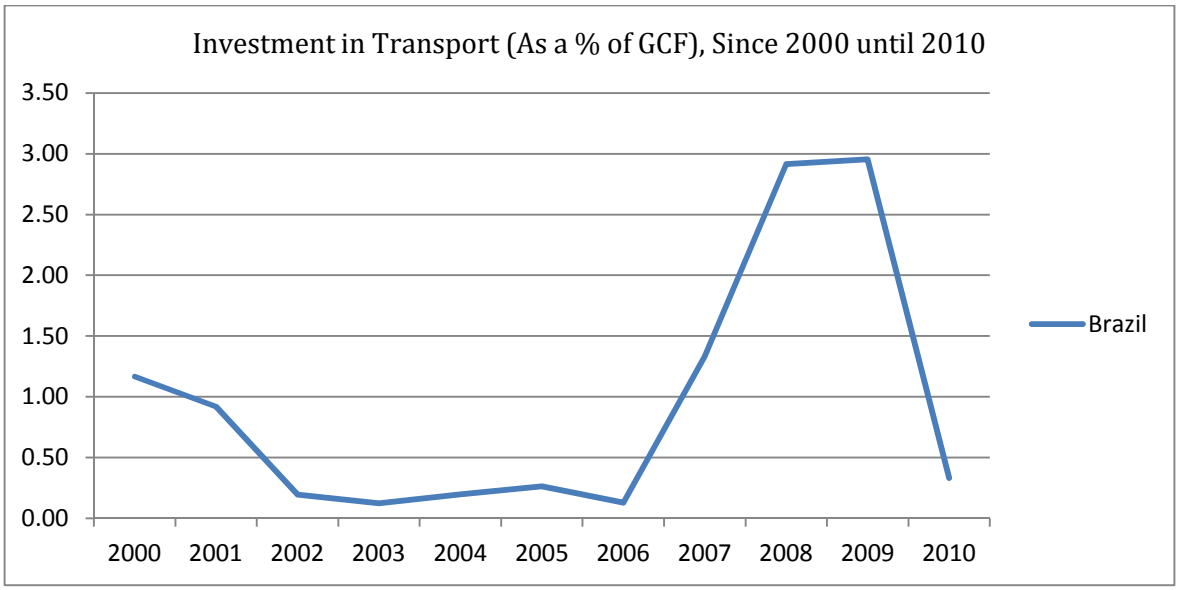

Figure 4.18: Investment in transport with private participation (As % of GCF) in Brazil

This curve shows Investment in transport with private participation (As a % of GCF) in Brazil since 2000 until 2010 that this investment has not significantly trend until2006. At 2006 it can be observed significant increase in the trend until 2008 and the amount reached to maximum in past decade. So after 2008 this sector of industry lost significant amount of investment funds.

4.3 Chile

Economy of Chile based on World Bank report is an upper middle income economy which is mainly based on mining and exporting the copper. The first South American country to join OCED was Chile in May 2010. This country has the highest nominal GDP per capita in Latin America. Other items important in Chile's economy are producing Salmon as the second largest producer in the world and Forestry products. The main land of Chile is mostly mountainous and there is only small amount of farm land which is hardly reaching 3% of the total country area, so the Agricultural products has small share in its economy. Although Chile is ranged as upper middle income economy but it is so in-equal and around 5.5% of the people lives on less than 2 USD per day.

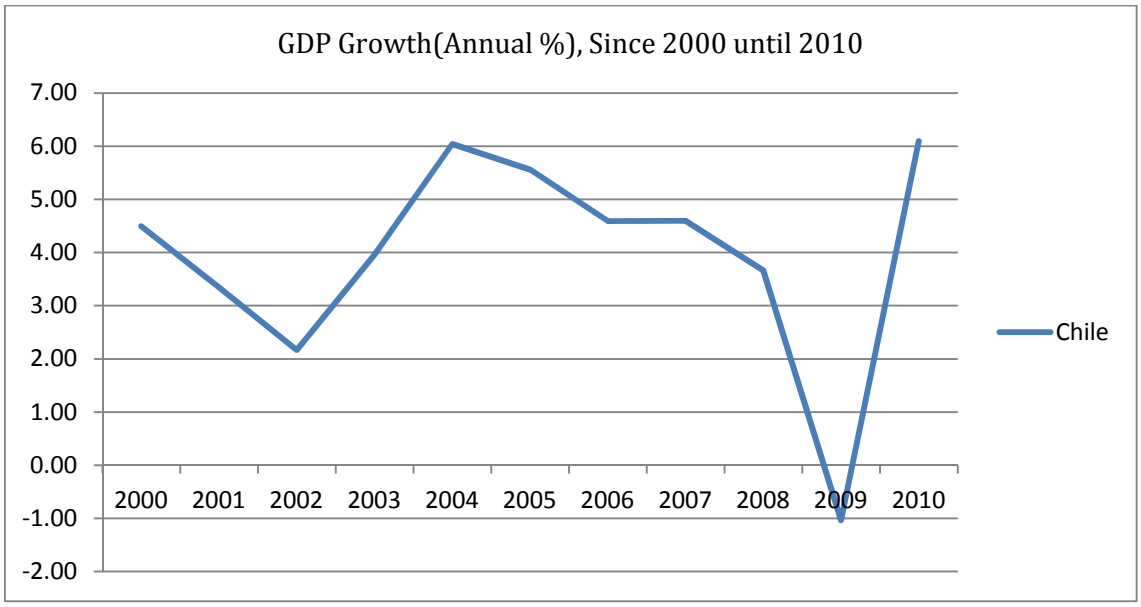

Figure 4.19: GDP Growth (Annual %) in Chile

Figure 4.19 shows a fluctuation between 2000 until 2009. The maximum growth rate belongs to 2009 while the maximum is approximately is 2010. In 2009 after a significant decrease the curve changed its path to reach the highest value.

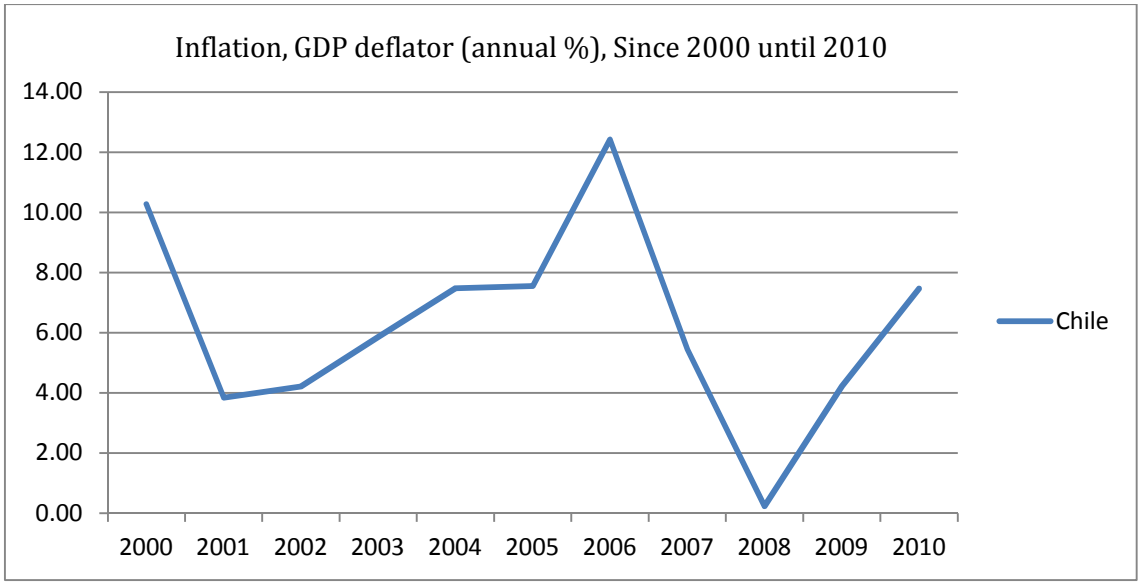

Figure 4.20: Inflation, GDP deflator (annual %) in Chile

In figure 4.20 it can be seen the maximum amount of inflation belongs to the year 2006 and after that a huge decrease brings the curve down to near zero.

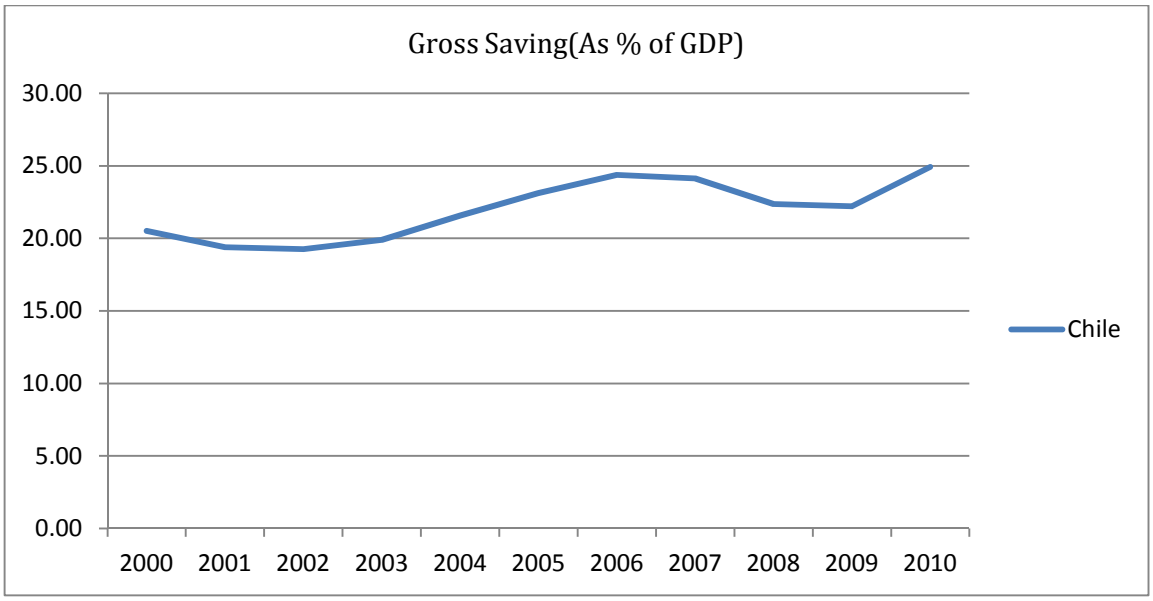

Figure 4.21: Gross Saving (As % of GDP) in Chile

Figure 4.21 shows a smooth curve showing the cross savings between 2000 until 2010. The maximum is 25% while the minimum amount is close to 20%. So, as it can be seen there is not too much difference between the maximum and minimum value.

Figure 4.22: Trade (% of GDP) in Chile

In figure 4.22 the amount of trades in ten years is shown. There is smooth increase during in eight years but after 2008 the trade amount decreased about 15%.

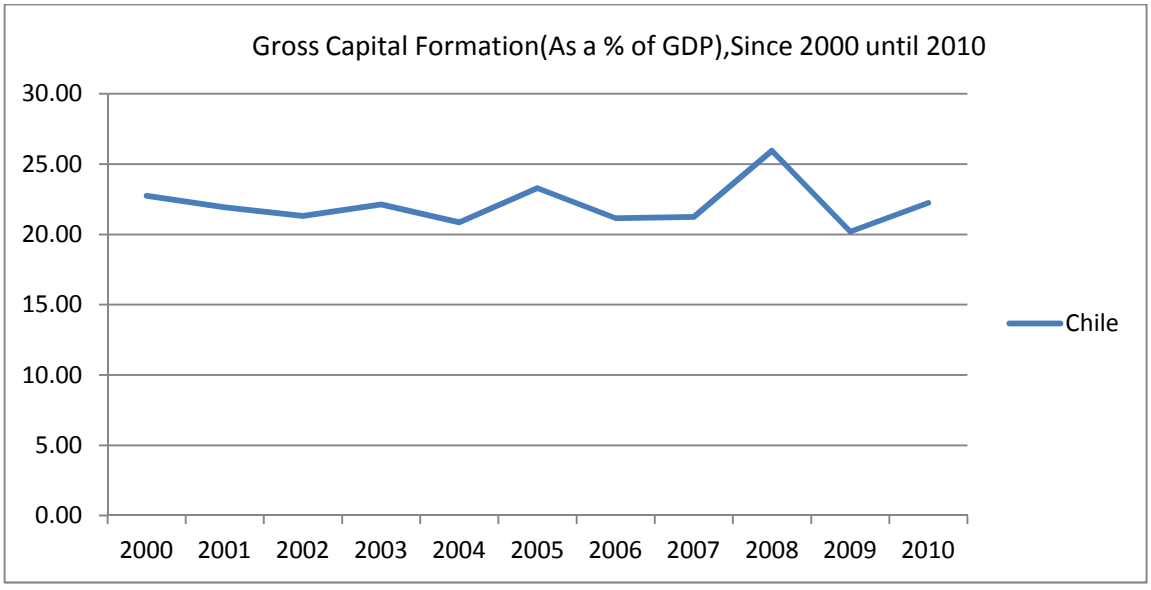

Figure 4.23: Gross Capital Formation (As a % of GDP) in Chile

Figure 4.23 illustrates the fluctuation in Gross Capital Formation in ten years. The maximum is 26% in 2008 and the minimum in 20% in 2009.

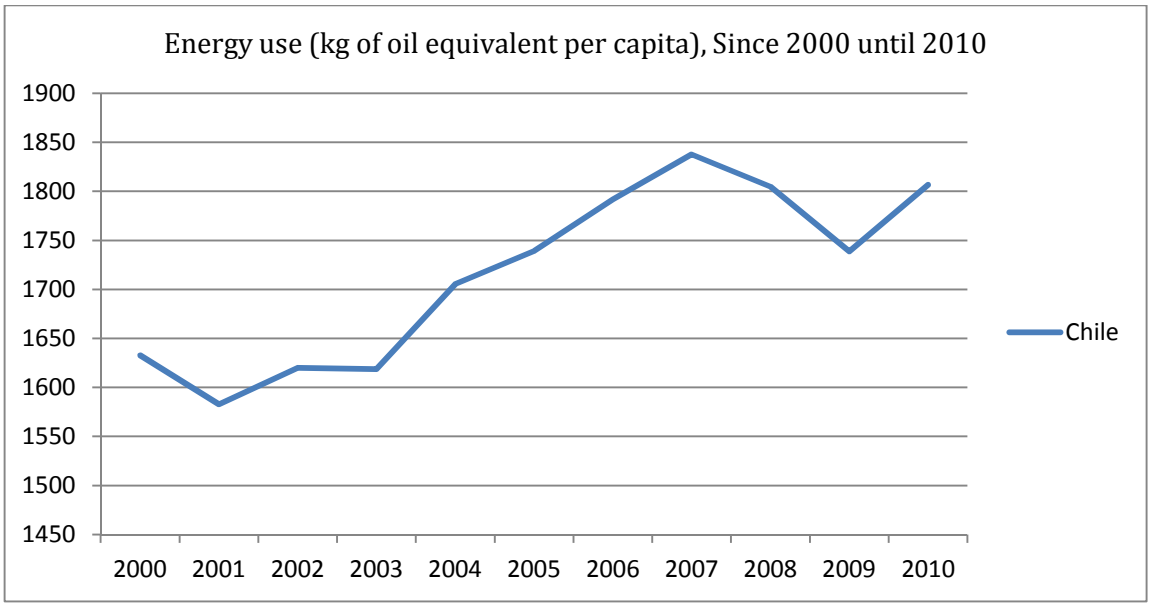

Figure 4.24: Energy use (kg of oil equivalent per capita) in Chile

In figure 4.24 a positive effect can be observed which increase the value of energy use during the ten years. The minimum amount is 1570 kg oil equivalent per capita, and the maximum value is 1840 kg oil equivalent per capita.

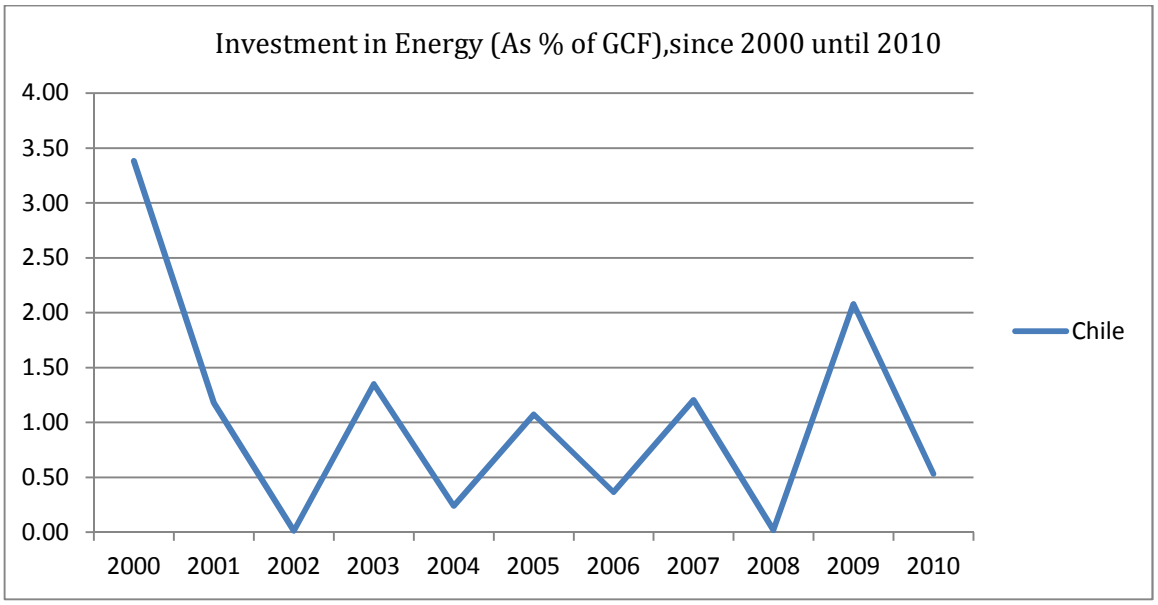

Figure 4.25: Investment in Energy with private participation (As % of GCF) in Chile

Figure 4.25 shows fluctuations of investment in Energy in a decade. These fluctuations can be the result of many factors. The maximum value is in 2000 which is nearly 3.4% of GCF.

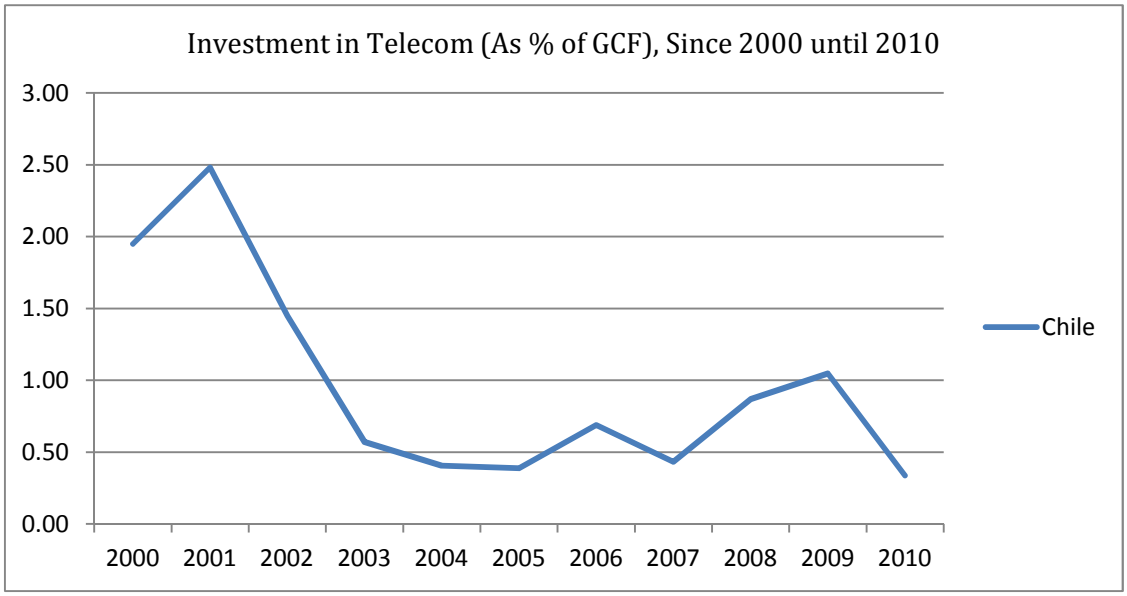

Figure 4.26: Investment in Telecoms with private participation (As % of GCF) in Chile

In figure 4.26 it can be seen that the maximum amount is 2.5% of GCF in the year 2001. After this year this amount has been decreased up to the point 0.4% of GCF in 2010.

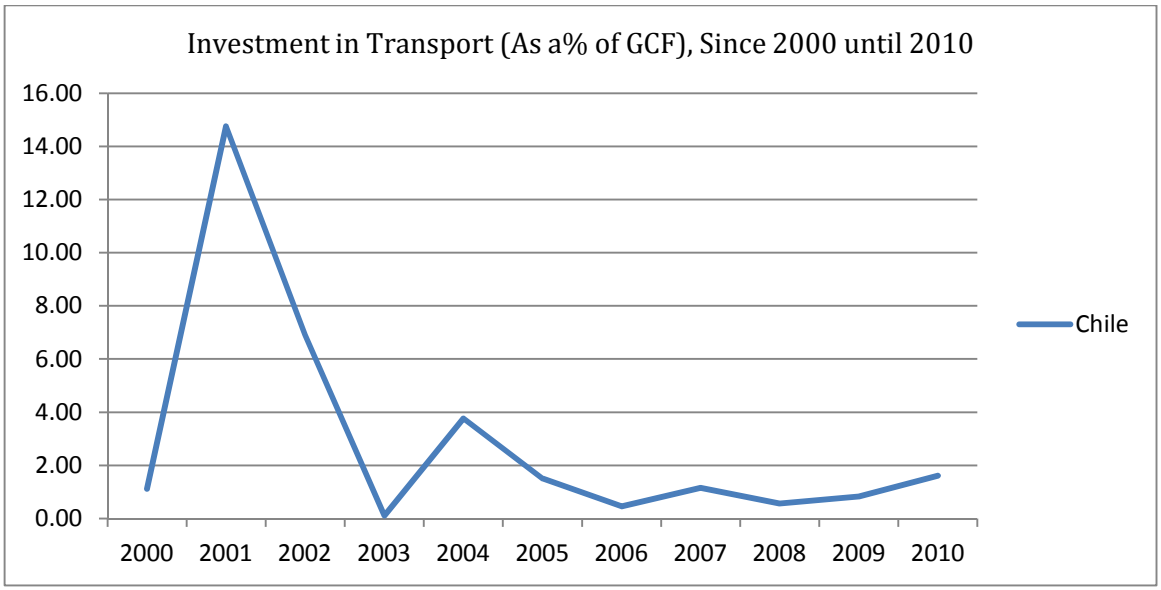

Figure 4.27: Investment in Transport with private participation (As % of GCF) in Chile

In Figure 4.27 between 2000 and 2003, there is a significant change in the rate of investment in Transport as a percentage of GCF. The maximum amount occurs in 2001 which is nearly 15% of GCF.

4.4 China

The world's second large economy belongs to China. The growth rate is an average of 10% annually for the last 30 years, so it's the fastest growing economy in the world. China is also the largest exporter and importer of the goods in the world. Through economic growth of China, structures and health and also standardized of economy has been points of attention accordingly. Since 2000 special protections for private property rights has been provided and for special efforts has been done to reduce the

unemployment in government with the rate of 8-10% to rebalance the income distribution and also improvement in social equity and environment protection.

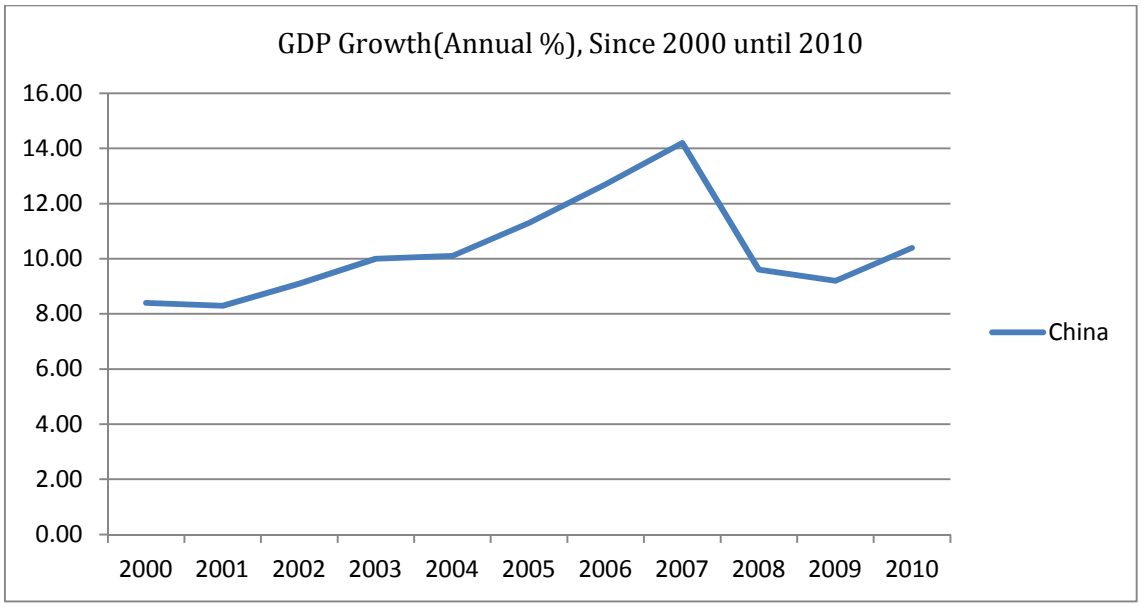

Figure 4.28: GDP Growth (Annual %) in China

Figure 4.28 illustrates the GDP Growth percentage annually. The maximum value belongs to the year 2007 and the minimum is in the year 2000 nearly 8% of GDP growth.

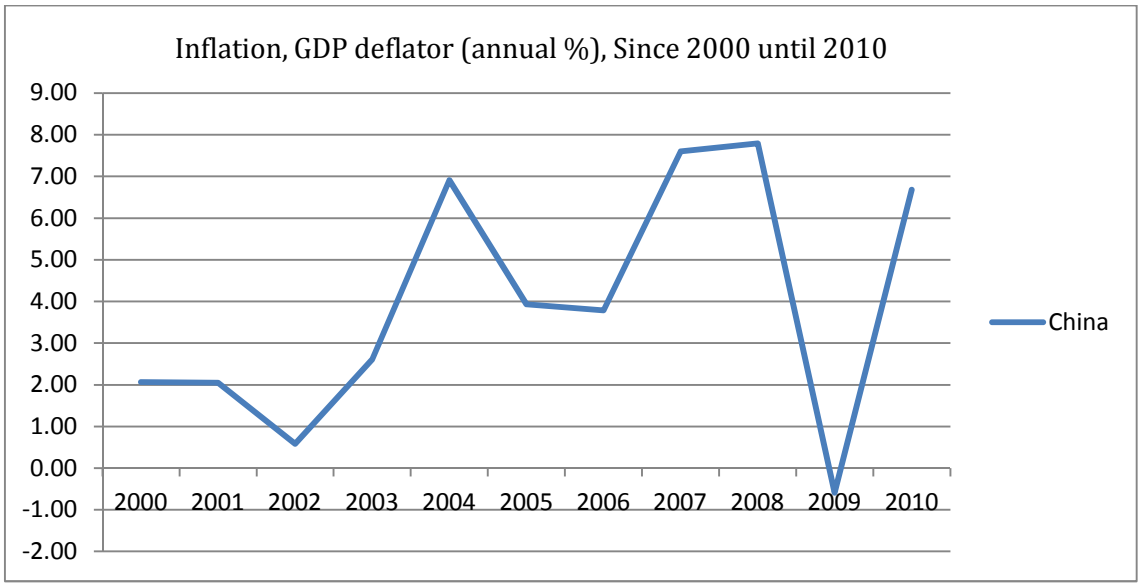

Figure 4.29: Inflation, GDP deflator (annual %) in China

As it can be observed in figure 4.29 there are significant inflations during the ten years, which as a consequence there are different values of GDP deflator. In this case, the minimum rate in is 2009 which has the negative value.

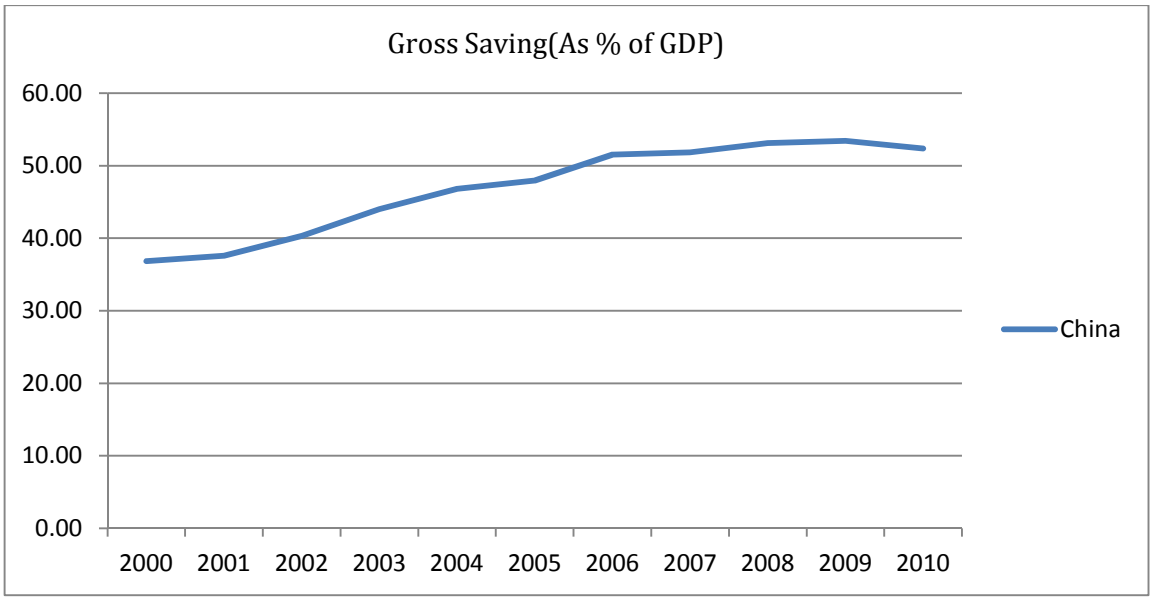

Figure 4.30: Gross Saving (As % of GDP) in China

Figure 4.30 shows the Gross Saving as the percentage of GDP in ten years. The smooth curve shows that there is no fluctuation in these years, and the graph has the positive slope.

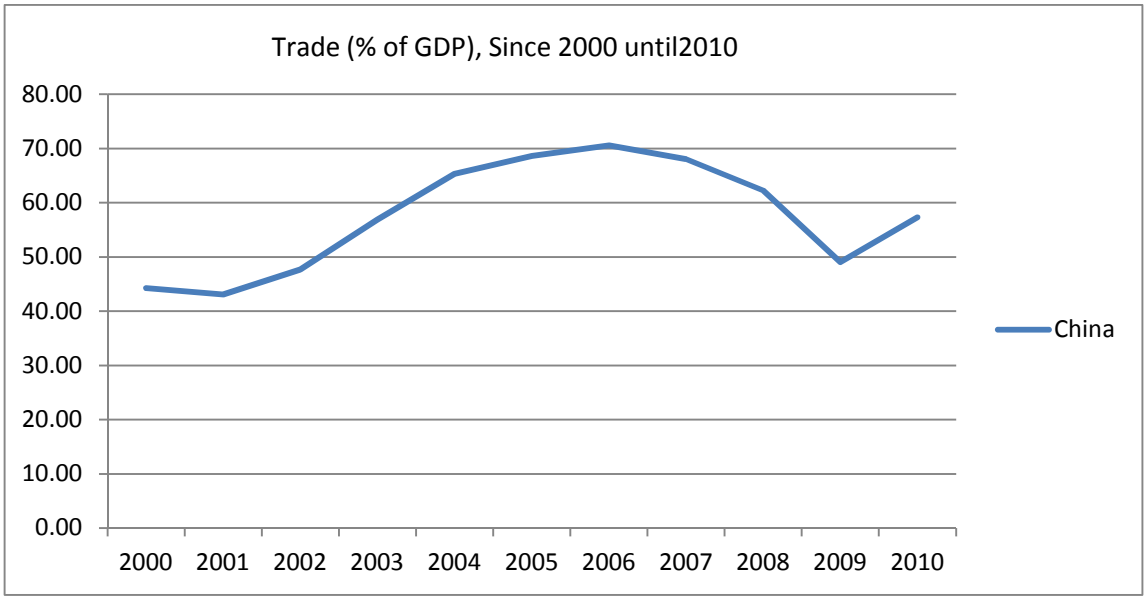

Figure 4.31: Trade (% of GDP) in China

In Figure 4.31 the rate of trade as the percentage of GDP has the positive slope in the beginning of the year 2000. As it reached to the year 2006, a decrease has been made until the year 2009. The maximum value belongs to the year 2006, while the minimum value is in 2001.

