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**Diploma Thesis**

**Effect of inflation on economic growth in Vietnam**

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## **Declaration**

I hereby declare that I have worked out my diploma thesis titled “Effect of inflation to economic growth in Vietnam” myself and all of the sources use in this work are listed at the end of the thesis.

In Prague .....

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Pham Thi Bich Trang

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## **Abstract**

Over the past centuries, the relationship between inflation and economic performance has attracted much attention of the public and especially of economists. But up to now it is still a controversial topic in both theoretical and experimental results. The thesis “Effect of inflation on economic growth in Vietnam” aims to investigate the short run and long run dynamics of the inflation and economic growth relationship in the context of Vietnam. Besides, it also seeks to understand the attitude and concern of people toward inflation. The data used for this study were mostly taken from the official statistics such as GSO, ADB, IMF and WB. In order to meet the objective, the study adopted co-integration, vector error correction and vector autoregressive models using quarterly data cover the period of 1995:1-2012:4 that are described in quantitative terms of CPI and real GDP. The empirical results found that there was a negative short run relationship between inflation and economic growth. Further, this relationship was positive in the long run. In addition, inflation affects growth more than the reverse effect of growth on inflation that suggests inflation is also affected by many other factors, especially the fluctuations in the short term. On the other hand, according to the specific objective of the thesis, it was important to understand what local people think about inflation, its causes and why they are so concerned with the increase in price level and/or decline in value of money. A questionnaire survey was prepared and carried out in the capital city of Hanoi and Ho Chi Minh city in the southern region of Vietnam. The respondents were selected with the differences between young and old generation and among their high, middle and low income. The outcome of the questionnaire gathering clearly showed that the inflation consequences have no strong impact on the high-income class while the lower class is more sensitive to inflation.

**Key words:** inflation, economic growth, living standard, Vietnam, Hanoi city, Ho Chi Minh city.

## **Abstrakt**

V průběhu minulých staletí, vztah mezi inflací a ekonomickou výkonností přitahoval hodně pozornosti ze strany veřejnosti a hlavně ekonomů. Dodnes je to stále kontroverzní téma jak z hlediska teoretických tak i experimentálních výsledků. Diplomová práce "Vliv inflace na hospodářský růst ve Vietnamu" si klade za cíl prozkoumat v krátkodobém horizontu a dlouhodobém horizontu dynamiku vztahu inflace a ekonomického růstu ve Vietnamu.

Kromě toho se také snaží pochopit postoje a obavy lidí vůči inflaci. Data, která byla použita v této studii byla většinou převzata z oficiálních statistických zdrojů, jako jsou GSO, ADB, IMF a WB. Za účelem dosažení cíle, v této studii byla použita kointegrace, vektorová korekce chyb a vektorové autoregresní modely s použitím čtvrtletních dat, která se vztahují k období 1995:1-2012:4, které je popsáno kvantitativně v rámci Indexu spotřebitelských cen a reálného Hrubého domácího produktu. Na základě empirických výsledků byl zjištěn negativní krátkodobý vztah mezi inflací a ekonomickým růstem. Dále, tento vztah byl pozitivní ve dlouhodobém horizontu. Navíc inflace ovlivňuje růst více než opačný účinek růstu na růst míry inflace, což naznačuje, že inflace je ovlivněna mnoha dalšími faktory, zejména výkyvy v krátkém časovém horizontu. Na druhou stranu, v souladu se specifickými cíli práce, bylo důležité porozumět co si místní lidé myslí o inflaci, o příčinách a proč jsou tak znepokojeni růstem cenové hladiny a/nebo poklesem hodnoty peněz. Bylo připraveno dotazníkové šetření, které proběhlo v hlavním městě Hanoj a ve městě Ho Chi Minh v jižním regionu Vietnamu. Respondenti byli vybráni tak, aby byl patrný rozdíl mezi mladší a starší generací a mezi vysokými, středními a nízkými příjmy. Výsledky dotazníkového šetření jasně ukázaly, že inflační důsledky nemají velký vliv na obyvatele s vyššími příjmy, zatímco nižší třída obyvatelů je více citlivější na inflaci.

Klíčová slova: inflace, ekonomický růst, životní úroveň, Vietnam, Hanoi, Ho Chi Minh.

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## List of Acronyms and Abbreviations

ADB	Asian Development Bank
ADF	Augmented Dickey-Fuller
AFTA	ASEAN Free Trade Area
AIC	Akaike Information Criteria
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
CPI	Consumer Price Index
CULS	Czech University of Life Sciences
CV	Coefficient of Variation
ECM	Error Correction Model
EIU	Economist Intelligence Unit
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GSO	Vietnamese General Statistics Office
IMF	International Monetary Fund
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LR	Likelihood-Ratio
NFSC	National Financial Supervisory Commission
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square
PP	Phillips-Perron
R&D	Research and Development
RSS	Residual Sum of Square
SIC	Schwarz Information Criterion
SOEs	State-Owned Enterprises
UNDP	United Nations Development Programme
USA	United States of America
VAR	Vector Autoregressive Model
VND	Vietnamese Currency
WB	World Bank
WTO	World Trade Organization

## **I. INTRODUCTION**

From the 20<sup>th</sup> century up to present day, the change in currency value has become more concerning to people in society as the individual wishes to maximize on their income to get more of a benefit with its expenditure for consumption of goods and services. The countries around the world have suffered from changing in currency value either appreciating (deflation) or depreciating (inflation). People will be better off when their money can buy more things compare to their previous purchased time (currency appreciation). In the opposite position, people will get worse off when their money is able to buy less things in regard to previously purchased items (inflation).

According to Global Economic Prospective World Bank (2008) reports that events in high-income countries still demonstrate concern about their currency value. In Japan in 2007, there was the deflation (inflation rate was negative), Yen was increasing value as its appreciation again other currencies especially us dollar, with this situation the Japanese government was concerned about their export ability for goods and services. In Europe in 2007 the inflation volatility around Europe but European Central Bank (ECB) was expected to hold inflation rate with 4%. The United States of America (USA) in 2007 found themselves in the possibility of a recession with acceleration of inflation rate and low Federal Reserve fund. Similarly for developing countries, there is still a higher inflation rate according to the developing countries where they are experiencing a rapid economic growth with controlling policy interest rate having increased gradually in South Asia (India, Pakistan, and Sri Lanka), Latin America and The Caribbean (Argentina, Chile, Colombia and Republic Bolivarian of Venezuela). In both China and Czech Republic, economies are tightening with their monetary policy. On the other hand, some countries (Belarus, Brazil, the Lao People's Democratic Republic, and the Philippines) even they impose a tighter monetary policy but ease inflation still appear.

Inflation has become the most public concern in Vietnam since it hit the rank of the third highest inflation country in the world in 2008, overtaken only by Ethiopia and Venezuela. The authorities are concerned that the public over-anxiety about inflation may cause unpredictable consequences, such as speculation and hoarding. It can be said that, of the many factors affecting economic growth, the inflation rate plays a major role. Both of these things are the big issues in macroeconomics, and they have a mutually restrained relationship and inflation can accept only a certain level to favour growth. However, it is not like in all cases or at all stages of economic development, the theory of inflation and growth is absolutely correct.

Accordingly, the interaction between them is very complex and does not always follow the rules of economics. Due to the effects caused by inflation on the economy and people's life, it is clear that the study of inflation is an urgent and essential issue for economy, especially an economy as immature as market economy in Vietnam. Also, the determination of the inflation-growth relationship has been attracting the attention of many economists and of the public.

The main purpose of this study is to analyse and establish directional relationship between inflation and economic growth, also, use inflation as one of macroeconomic management tools to promote economic growth. Then of course the given macroeconomic policies' target is to raise inflation rate in case of positive interaction. Thus, the policies of money supply as well as currency devaluation, etc. will be considered at the reasonable level. Otherwise, the policy makers have to consider the macro solutions to promote economic growth and inflation becoming secondary though still maintaining the level of control. In Vietnam, in the context of economic reform, inflation is not only an economic criterion but also a political meaning.

## **II. LITERATURE REVIEW**

When the prices of goods and services increase in the market, people intuitively know they are faced with the problem of money inflation (currency decreases its value).

Since the term of inflation was defined, there are many papers have investigated on impact of inflation on one or more sector(s) inside an economy system. Some research has found a link between positive and negative inflation. Whatever the outcome of this research is, the investigation works have been continued. Fisher et al., (1993) has provided evidence that macroeconomic stability, including manages of inflation, is a necessary precondition for economic performance. Bruno and Easterly, (1998) found the robust link when the growth falls sharply during discrete high of inflation crisis, then recovers rapidly and strongly after inflation falls. Hung, (2001) found there is evidence in the rising of inflation and reduce economic growth for countries with a relatively high initial inflation rate. But on the other hand, when initial inflation rates are relatively low financial development will reduce inflation and promote growth. Gylfason and Herbertsson, (2001) employed the data from Penn World Table and from the World Bank, found that the results that show the link between inflation and growth are economically and statistically significant and robust, especially in case inflation in excess of 10% to 20% per year which is generally detrimental to growth. Jin (2006) reports that the impulse response functions indicate that a shock to openness has negative effects on the output growth rates and of the price level, but no long term effects. Shimasawa and Sadahiro, (2009) show four main results with very robust to calibration: (i) the optimal inflation rate for Japan is calculated around 1.0%; (ii) the calculated underlying inflation rate is about 9% under the current Japanese economic and fiscal situation; (iii) to prevent high inflation, fiscal reconstruction needs to be implemented; (iv) if fundamental fiscal reform is conducted, the optimal inflation rate might be achieved.

Conversely and Valdovinos (2003) employs the original data illustrate the absence of a clear relationship between inflation and economic growth over the time. Horvath, Komarek, Rozsypal, (2001) argue that money still serves as a useful cross-check for monetary policy analysis.

### **2.1 The theoretical studies of inflation**

Theoretical study is concerned with theories, models and previous researches related to the research problem (Kananen, 2011). Therefore, this section plays an important role in every research since it provides readers essential knowledge to understand the empirical section.

### **2.1.1 The concept of inflation**

The history of currency's value changes with regard to a particular situation. It can be either appreciating or depreciating, with the currency depreciation (inflation) which has been studied for a long time, there has been a lot of research about the concept of inflation. The inflation is known as a situation the economy is facing during a rise in the general of price level of goods and services over a period of time. When the general price level rises, each unit of currency can buy fewer goods and services than before (Abel and Bernanke, 2005; Barro, 1997; Blanchard, 2000; Burda and Wyplosz, 1997; Hall and Taylor, 1993; Mankiw, 2002).

### **2.1.2 Inflation rate**

The inflation is the rate of change of the price level from one year to the next year and is measured by the percentage increase in an index of price (Farmer, 1999).

$$\text{Inflation rate} = \frac{p_t - p_{t-1}}{p_{t-1}}$$

Several indices of price level are in the common use; these differ according to the bundle of goods included in the index:

- (i) The consumer price index (CPI) measures the average cost of standard bundle of consumer goods in a given year. The price of each good in the bundle is multiplied by number, called the consumer price index. For the CPI the weight of each good in the bundle is its share in the budget of an average consumer (Farmer, 1999).
- (ii) The producer price index is also a weight average, but the bundle of goods is selected from an earlier stage in the manufacturing process. For example, the producer price index includes the producer price of wheat and pork, as opposed to the consumer price of bread and bacon (Farmer, 1999).
- (iii) The GDP deflator is the most comprehensive price index. It includes all of the goods and services produced in the United States. It differs from the GDP deflator in the way it weights different commodities (Farmer, 1999).
- (iv) The GDP price index is similar to the GDP deflator in that it includes all of the goods and services produced in the United States. It differs from the GDP deflator in the way it weights different commodities (Farmer, 1999).

### **2.1.3 Classification of inflation**

The level of inflation rate has been classified into two types, for low inflation rate and hyperinflation (high inflation) rate. Both types are explained below: Low inflation has been ranked from 0% to 4% this is normal situation in economic movement (Burda and Wyplosz, 1997). Hyperinflation is used for description the situation when this monthly inflation rate exceeds 50%. A sign of exceptional economic distress, hyperinflation has been observed in Central Europe the wave of hyperinflation occurred in the early 1920s, and again early in transition period the rate of inflation of 10% per hour was actually observed for a brief period, as is also true in Latin America in 1980s, and in many countries born out of the collapse of the Soviet Union in the early 1990s (Burda and Wyplosz, 1997).