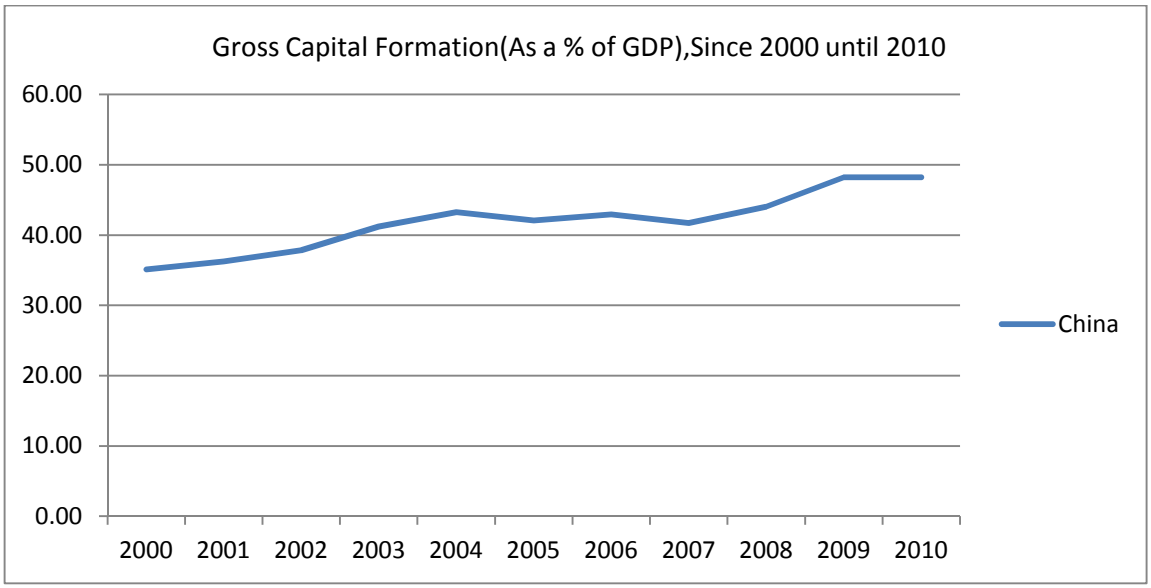

Figure 4.32: Gross Capital Formation (As a % of GDP) in China

Figure 4.32 shows a stable pattern in the Gross Capital Formation in ten years and the curve has the positive slope which consequently reach the 50% of GDP in the year 2010.

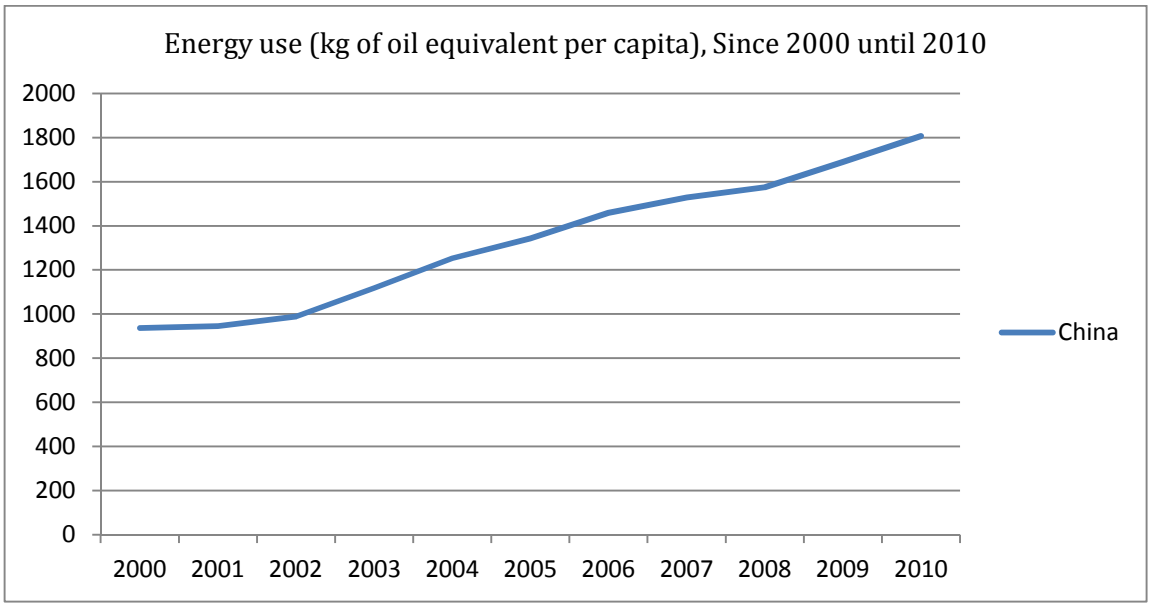

Figure 4.33: Energy use (kg of oil equivalent per capita) in China

In Figure 4.33 a significant increase can be observed which results in the positive effect on energy use in kg of oil equivalent per capita. The minimum value is nearly 90 kg and the maximum value is nearly 1800 kg.

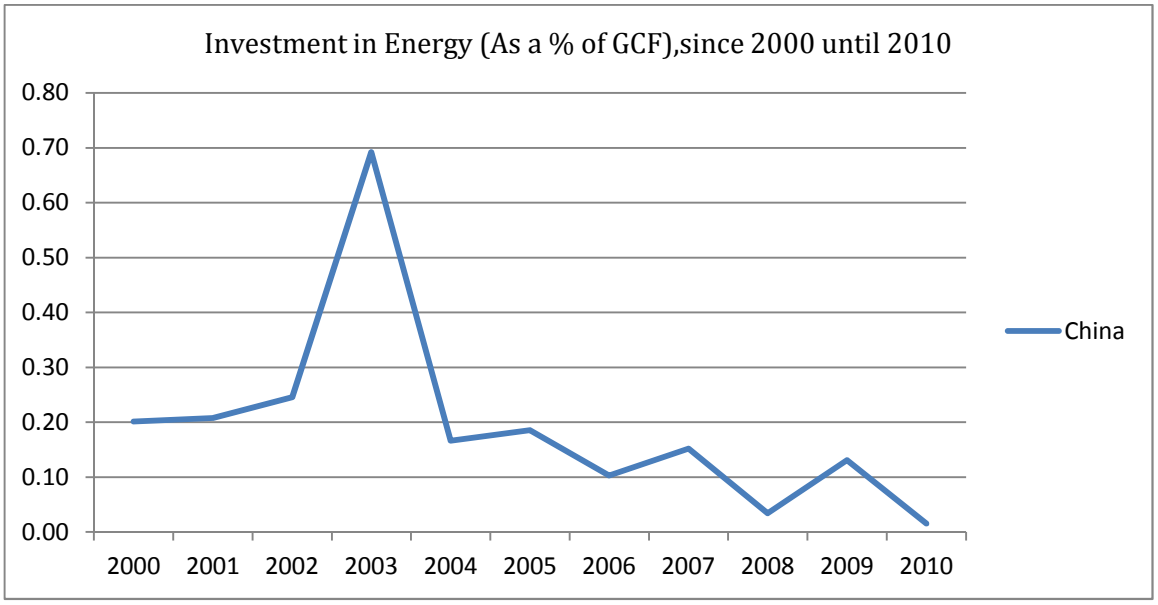

Figure 4.34: Investment in Energy with private participation (As a % of GCF) in China

Figure 4.34 shows the investment in energy with private participation as the percentage of GCF. A significant change is observed in 2003 when the amount reaches the 0.70% of GCF. The minimum value is nearly 0 in 2010.

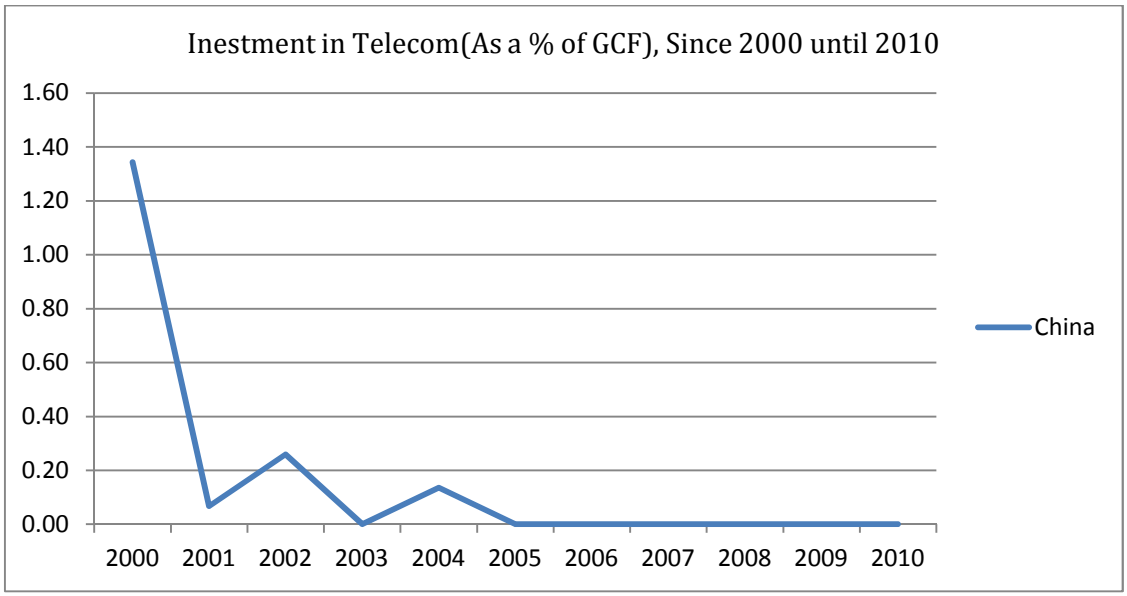

Figure 4.35: Investment in Telecoms with private participation (As a % of GCF) in China

In Figure 4.35 there is a significant decrease in 2000 until 2005. From 2005 there no accurate data available, consequently the amount of investment in Telecom is assumed zero for these years.

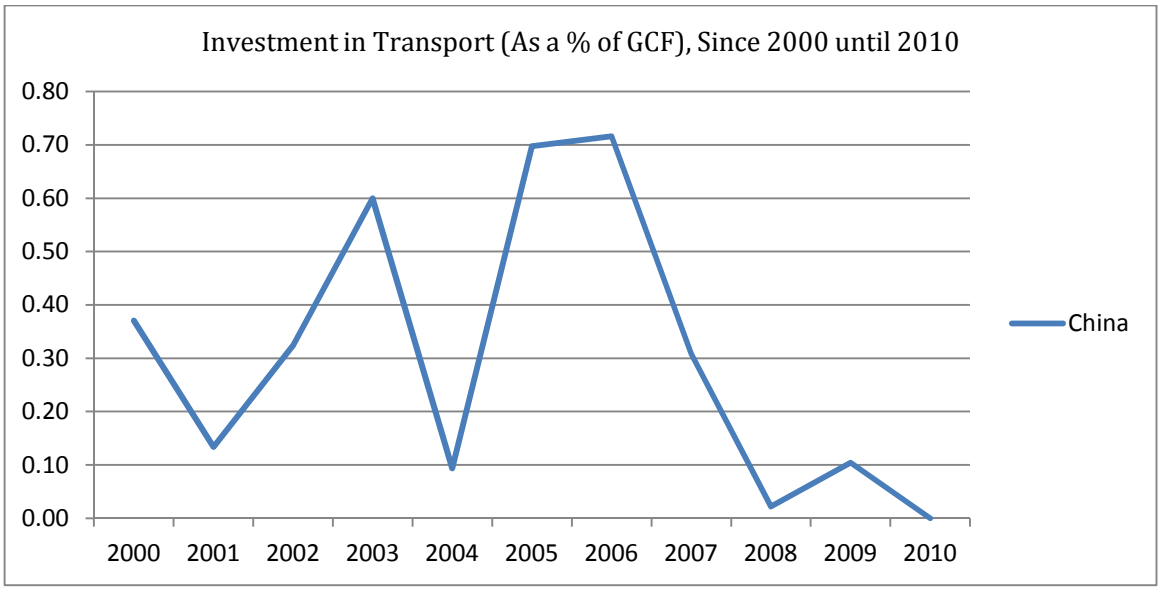

Figure 4.36: Investment in Transport with private participation (As a % of GCF) in China

Figure 4.36 shows the fluctuations in investment in transport with private participation as the percentage of GCF. The maximum value is approximately 0.70% in the year 2006.

4.5 Colombia

The country has an economy mainly depend on the agricultural products like coffee, dairy, sugar, bananas, flowers, cotton and meat. The economy is free market in which major investments and businesses are chiefly bound to the USA. The "APERTURA ECONOMICA" which is liberalism in economic including the reduction of tariff, privatizing the enterprises owned by governments and free rates for foreign exchanges in addition to deregulating the financial issues has been started since 1990. In this situation the agricultural products are protected and foreign investment can freely be done in any sector. Colombia benefited 4%-5% economic growth through the "APERTURA ECONOMICA" policies for following years up to 1997, but the economic slowed down in following years up to 1999 and the GDP reached down to 0.6% caused the country to experience the recession. In 2000 the government tried new policies for disciplining the country budgets and reforms in structure in addition to floating the value of Peso mainly caused by agreement with International Monetary Fund. As a result the export sector became the pioneer in the new situation because of the competitive exchange rate and also increased prices for coffee and petroleum caused the GDP reached 3.1%. Later on additional reforms in economic created a safe economical situation in which year by year the GDP grown gradually and reached its highest in 2007 but in recent years, the GDP has again slowed down because of the major financial crises in the world for 2007-2009.

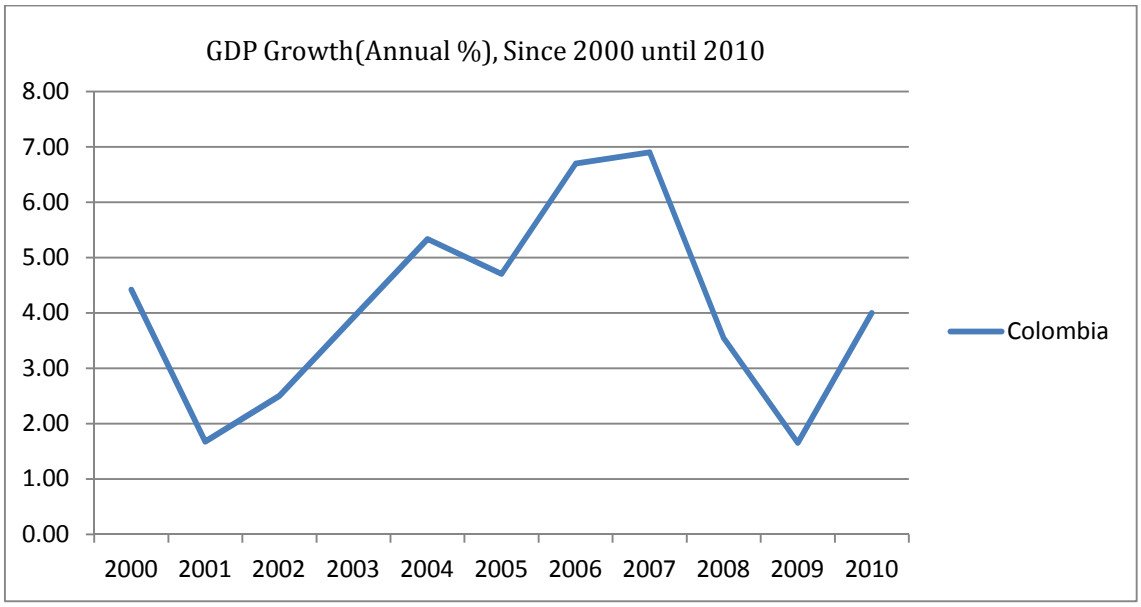

Figure 4.37: GDP Growth (Annual %) in Colombia

In figure 4.37 the GDP growth in a decade has been observed. Two significant fluctuations has influenced the curve, the first is a positive effect in 2001 and second is a negative effect in 2007.

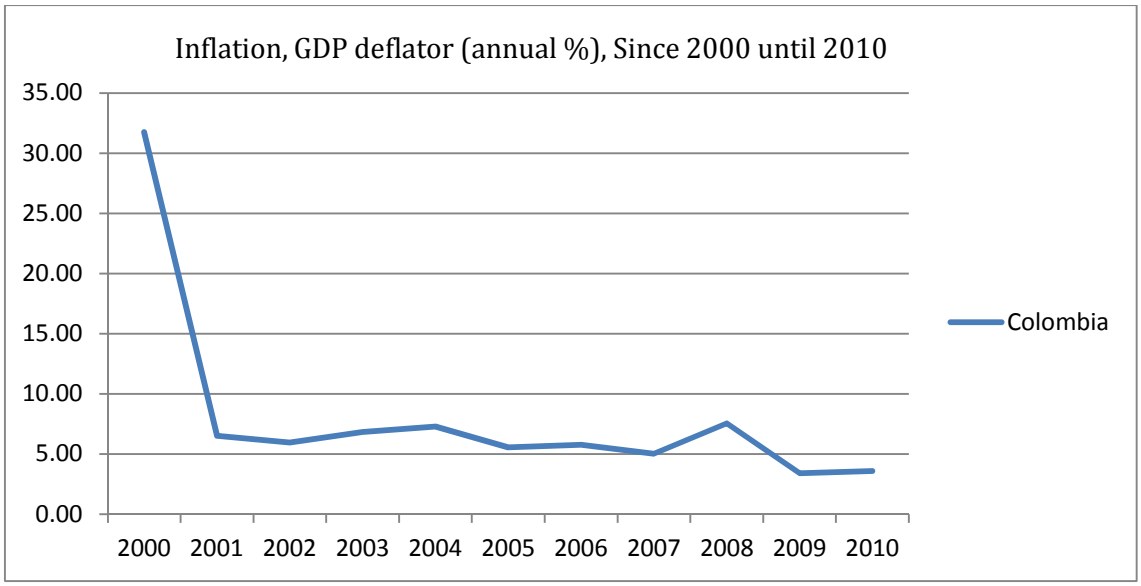

Figure 4.38: Inflation, GDP deflator (annual %) in Colombia

Figure 4.38 shows the inflation in Colombia from 2000 until 2010. The maximum amount is at the beginning of the year 2000 and right after that year a significant decrease brings down the value of this factor until 2010.

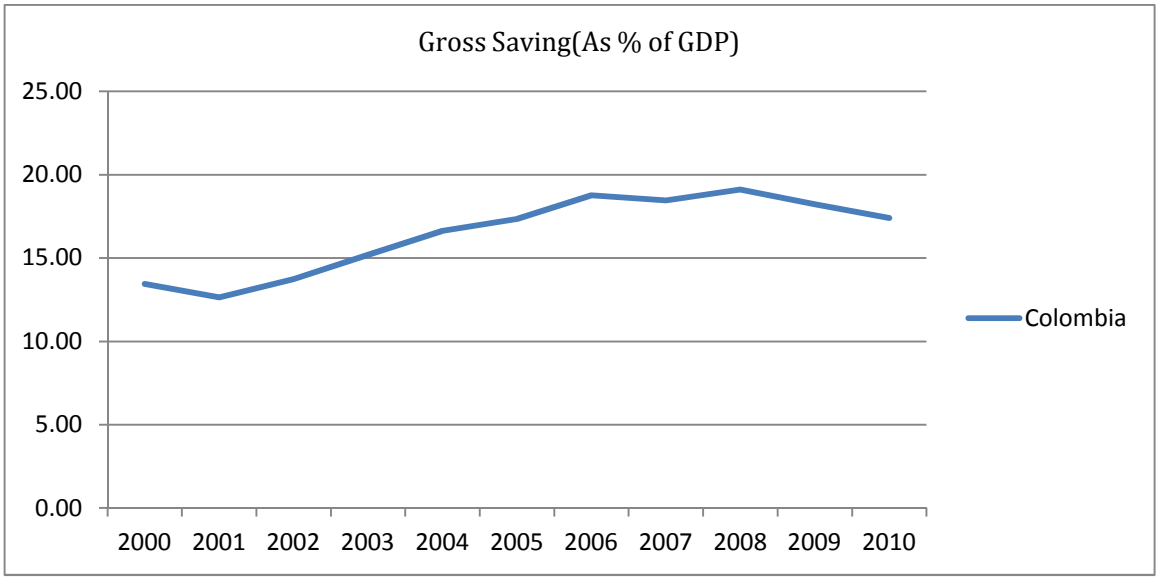

Figure 4.39: Gross Saving (As % of GDP) in Colombia

In figure 4.39 a smooth curve can be seen which resembles the lack of fluctuations. The maximum value is in 2008 while the minimum value is in 2001.

Figure 4.40: Trade (% of GDP) in Colombia

Figure 4.40 has four levels of significant change and the greatest amount of trade as the percentage of GDP is in the year 2006, and the minimum amount is at the beginning of the year 2000.

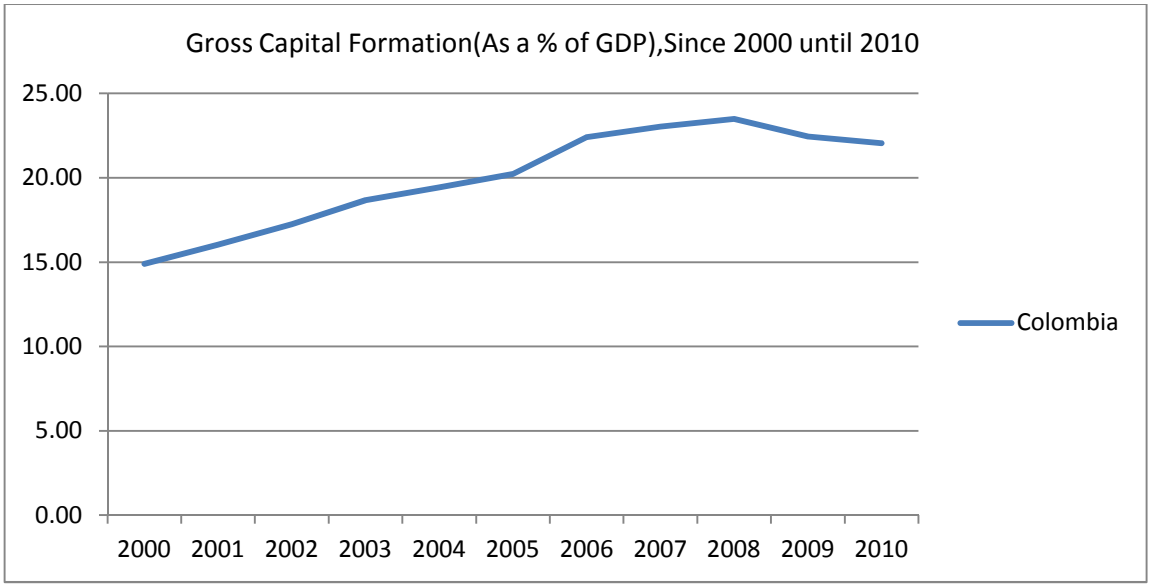

Figure 4.41: Gross Capital Formation (As a % of GDP) in Colombia

Gross Capital Formation as the percentage of GDP doesn't change a lot during the ten years. Consequently, there is no significant fluctuation all through these years.

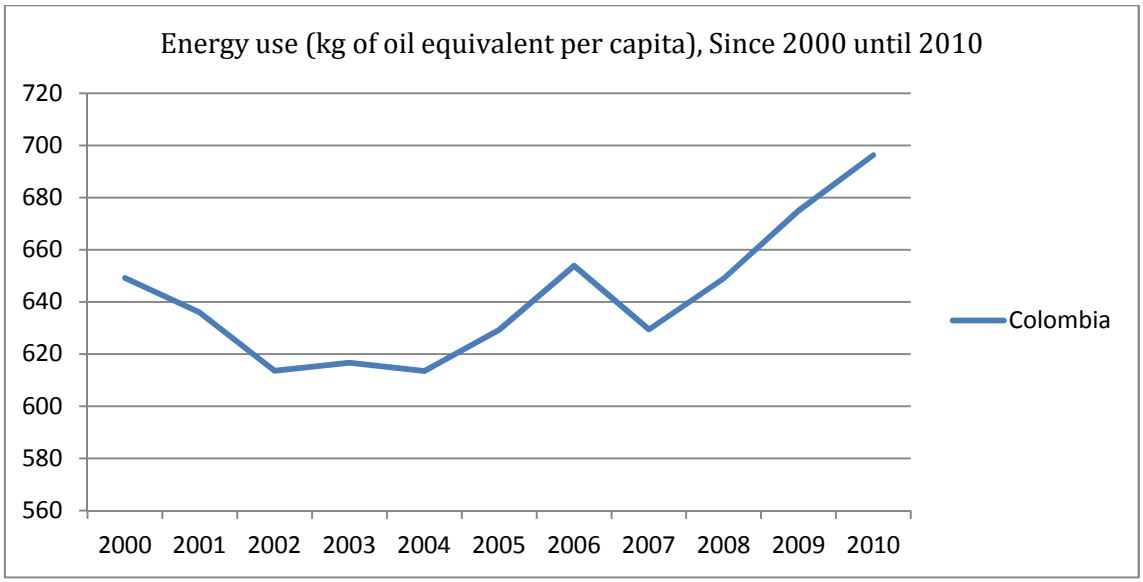

Figure 4.42: Energy use (kg of oil equivalent per capita) in Colombia

In figure 4.5.6 the rate of energy use as the kg of oil equivalent per capita has been shown. The maximum value belongs to the year 2010 (approximately 700 kg) and the minimum amount is in the year 2002 (approximately 610kg).

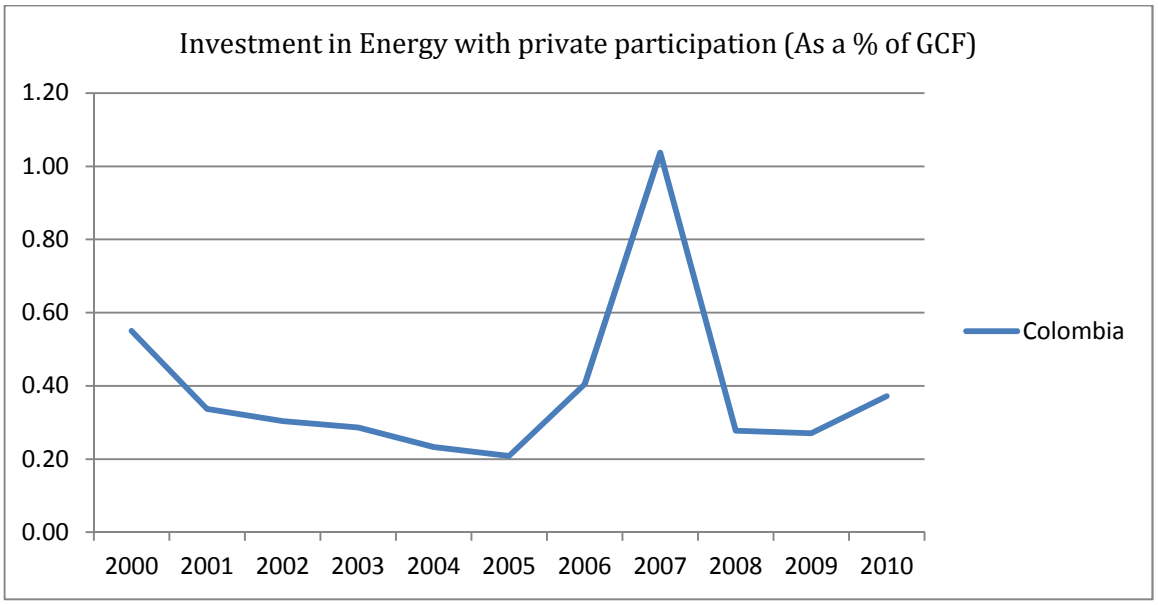

Figure 4.43: Investment in Energy with private participation (As a % of GCF) in Colombia

The investment in energy with private participation is shown in the Figure 4.5.7. A significant change can be seen in the year 2007 which increased the value of this factor up to 1% of GCF.

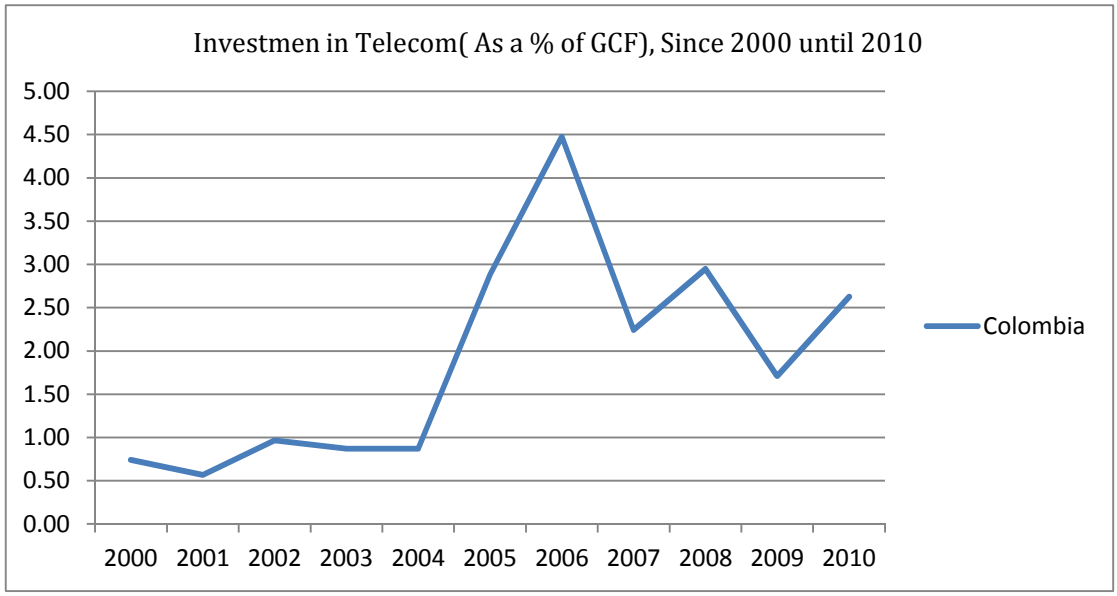

Figure 4.44: Investment in Telecoms with private participation (As a % of GCF) in Colombia

Figure 4.44 shows the investment in Telecoms with private participation as the percentage of GCF. In this figure a significant fluctuation can be seen in 2006 which results in the maximum value of this factor (nearly 4.5%).

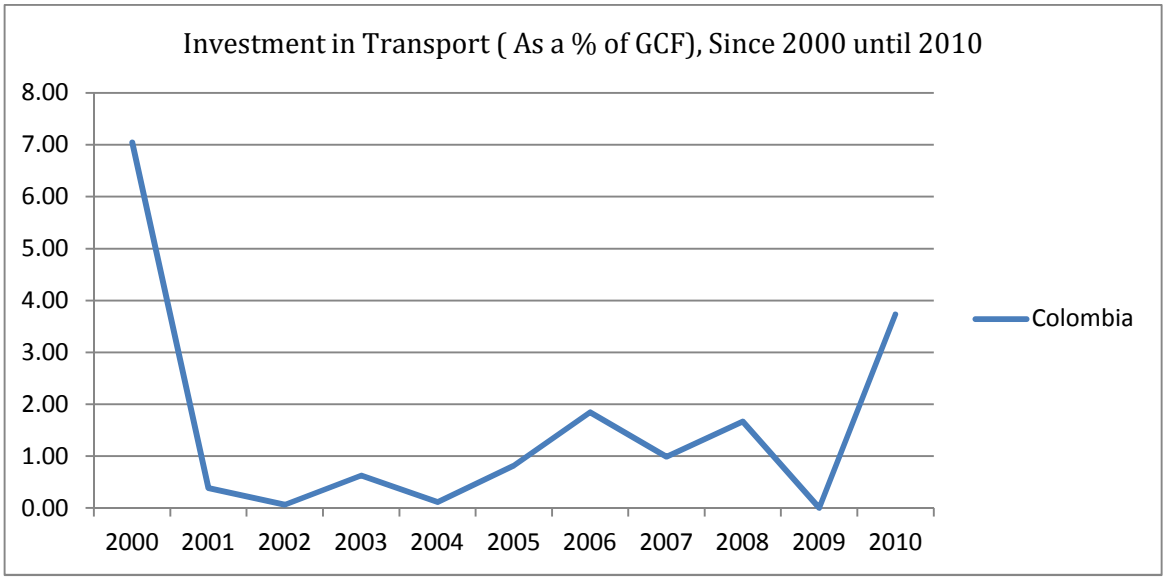

Figure 4.45: Investment in Transport with private participation (As a % of GCF) in Colombia

In figure 4.45 there are many factors which effect on the rate of investments, and as it can be seen there are some changes in different years. The maximum value of investment is in 2000 which is approximately 7% of GCF.