### **2.1.4 Cause of inflation**

The economists thought in Keynesian believe that a change in the amount of money supply is not directly related to price, and the inflation appears to follow by the its economy expressing itself in price. The Keynesian economist thought is that there are three clauses of inflation phenomenon. Firstly, Demand-pulls inflation is a case of increasing in aggregate demand due to increasing of private and government spending clause to raise the general level of price of goods and services. Secondly, cost-pulls inflation, also known as supply shock inflation, in case of price of goods and services increase, due to natural disaster or increasing price of input factors, for instance earthquake damaged, oil price increased. The third reason of the rising in products' price is the increasing of wages within the firms. Because of the inflation, workers face with many difficulties in their daily lives especially the rising in price of basic commodities; so they want to keep their wages high enough to cope with the problem. However, this situation could create a vicious circle if there is not any intervention from the authority. The monetarists think that an important factor that influences currency inflation or deflation is how fast the money supply grows and shrinks. They rely on national fiscal policy or government spending and its taxation, as ineffective in controlling inflation (Laggasse, 2000). According to the famous work of monetarist economist Friedman, (1963) inflation is always and everywhere a monetary phenomenon. The quantity theory of money says any change in the amount of money in a system will change the price level.

By examination of inflation and growth of money supply, the Austrian thought that the rising in price are merely consequences and this semantic difference is important in defining inflation. The Austrian addressed the category levels of inflation which affect the price in

several degrees and found that the price of some sectors rises more sharply than in other sectors in economy system. The reason for the disparity is that the excess money will be concentrated into certain sectors, such as housing, stocks or health care. Because of this disparity, the Austrian thought says that the aggregate price level can be very misleading when observing the effects of inflation. Austrian economists explain inflation through determining the growth of new units of money that are available for immediate use in exchange, that have been created over time (Shostak, 2000 and Joseph, 1987).

Anti-classical or backing theory thought they assume hypothesis of money or backing theory. The Backing theory argues that assets and liabilities of the issuing by agent can calculate the value of money. On the other hand the Quantity theory of classical political economic, the backing theory argues that issuing authorities can issue money without causing inflation so long as the money issuer has sufficient assets to cover the redemption.

### **2.1.5 Impact of Inflation**

McNabb and McKenna, (1990) wrote that during the past fifteen years or so, many governments have reduced their inflation rate within their economic policies. This unanimous goal of governments would suggest that inflation is the problem that has obvious detrimental, economic consequences. The question arises of why low or moderate inflation is such a major problem and should become the overriding objective of government policy.

The level of inflation rate has been classified into two types, low inflation rate and hyperinflation (high inflation) rate. Both of these types are explained below: Low inflation has been ranked from 0% to 4% this is a normal situation in the economic movement (Burda and Wyplosz, 1997). Some economists believe that a little bit of inflation – saying 2% or 3% per year – can be a good thing for the country economy (Mankiw, 2007). Hyperinflation expresses the situation when this monthly inflation rate exceeds 50%, which is just over 1% per day (Mankiw, 2007). A sign of exceptional economic distress, hyperinflation has been observed in Central Europe and a wave of hyperinflation occurred in the early 1920s, and again in the beginning of the transition period, the inflation rate of 10% per hour were actually observed for brief period, and this also happened in Latin America in 1980s, and in many countries born out of the collapse of the Soviet Union in the early 1990s (Burda and Wyplosz, 1997).



### **2.1.6 The consequences of inflation**

The fact that Bernanke et al., (1999) set price stability as the primary goal of monetary policy is a growing belief among economists and central bankers that low inflation helps to promote economic growth and efficiency in the long-run. On the other hand, the high inflation is detrimental to the economy as has long been recognized. Countries experiencing high inflation (or, in extreme case, “hyperinflation” of 500% to 1000% or more per year) usually exhibit the poor performance in economic.

### **2.2 An overview of economic growth**

The term of national economic growth is directly proportional to the change in the national income over a period of time (usually counts as a cycle of a year); its income is dominated by the national Gross Domestic Product (GDP). GDP can go up from year to year for either of the following two reasons. First, it may increase because a country produces more goods and services; we call this increase growth. Second, it may increase because goods and services cost more money on average; we call this increase inflation. To separate the increase in GDP that comes from growth and the increase that comes from inflation, we measure the value of GDP every year using a common set of price. These prices are the ones that prevailed in one year, called the based year. GDP measured using current prices is called nominal GDP and GDP measured using based year price is called real GDP. Increase in living standards is measured by changes in real GDP per person (Farmer, 1999).

Since researches released the investigation with Harrod-Domar model regarding their works Harrod, (1939, 1948) and Domar, (1946, 1947), they set a basic schematic form as follows:

- (1) A constant proportion ( $s$ ) of income ( $Y$ ) is devoted to saving as the capital accumulation.
- (2) The amounts of capital and of labour needed to produce a unit of output are both uniquely given.
- (3) The labour force grows over time at a constant rate, fixed by non-economic, demographic, forces. They primarily require four assumptions namely labour market, labour supply, technology and saving assumption.

Solow, (1956) published the article of contribution on economic growth theory that latter on won Nobel Prize in 1987, his model was developed from Harrod-Domar model and Solow’s model based on assumptions those focuses on four variables: output, capital, labour and knowledge (technical level), with regarding time difference. The production function was developed by two features: firstly, the variable time does not enter directly to production function but through input factors as labour, capital and knowledge; secondly, the

combination of knowledge and labour has been recognized as labor-augmenting (Harrod-neutral). There are important works similar from Solow work namely Swan, (1956); Meade, (1961) and Samuelson, (1962).

As people know the production function is a combination of labour, physical capital and technological progress factors, these factors known as the endogenous factors in production function observe the performance of economic growth by ignoring other factors (exogenous factors). People today turn their attention to inserting some factors inside the production function namely R&D (Research and Development) based, human capital, natural capital, social capital and it can be others.

In the endogenous R&D base, the authors pointed out that the technological progress is one of other factors that drive the economic growth model (Romer, 1990; Grossman and Helpman, (1991); Aghion and Howitt, 1992 and Jones, (1995, 1999)). Besides, the human capital accumulation is also one of factors which influence the economic performance, we can find this in the work done by Lucas, (1988) the model was built based on Solow's model and introduce an equation of human capital accumulation, which allows for endogenous growth. Then there are those works which regard human capital as endogenous factor that drive economic growth namely Becker, Murphy, Tamura, (1990); Barro and Lee, (1994).