4.6 India

Indian economy as a major member of the G-20 economies and BRICS is the tenth-largest in the world by nominal GDP. The country is also the 10th-largest importer and the 19th-largest exporter and in the world. Since 1991 Indian economy has experience liberal markets and economy in the world trade market. Later on through major economic reforms and facilitate of establishing new industries by limiting government

control, the economy growth moved on more rapidly with progress in per-capita incomes.

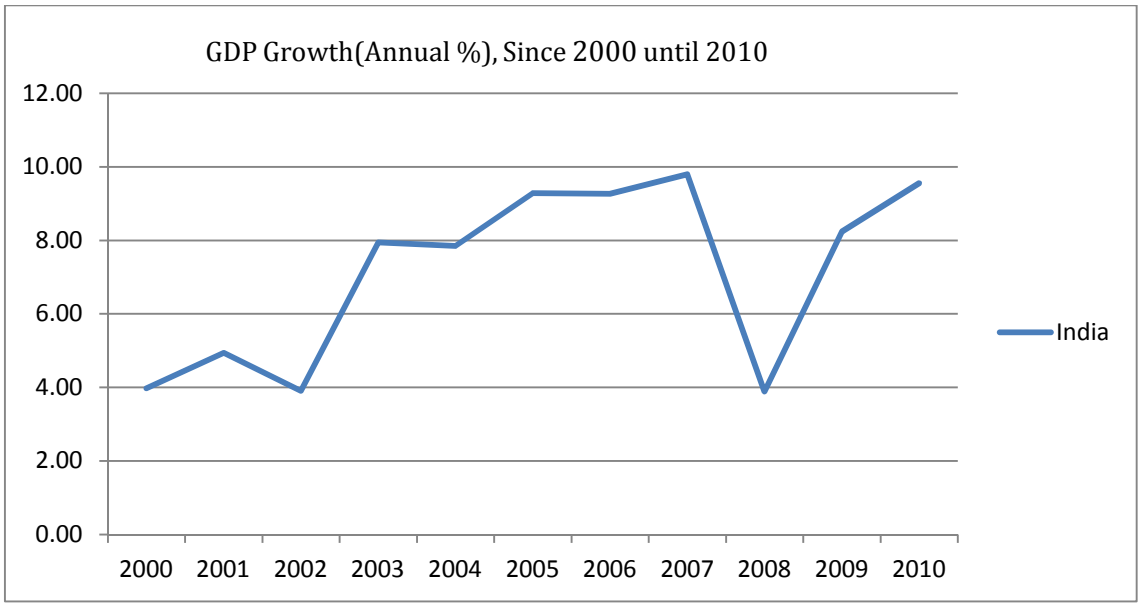

Figure 4.46: GDP Growth (Annual %) in India

In Figure 4.46 the GDP growth rate has been shown for a decade. The maximum value is in 2007, while the minimum value is in 2008. After the year 2007, a significant decrease has been made which brings down the value of the GDP growth.

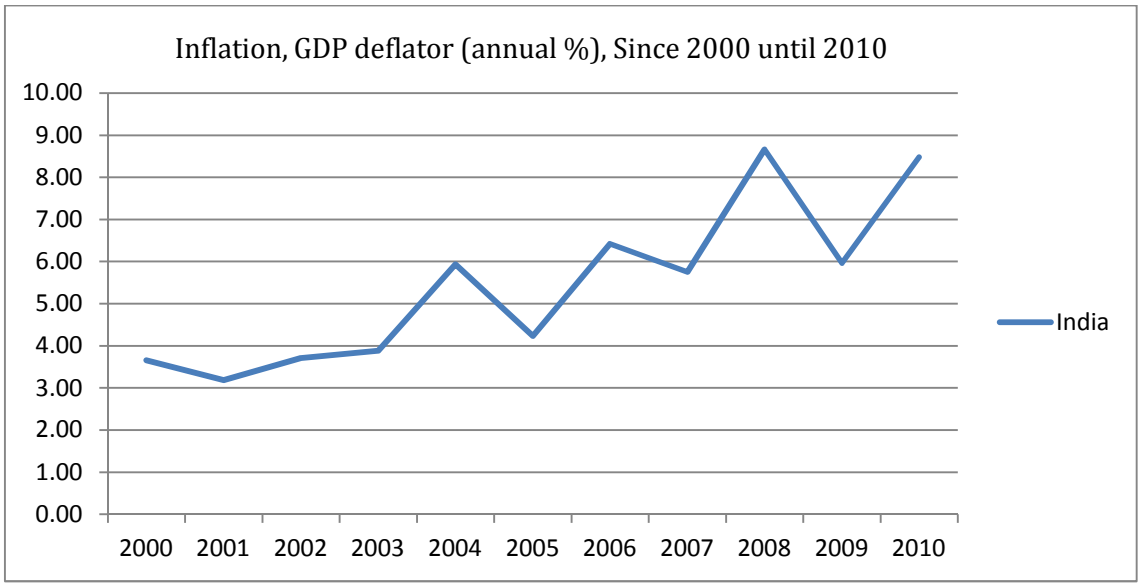

Figure 4.47: Inflation, GDP deflator (annual %) in India

In figure 4.47 the inflation, GDP deflator is shown annually from 2000 until 2010. The minimum value belongs to 2000, and after this year the curve continued with the positive slope up to the point that it reaches the maximum value in 2008.

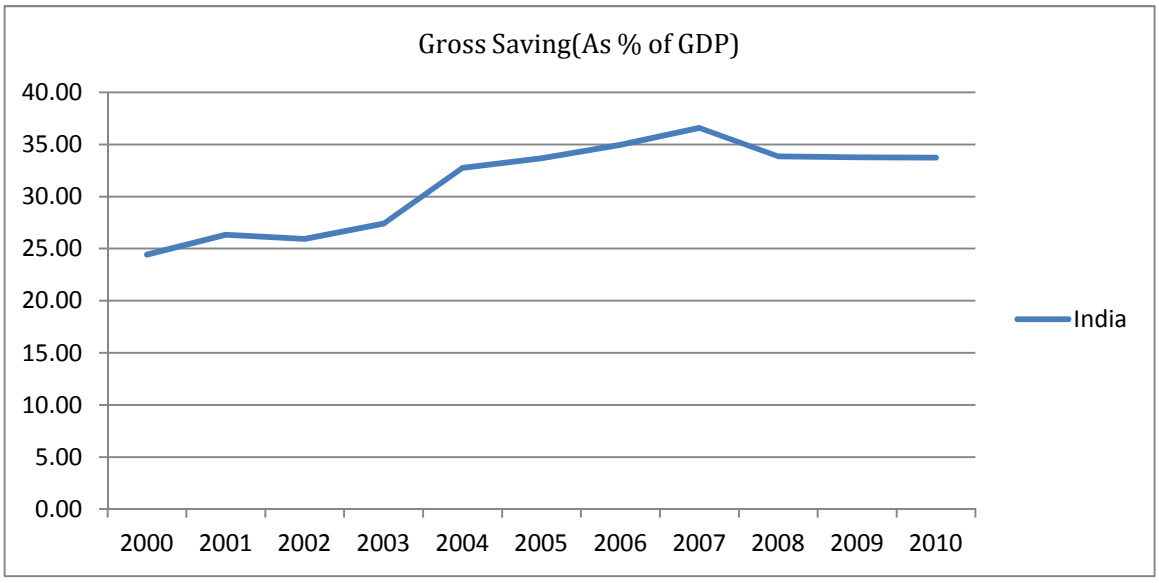

Figure 4.48: Gross Saving (As % of GDP) in India

Gross Savings as the percentage of GDP has been shown in the figure 4.48 In this case the curve is approximately smooth and there is no significant change in the amount of this factor among these years.

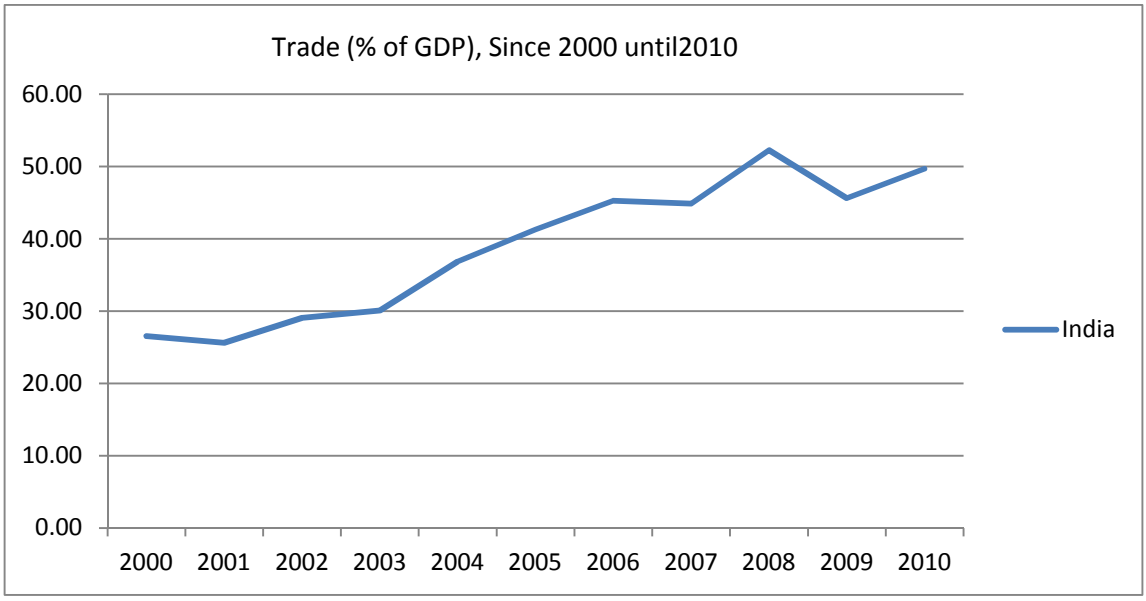

Figure 4.49: Trade (% of GDP) in India

Figure 4.49 shows the trade as the percentage of GDP in ten years. The minimum value belongs to the year 2000 while the maximum value can be found in the year 2010.

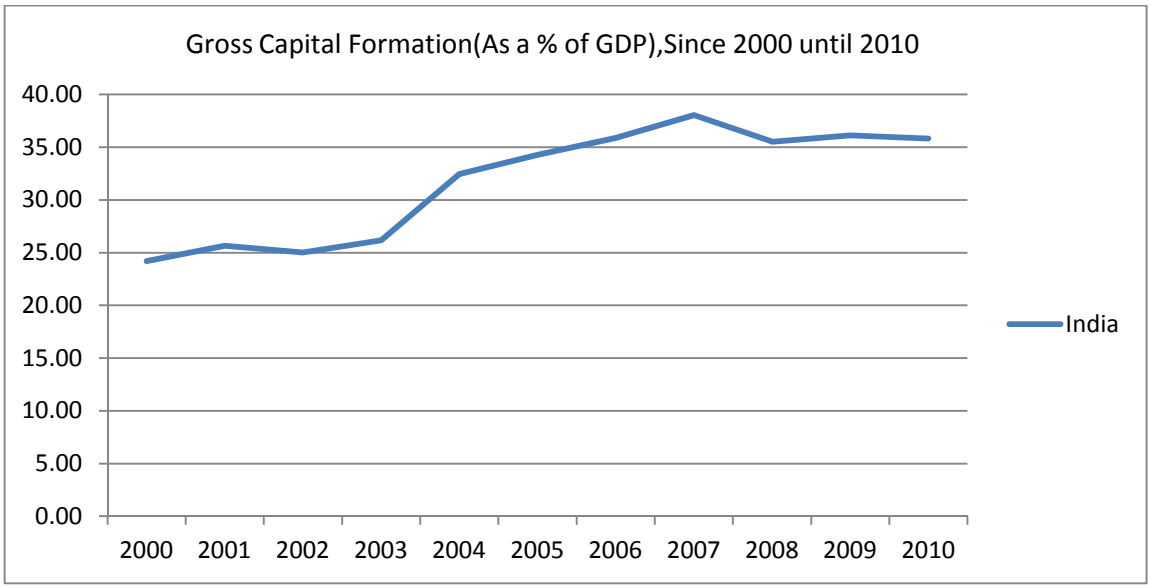

Figure 4.50: Gross Capital Formation (As a % of GDP) in India

Gross Capital Formation as the percentage of GDP has been drawn in figure 4.50. In this case, there is no significant fluctuation in the amount of this factor.

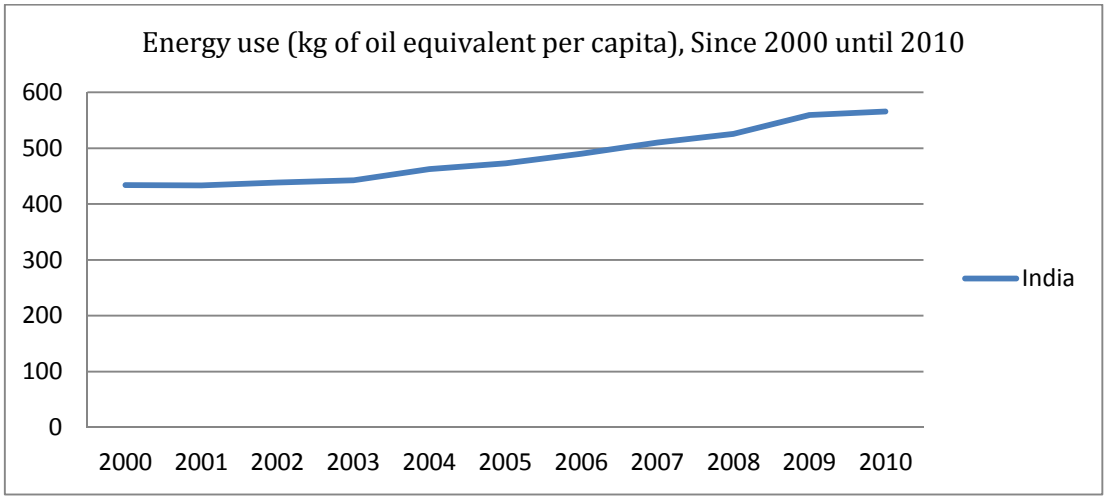

Figure 4.51: Energy use (kg of oil equivalent per capita) in India

Figure 4.51 illustrates the energy use as kg of the equivalent per capita. The smooth curve can be the result of the stable condition. It can be obvious that there's no significant fluctuation all through these ten years.

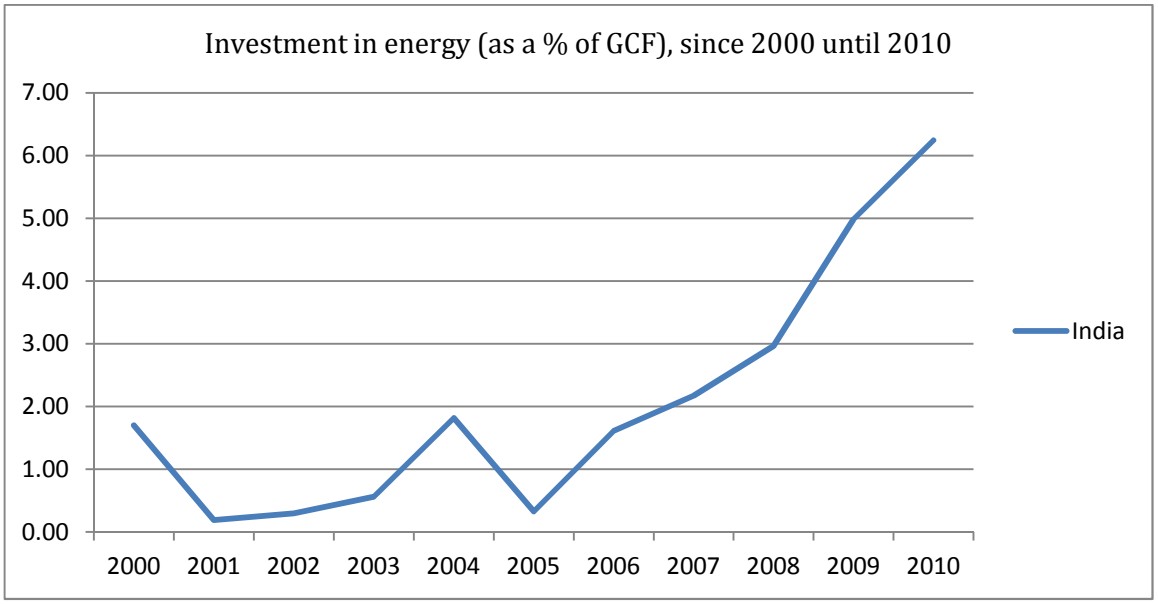

Figure 4.52: Investment in Energy with private participation (As a % of GCF) in India

Figure 4.52 shows the amount of investment in energy with private participation as the percentage of GCF. The minimum value belongs to 2001, while the maximum value can be seen it 2010.

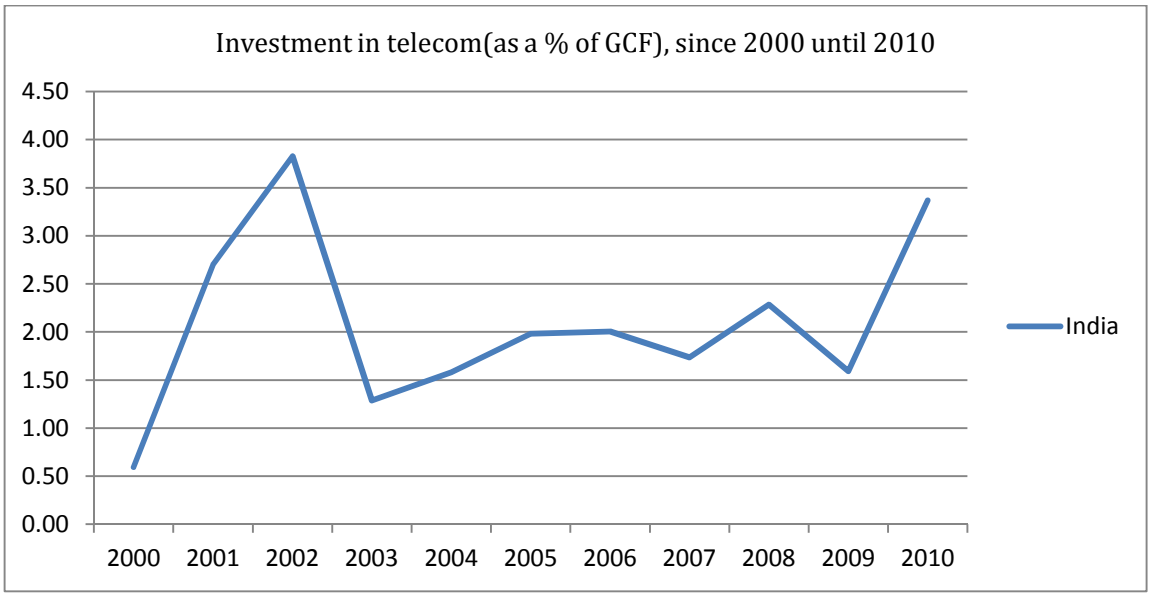

Figure 4.53: Investment in Telecoms with private participation (As a % of GCF) in India

In Figure 4.53 the investment in Telecoms is influenced by some fluctuations. A significant change increased the amount of this factor from 2000 until 2002 and then a negative effect decreased this amount from 2002 to 2004.

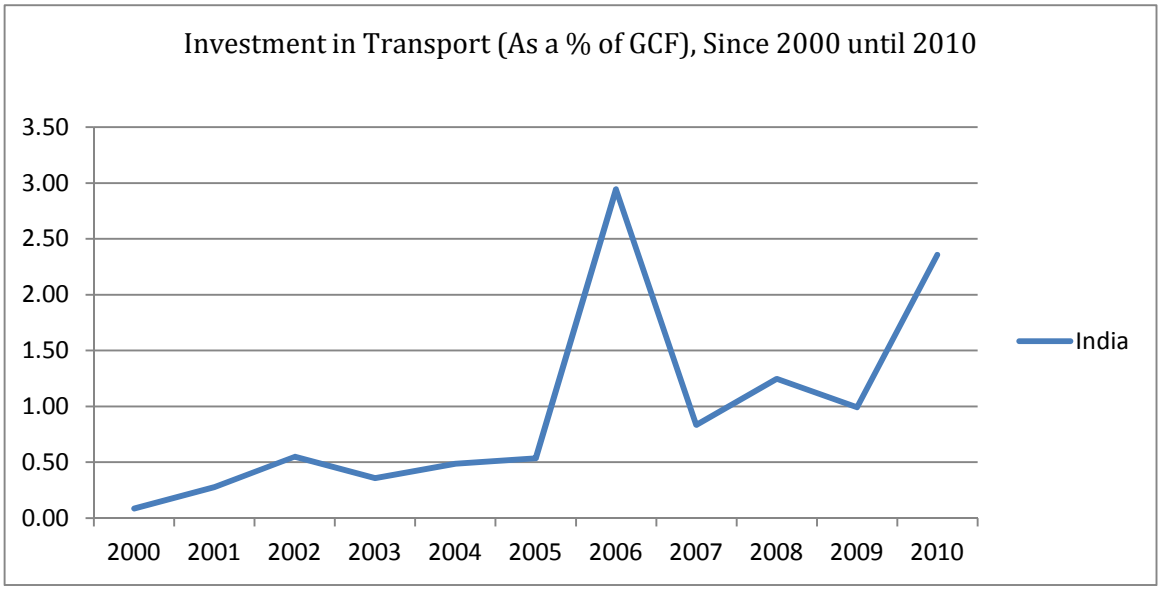

Figure 4.54: Investment in Transport with private participation (As a % of GCF) in India

In figure 4.54 the condition was approximately steady for investment in Transport with private participation, but in 2006 there is a significant fluctuation which yields this amount to reach its maximum value which is 3% of GCF.

4.7 Indonesia

Indonesia as a newly industrialized country is a member in G-20 countries which mainly are major economies in the world. Although the Indonesian economic are mainly controlled by government and most of the main enterprises is owned by central government in addition to administrating the market economy and the prices for most of the basic goods like rice, fuel and electricity, but Indonesian economic is the largest one among the countries of southern-east of Asia. The country has experienced a financial and economic crisis in 1997, and the government took a role in administrating the private sector through bank loans for the process of debt restructuring. The GDP fluctuate 3% up to 6% for the 2001-2010.

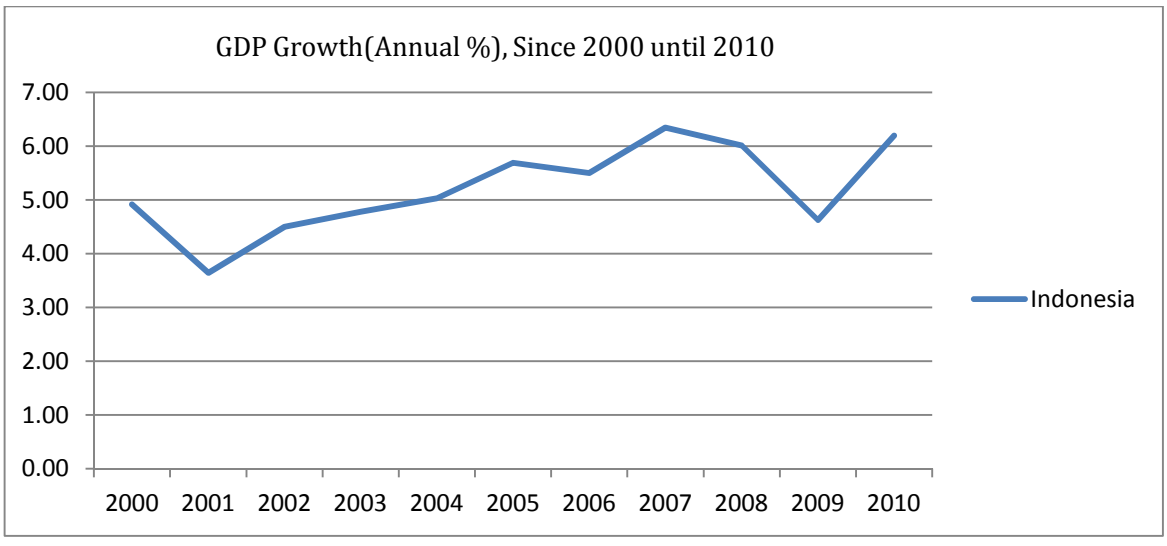

Figure 4.55: GDP Growth (Annual %) in Indonesia

The general trend for this variable between 2001 and 2007 is an upward trend. Its maximum value is 6.35 which happened in 2007 but its lowest value is equal to 3.6 which happened in 2001.

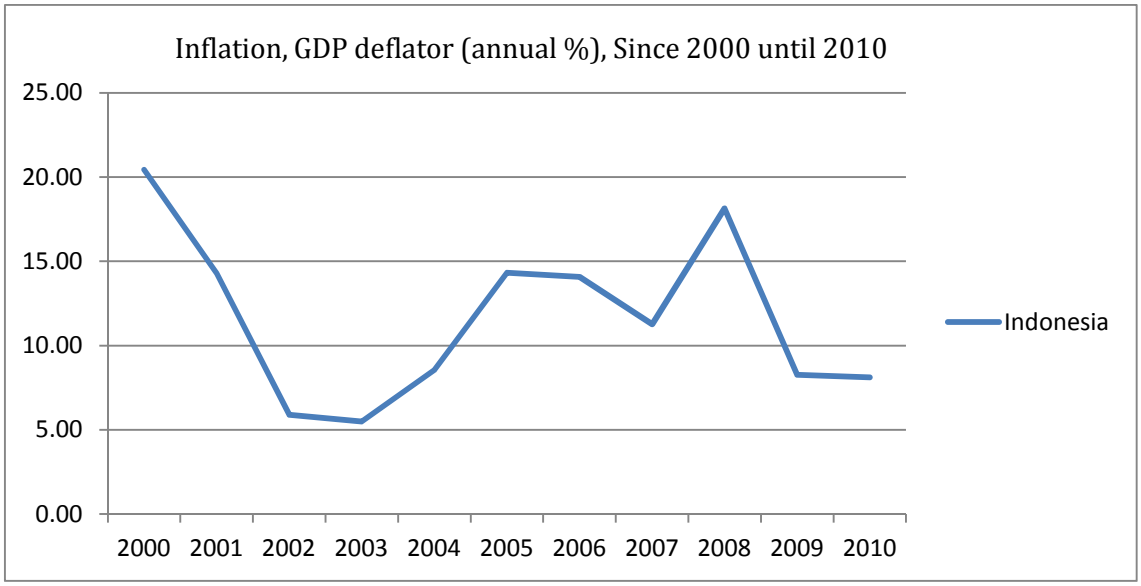

Figure 4.56: Inflation, GDP deflator (annual %) in Indonesia

This variable shows a lot of fluctuation during this period. The maximum value for this indicator is 20.45 which happened in the first year of this period and after 2000 this variable declined sharply and touched the lowest point in 2003 which is equal to 5.49.

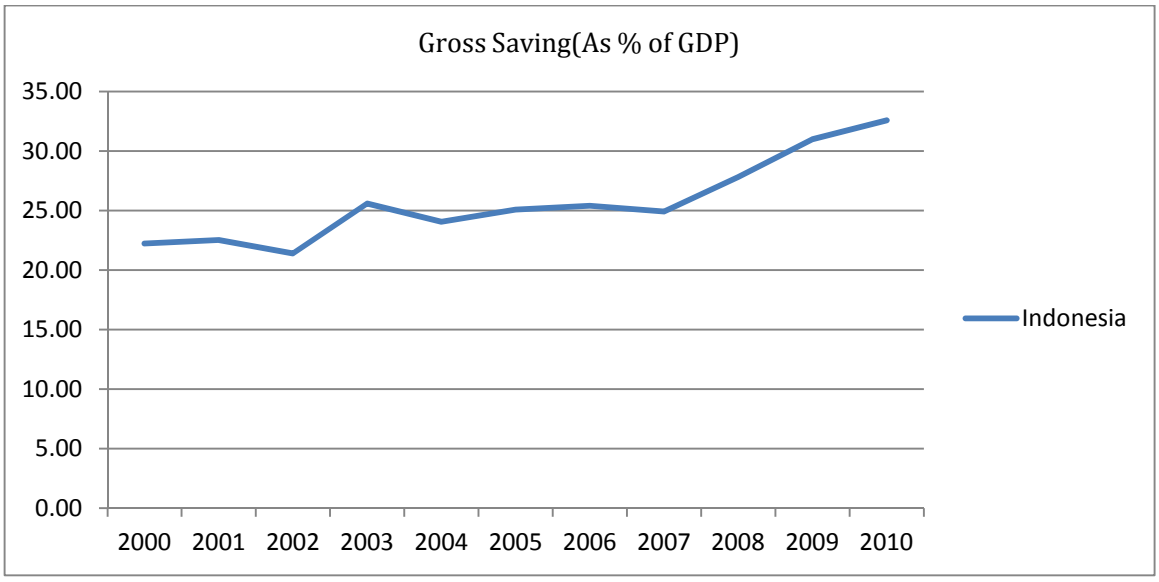

Figure 4.57: Gross Saving (As % of GDP) in Indonesia

By looking on this diagram, it can be observed that this indicator has an upward trend during this period. Its maximum value is 32.57 which is related to the last year of this period and its minimum value is 21.40 which is related to 2002.

Figure 4.58: Trade (% of GDP) in Indonesia

By looking on this diagram it can be observed that the general trend for this variable is a downward trend. Its maximum value is 71.44 which is related to the first year of this period and its minimum value is 45.51 which are related to 2009.

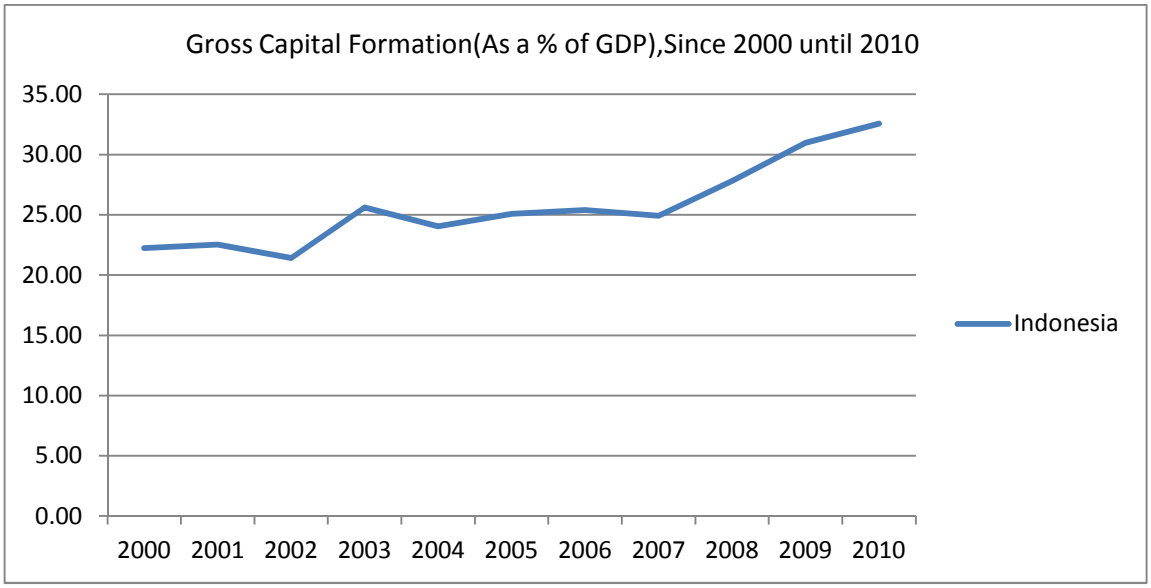

Figure 4.59: Gross Capital Formation (As a % of GDP) in Indonesia

By looking on this diagram, it can be observed that this indicator has an upward trend during this period. Its maximum value is 32.57 which is related to the last year of this period and its minimum value is 21.40 which are related to 2002.