Regarding endogenous natural capital for economic growth model, Stiglitz, (1974, 1981) released the production function using natural capital as one of endogenous factors. Romer, (2012) suggests that decline in quantities of resources and lands per worker are not the only ways the environment problems can limit growth. Interestingly, the works done by Ayres, (1995, 2003) and England, (1998, 2000) releases the forum of natural capital influences on economic growth.

According to works done by Bourdieu, (1986); Coleman, (1988) and Putnam, (1993) there are many different definitions of social capital in research on people relationship and its value, thus we start with simple highlight the one given by Putnam, (1993) presents social capital as the "features of social organisation such as trust, norms, and networks. Those can improve the efficiency of society by facilitating collaboration actions". Another by Fukuyama, (1995) emphasizes that the importance of social capital as "a constructive element in the creation and maintenance of economic prosperity". There are several works which attempt to indicate the contribution of social capital on economic growth namely Knack and Keefer, (1997). For example, Temple and Johnson, (1998) built a causal relationship between trust and economic growth then applied the index composed of several measures of social capital and found it is a useful predictor of economic growth.

With adapted neoclassical economic growth model, the following work by Gylfason and Herbertsson, (2001) endogenous money and finance factors into economic growth model with constant returns to capital, later they concluded that the cross-country links between inflation and economic growth are economically and statistically significant and robust, with special result of 10 to 20% of inflation per year is general detrimental to growth.

Throughout history, there have been many studies on economic growth and the using methodology has been developed so far since many endogenous factors could be selected to analyse the model.

### **2.3 The role of money supply to economy system**

The role of national Central is important on observation and put the right policy for control amount of money supply in national economy. The money in economy as blood inside the body, or the water inside balloon, this is how the role of money important to the country economy. The amount of money supply to economy system also has its limited; to optimize benefit for every sector inside economy system throughout by imposing popular monetary policy those are open-market operation, the discount rate and the required reserve ratio (Froyen and Farmer, 1999).

Thus we view the money supply within two cases for lower amount of money supply and higher amount of money supply in economy system. First, in case of the amount of money supply very high it cause to the country currency has less value (less power to buy goods and services) with this scenario the central bank might impose the tight monetary mechanism to limit the quantity of money inside economy system (Froyen and Farmer, 1999).

Second, when the amount of money supply less than economy need, it cycle of money movement seems lower frequency, it cause difficult for trading activities, sometime it make country currency got move power to buy goods and services, with his situation the central bank might relax policy by easy monetary policy, to increase the cycle of money movement in economy system, encourage private investment, household consumption, as well as commercial bank activities (Froyen and Farmer, 1999).

### **2.4 The effect of inflation on the economy**

People get better feeling when they can earn more money as well as either the producer get more revenues from selling their productions or workers can get more wage from their involving inside factory activities. According to report has done by De Gregorio, (1996)

suggests that there is robust negative relation between inflation and economic growth, with his argument for the inflation limits the performance of national economy as its reduction of efficiency investment. Bruno and Easterly, (1995) investigate the correlation between inflation and economic growth; the result reported that economic growth fall sharply during the country has high inflation and then surprisingly of its strong recover after high inflation. McNabb and McKenna, (1990) reported for the inflation today through way of output and inflation period since 1982 has largely been one of recovery in the OECD countries, although unemployment remains high in many countries. They pointed out that inflation is down to rates not experienced for over fifteen years, inflation rates are stable and broadly in line between countries. Many countries are, however, more cautious about inflation and regard the threat of acceleration inflation as never far away. Countries now face a relatively new problem, which of maintaining price stability while ensuring a continued growth in output and employment.

#### **2.4.1 Inflation impact on interest rates**

According to Mankiw, (2007), economists call the interest rate that the bank pays is nominal interest rate and the increase in purchasing power the real interest rate. If  $i$  denote nominal interest rate,  $r$ : real interest rate and  $\pi$ : the rate of inflation, then the relationship among these three variables can be written as:

$$r = i - \pi \quad (\text{commonly known as the Fisher Effect})$$

When depositing money in the commercial bank, people will get real interest rate that came from the reducing nominal interest rate because of inflation in the end of the period. People usually feel they get more money but in fact they have the same or less for their money power purchasing.

#### **2.4.2 Inflation and income**

At the moment inflation appears, obviously by mathematic calculation for the economy with the inflation, it can reduce currency's purchasing power for buying goods and services (assume that they have constant income) since with the same budget of money but less quantity of goods and services we can buy in comparison with previous period. The other situation is more complex if both inflation and wages increase, people still will be better off since they get a higher increase in their income than the increase in inflation. According to Perry, (1980, 1983) the wage norms are considered as an important factor to explain the

inflationary process in the 1970s and the following disinflation in U.S. The special method that influences these norms and the inflationary expectations is income policy.

Similarly, Hagens and Russel, (1985) were interest on income policy, they analysed the country's income policy against the economic crisis problem using structural wage-price model and they concluded that wage demands increase less than inflation growth.

To be good example of income under the inflation, suppose the rate of interest is 10% and the inflation rate is zero for this year. This mean that each \$1 held in cash loses 10% of interest opportunity can be earned if it had been used to purchase an interest, however, because of the convenience of holding cash for conducting transactions what has been called the non-pecuniary services' provided by these real balances McNabb and McKenna, (1990).

### **2.4.3 Impact of inflation on employment and the state budge**

The employment rate depends on situation of producers in economy, as well as state budget also depends on what the priority need for the country spending. When the inflation rate negatively affects the country economy, it also affects employment in production sectors less and as well the government needs to increase budget to get at least the same amount of goods and services regarding the previous year budget. The research survey done by Lucas, (2000) suggests that the state's welfare will gain zero to 10% from the reduction inflation rate. Fender, (1990) concludes that the unemployment and inflation rate should move in same direction on the optimal path, which means that by increasing the inflation rate this can cause an increase in the unemployment rate within the national economy. Ghironi and Giavazzi, (1998) show that there is a trade off between inflation and employment rate within national economy. Mansoorian and Mohsin, (2006) investigated the effects of inflation as the cause of reducing labour employ in economy, and thus increasing the unemployment rate.