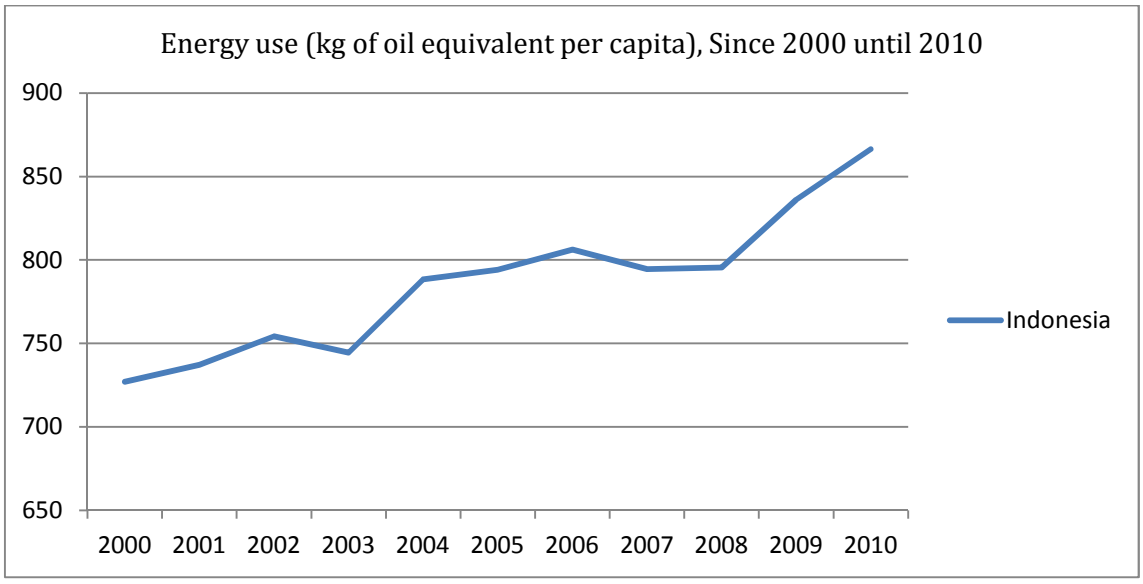

Figure 4.60: Energy use (kg of oil equivalent per capita) in Indonesia

By looking on this diagram it can be mentioned that the general trend for this variable is an upward trend in this period. Its minimum value happened in the first year of this period which is equal to 727 kg of oil per capita and its maximum value is equal to 867 kg which is related to the last year of this period.

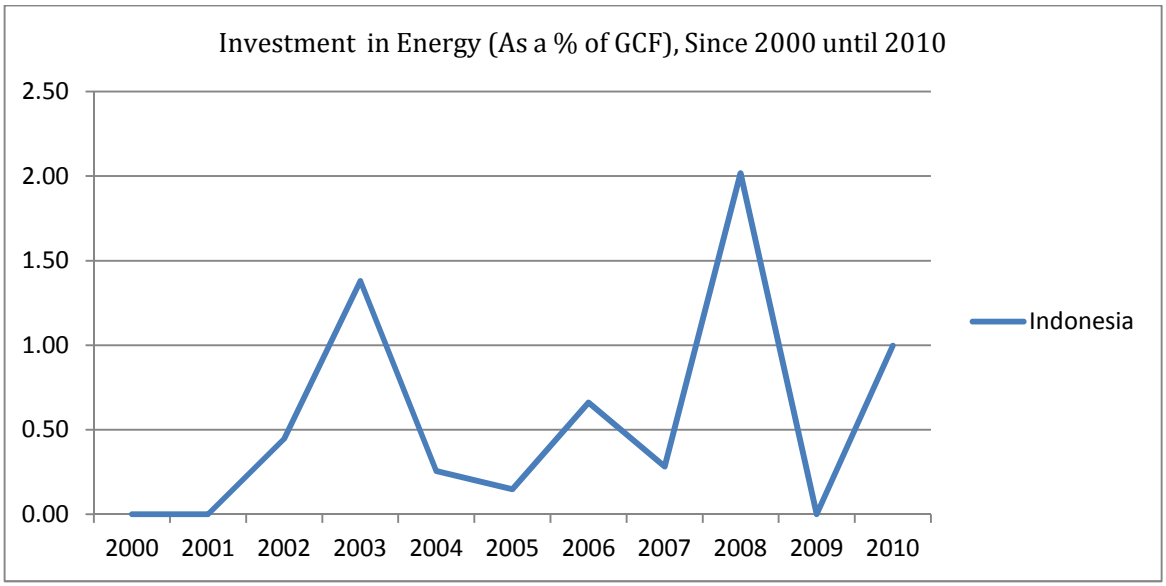

Figure 4.61: Investment in Energy with private participation (As a % of GCF) in Indonesia

By looking on this diagram, it can be mentioned that this variable fluctuate too much during this period, its maximum value is2.02 which is related to 2008.

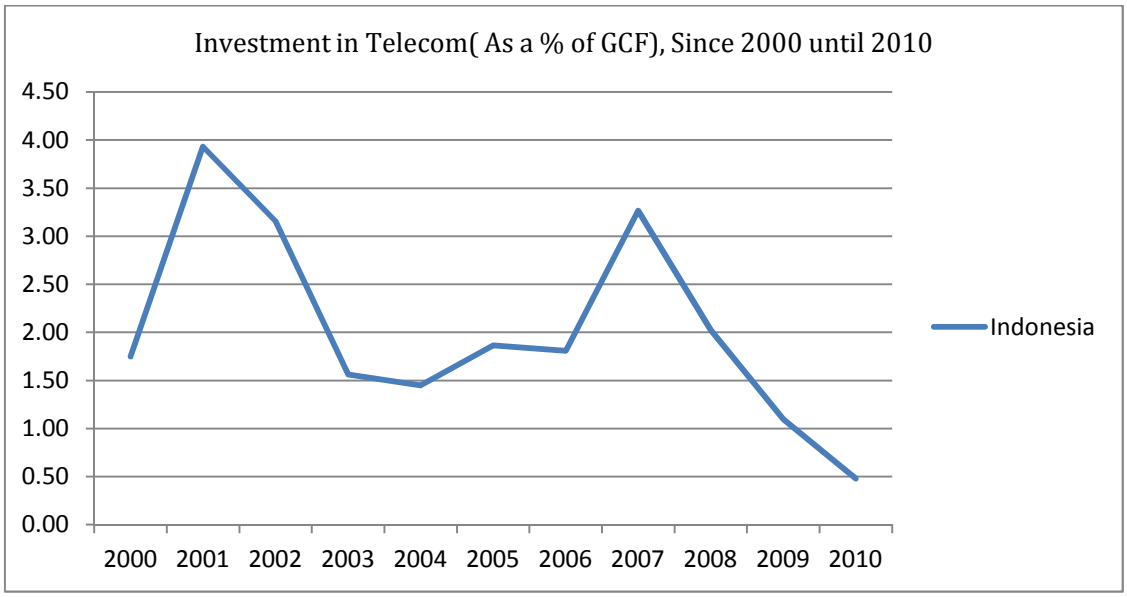

Figure 4.62: Investment in Telecoms with private participation (As a % of GCF) in Indonesia

The maximum value for this indicator happened in 2001 which is equal to 3.93, after this year this statistics decreased and fluctuated too much. Finally in the last year of this period this variable touched its lowest amount which is equal to 0.48 % of GCF.

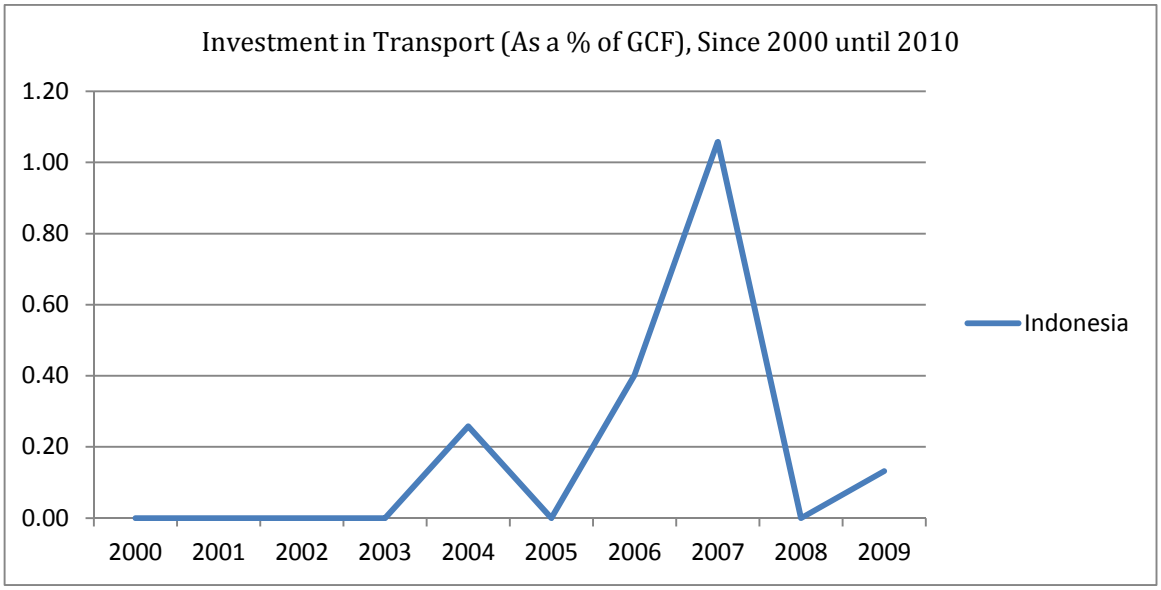

Figure 4.63: Investment in Transport with private participation (As a % of GCF) in Indonesia

In the first three years of this period there are not any available data. After 2005 this indicator increased significantly and touched its highest value which is equal to 1.06% in 2007.

4.8 Malaysia

Malaysian economy is one of the new market economies, which is relatively industrialized and open but government oriented. Government although plays an important role in guiding the economy but it causes decline as well. Most of countries in South East Asia have experienced an explosion in their economies with fast development and rapid GDP growth in recent years and Malaysia also has reached the

third place in the region after Indonesia and Thailand. Industrial manufacturing and international trade are the main sources for their development and GDP growth.

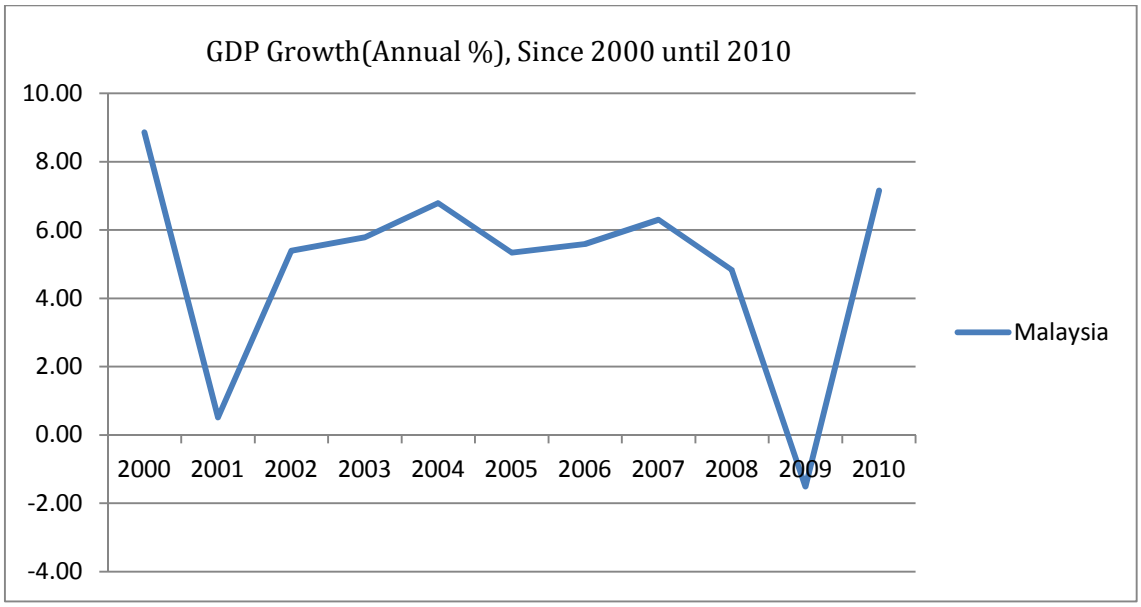

Figure 4.64: GDP Growth (Annual %) in Malaysia

The maximum value for this indicator is 8.86 which is related to the first year of this period. After 2001 this variable fluctuates too much and in 2009 touched its lowest value which is equal to -1.51.

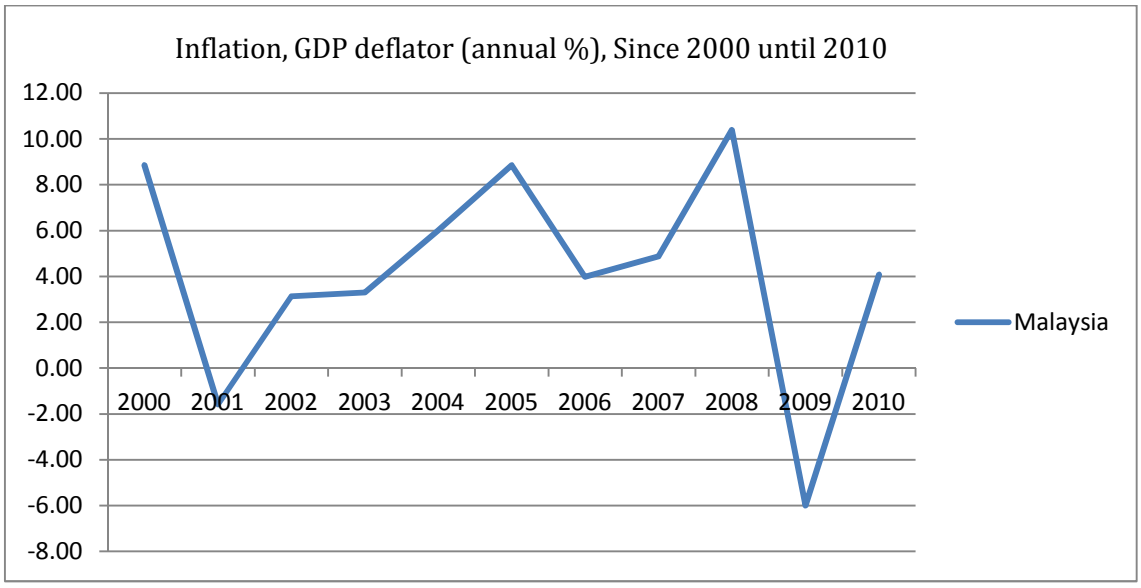

Figure 4.65: Inflation, GDP deflator (annual %) in Malaysia

This variable fluctuates too much during this period. Its maximum value is 10.39 annual percent which is related to 2008 but after this year this diagram decreased significantly and touched its lowest point in 2009 which is equal to -5.99.

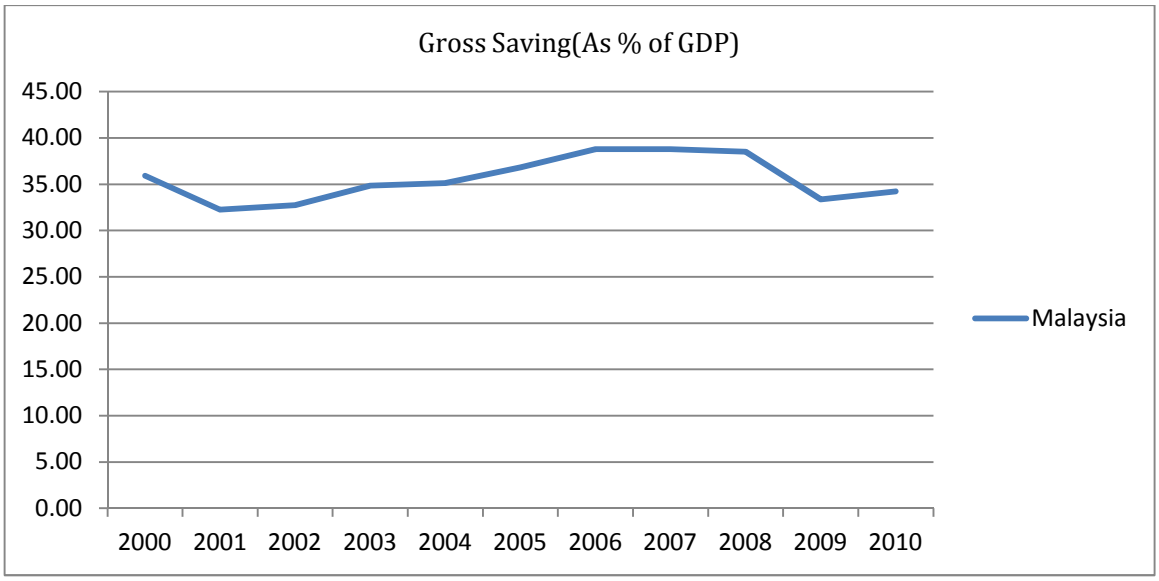

Figure 4.66: Gross Saving (As % of GDP) in Malaysia

By looking on this diagram it can be mentioned that this variable does not fluctuate too much during this period. Its maximum value is 38.80 which is related to 2006 and its minimum value is 32.25 which is related to 2001.

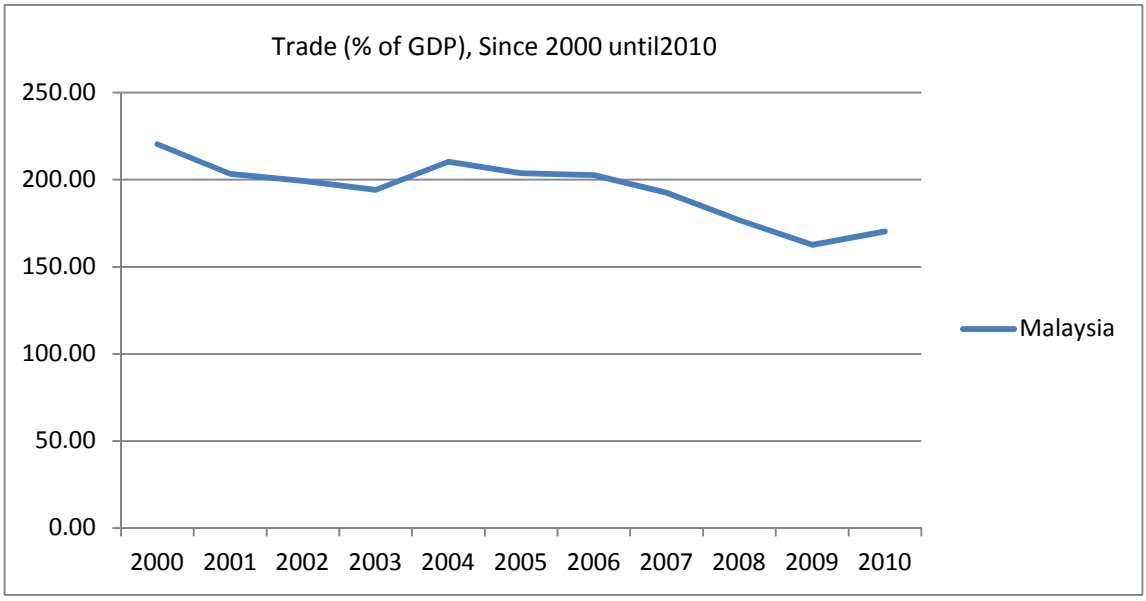

Figure 4.67: Trade (% of GDP) in Malaysia

By looking on this diagram it can be mentioned that this variable does not fluctuate too much during this period. Its maximum value is 220.41% of GDP which is related to the first year of this period and its minimum value is 162.56 % of GDP which is related to the 2009.

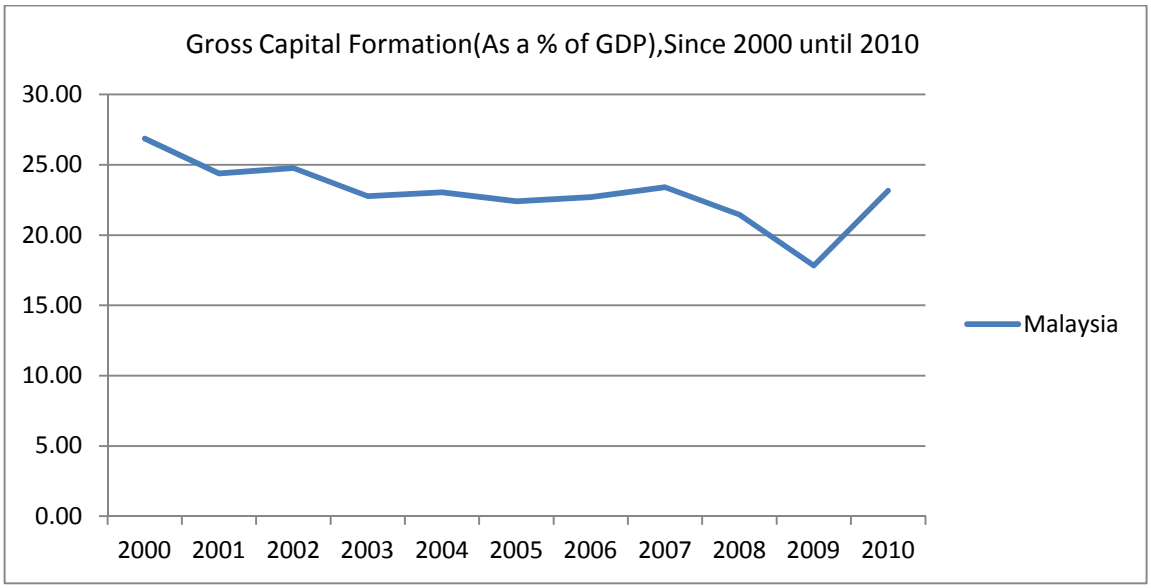

Figure 4.68: Gross Capital Formation (As a % of GDP) in Malaysia

This certain variable does not fluctuate too much during this period and its minimum value is equal to 17.84 which is related to 2009.

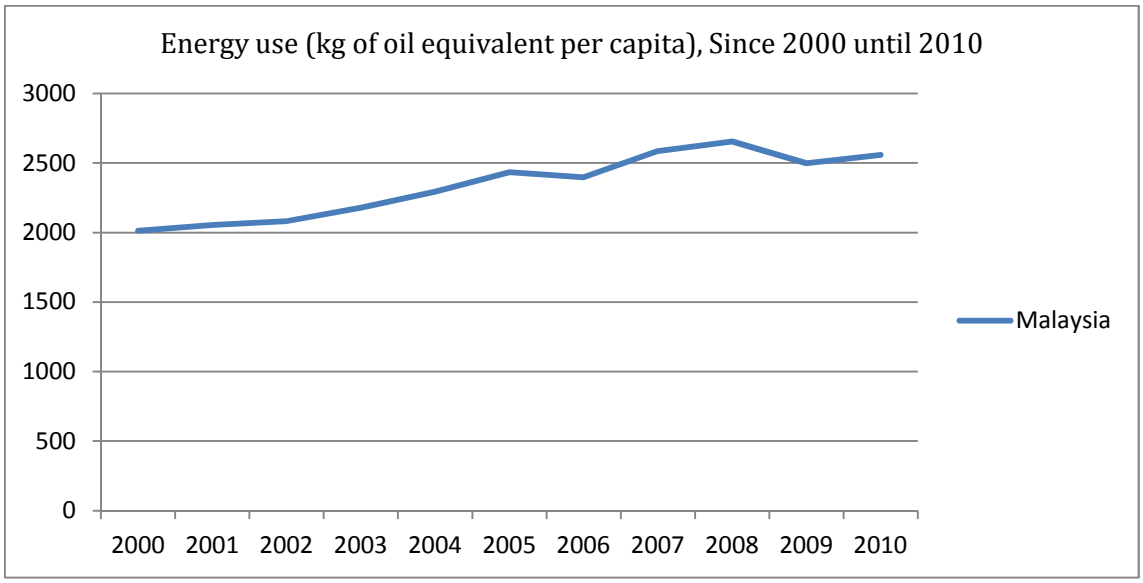

Figure 4.69: Energy use (kg of oil equivalent per capita) in Malaysia

This certain variable does not fluctuate too much during this period. The general trend which can be observed for this variable is an upward trend during this period. Its lowest value is equal to2000 which is related to the first year of this duration.

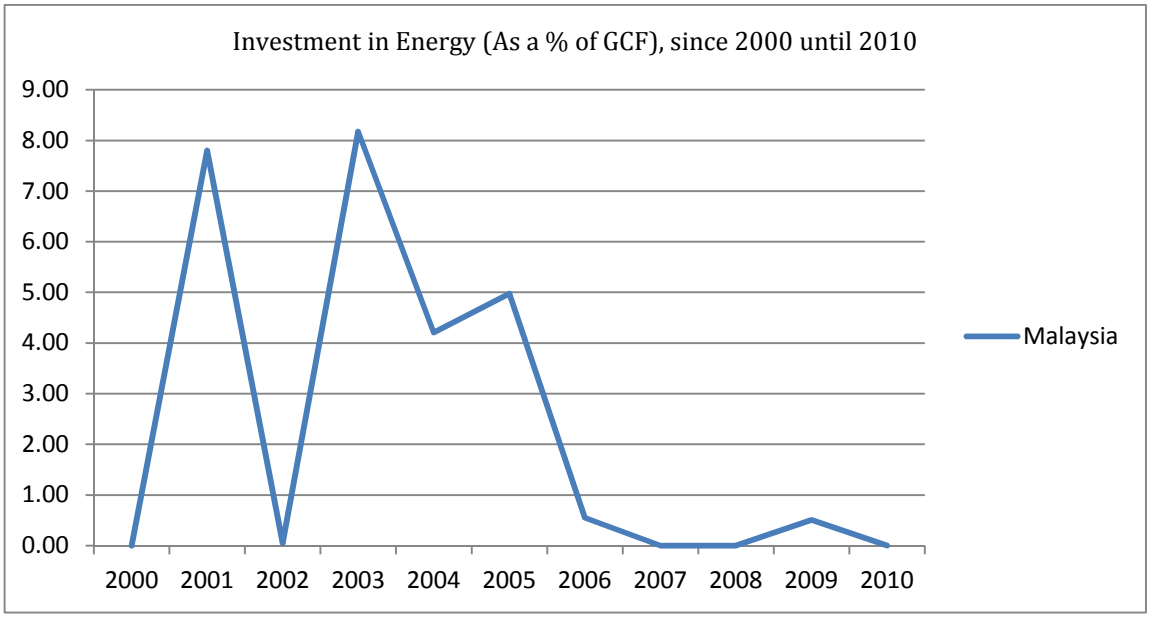

Figure 4.70: Investment in Energy with private participation (As a % of GCF) in Malaysia

This indicator shows a lot of fluctuation during this period. Its highest value is 8.17 which happened in 2003. After 2003 the general trend which can be observed for this variable is a downward trend.

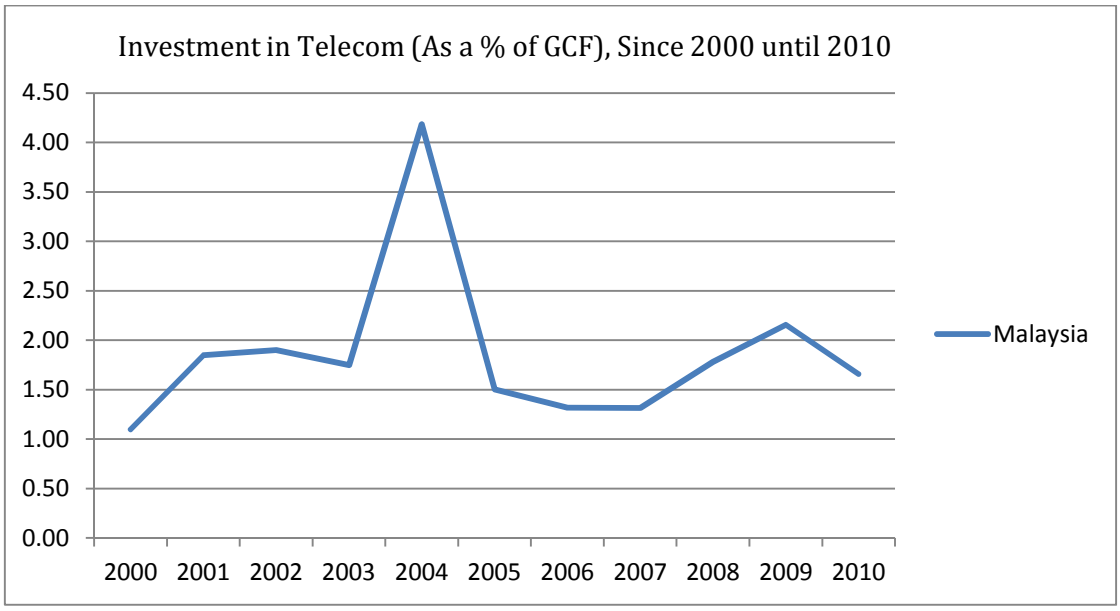

Figure 4.71: Investment in Telecoms with private participation (As a % of GCF) in Malaysia

The maximum value for this indicator is 4.19 which happened in 2004 but the lowest point is 1.10 which is related to the first year of this period.

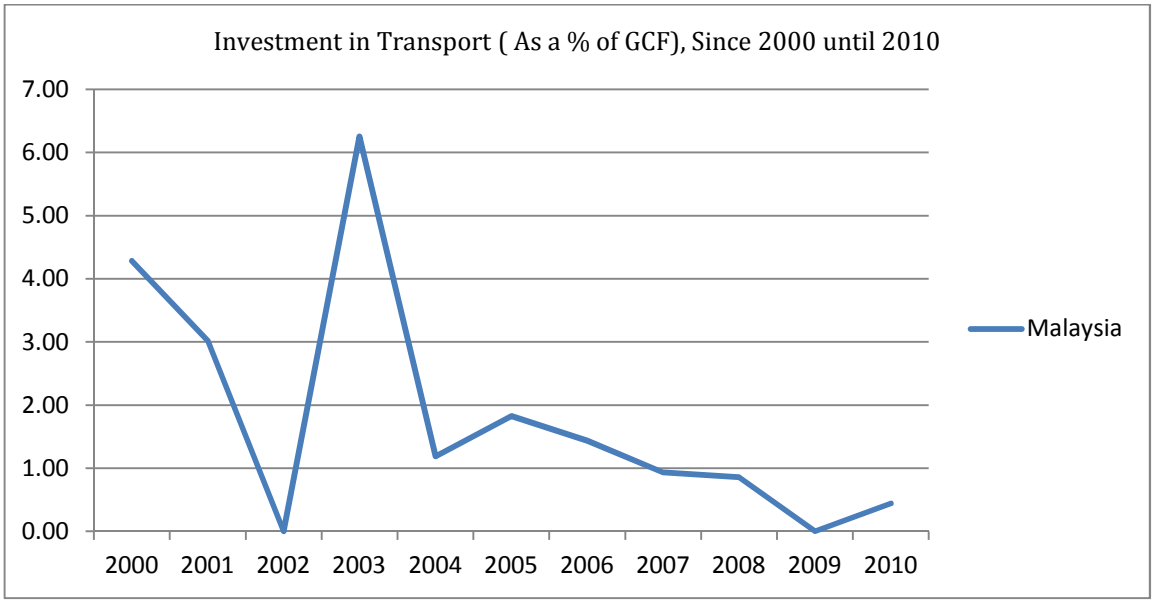

Figure 4.72: Investment in Transport with private participation (As a % of GCF) in Malaysia

The investment in telecom shows a lot of fluctuation during this period. Its maximum value is equal to 6.26 % of GCF which happened in 2003, after this year the general trend which can be observed for this indicator is a downward trend.

4.9 Mexico

According to World Bank the economy of Mexico is the 13th largest in the world although the government needs to reform some of the economic fundamentals as like as the system of tax and laws for labors in addition to renewal of infrastructure and decreasing the inequality of income. To overcome such problems, competition in airports, railroads, ports, telecommunications, natural gas distribution, electricity generation are widely expanded in order to renew the infrastructure. And as a result the country economy is mainly benefit from development in modern services and industries while private ownership is increasing.

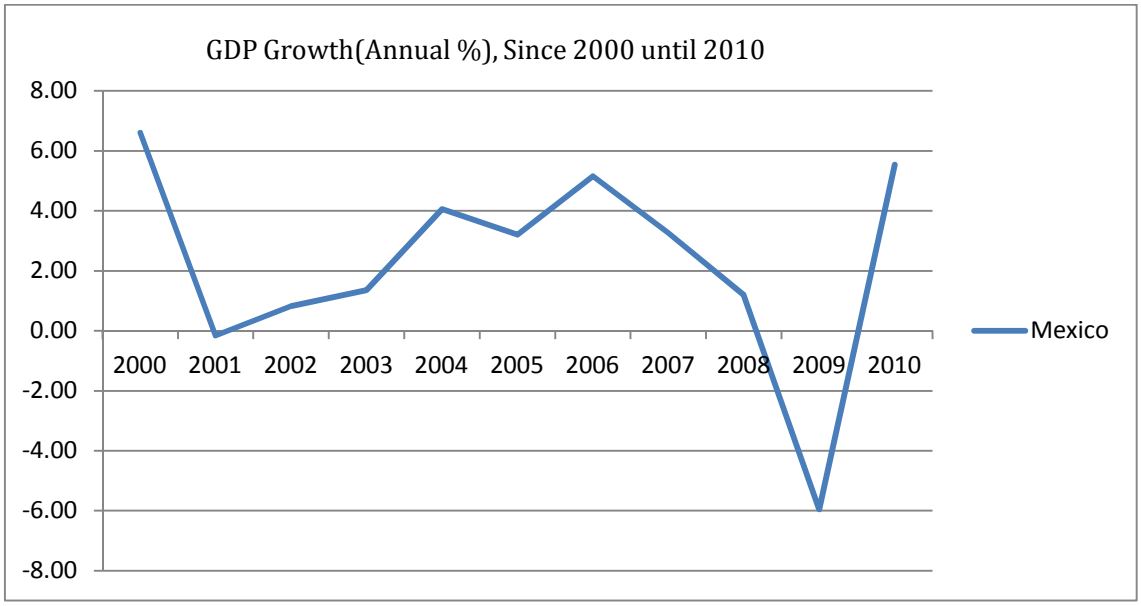

Figure 4.73: GDP Growth (Annual %) in Mexico

This certain variable shows a lot of fluctuation during this period. Its maximum value is 6.60 which happened in the first year of this duration, but its minimum value is equal to -5.95 which is related to 2009 and it is obvious that there is too much different between this two amounts.

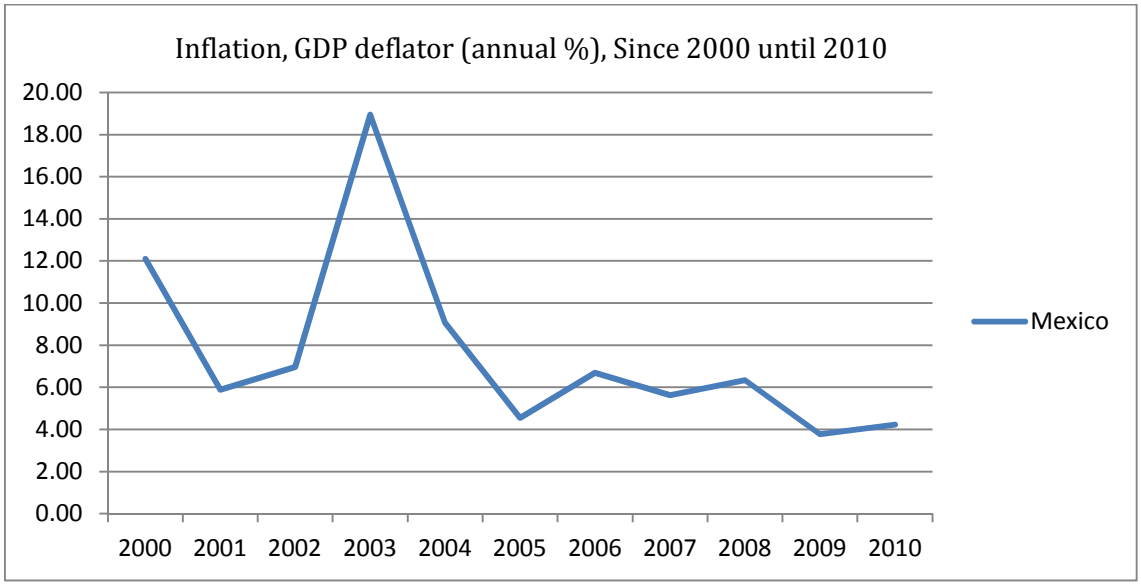

Figure 4.74: Inflation, GDP deflator (annual %) in Mexico

The maximum value for inflation is 18.95 which is related to 2003 but the minimum value for this variable is 3.77 which is related to 2009.

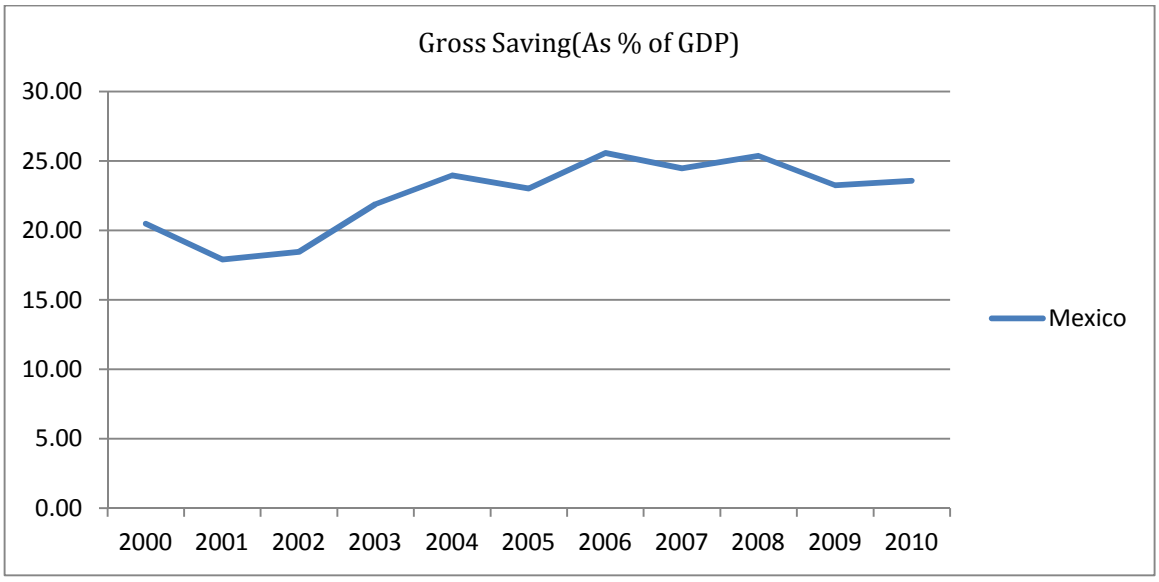

Figure 4.77: Gross Saving (As % of GDP) in Mexico

This variable does not fluctuate too much during this period. Its maximum value is 25.57 which is related to 2006 and minimum value for this indicator is 17.92 which is related to 2001.

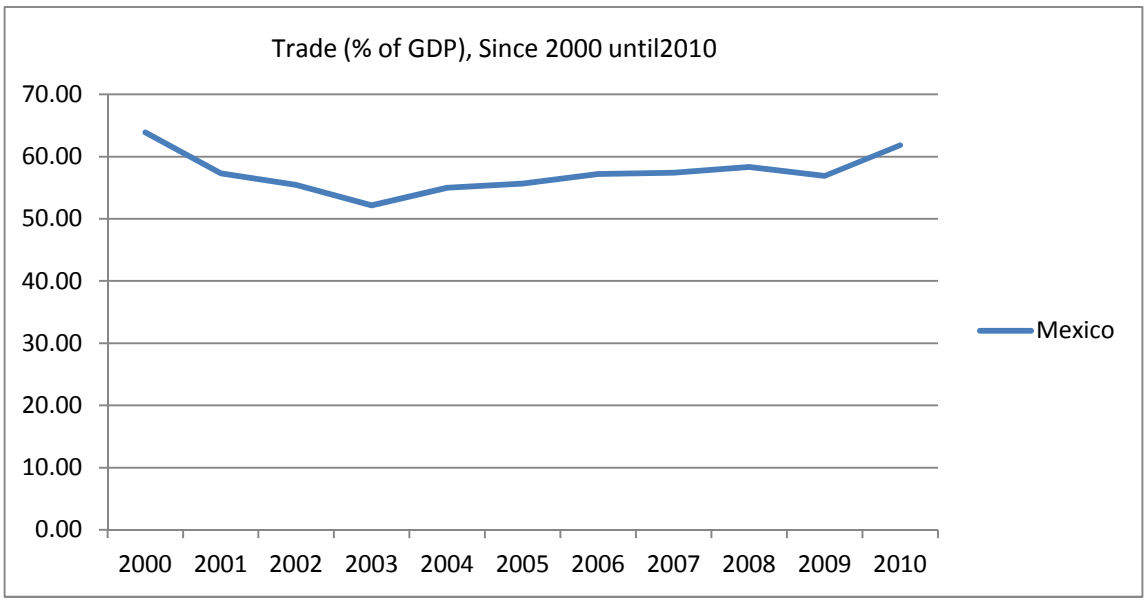

Figure 4.76: Trade (% of GDP) in Mexico

This variable does not fluctuate too much during this period. Its maximum value is 63.87 which are related to the first year of this period.

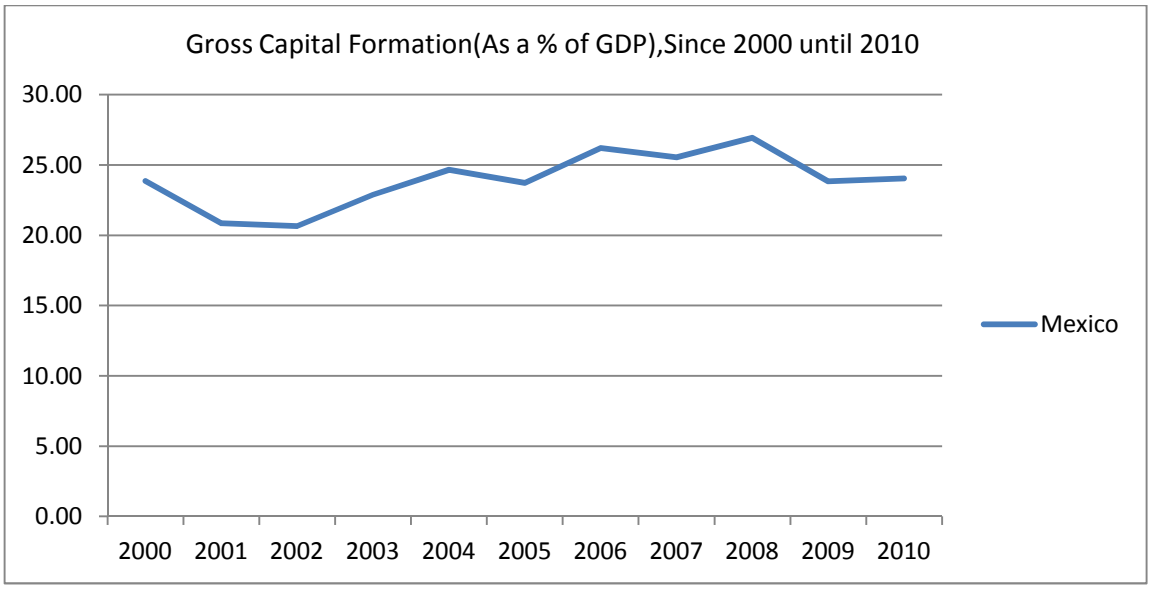

Figure 4.77: Gross Capital Formation (As a % of GDP) in Mexico

Gross capital formation does not show significant variation during this period. Its maximum value is equal to 26.94 but its minimum value is equal to 20.66% of GDP.

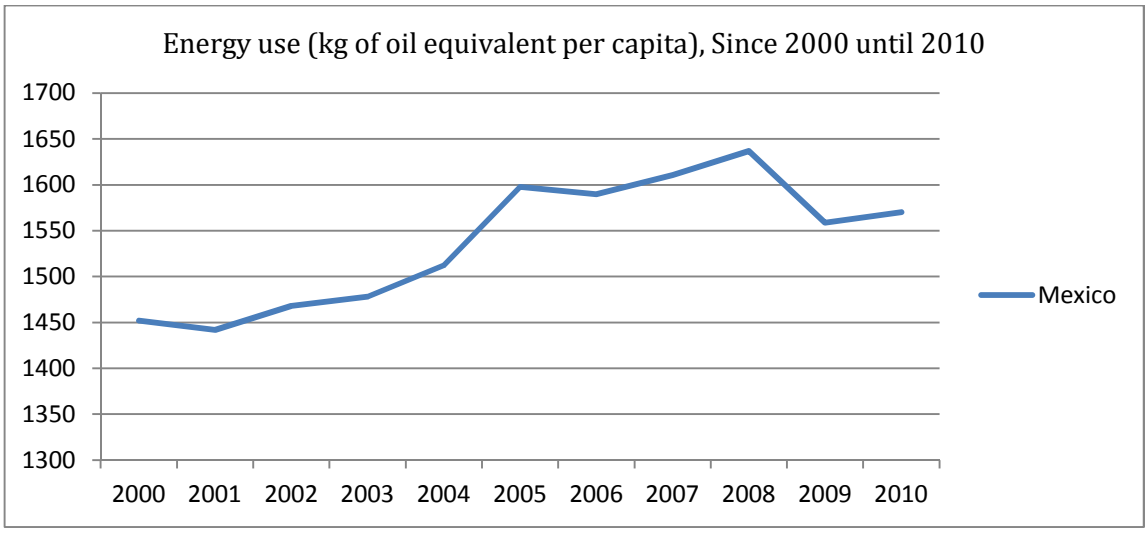

Figure 4.78: Energy use (kg of oil equivalent per capita) in Mexico

The general trend which can be seen for this certain variable is an upward trend during this period. Its maximum value is 1637kg of oil per capita which happened in 2008 and its minimum value is 1442kg which happened in 2001.

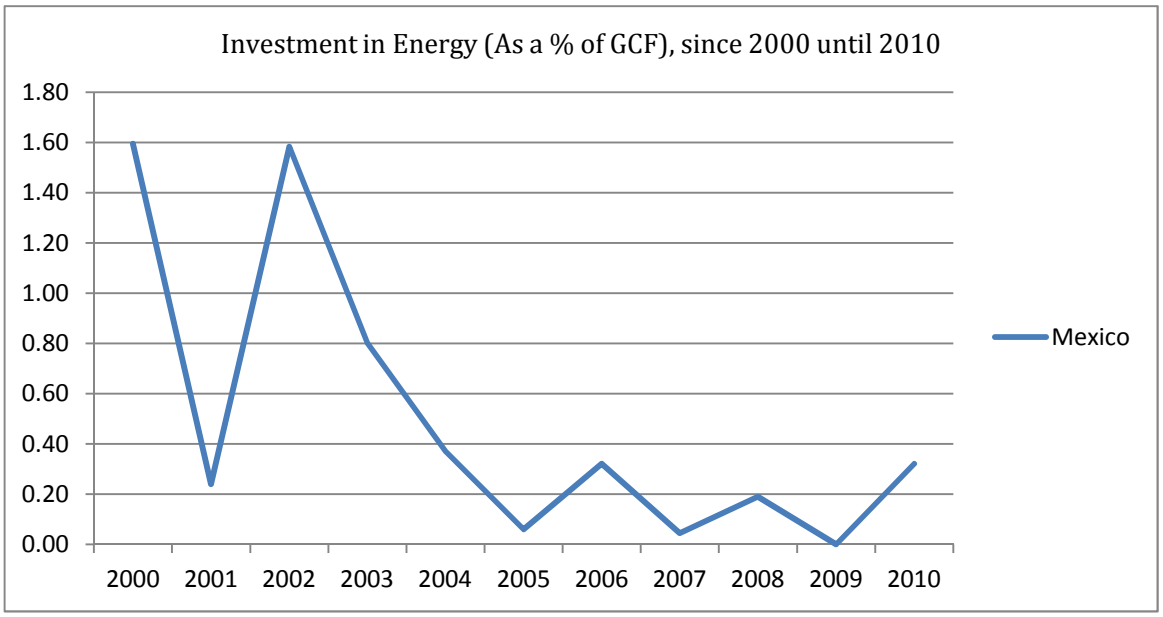

Figure 4.79: Investment in Energy with private participation (As a % of GCF) in Mexico

This variable shows a lot of variation in this period. Its maximum value is 1.6 which is related to the first year of this period. After 2002 this variable decreased significantly until 2009.

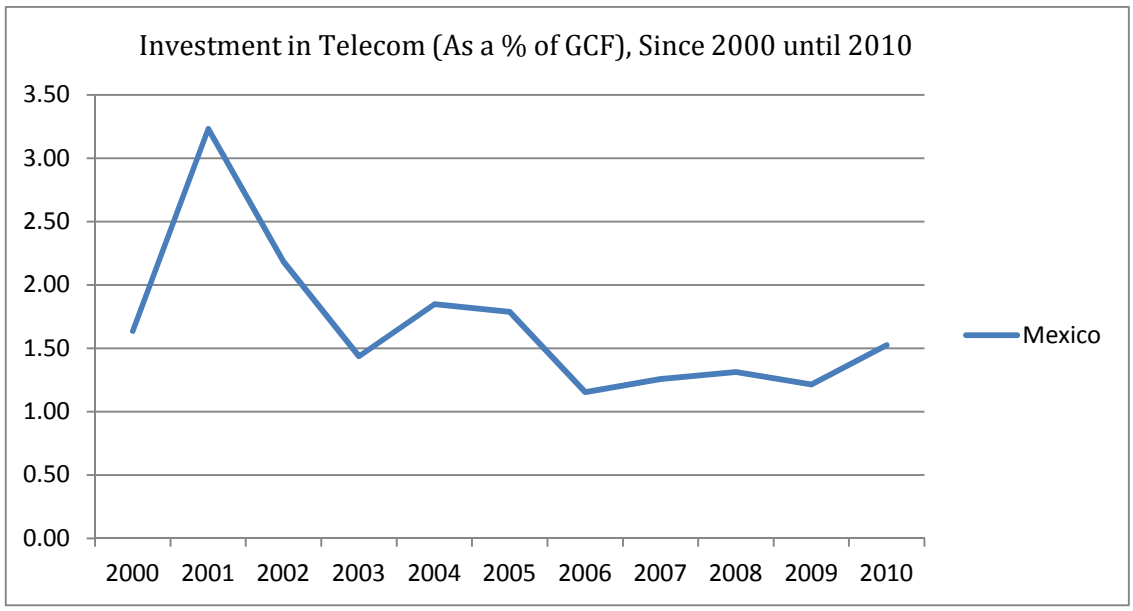

Figure 4.80: Investment in Telecoms with private participation (As a % of GCF) in Mexico

By looking on this diagram, it can be mentioned that the general trend which can be seen for this indicator is a downward trend. The maximum value is 3.23 which happened in 2001 and the minimum value is 1.15 which is related to 2006.

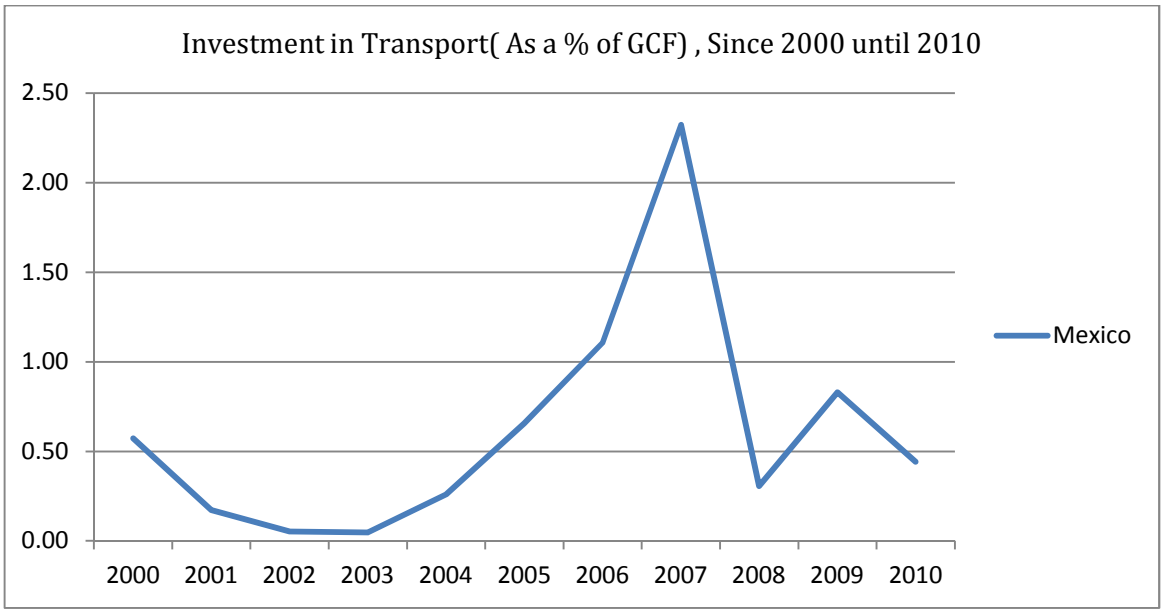

Figure 4.81: Investment in Transport with private participation (As a % of GCF) in Mexico

The general trend which can be mentioned for this variable between 2002 and 2007 is a rising trend. The maximum point for this indicator is 2.32 which happened in 2007 and the lowest value is 0.05.

4.10 Peru

According to World Bank the economy of Peru is the 42nd largest with upper middle income which experiences an economic explosion during recent years and so it is classified as the most rapid growing economies in the world. The country economy performance include various factors in its success such as caring about the country's financial budgeting, reduction in international debt, high reserve in international accumulation and infrastructural investments. There is a high level of foreign trade in Peru's economy mainly include the export of industries and agricultural products.

According to World Bank the social inequalities also has decreased through investment in electric power, water and sanitation.

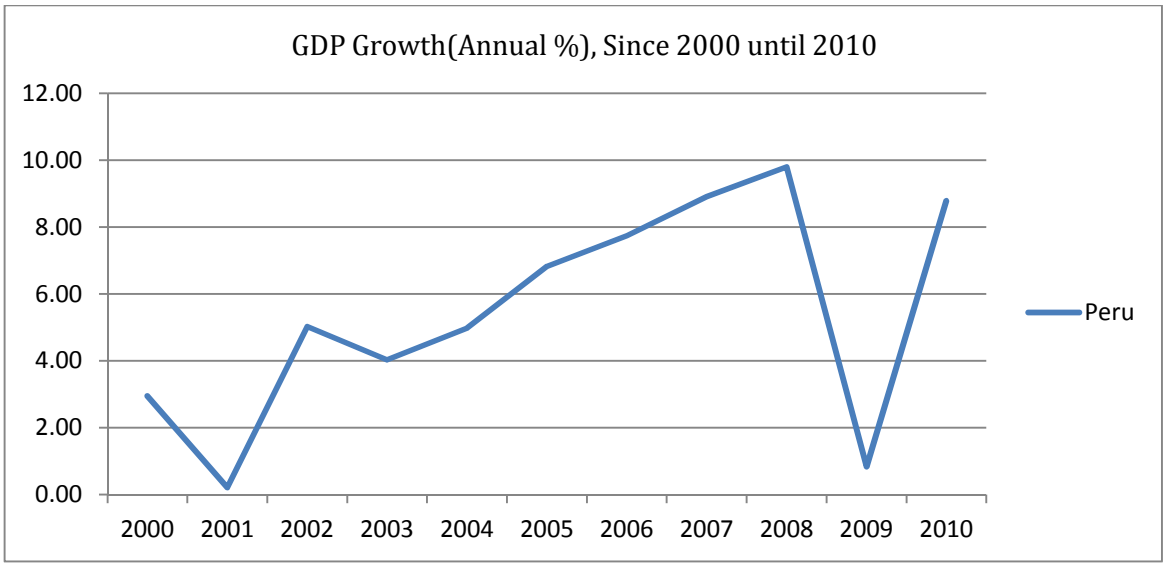

Figure 4.82: GDP Growth (Annual %) in Peru

The minimum value which is recorded for this indicator during this period is 0.21 which is related to 2001, after this year this variable increased significantly and touched its highest value in 2008 which is equal to 9.80%. Another significant decline can be seen after 2008.

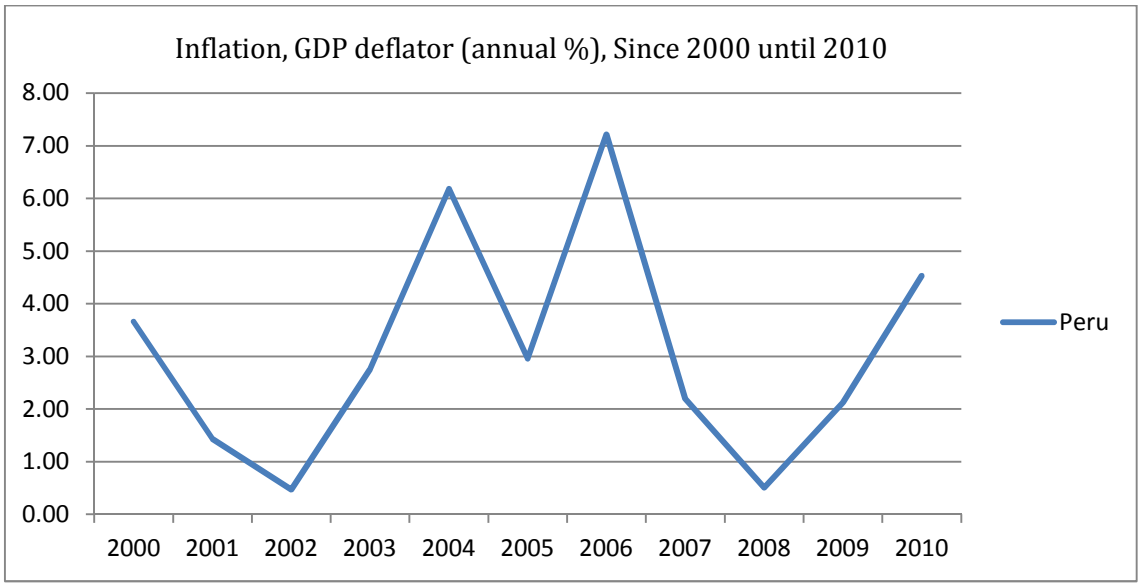

Figure 4.83: Inflation, GDP deflator (annual %) in Peru

This variable shows a lot of fluctuation in this period. Its maximum value is7.22 in 2006 and its minimum value is 0.47 which is related to 2002.

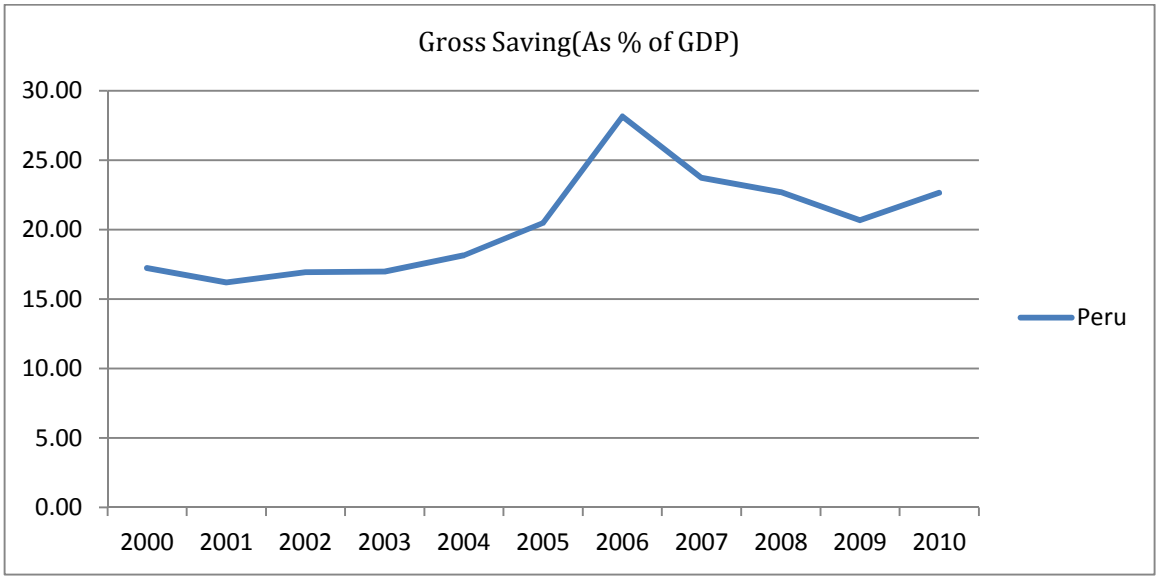

Figure 4.84: Gross Saving (As % of GDP) in Peru

The general trend which can be seen between 2000 and 2006 is a rising trend, after 2006 this indicator changed its pattern and decrease until 2009. The highest value for this indicator is 28.16 which is related to 2006.

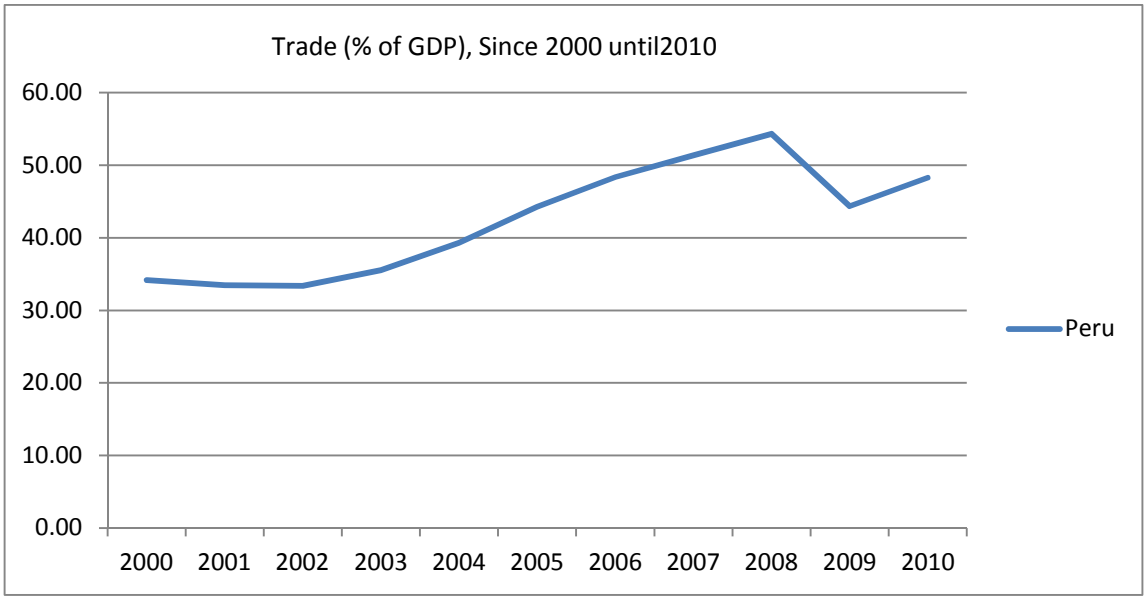

Figure 4.85: Trade (% of GDP) in Peru

This statistics increase significantly until 2008 and reached its highest point in this year, but after this year changed its pattern and decrease. Its maximum value is 44.37 and its minimum value is 33.38 which is related to 2002.

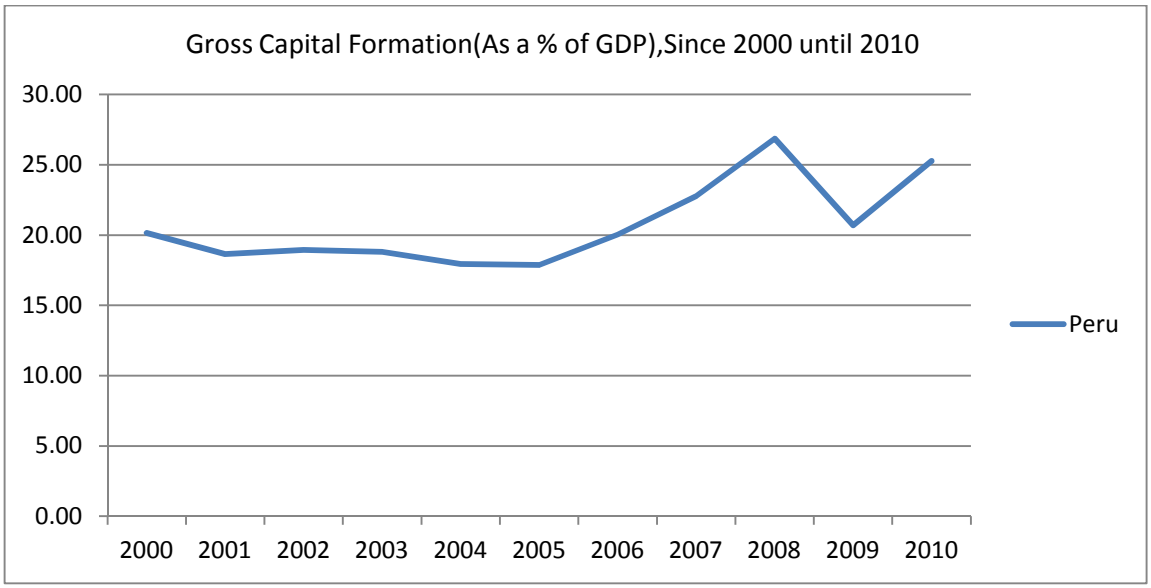

Figure 4.86: Gross Capital Formation (As a % of GDP) in Peru

Between 2000 and 2008 this variable shows an upward trend and reached its highest point in 2008 which is equal to 26.387. The minimum value for this statistics is 17.89 in 2005.