### **2.4.4 Inflation and economic growth**

Inflation can cause the positive and negative for economic growth. First, in general people fear and get upset when they listen to the news reports about inflation. In fact inflation also has positive to encourage economic as well, but it depends on what level of inflation, how much the inflation rate is this year and expected inflation rate of coming year. For instance if we look from the producer side, if there is expected lower inflation in coming year as well as in the present year, after the producer sell their goods and services, they will earn a total amount of revenue more than the previous time regarding the same amount of quantities of

production. Thus, the price increases cause producer's revenue increase. Also when we look at the whole economy system, lower inflation motivates producers to earn more revenue by selling their goods and services. According to the research done by Tobin, (1972) suggest that if it is particularly difficult for a firm to cut nominal wages, real wages can make the needed adjustments to sector-specific shock more rapidly when inflation is higher. Mankiw, (2003) suggests that somewhere labour market gets more effective with certain inflation rates. The supply and demand of labour in market are dependent on what kind of work they need and it also ways of changing. Sometimes increase in labour supply and decrease in labour demand causes a decrease of wage for that group of workers. Of course it is difficult to cut directly labour wage but when the inflation rate increases, producers still pay the same wage for labour, if inflation within 2% per year it means 20% per decade, from this point of view some economists argue for greases the wheels of labour markets. Besides, there are several studies investigating the inflation-growth relationship using inflation as exogenous variable and found a significant positive effect between variables. Tobin (1965) revealed a positive effect of inflation on growth; higher inflation rate would raise economic growth although temporarily. The Tobin's framework, during the inflationary period, individual tends to hold their assets as interest earning securities. Thus, the capital intensity is greater and this contributes to promoting economic growth. Thirlwall and Barton, (1971) reported a positive relationship between inflation and economic growth in a study of a cross section of industrial countries. Using panel data covering 1970-1990 of 87 countries, Sarel, (1996) found a significant structural break point of 8% inflation rate. He asserted that inflation affects slightly positively economic growth but this relationship would be powerful negative if inflation exceeds 8%. Using co-integration and error correction model to examine the short term and long term dynamics of interaction between inflation and growth for four South Asian countries: Bangladesh, India, Pakistan and Sri-Lanka, Mallik and Chowdhury, (2001) showed the statistically significant positive sign in inflation-growth relationship for all four economies and the impact of inflation to economic growth is more sensitive than that of growth to inflation. Likewise, Gillman et al., (2002) indicated that the moderate inflation (single digit) has a statistically significant positive effect on growth for the OECD and APEC countries. Secondly, in the opposite situation, inflation with negative effect on economic growth when the hyperinflation occurs in an economy system, the country's economy collapses, price uncertainty in the market, people store their production and wait to sell when price is stable or sell at the highest price. Within this situation, the growth of the country's economy is very high but contains many problems. For instance Kormendi and Meguire, (1985) estimated the

inflation-growth relationship using cross sectional data and found that inflation affects economic growth negatively. However, this estimation loses its explanatory power when the variable of investment rate is included in the regression, meaning that the effect of inflation does not manifest itself in capital productivity but in a reduction in investment. Grimes, (1991) explored data of 21 countries covering the period of 1961-1987 and found a negative relationship between inflation and economic growth in a long term but positive sign in a short term. In the study on cash in an advanced economy with capital Stockman, (1981) found a statistical significant negative effect of inflation on economic growth, increase in inflation rate results in a lower level of output. Similarly, Fischer and De Gregorio, (1993) showed evidence for a negative inflation-growth relationship. Fischer used cross sectional data covering 93 countries and found that increasing inflation would decrease investment and productivity growth. He also found evidence of a non linear relationship with structural break at 15% and 40%. In a related study, Barro, (1995) used a sample data covering the period of 1960 to 1990 of more than 100 economies to address the issue of inflation and economic growth. The study revealed a statistical significant negative inflation-growth relationship, specifically, if the annual inflation increases by 10% per year then the real GDP growth will decrease by 0.2 to 0.3% per year. Alexander, (1997) found a strong negative relationship between inflation and growth rate of GDP/capita using a panel of OECD countries. During their research in 1997, Andres and Hernando also found a significant negative nonlinear link between inflation and economic growth; accordingly, reducing in inflation by 1% could help to increase output by 0.5% to 2.5%.

Nevertheless, on the other side, the studies done by Dorrance (1963) and Johanson, (1967) showed that there was hardly any significant impact of inflation on economic growth in the 1960s. Bruno and Easterly, (1995) examined the issue of inflation and economic growth and concluded that there was no evidence of any consistent relationship between the involved variables up to a certain level of inflation. The result also showed that since inflation exceeded 40% threshold level there would be a temporal negative relationship between these variables, i.e. the economic growth falls sharply during high inflation crisis (over 40%) and recovers after inflation decreases. Thus, there is no permanent harm to economic growth due to high inflation crisis, as the countries tend to recover the pre-crisis growth rate. Bruno and Easterly, (1998) used the annual consumer price index of 26 countries covering the period of 1961-1992 and suggested that the inflation rate of 40% is the threshold level and below this level they found an inconsistent or inconclusive relationship between inflation and growth. Further and Chimobi, (2010) addressed the inflation-growth issue in Nigeria and indicated

that there was no co-integrating relationship between inflation and economic growth within the period of the study. Then the Granger causality test was used and the result revealed unidirectional causality from inflation to economic growth. He concluded that inflation has an impact on economic growth and high inflation has never been favourable to growth.

Obviously, almost research affirm that a high persisting inflation rate leads to a change in innate potential of the level of output growth in the long term in any given economy. And the founding of a stated percentage level at which inflation tends to harm economic growth is the most essential (Goncalves and Salles, 2008; Lin and Ye, 2009). In order to probe the existence of threshold level of inflation in inflation-growth relation Khan and Senhadju, (2000) built a new empirical approach and discovered that the threshold level of inflation at which inflation significantly reduces growth is estimated at 7% to 11% for developing countries and 1% to 3% for developed countries. Besides, Mubarik, (2005) found a unidirectional relationship between inflation and growth by using Granger Causality test and he also suggested the threshold level of inflation at 9 % for a health domestic output growth in Pakistan within the period of 1973-2000. Conversely, Hussain, (2005) used the annual data set from the period of 1973-2005 to estimate the threshold level of inflation for Pakistan and his result showed that there was no level of inflation that is detrimental for economic growth. However, from a broader perspective, he suggested that exceeding a range of 4% to 6% inflation would hinder growth. Furthermore, the empirical test results of Kremer et al., (2009) confirm that the pace at which inflation would not impact on output growth for developed economies is about 2% and for developing economies is below 17%. Lin and Ye, (2009) stated that the appropriate levels of inflation targeting and the inflation thresholds are more likely country specific in developing countries.