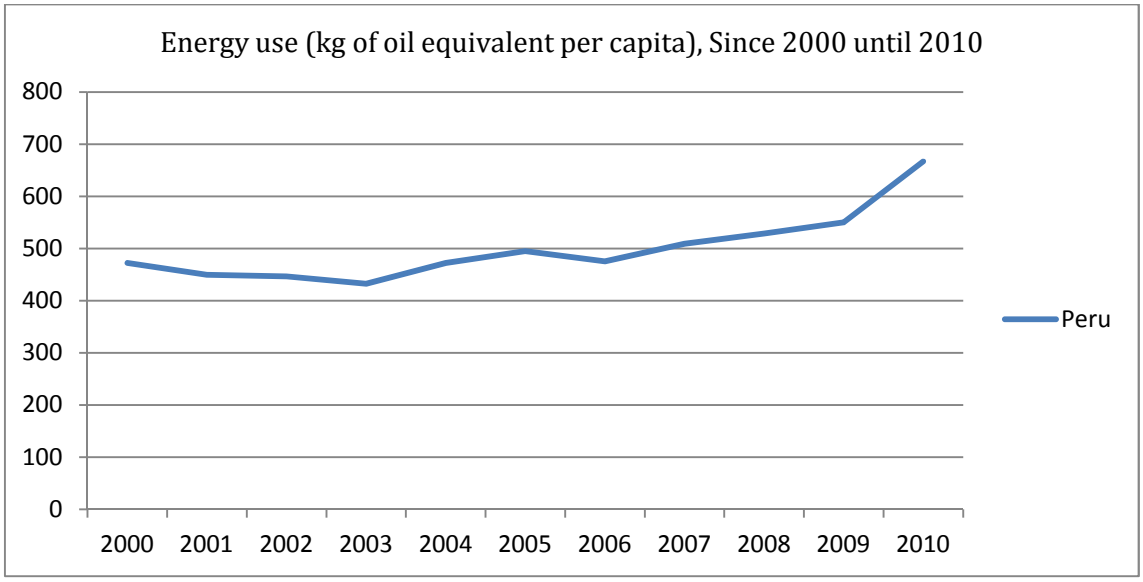

Figure 4.87: Energy use (kg of oil equivalent per capita) in Peru

The general trend which can be seen for this indicator is an upward trend, but this certain variable does not show too much variation during this period. Its maximum value is 667kg which is related to the last year of this period.

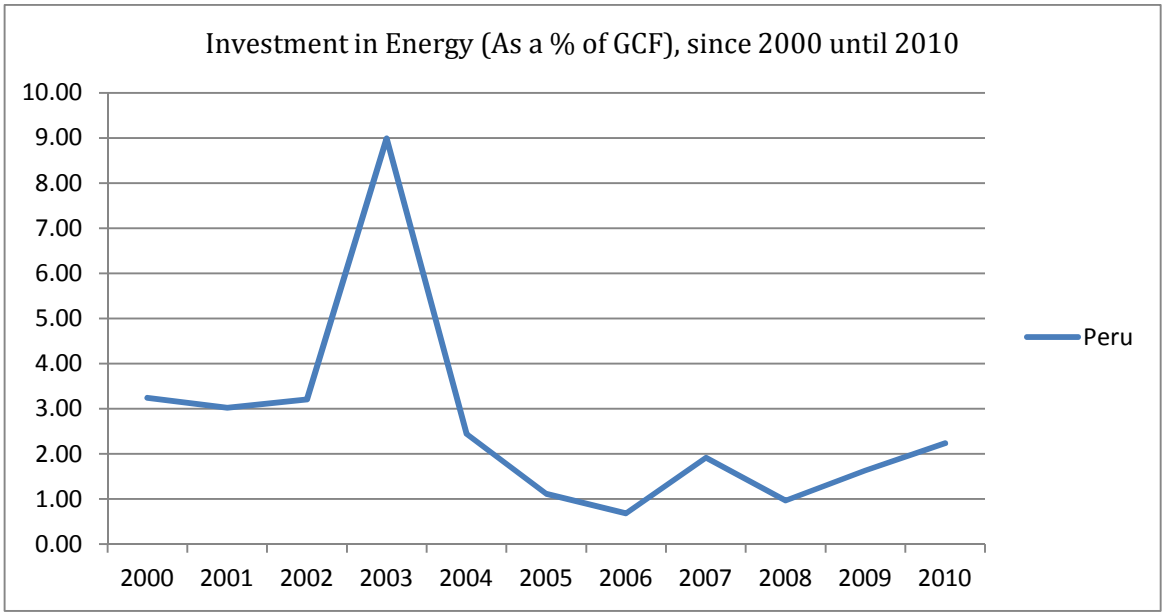

Figure 4.88: Investment in Energy with private participation (As a % of GCF) in Peru

By looking on the presented diagram it can be mentioned that the highest value for this indicator is 8.99 which happened in 2003 and the lowest point is 0.68 which happened in 2006. After 2005 this variable does not show too much variation until the end of this period.

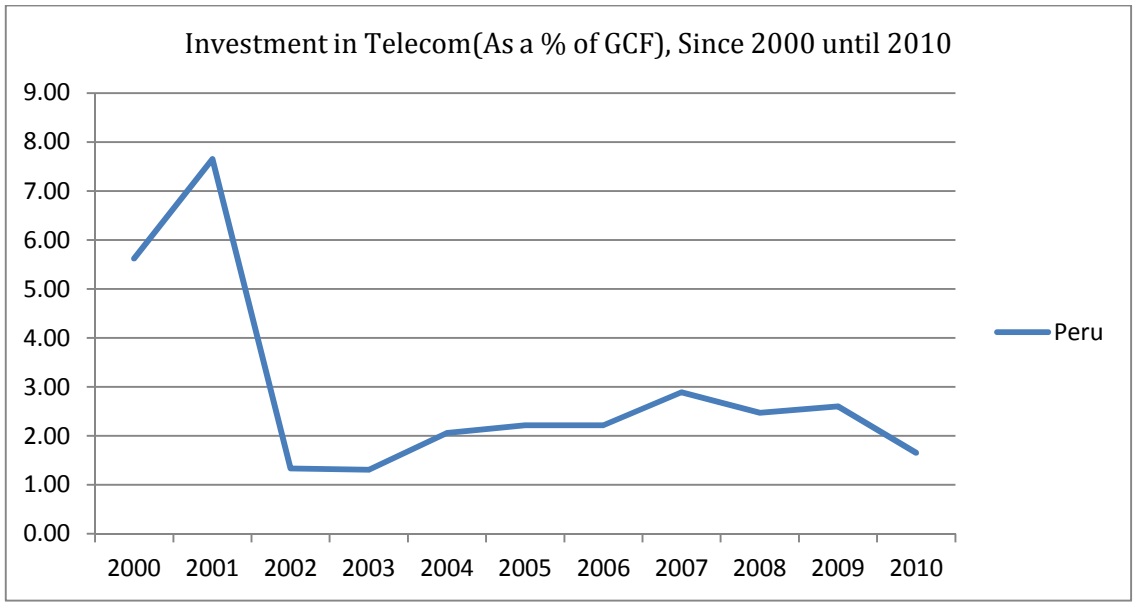

Figure 4.89: Investment in Telecoms with private participation (As a % of GCF) in Peru

This statistics got its highest value during this period in 2001 which is equal to 7.66. After 2001 this statistics started to decrease until 2003. It should be mentioned that this variable does not show a lot of variation between 2004 and 2010.

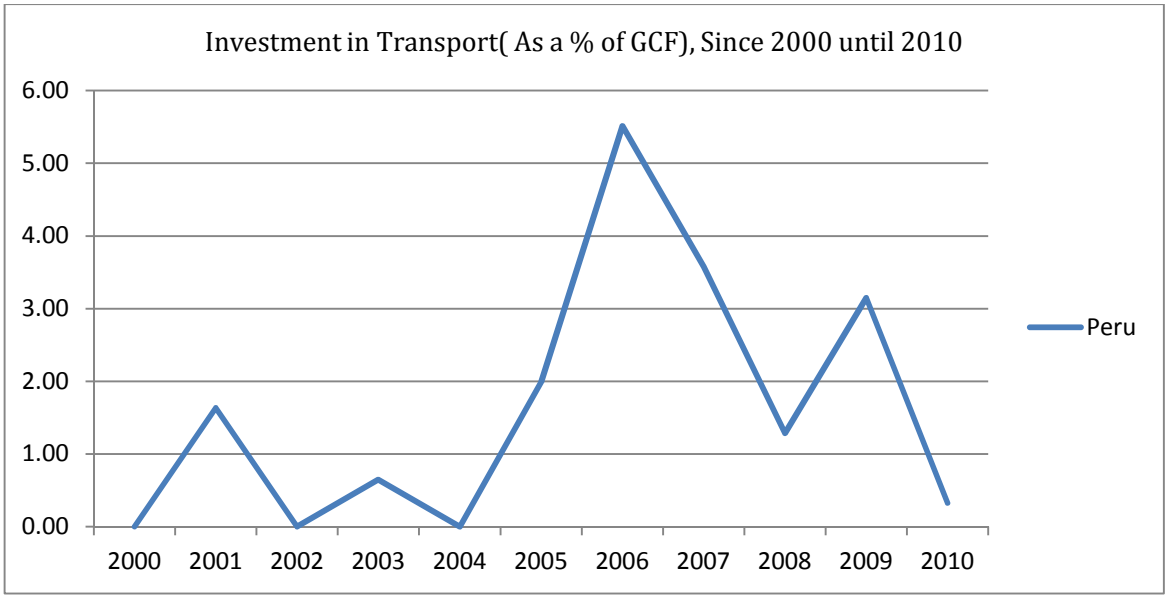

Figure 4.90: Investment in Transport with private participation (As a % of GCF) in Peru

By looking on this graph it can be see that after 2004 this variable increase considerably and reached the highest point which is equal to 5.51 in 2006. After 2006 this indicator shows another decrease until 2008.

4.11 Philippines

According to IMF the economy of Philippines is the 40th largest and it is classified as newly industrialized country. The growth of GDP is mainly depend on the export of the electronic products and semiconductors, petroleum products, copper products, transport products, garment, fruit and coconut oil.

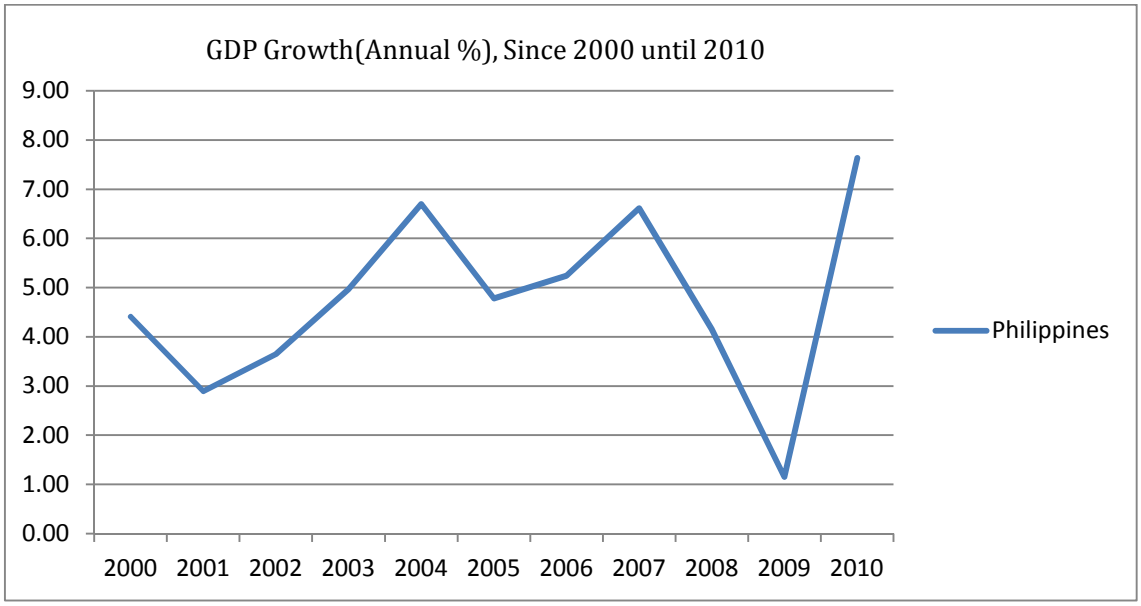

Figure 4.91: GDP Growth (Annual %) in Philippines

By looking on this diagram it can be mentioned that this variable shows a lot of variation during this period. After 2007 this indicator decreased sharply and touched its lowest

amount which is equal to 1.15 in 2009 but after this year this variable changed its trend and increased significantly and touched its highest value in 2010 which is equal to 7.63.

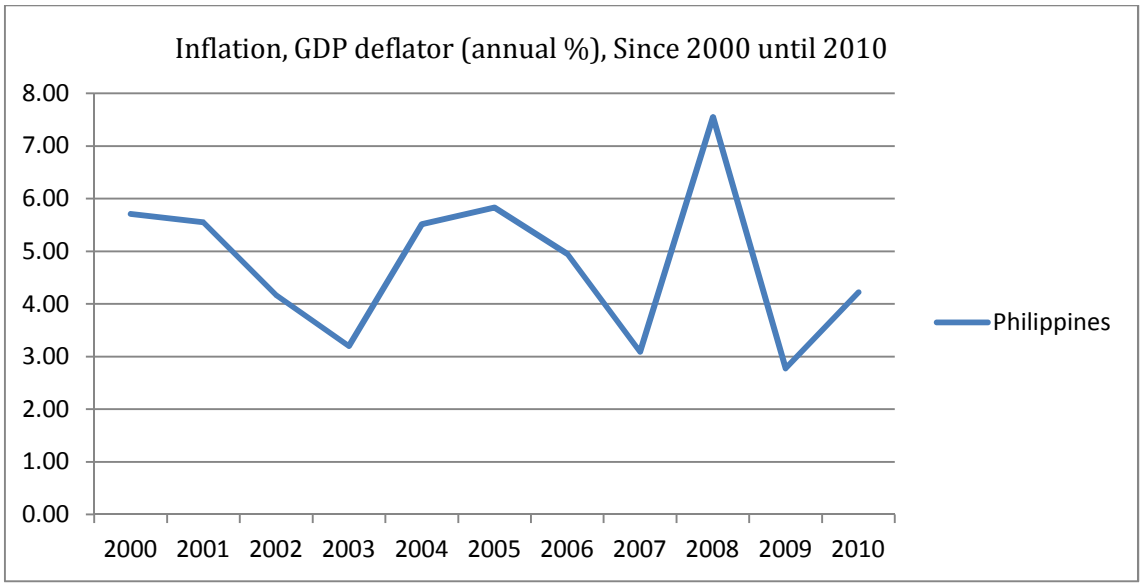

Figure 4.92: Inflation, GDP deflator (annual %) in Philippines

This variable shows a lot of fluctuation during this period. Its maximum value is 7.55 which happened in 2008 and its minimum value is 2.77 which is related to 2009.

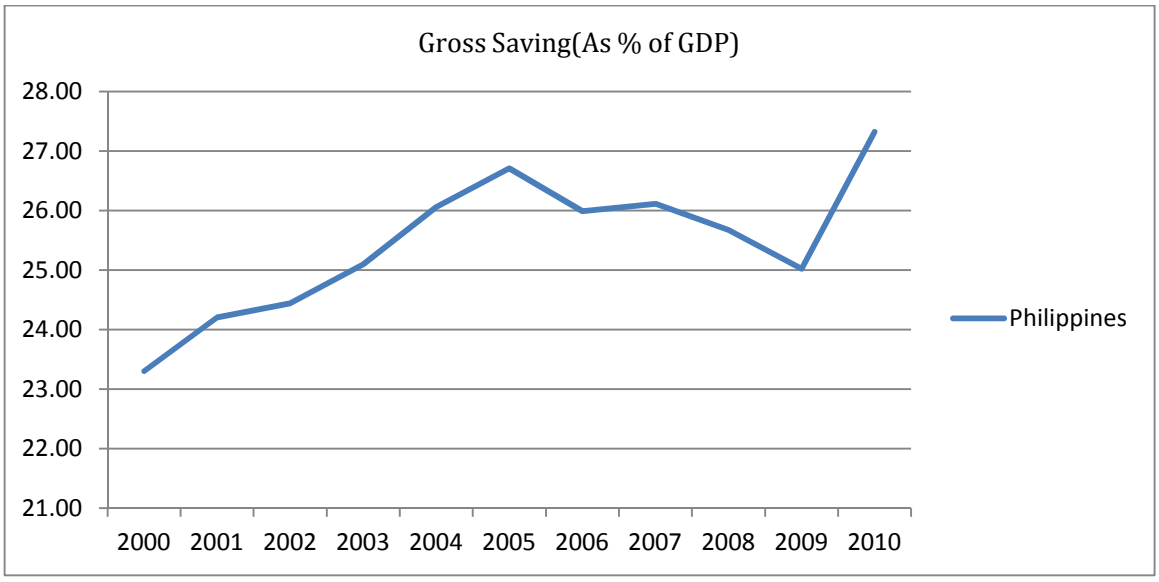

Figure 4.93: Gross Saving (As % of GDP) in Philippines

This statistics shows an upward trend between 2000 and 2005. After this year this variable shows a downward trend until 2009. The minimum value for this statistics is equal to 23.30 and the maximum value is equal to 27.32.

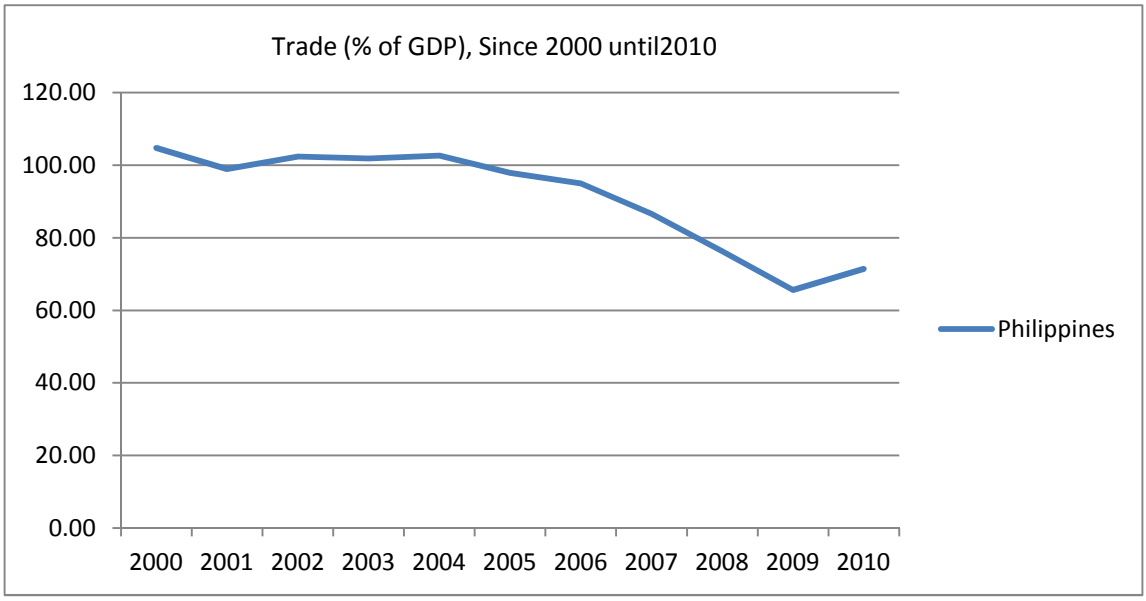

Figure 4.94: Trade (% of GDP) in Philippines

By looking on the above diagram it can be mentioned that the general trend for this certain variable during this period is a downward trend. The lowest point for this indicator is 65.59 which happened in 2009.

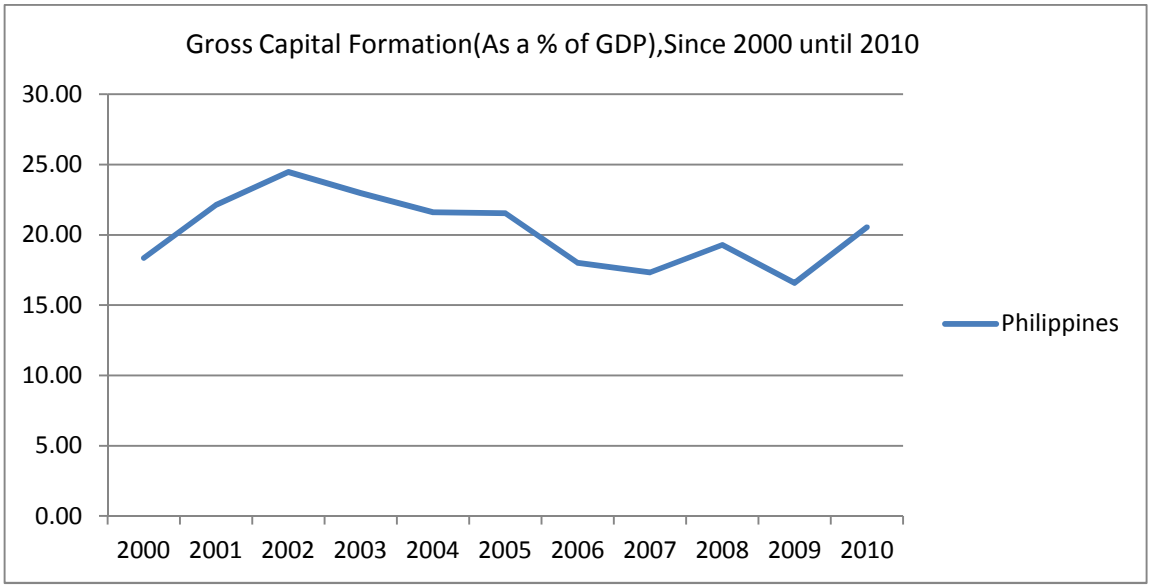

Figure 4.95: Gross Capital Formation (As a % of GDP) in Philippines

The highest amount which is recorded for this variable during this period is 24.47 in 2002 and the minimum value which is recorded for this certain variable is equal to16.59.

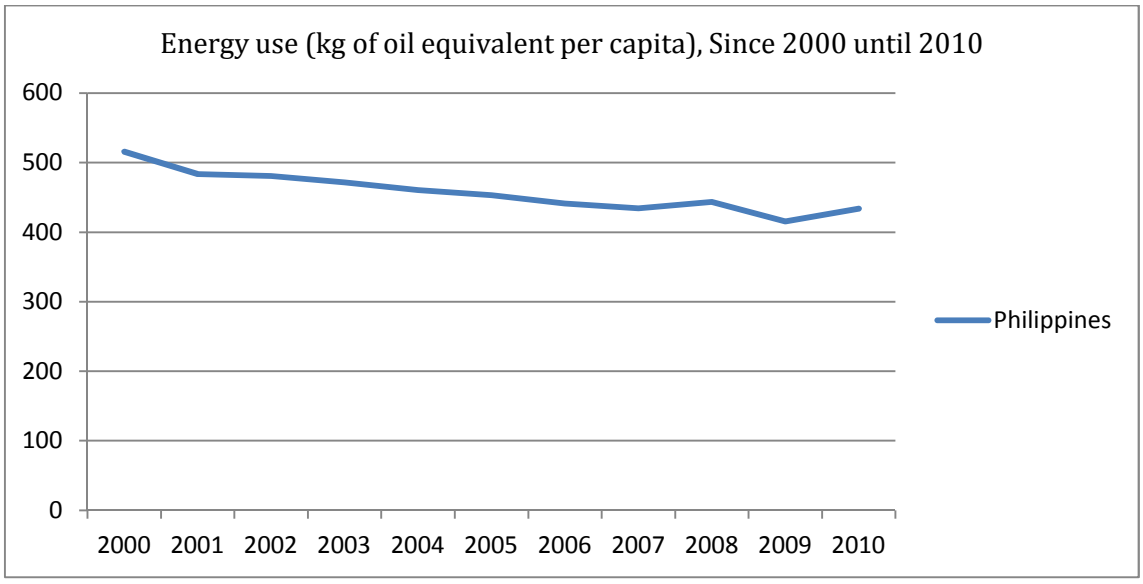

Figure 4.96: Energy use (kg of oil equivalent per capita) in Philippines

This certain variable does not fluctuate too much during this period, its maximum value is 516 kg of oil which are related to the first year of this period and its minimum value is 415kg which is related to 2009.

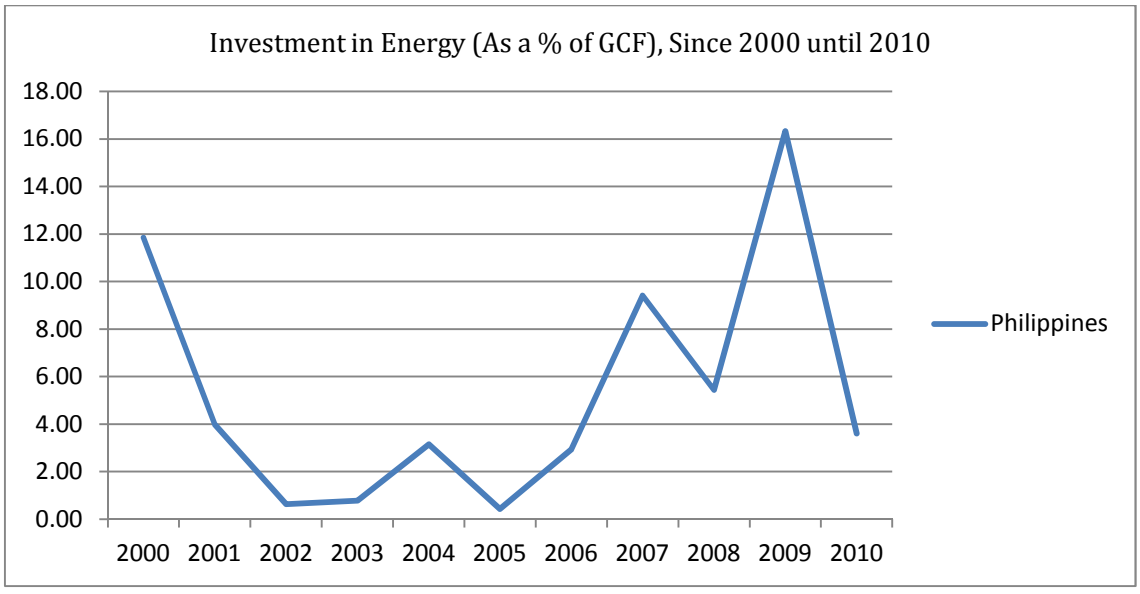

Figure 4.97: Investment in Energy with private participation (As a % of GCF) in Philippines

After 2000 this variable shows a downward trend and this trend continue until 2003. The general trend for this variable between 2005 and 2009 is an upward trend. The maximum value is 16.33 which happened in 2010.

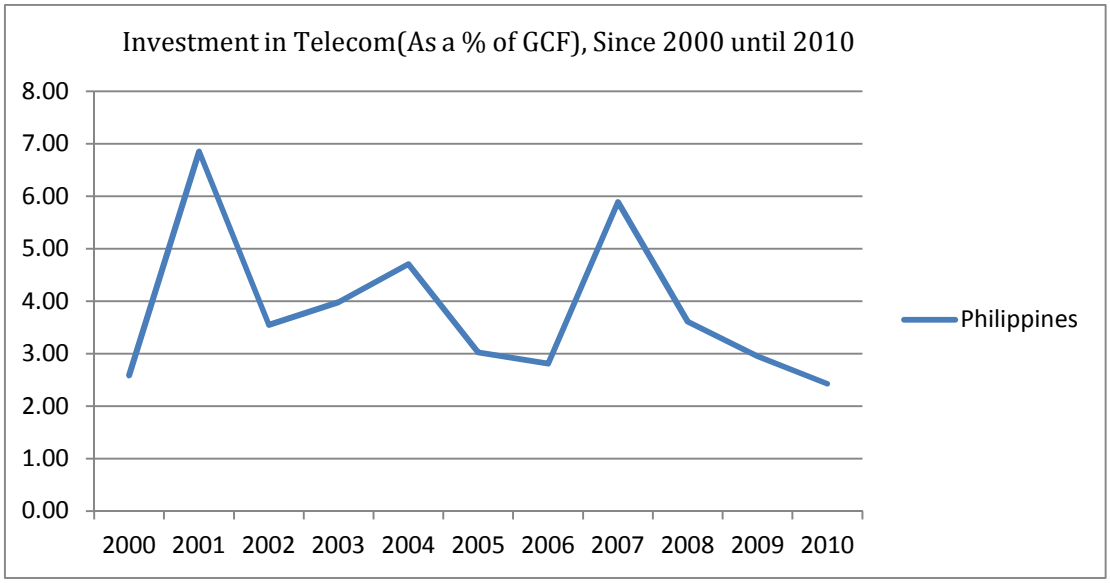

Figure 4.98: Investment in Telecoms with private participation (As a % of GCF) in Philippines

By looking on this diagram it can be mentioned that this variable fluctuates too much during the period. Its maximum value is 6.85 which happened in 2001 and its minimum value is 2.43 which happened in the last year of this period.

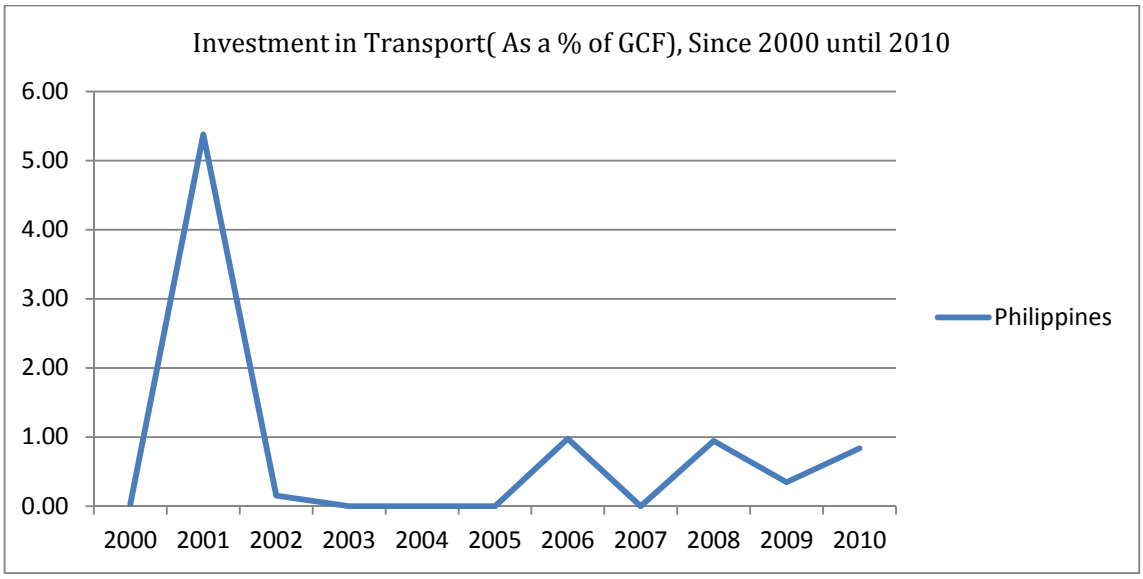

Figure 4.99: Investment in Transport with private participation (As a % of GCF) in Philippines

The maximum value for this indicator is 5.38 which happened in 2001, after this year this indicator decreased sharply and touched its lowest amount in 2002 which is equal to 0.15. This variable shows a lot of fluctuation between 2005 and 2010.

4. 12 Russian Federation

According to IMF and World Bank, although Russian economy is the 8th largest one in the world but it is considered as a developing economy. Since 1990 the reforms toward market based economy and private ownership in different sectors of industries and agriculture has been processed with the exception in sectors related to energy and defense. The growth of GDP in mainly depends on the export of oil, gas, gold, mineral and fishing industries.

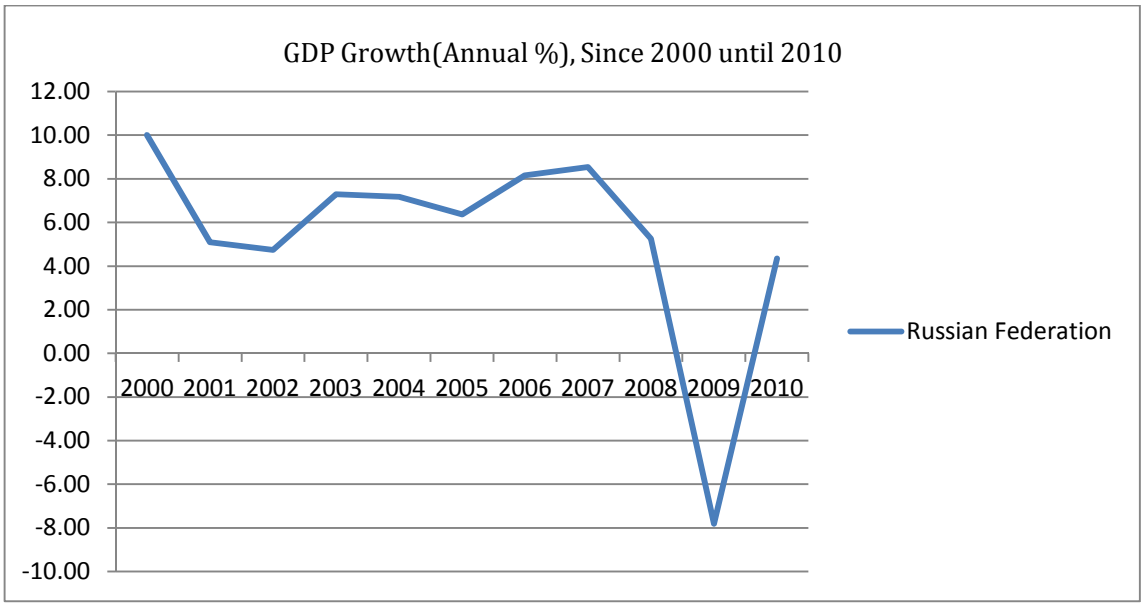

Figure 4.100: GDP Growth (Annual %) in Russian Federation

This variable shows a lot of variation during this period. Its highest amount was 10 which happened in 2000. After 2007 this indicator decreased sharply and touched its lowest amount in 2009 which is equal to -7.82.