## **2.5. Analytical research in Vietnam**

### **2.5.1 Overview of national economy**

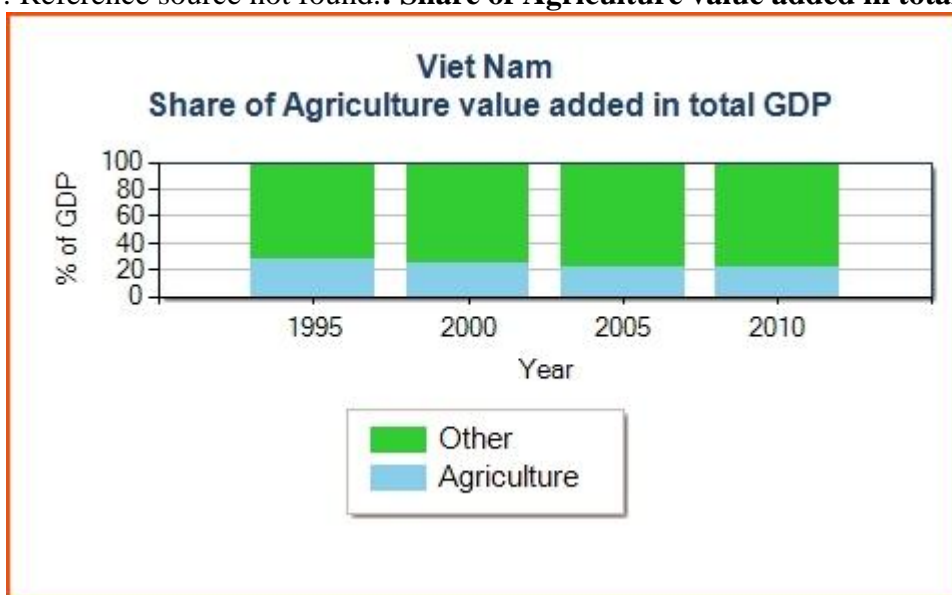
Vietnam is known as a densely populated, developing country that is mostly literate and has an energetic population. It has always been one of greatest economic sources of the country. Its long coastline provides many attractive beaches, areas of scenic beauty and excellent harbours that help to access marine resources. However, the lack of infrastructure and sound management policies in the exploitation of natural resources, etc that have inhibited full utilization of these assets. In addition, as a result of long wars, Vietnamese economic development has suffered compared to other neighbouring countries. In 1954, Vietnam was



divided into two independent governments; the Communist North was a very centralized planned economy under government control, while the Republic in the South was a pretty free-market economy. When the country was reunited in 1976, the Northern development model was expanded throughout the country.

Until now, Vietnam's economy has been mostly based on agricultural production such as rice, pepper, coffee, tea, rubber, etc. With an agricultural land accounting for 33.1% of total land area, agricultural production represented 20% of Vietnam's GDP in 2011 (WB, 2012). However, distribution of agricultural land among different regions of the country is unbalanced (Tran, 1998). In which, the belt land in Northern Red River basin and the Southern Mekong Delta are two main granaries. Vietnam has changed the role from a rice importer to a global leading exporter of agricultural products such as rice (known as the World second exporter), coffee, pepper, rubber, cashew and manufactured products (shoes, cloth, etc.). However, along with rapid industrial growth, the agricultural land area has been narrowed that has caused the changing of its economic structure. Agriculture's share of GDP decreased from 22% in 2008 to 20% in 2011 (WB, 2012).

Error! Reference source not found.: **Share of Agriculture value added in total GDP**



Source: FAO, 2012

In the 1980s, Vietnam was extremely one of the poorest countries in the world, with a low rate of economic growth. Income per capita is below \$100 (WB, 2012). However it is catching up fast. The country has had to recover from ravages of war, loss of financial support from the old Soviet Bloc in the last 30 years. Despite the 1997 Asian economic crisis, Vietnam's economy has expanded rapidly since the reform policies launched in 1986 (known

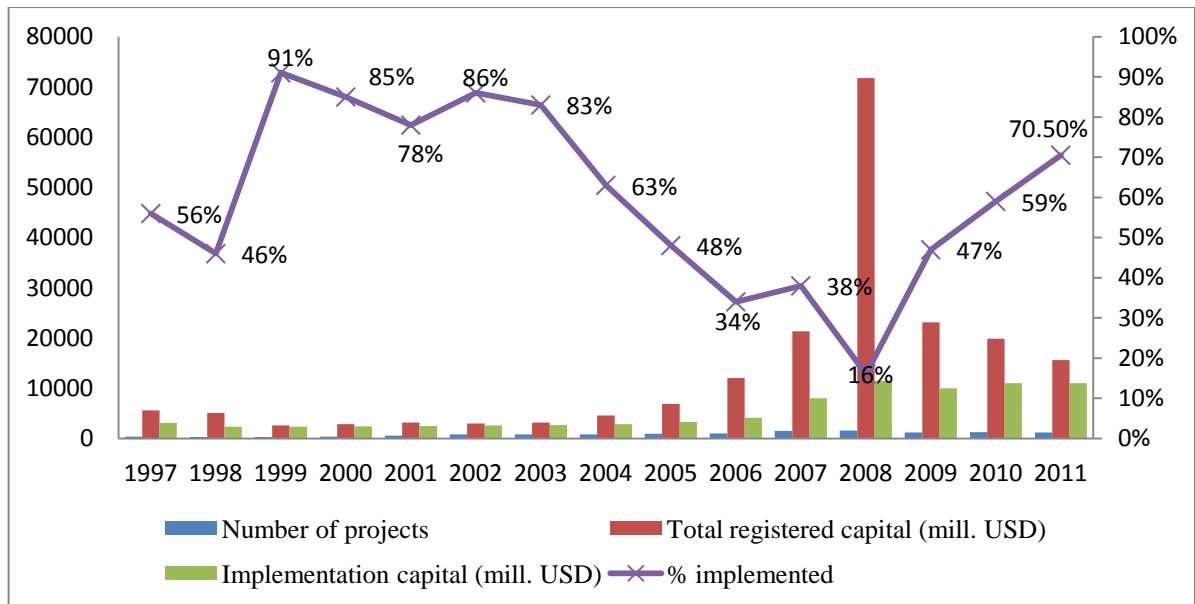
as Doi Moi) that translated literally as “restoration”, have brought profound changes to the country such as the shifting from a centrally-planned economy with state subsidies to a socio-oriented market economy. The new policy has encouraged private businesses, foreign investment; developed a multi-sectored market; pushed the multilateral development and diversification of economic relations for “an open-door”, world integration policy. Since then, foreign exchange and trade rules have been gradually relaxed that created chance for increasing number of private enterprises. For instance, at the beginning of 1998, there were about 2400 enterprises participated in foreign trade (Chatterji and Sangopadhyay, 2005). The goals of reform policies have made important contribution to the industrialization and modernization of the country. The average annual GDP growth was 5.4% for the 1986-1991 period and around 8.86% for the next five years (WB, 2012). Annual growth of industrial output has exceeded 10% per year since 1991 (ASEAN, 2012). Similarly, the services sector has constituted 44% of total GDP in 1995, increase from 36% in 1991. Simultaneously, share of agriculture in GDP has decreased from 40% in 1991 to 27% in 1995 (WB, 2012). These have been strong evidences for the shifting of Vietnam’s economic structure from agriculture base towards industrial and service economy.