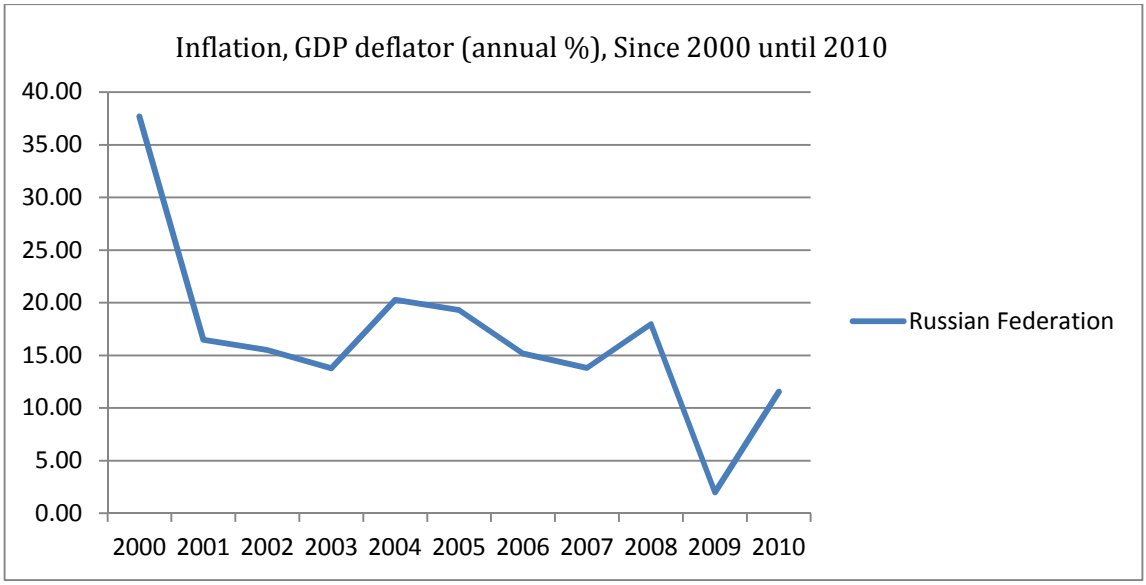

Figure 4.101: Inflation, GDP deflator (annual %) in Russian Federation

This certain variable shows a lot of fluctuation during this period, its maximum value is equal to 37.70 which happened in 2000 and its lowest value is equal to 1.99 which happened in 2009.

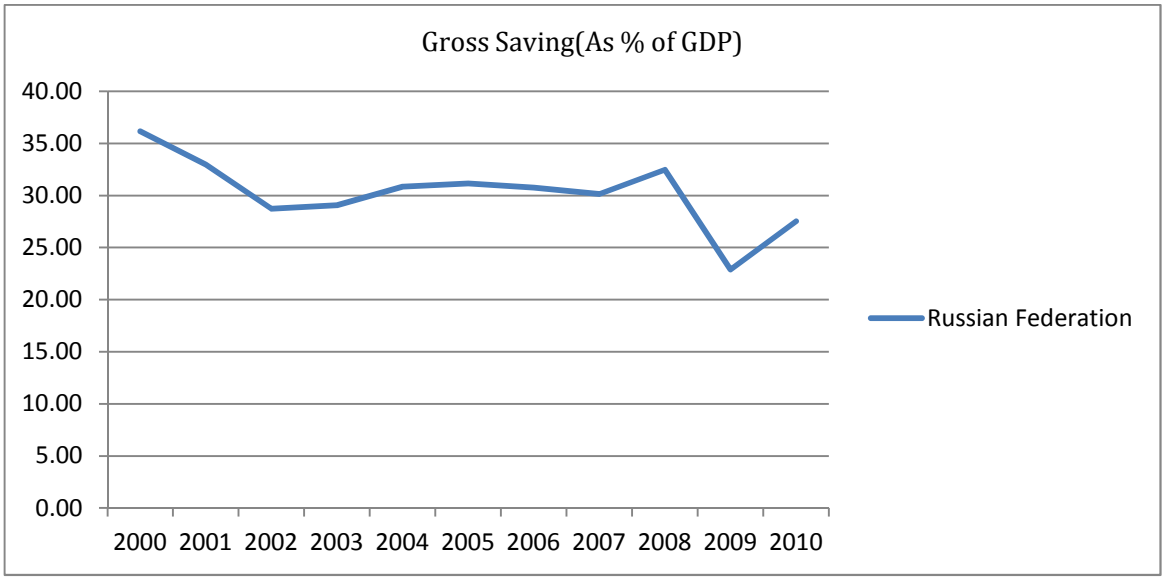

Figure 4.102: Gross Saving (As % of GDP) in Russian Federation

The maximum value for saving is 36.15 which happened in the first year of this period and the minimum value is 22.90 which happened in 2009.

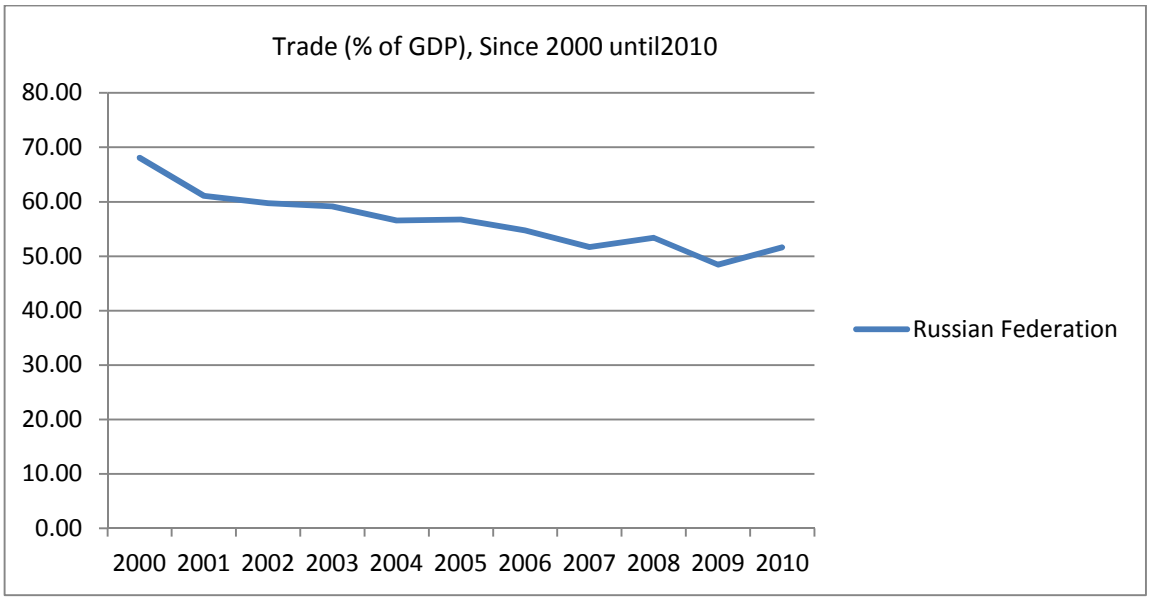

Figure 4.103: Trade (% of GDP) in Russian Federation

The general trend for this certain variable during this period is a downward trend. Its highest point is 68.09 which happened in the first year of this period and its minimum value is 48.44 which is related to 2009.

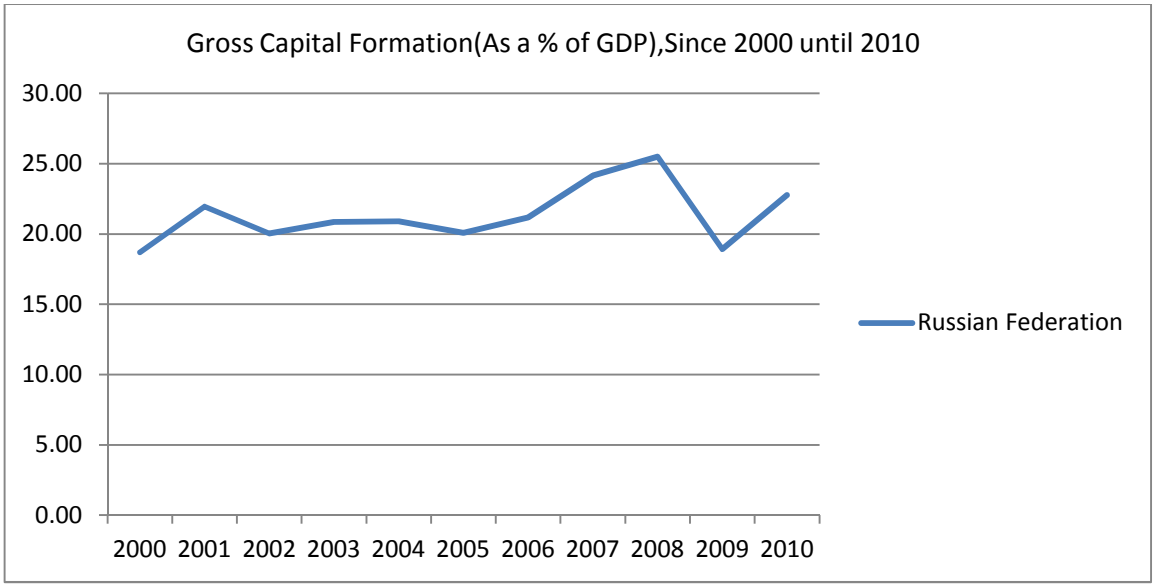

Figure 4.104: Gross Capital Formation (As a % of GDP) in Russian Federation

This certain indicator does not fluctuate too much during this period. Its highest point is 25.50 which happened in 2008 and its lowest point is 18.69 which is related to the first year of this period.

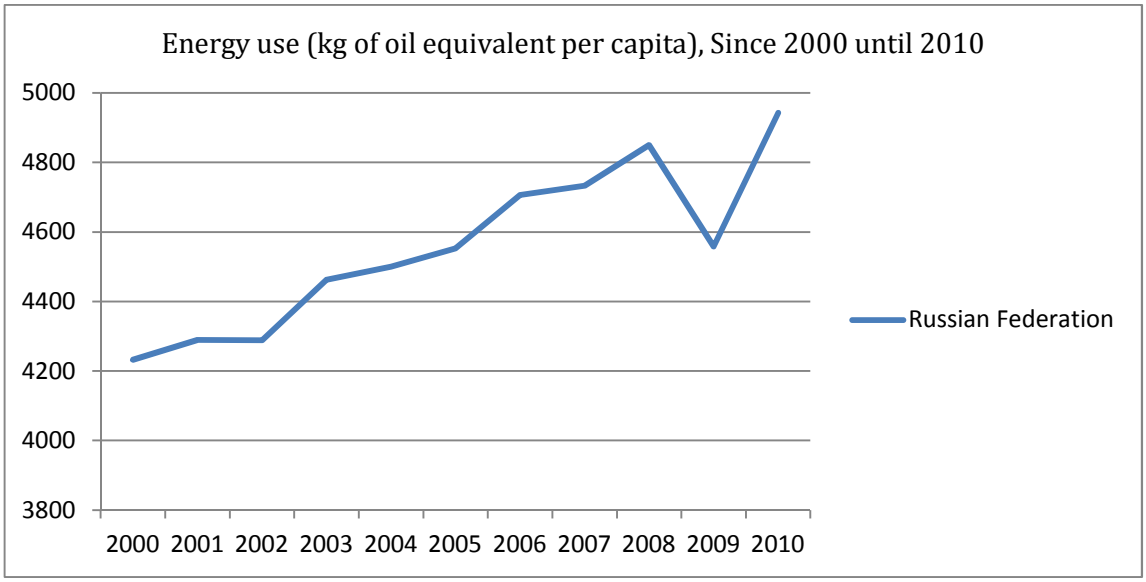

Figure 4.105: Energy use (kg of oil equivalent per capita) in Russian Federation

The general trend for this variable is an upward trend during this period. The maximum value is 4943kg which happened at the end of this period and the minimum value is 4233kg which is related to the first year of this period.

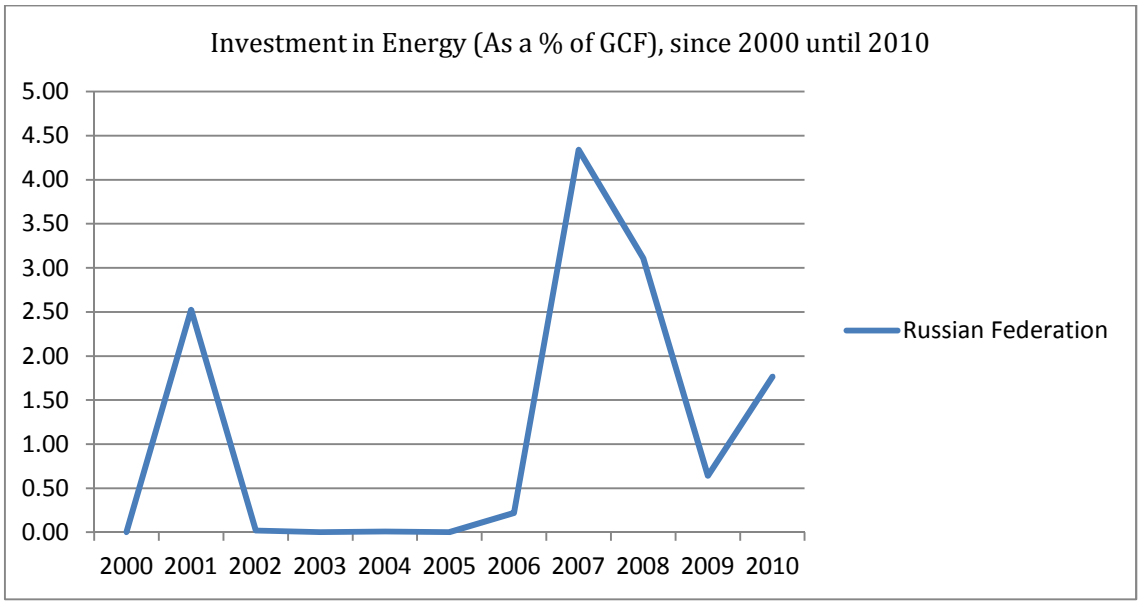

Figure 4.106: Investment in Energy with private participation (As a % of GCF) in Russian Federation

After 2005 this variable increased significantly until 2007. The highest value for this indicator is 4.34 which happened in 2007 but after 2007 this variable shows a downward trend until 2009.

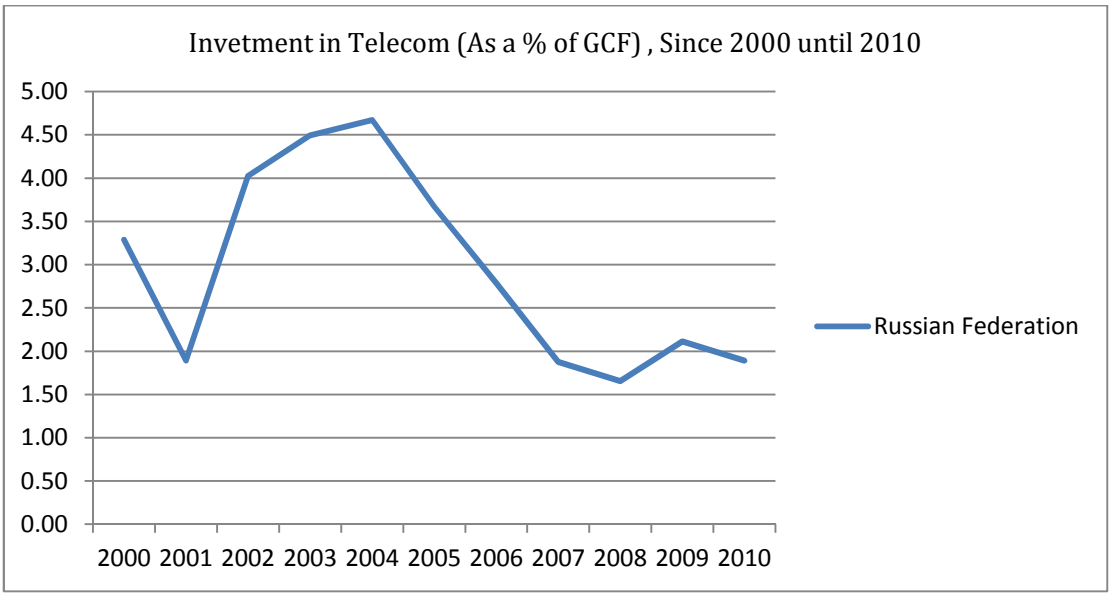

Figure 4.107: Investment in Telecoms with private participation (As a % of GCF) in Russian Federation

The maximum value for investment in telecom is 4.67 which happened in 2004 and the minimum value is related to 2008 which is equal to 1.65. This variable shows fluctuation during this period.

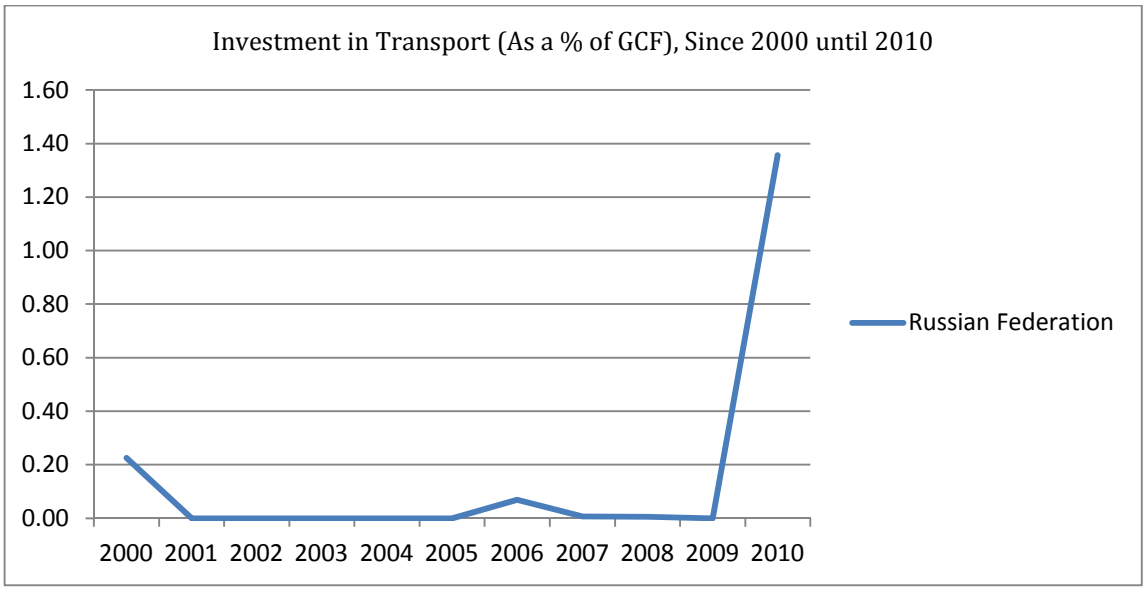

Figure 4.108: Investment in Transport with private participation (As a % of GCF) in Russian Federation

The values for this certain variable are not recorded in many years during this period, but it should be mentioned that the highest value among for this available data is 1.36 which related to 2010.

4.13 Turkey

According to IMF Turkey is a developing and newly industrialized country. The growth of GDP is widely depends on the production and export of the agricultural products, ship and other transportation equipments, textiles and construction materials and motor vehicles. Although the government has a leading role in banking, transport, industry and communication but reforms toward private ownership is processed rapidly.

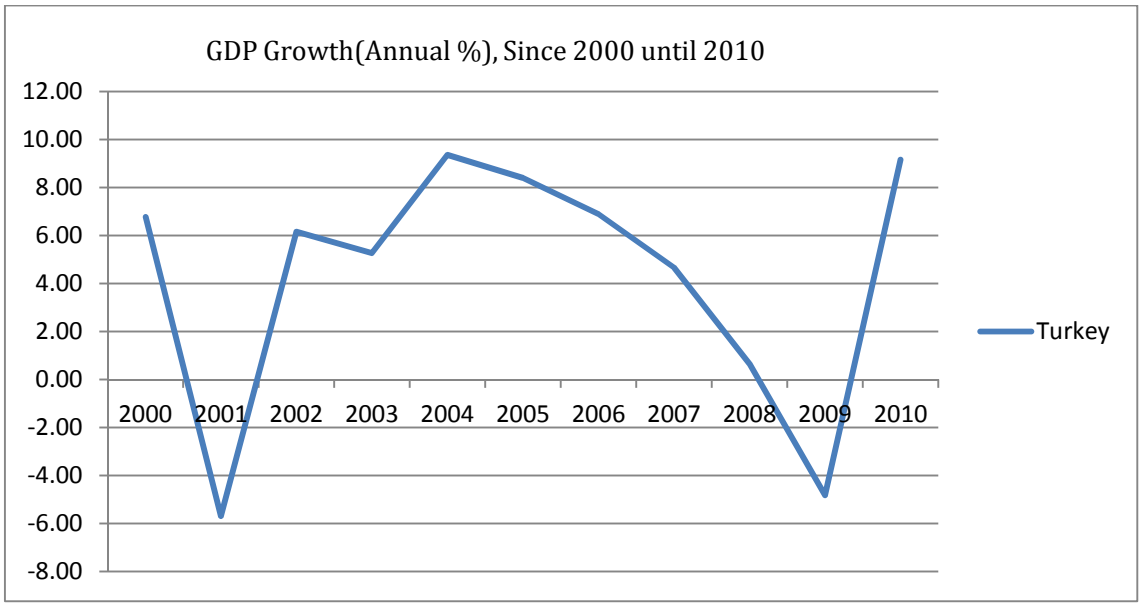

Figure 4.109: GDP Growth (Annual %) in Turkey

This variable shows a lot of fluctuation during this period. This variable shows an upward trend between 2001 and 2004 and reached its highest point in 2004 but after this year decreased sharply. The minimum value for this variable is -5.70 which is related to 2001.

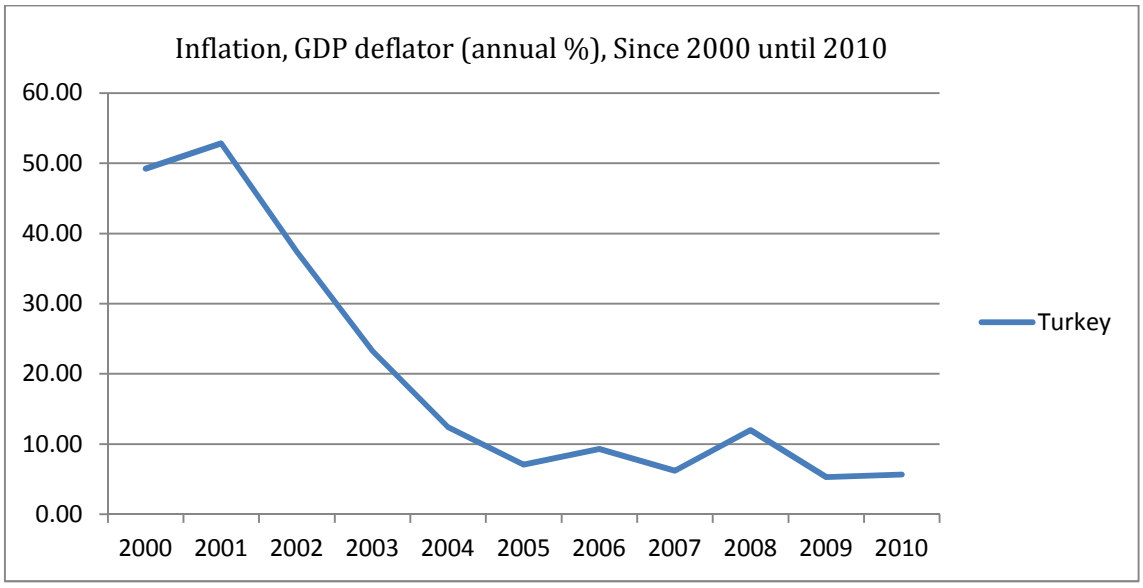

Figure 4.110: Inflation, GDP deflator (annual %) in Turkey

The highest value for this variable is 52.85 which happened in 2001. After this year this variable decreased significantly until 2005. This variable touched its lowest point in 2009 which is equal to 5.29.

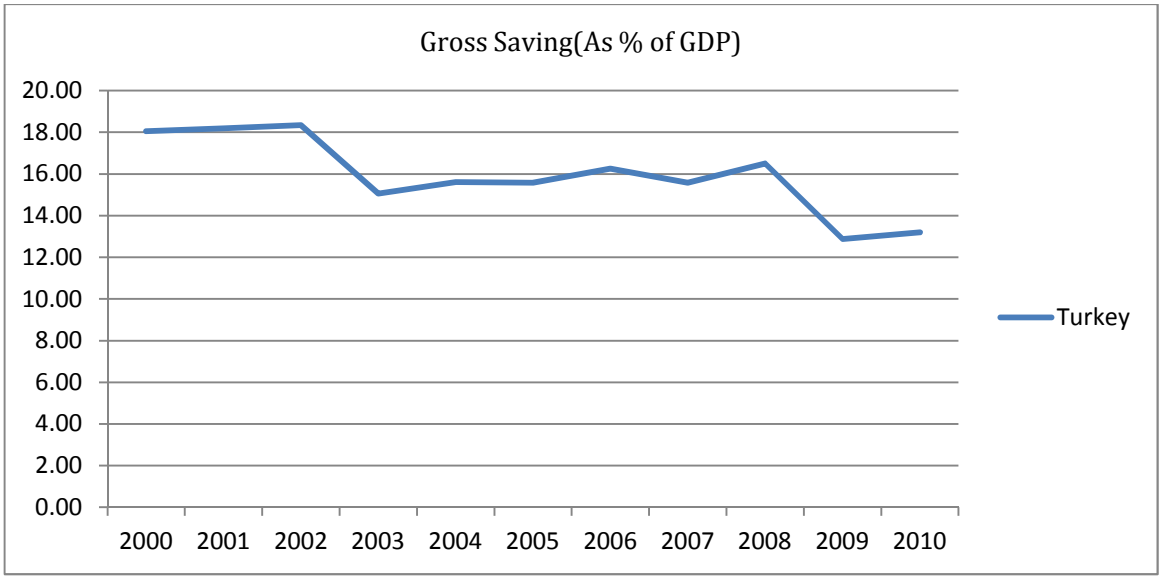

Figure 4.111: Gross Saving (As % of GDP) in Turkey

The maximum value for this variable is 18.34 which happened in 2002 and the minimum value is 12.88 which happened in 2009. This certain variable does not show too much variation during this period.

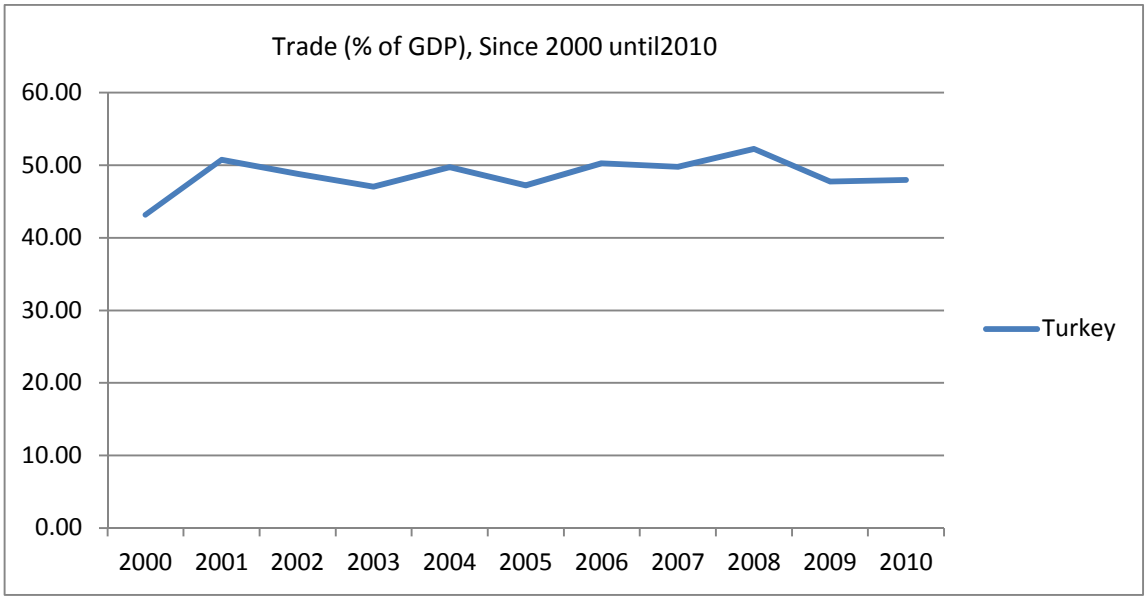

Figure 4.112: Trade (% of GDP) in Turkey

This variable does not fluctuate too much during this period. The maximum value is 52.25 which happened in 2008 and the lowest value happened in 2000 which is equal to 43.19.

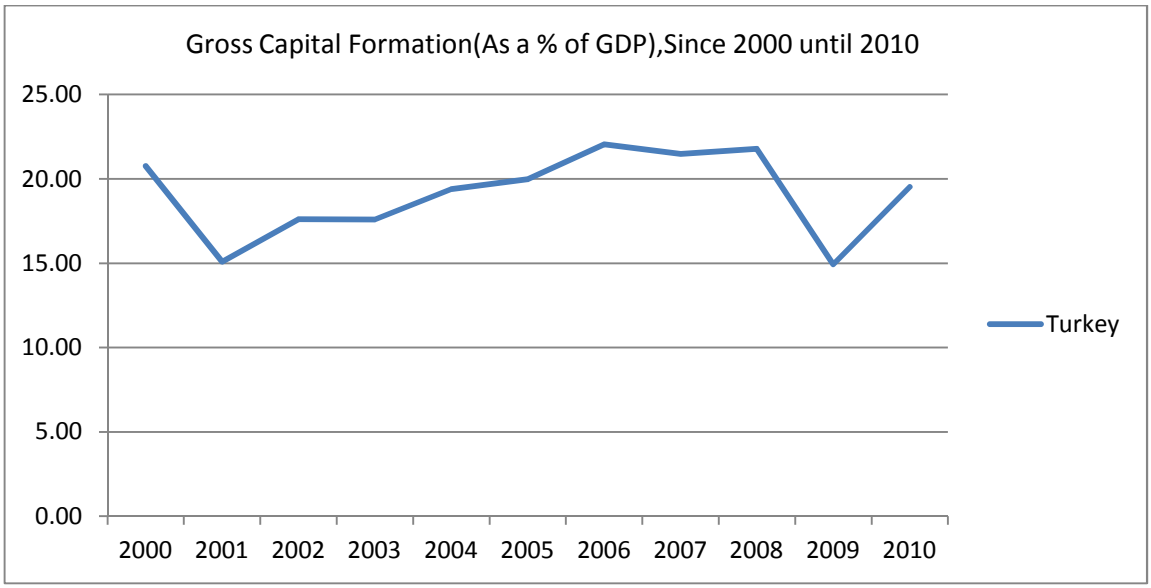

Figure 4.113: Gross Capital Formation (As a % of GDP) in Turkey

This variable shows an upward trend between 2001 and 2008. The highest value is 22.05 which happened in 2006 and the lowest value is 14.94 which happened in 2009.

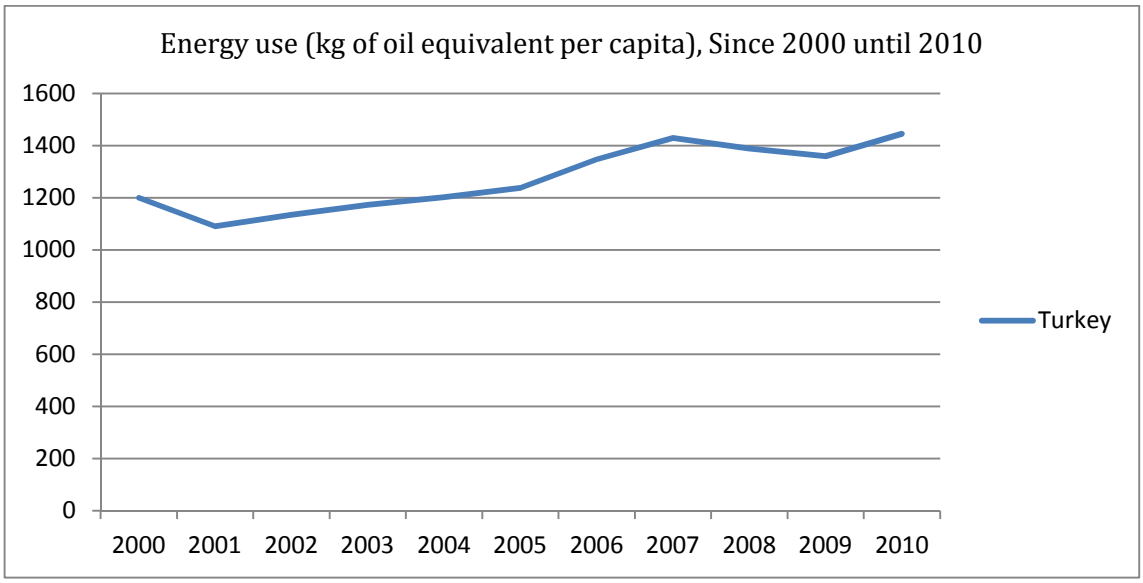

Figure 4.114: Energy use (kg of oil equivalent per capita) in Turkey

The general trend for this variable is an upward trend, the maximum value happened in the last year of this period and the minimum value happened in 2001. This certain variable does not show too much variation during this period.