In 1995, Vietnam was officially accepted as one members of ASEAN (Association of Southeast Asian Nations) and became the 7<sup>th</sup> member of this organization. Three years later, Vietnam joined Asia-Pacific Economic Cooperation (APEC) since November 1998 and has implemented policy of ASEAN Free Trade Area (AFTA). It was the first time Vietnam joined a regional economic cooperation. After that, on January 11<sup>th</sup>, 2007, Vietnam became the 150<sup>th</sup> member of the World Trade Organization (WTO). And its GDP grew 6% in 2008 despite the global economic recession.

Up to now, Vietnam has established diplomatic relationship with over 179 countries all over the world (MFA, 2012). After ten years of “renovation”, the number of Vietnamese living on less than \$1.25 per day fell from over 60% in 1990 to 18.1% in 2004 with annual average at 8-9% because of its rapid annual economic growth (UNDP, 2012). Thus, the country has low entry cost for investors, flexible business rules, cheap labor cost, especially abundant manpower and material resources. Foreign investors, therefore, have considered Vietnam as one of the most attractive destination in Asia along with China, Thailand, Philippine, etc. FDI inflowing into Vietnam increased dramatically with emergence of large-scale projects which were mainly in the industry and service area. In 2007, Vietnam received over \$US 21 billion from FDI through 1500 new projects that increased 70% compared to that in 2006 and hit a record \$US 71 billion in 2008. In the context of difficulties of global economy as well as

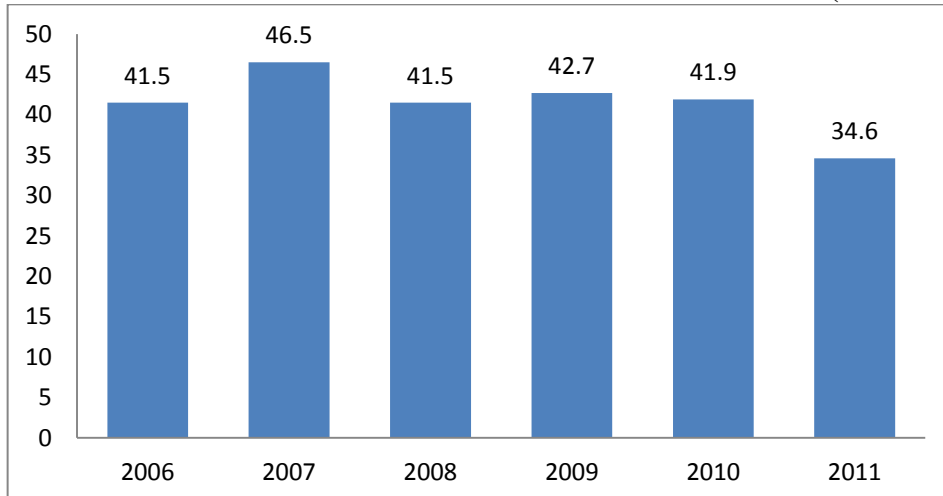
domestic economy, foreign investment flowing into Vietnam in 2009 and 2010 also declined significantly, yet the disbursement, both in terms of percentage and value, compared to 2008. FDI reached \$US 23.1 billion in 2009 and \$US 15.6 billion in 2011 (GSO, 2012). The integration into the global economy has promoted the liberalization process of the country's trade regime, created a vibrant, attractive and safe investment environment. Recently, FDI into Vietnam has covered not only export processing industries but also services, high technology and energy saving industry sectors.