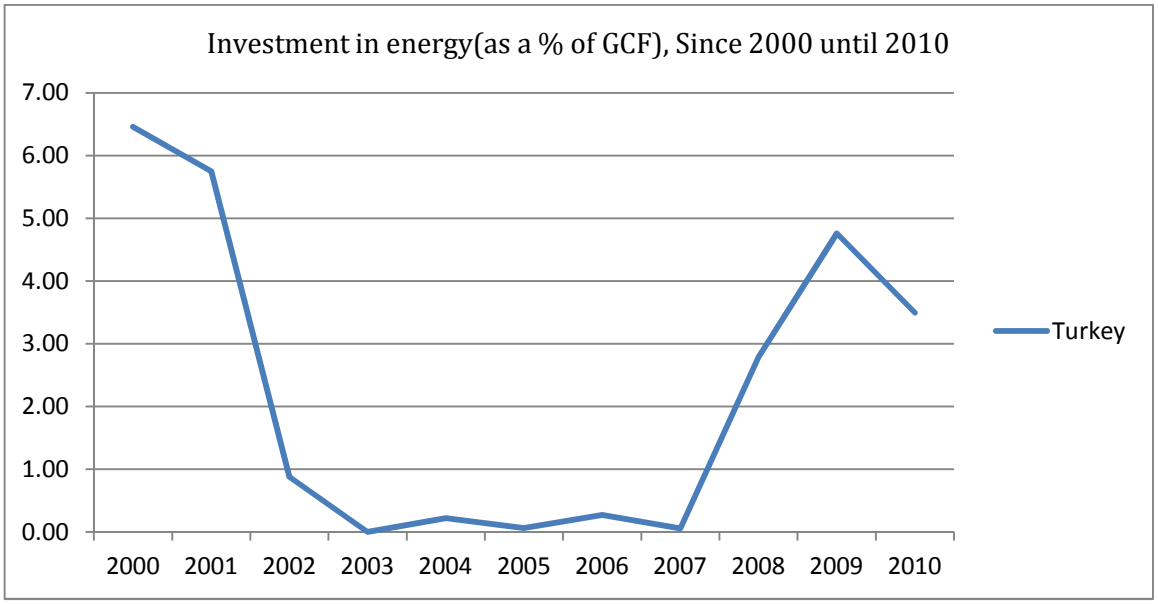

Figure 4.115: Investment in Energy with private participation (As a % of GCF) in Turkey

By looking on this graph, it can be mentioned that the maximum value for this variable happened in the first year of this period. After 2000 this variable decreased significantly and got its lowest amount. The values for this indicator are not available in certain years and because of that this graph shows zero value in these years.

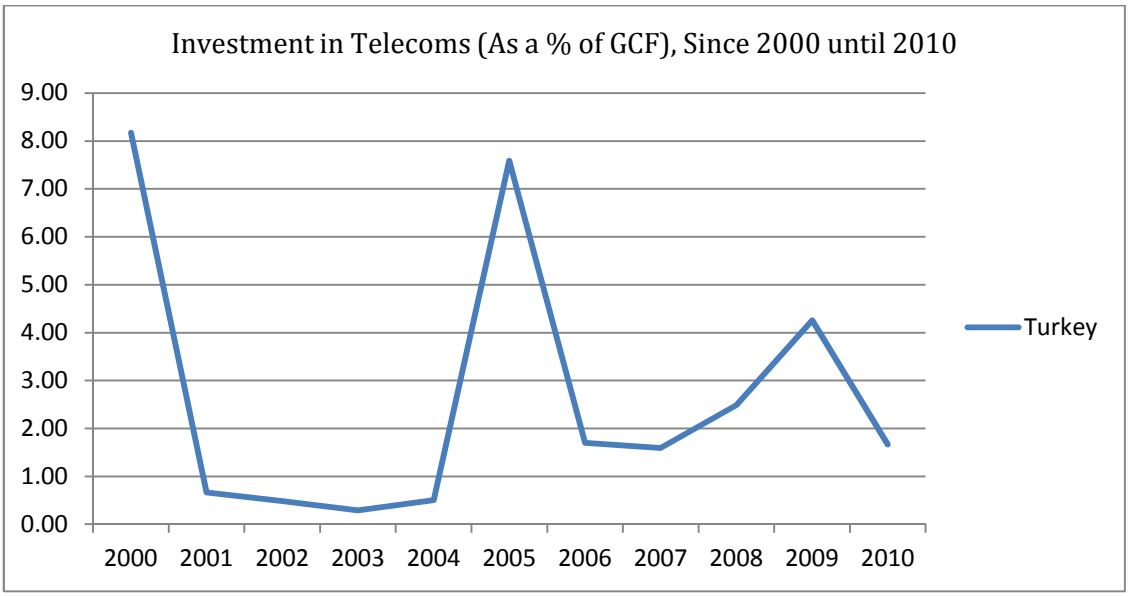

Figure 4.116: Investment in Telecoms with private participation (As a % of GCF) in Turkey

The maximum value for this certain variable happened at the beginning of this period, after 2000 this variable decreased significantly and touched its lowest amount in 2003, another rise can be observed in 2005.

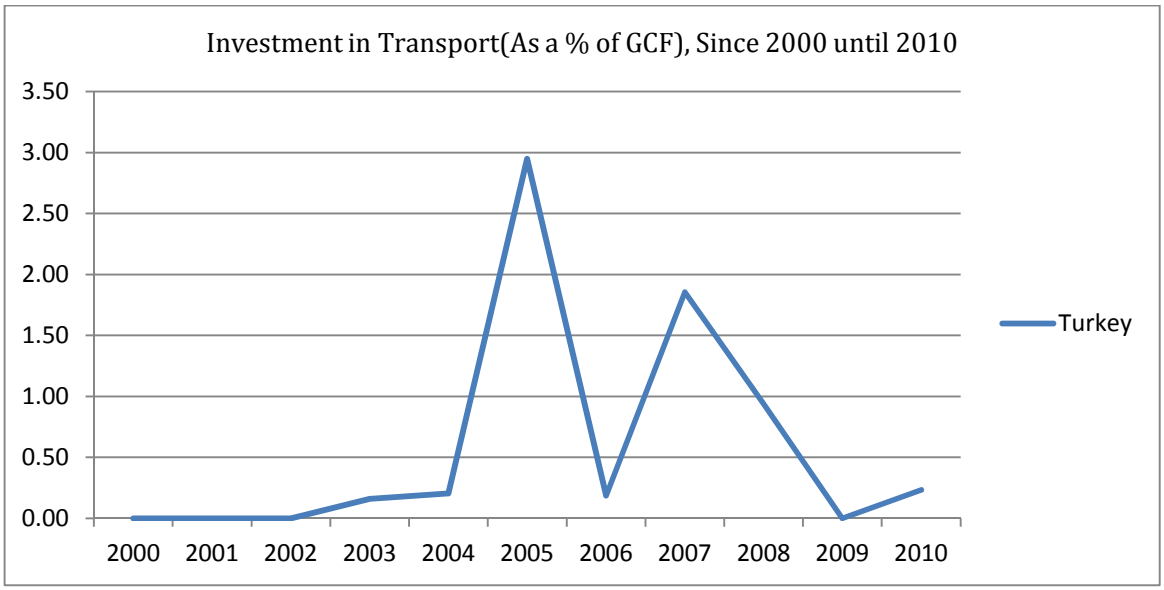

Figure 4.117: Investment in Transport with private participation (As a % of GCF) in Turkey

By looking on this graph it is obvious that the maximum value for this indicator happened in 2005, after this year this variable decrease and shows a little fluctuation up to end of this period.

Chapter 5

RESULTS

5.1 Regression Results

In this chapter the needed data for thirteen countries (Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Russian Federation and Turkey) have been set in Excel program. This table's data includes Energy use (kg of oil equivalent per capita), share of gross saving in GDP, share of trade in GDP, Gross capital formation (as a % of GDP), Inflation GDP deflator (annual %), GDP growth (annual %), Investment in Energy with private participation (as % of GCF), Investment in Transport with private participation (as % of GCF) and Investment in Telecoms with private participation (as % of GCF) since 2000 until 2010.

In order to find the relation among the data, the excel table is very useful which in turn the data can also be applied in other applications such as EVIEWS.

The outcome of this application is the regression formula and the method used in this study is fixed effect method which is one of the approaches in panel data analysis.

The aim of individual regression analysis is verifying that the independent variable have a significant effect on the dependent variables and to understand the correlation among them.

EVIEWS sets probability and T-statistic. Therefore we have to use T-statistic or probability for finding out the level of significance for each independent variable.

Another important factor as outcome of EVIEWS is Coefficient which presents the measure of effect of independent variable on dependent variable. If coefficient is negative, independent variable will have negative effect on relative variable, but whenever the coefficient is positive, independent variable has positive influence on dependent variable.

For α=90% confidence level of tabular value for t is 1.711 and for α= 95% confidence level of tabular value of t is 2.064. If the observed t-statistics are below -2.064 or above 2.064 at α= 95% the variables are significant. Also for α=90% when the observed t-statistics is below -1.711 or above 1.711 the variables are significant.

1- R= F(LOG(E), I,IN,TO)
2- GR= F(S,INE,IN,TO)
3- GR= F(S,INTE,IN,TO)
4- GR= F(S,INTR,IN,TO)
5- GR= F(S,(INE+INTE+INTR),IN,TO)
6- GR= F(IN,I,TO)
7- GR= F(IN,S,TO)

Where:

- GR= GDP growth (annual %)
- E= Energy use (kg of oil per capita)
- I= share of gross capital formation in GDP
- S= share of gross saving in GDP
- IN= Inflation, GDP deflator (annual %)
- TO=share of trade in GDP
- INE= Investment in energy with private participation (% of GCF),
- INTR= Investment in transport with private participation (% of GCF)
- INTE=Investment in telecoms with private participation (% of GCF)

In this study t-statistic will be illustrated in parenthesis under it:

- Whenever the coefficient is significant at 10%, the t-value is marked with one star (t-value)*.
- Whenever the coefficient is significant at 5%, the t-value is marked with two stars (t-value) **.
- Whenever the coefficient is significant at 1%, the t-value is marked with three stars (t-values) ***.

5.2. Case 1: The effect of Energy use (kg of oil per capita), share of gross capital formation in GDP, Inflation GDP deflator (annual %) and Share of trade in GDP on GDP growth (annual %).

Equation is:

GR= -2.46 - 0.41 log (E) + 0.28(I) + 0.07(IN) + 0.05(TO)

(- 0.16) (-0.17) (3.71)*** (1.73)* (2.32) **

R-squared= 0.54

All independent variables have positive relationship to GDP growth (annual %) except the energy use which affects the GDP growth (annual %) negatively. The equation presents that 1% increase in share of gross capital formation in GDP shows 0.28 % increase in GDP growth, 1% increase in Inflation, GDP deflator (annual %) leads to 0.07% increase in GDP growth, 1% gain in share of trade in GDP leads to 0.05% increase in GDP growth (annual %) and 1% increase in Logarithm of energy use shows 0.41% decrease in GDP growth (annual %).

In this case energy use is insignificant.

R-squared presents that variation in independent statistic describes for 54% variation in GDP growth.

5.3. Case 2: The effect of share of gross saving in GDP, Investment in Energy with private participation (% of GCF), Inflation, GDP deflator (annual %) and Share of trade in GDP on the GDP growth (annual %).

Equation is:

GR= -4.84 + 0.26(S) – 0.14 (INE) + 0.03(IN) + 0.05(TO)

(-2.785) (5.00)*** (1.63) (0.79) (2.35) **

R-squared= 0.54

Share of gross saving in GDP, Inflation, GDP deflator (annual %) and Share of trade in GDP have positive relationship with GDP growth (annual %) while investment in energy has a negative effect with GDP growth (annual %).

The equation shows that 1% increase in share of gross saving causes 0.26% rise in GDP, 1% rise in investment in energy leads to 0.14% decrease on GDP growth, 1% gain in Inflation results 0.03% increase in GDP growth and 1% increase in share of trade leads to 0.05% rise in GDP growth (annual %).

Investment in energy and inflation are insignificant. By looking more precisely in R-squared, it presents that variation in independent statistic explains 54% variation in GDP growth rate.

5.4. Case 3: The effect of share of gross saving in GDP, Investment in Telecoms with private participation (% of GCF), Inflation, GDP deflator (annual %) and trade (as % of GDP) on GDP growth (annual %).

Equation is:

GR= - 5.06 + 0.26 (S) - 0.13 (INTE) + 0.02 (IN) + 0.06 (TO)

(-2.84) (4.64)*** (-1.00) (0.68) (2.73) ***

R-squared= 0.54

Share of gross saving in GDP, inflation and share of trade in GDP are correlated positively to GDP growth (annual %) while investment in telecom (% of GCF) is correlated negatively to GDP growth (annual %).

1% increase in gross saving leads to 0.26% rise in GDP growth, 1% increase in trade results 0.06% increase in GDP growth (annual %), 1% increase in investment in telecom results 0.13% decrease in GDP growth and 1% increase in inflation shows 0.02% increase in GDP growth (annual%).

Investment in telecom and inflation are insignificant.

R-squared in this case illustrate that variation in independent statistics accounts for 54% variation in GDP growth.

5.5. Case 4: The effect of Gross saving (% of GDP), share of investment in transport with private participation in GCF, Inflation, GDP deflator (annual %) and Share of trade in GDP on GDP growth (annual %).

Equation is:

GR= -5.52 + 0.27 (S) + 0.03 (INTR) + 0.03 (IN) + 0.05 (TO)

(-3.20) (5.07)*** (0.28) (0.72) (2.57) **

R-squared = 0.53

All independent variables are positively correlated to GDP growth (annual %). 1% increase in gross saving (% of GDP) and share of trade in GDP separately lead to 0.27 %, and 0.05 % increase in GDP growth (annual %).

1% increase in investment in transport causes 0.03% rise in GDP growth and 1% increase in inflation 0.03% gain in GDP growth(annual %).

Share of Investment in transport in GCF and inflation are insignificant. By looking more accurately in R-Squared it can be said variation in independent statistic illustrates for 53% variation in GDP growth.

5.6. Case 5: The effect of share of gross saving in GDP, Investment in Energy with private participation (% of GCF), Investment in Telecom with private participation (% of GCF), Investment in Transport with private participation (% of GCF), Inflation, GDP deflator (annual %) and Share of trade in GDP on GDP growth (annual %).

Equation is:

GR= - 4.86 + 0.26(S) - 0.08 (INE+INTE+INTR) + 0.03(IN) + 0.05(TO)

(-2.74) (4.87)*** (-1.41) (0.76) (2.56) **

R-squared= 0.54

In this case Gross saving (% of GDP), Inflation, GDP deflator (annual %) and Trade (% of GDP) have correlated positively to GDP growth (annual %), However the summation of three variables (INE+INTE+INTR) have negative effect on GDP growth (annual %).

1% increase in share of gross saving in GDP causes 0.26% gain in GDP growth, 1% increase in share of trade in GDP leads to 0.05% increase in GDP growth (annual %). 1% rise in inflation results 0.03% gain in GDP growth and 1% in summation of these variable(INE+INTE+INTR) leads to 0.08% decrease in GDP growth (annual %). The summation of these variables (INE+INTE+INTR) and Inflation, GDP deflator (annual %) are insignificant. By looking more accurately in R-Squared it can be said variation in independent statistic illustrates for 54% variation in GDP growth.

5.7. Case 6: The effect of Inflation GDP deflator (annual %), share of gross capital formation in GDP, Share of trade in GDP on GDP growth (annual %).

Equation is:

GR= -5.18 +0.07(IN) + 0.28(I) +0.05(T0)

(-2.91) (1.79)* (4.75) *** (2.30) **

R-squared= 0.53

In this equation, Inflation, Gross capital formation (% of GDP) and share of trade in GDP have positive effect with GDP growth (annual %).1% increase in Inflation leads to 0.07% increase in GDP growth (annual %). 1% rise in share of gross capital formation in GDP shows 0.28% increase in GDP growth and 1% rise in trade leads to 0.05 % increase in GDP growth (annual%). By looking more accurately in R-Squared it can be said variation in independent statistic illustrates for 53% variation in GDP growth.

5.8. Case 7: The effect of Inflation GDP deflator (annual %), share of gross capital formation in GDP, Share of trade in GDP on GDP growth (annual %). In this case when the time is increased from 1988 until 2011, the result will change:

Equation is:

GR= -1.17 – 0.002(IN) + 0.30(I) -0.02 (TO)

(-1.02) (-4.01) *** (7.07) *** (-1.62)

R-squared= 0.44

Inflation and share of trade in GDP have negative effect with GDP growth (annual %). But share of gross capital formation in GDP still has positive effect with GDP growth (annual %).

1% increase in Inflation, GDP deflator (annual %) leads to 0.002% decrease in GDP growth (annual %) and 1% increase in gross capital formation (% of GDP) results 0.30% increase in GDP growth (annual %) and 1% rise in share of trade in GDP leads to 0.02% decrease in GDP growth (annual %).

Share of trade in GDP is not significant. By looking more accurately in R-Squared it can be said variation in independent statistic illustrates for 44% variation in GDP growth.

5.9. Case 8: The effect of Inflation, GDP deflator (annual %), Gross saving (as a % of GDP), Share of trade in GDP on GDP growth (annual %).

Equation is:

GR= -5.54 +0.03 (IN) + 0.27 (S) +0.05(T0)

(-3.22) (0.74) (5.10) *** (2.59) **

R-squared= 0.52

In this case the all independent variables have positive effect with the GDP growth (annual %). 1% increase in gross saving (% of GDP) results 0.27% increase in GDP

growth (annual %) and 1% increase in share of trade in GDP leads to 0.05% increase in GDP growth (annual %) and 1 % rise in inflation causes 0.03% increase in GDP growth. Inflation is not significant.

R-squared presents that variation in independent statistic describes for 52% variation in GDP growth.

5.10. Case 9: The effect of Inflation, GDP deflator (annual %), Gross saving (as a % of GDP), Share of trade in GDP on GDP growth (annual %). In this case when the time is increased from 1988 until 2011, the result will change:

Equation is:

GR= 0.05 – 0.002(IN) + 0.29(S) -0.04 (TO)

(0.04) (-4.40) *** (5.88) *** (-2.29) **

R-squared= 0.41

Despite the previous result, inflation and share of trade in GDP have negative effect on GDP growth (annual %) but share of gross saving in GDP has positive effect on GDP growth (annual %).1% increase in inflation decreases GDP growth by 0.002%. 1% increase in share of gross saving in GDP leads to 0.29% increase in GDP growth (annual %).1% increase in trade (% of GDP) leads to 0.04% decrease in GDP growth (annual %).

R-squared shows that variation in independent statistic describes for 41% variation in GDP growth.

5.11 Addition Note:

By looking on the correlation matrix it can be seen that there is a correlation between two variables named gross capital formation (% of GDP) and gross saving (% of GDP). The percentage of the correlation is around 81%. Despite of existing correlation between these variables but these variables are not used in any cases simultaneously. The matrix present in appendix B.

Chapter 6

CONCLUSIONS

Regression results in this study show that share of gross capital formation in GDP have positive effect on GDP growth (annual %) in all the selected case. In addition it should be mentioned that this variable has a significant effect on GDP growth (annual %) in the group of countries which are selected on emerging countries.

Another variable which should be presented in this chapter is Inflation, GDP deflator (annual %) which has a positive effect in all equation except case 7 and case 9. On the other hand it is positively significant in cases 1 and 6 and negatively significant in cases 7 and 9. In all other cases it is not significant.

Regression result illustrate that share of trade in GDP has positive effect on GDP growth (annual %) except case 7 and case 9 which have negative effects on GDP growth. It means that by reducing tariffs or decreasing export subsidies and reducing import quotas and sometimes dropping this barriers in trade, the amount of GDP growth (annual %) will increase. Also this item is significant in all cases except of case 7.

Another variable which has a positive effect on GDP growth (annual %) is share of gross saving in GDP in all these cases. This certain variable presents a positive relationship

with GDP growth (annual percent) and it should be noticed that gross saving is significant in all these cases.

The next variable is energy use (kg of oil equivalent per capita) which has a negative effect on GDP growth (annual %) and it is not significant. Other variables which have a negative effect on GDP growth (annual %) are share of investment in energy with private participation in GCF and share of investment in telecoms with private participation in GCF. It means when (INE) or (INTE) increased, the GDP growth (annual %) decreased, but like energy use (kg of oil equivalent per capita) the effect of this variables are not significant in any of these assumptions.

The last variable is Investment in Transport with private participation (% of GCF) which is illustrates positive effect on GDP growth (annual %) but this positive effect is not significant in this study.

In this study we mentioned the relationship between independents variable and dependent variable, although the results can't definitely explain whether the increase or decrease in share of investment in transport over total investment yields to increase or decrease of GDP growth (annual %), and this is basically the consequent of the lack of data as the data in this evaluation only belongs to the years 2000 to 2010. These results are in the opposite direction of most experimental achievements but they are theoretically correct that can be considered as an exception. These achievements can also be applied to in Telecom and Energy Investments.

In future work, by using more completed data resources and applying them in specified equations, it is possible to achieve more valuable policies for investment rate in these infrastructures. These new policies can yield to increase the total GDP growth rate.

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APPENDICES

Appendix A:

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/27/13 Time: 11:43
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.465725	15.75039	-0.156550	0.8758
LOG(E)	-0.411129	2.395969	-0.171592	0.8640
I	0.279515	0.075426	3.705795	0.0003
IN	0.065120	0.037658	1.729227	0.0862
TO	0.051917	0.022344	2.323584	0.0217

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.543094	Mean dependent var	6.788387
Adjusted R-squared	0.485074	S.D. dependent var	5.108524
S.E. of regression	2.945044	Sum squared resid	1092.833
F-statistic	9.360483	Durbin-Watson stat	1.933375
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.392682	Mean dependent var	5.048480
Sum squared resid	1250.032	Durbin-Watson stat	1.881613

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C LOG(E) I IN TO

Estimation Equation:
==========
GR = C(1) + C(2)*LOG(E) + C(3)*I + C(4)*IN + C(5)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -2.46572545067 - 0.411128899162*LOG(E) + 0.279514942828*I + 0.0651199153891*IN + 0.0519174127883*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/30/13 Time: 17:53
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.843952	1.745316	-2.775401	0.0064
S	0.264619	0.052882	5.003936	0.0000
INE/GCF	-0.136418	0.083815	-1.627614	0.1061
IN	0.030243	0.038262	0.790404	0.4308
TO	0.050479	0.021501	2.347784	0.0204

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.540108	Mean dependent var	6.877430
Adjusted R-squared	0.481709	S.D. dependent var	4.944722
S.E. of regression	2.948870	Sum squared resid	1095.675
F-statistic	9.248599	Durbin-Watson stat	2.151116
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.403549	Mean dependent var	5.048480
Sum squared resid	1227.664	Durbin-Watson stat	2.042180

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C S INE/GCF IN TO

Estimation Equation:
==========
GR = C(1) + C(2)*S + C(3)*INE/GCF + C(4)*IN + C(5)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -4.84395192313 + 0.264619194109*S - 0.136417633534*INE/GCF + 0.0302425213409*IN + 0.0504792580805*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 05/07/13 Time: 23:21
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.063221	1.782012	-2.841295	0.0052
S	0.258159	0.055671	4.637269	0.0000
INTE/GCF	-0.130063	0.129653	-1.003162	0.3177
IN	0.026501	0.039059	0.678501	0.4987
TO	0.057992	0.021252	2.728728	0.0073

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.536027	Mean dependent var	6.891494
Adjusted R-squared	0.477110	S.D. dependent var	4.965202
S.E. of regression	2.970957	Sum squared resid	1112.150
F-statistic	9.097963	Durbin-Watson stat	2.171202
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.399577	Mean dependent var	5.048480
Sum squared resid	1235.841	Durbin-Watson stat	2.043793

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C S INTE/GCF IN TO

Estimation Equation:
==========
GR = C(1) + C(2)*S + C(3)*INTE/GCF + C(4)*IN + C(5)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -5.06322093791 + 0.25815922279*S - 0.130062974281*INTE/GCF + 0.0265012939749*IN + 0.0579918116734*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 05/07/13 Time: 23:44
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.519986	1.725299	-3.199438	0.0017
S	0.271714	0.053639	5.065613	0.0000
INTR/GCF	0.028975	0.104834	0.276389	0.7827
IN	0.027797	0.038758	0.717201	0.4746
TO	0.054250	0.021120	2.568580	0.0114

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.525609	Mean dependent var	6.865245
Adjusted R-squared	0.465369	S.D. dependent var	4.898431
S.E. of regression	2.973539	Sum squared resid	1114.084
F-statistic	8.725228	Durbin-Watson stat	2.185454
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.393093	Mean dependent var	5.048480
Sum squared resid	1249.185	Durbin-Watson stat	2.048617

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C S INTR/GCF IN TO

Estimation Equation:
==========
GR = C(1) + C(2)*S + C(3)*INTR/GCF + C(4)*IN + C(5)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -5.51998602385 + 0.271714155749*S + 0.0289750827121*INTR/GCF + 0.027797235594*IN + 0.0542496264398*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/30/13 Time: 17:55
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.861734	1.776653	-2.736457	0.0071
S	0.262723	0.053940	4.870645	0.0000
(INE+INTE+INTR)/GCF	-0.076880	0.054372	-1.413972	0.1598
IN	0.030199	0.039764	0.759457	0.4490
TO	0.053889	0.021027	2.562824	0.0116

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.537469	Mean dependent var	6.886072
Adjusted R-squared	0.478735	S.D. dependent var	4.973998
S.E. of regression	2.963363	Sum squared resid	1106.472
F-statistic	9.150876	Durbin-Watson stat	2.147480
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.401182	Mean dependent var	5.048480
Sum squared resid	1232.536	Durbin-Watson stat	2.031287

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C S (INE+INTE+INTR)/GCF IN TO

Estimation Equation:
==========
GR = C(1) + C(2)*S + C(3)*(INE+INTE+INTR)/GCF + C(4)*IN + C(5)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -4.86173356548 + 0.262723144462*S - 0.0768798560404*(INE+INTE+INTR)/GCF + 0.0301991941893*IN + 0.0538888060454*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/27/13 Time: 11:53
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.176171	1.776755	-2.913272	0.0042
IN	0.066150	0.036983	1.788650	0.0761
I	0.275731	0.058070	4.748277	0.0000
TO	0.050303	0.021859	2.301246	0.0230

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.526994	Mean dependent var	6.818891
Adjusted R-squared	0.471128	S.D. dependent var	5.080089
S.E. of regression	2.950165	Sum squared resid	1105.341
F-statistic	9.433053	Durbin-Watson stat	1.940597
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.392523	Mean dependent var	5.048480
Sum squared resid	1250.359	Durbin-Watson stat	1.880080

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C IN I TO

Estimation Equation:
==========
GR = C(1) + C(2)*IN + C(3)*I + C(4)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -5.17617087159 + 0.0661504500768*IN + 0.275731426574*I + 0.0503026075718*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/27/13 Time: 11:53
Sample: 2000 2010
Periods included: 11
Cross-sections included: 13
Total panel (balanced) observations: 143
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.535832	1.716862	-3.224390	0.0016
IN	0.028440	0.038619	0.736428	0.4628
S	0.273045	0.053545	5.099377	0.0000
TO	0.054331	0.020978	2.589874	0.0107

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.524322	Mean dependent var	6.860407
Adjusted R-squared	0.468140	S.D. dependent var	4.899651
S.E. of regression	2.964503	Sum squared resid	1116.112
F-statistic	9.332499	Durbin-Watson stat	2.184592
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.392526	Mean dependent var	5.048480
Sum squared resid	1250.353	Durbin-Watson stat	2.044364

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C IN S TO

Estimation Equation:
==========
GR = C(1) + C(2)*IN + C(3)*S + C(4)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -5.53583190636 + 0.0284400377893*IN + 0.273045468317*S + 0.0543306844916*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/27/13 Time: 11:55
Sample: 1988 2011
Periods included: 24
Cross-sections included: 13
Total panel (unbalanced) observations: 310
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.172442	1.150698	-1.018897	0.3091
IN	-0.001926	0.000480	-4.013679	0.0001
I	0.295330	0.041797	7.065762	0.0000
TO	-0.023006	0.014189	-1.621353	0.1060

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.437496	Mean dependent var	6.131215
Adjusted R-squared	0.408797	S.D. dependent var	5.909415
S.E. of regression	3.943583	Sum squared resid	4572.242
F-statistic	15.24419	Durbin-Watson stat	1.539424
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.323300	Mean dependent var	4.523073
Sum squared resid	4680.438	Durbin-Watson stat	1.279967

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR IN I TO

Estimation Equation:
==========
GR = C(1) + C(2)*IN + C(3)*I + C(4)*TO + [CX=F]

Substituted Coefficients:
==========
GR = -1.17244235703 - 0.00192615663264*IN + 0.295330133876*I - 0.0230058919436*TO + [CX=F]

Dependent Variable: GR
Method: Panel EGLS (Cross-section weights)
Date: 04/27/13 Time: 11:55
Sample: 1988 2011
Periods included: 24
Cross-sections included: 13
Total panel (unbalanced) observations: 304
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.047241	1.112388	0.042468	0.9662
IN	-0.002003	0.000455	-4.398795	0.0000
S	0.290824	0.049493	5.876045	0.0000
TO	-0.039346	0.017181	-2.290096	0.0227

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.409034	Mean dependent var	5.852459
Adjusted R-squared	0.378254	S.D. dependent var	5.473382
S.E. of regression	3.831323	Sum squared resid	4227.563
F-statistic	13.28916	Durbin-Watson stat	1.598013

Unweighted Statistics

R-squared	0.317708	Mean dependent var	4.672878
Sum squared resid	4241.737	Durbin-Watson stat	1.516010

Estimation Command:
==========
LS(CX=F,WGT=CXDIAG) GR C IN S TO

Estimation Equation:
==========
GR = C(1) + C(2)*IN + C(3)*S + C(4)*TO + [CX=F]

Substituted Coefficients:
==========
GR = 0.0472405875318 - 0.00200331819888*IN + 0.290823997529*S - 0.039345987978*TO + [CX=F]

Appendix B:

Correlation Matrix; since 2000 up to 2010

	GR	E	I	S	IN	TO	INE/GCF	INTE/GCF	INTR/GCF
GR	1.000000	-0.006523	0.550687	0.512109	-0.048206	0.062747	-0.188341	-0.255257	-0.006637
E	-0.006523	1.000000	-0.067880	0.253832	0.246028	0.245600	-0.149909	-0.044004	-0.079494
I	0.550687	-0.067880	1.000000	0.816702	-0.228698	0.051695	-0.247387	-0.410958	-0.054168
S	0.512109	0.253832	0.816702	1.000000	-0.120635	0.420693	-0.161631	-0.374066	-0.076214
IN	-0.048206	0.246028	-0.228698	-0.120635	1.000000	-0.135632	-0.008656	0.097650	-0.105777
TO	0.062747	0.245600	0.051695	0.420693	-0.135632	1.000000	0.070560	-0.113561	0.144796
INE/GCF	-0.188341	-0.149909	-0.247387	-0.161631	-0.008656	0.070560	1.000000	0.316214	0.049147
INTE/GCF	-0.255257	-0.044004	-0.410958	-0.374066	0.097650	-0.113561	0.316214	1.000000	0.027612
INTR/GCF	-0.006637	-0.079494	-0.054168	-0.076214	-0.105777	0.144796	0.049147	0.027612	1.000000

Correlation matrix; since 1988 up to 2011

	GR	IN	I	S	TO
GR	1.000000	-0.295619	0.504451	0.439340	0.112228
IN	-0.295619	1.000000	-0.134253	-0.135450	-0.141776
I	0.504451	-0.134253	1.000000	0.803001	0.215725
S	0.439340	-0.135450	0.803001	1.000000	0.437755
TO	0.112228	-0.141776	0.215725	0.437755	1.000000