Error! Reference source not found.: **Trend in foreign direct investment**



Source: GSO, 2012

Error! Reference source not found.: **Trend in total investment (% GDP)**

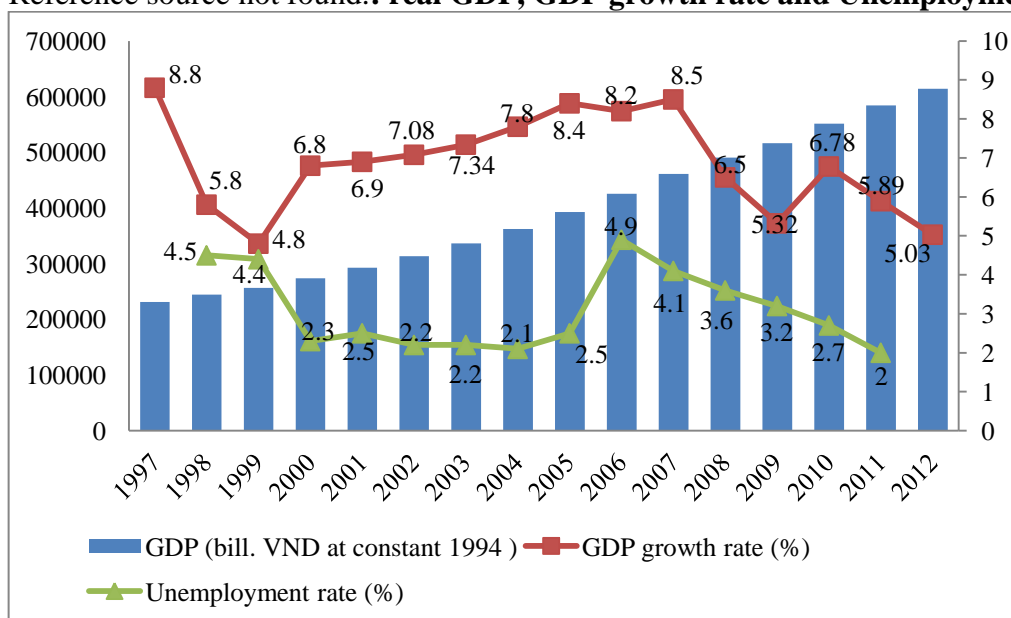


Source: GSO, 2012

Furthermore, due to efforts to restructure public investment and moving the economy from factors' accumulation to productivity that has caused the slowdown in credit growth. Total investment has fallen from 42.7% of GDP in 2009 to 41.9% in 2010 and only 34.6% in 2011 (GSO, 2012). This decline has been evenly shared among private sector, state enterprises and state budget.

Along with the innovation of global integration among the countries as well as regional level, Vietnamese economic performance is now rapidly getting better after many years of protracted wars, political isolation and economic stagnation. Picture of the 2011 economy was a mixture of bright and dark parts, in which the biggest achievement recorded was 5.9% of GDP growth rate although it was still lower than the government's proposed target of 7.5% but it should be considered as an encouraging result, especially in the context of stagnancy world's economy (Nguyen, 2011). During 2012, Vietnam's economy was generally stable with 5.1% of real GDP growth and inflation cooled to 6.81% from 18.7% in 2011. Unemployment rate was remained in the range of 4.5%. The country's account surplus also improved slightly to 0.3% of GDP from 0.2% during 2011. Nevertheless, in late 2012, financial sector was nearly in a crisis with over 10% of bad debts and bankruptcies filed at record rates (Robinson, 2012).

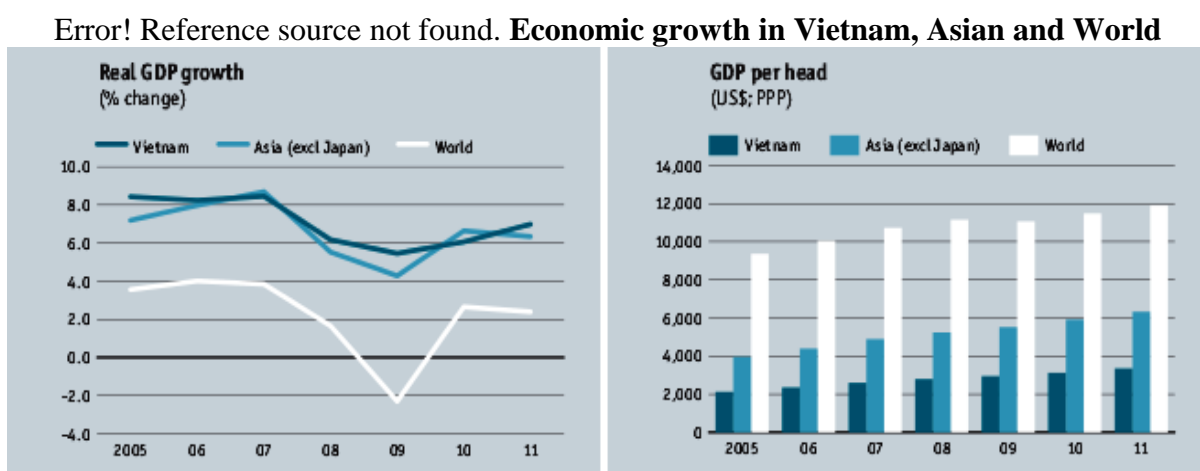
Error! Reference source not found.: **real GDP, GDP growth rate and Unemployment rate**



Source: GSO and ADB, 2012

Over the all, Vietnamese economy has had excellent long-term prospects but face many short term difficulties when the country has struggles in the context of global slowdown. Notwithstanding, if the government focus on pushing and advancing renovation into next

higher level together with addressing consistently shortcomings in each sectors, then the country might have a brighter long term future in comparison to some other ASEAN countries. Vietnam's economy will likely be better in the year 2013 amid slowly stimulating domestic and external demand as well as initial results from the recent reform efforts. During 2011-2012, the government attempted to deal with renovation issues in a holistic and wholly manner such as resolving bad debts and recapitalize banks, reinvigorating its residential property sector and seek to allow faster economic growth's pace with a curbing inflation level.



Source: EIU, 2012

## 2.5.2 History of inflation in Vietnam

Since 2010, sustainable economic growth has become the main objective of Vietnamese government and macroeconomic stability has been the primal item to economic policymaker. One of the most pressing problems the country has to face is the inflation that is also the most debated topic for more than two decades now (Nguyen, 2010).

From 1986, the country started on the way to transit from the central planned economy to market-oriented system. Administrative barriers on price setting simultaneously have been removed, however the inflation was not repressed too much in this period. It should be noted that the free market in Vietnam was rather significant but the government could not fully control production that entailed a shortage of goods for this market and price was pushed up as the inevitable result. In order to acquire necessary goods, the government raised the official price, for instance, the wholesale prices rose up by 7-10 times and retail prices increased by 10-15 times (Vo, 1994). Money creation is one of the factors leading to increase in the government budget spending in term of nominal value (Vo, 1992). Besides, the household

illegal saving and SOEs' financial activities outside banking system entailed the collapse of money banking transactions (McCarty, 1994). Thus, a cute inflation might arise if the government fails in controlling the situation. In despite of the government's hopeful expectation, immediate consequence of these adjustments has made inflation more seriously. The country experienced hyperinflation during the 1980s and early 1990s, especially it was reached to the peak with 454% annual growth in 1986 then remained hundreds of % some years later (IMF, 2008). As a result, currency hedging and goods hoarding have been used to prevent loss during economy with high inflation as well as expectation for high rate of inflation in the coming year. Excess demand increases, and thus enhancing the instability (Nguyen, 1992). Accordingly, the economic reforms that began in the late 1980s were to address this persistent hyperinflation. However, immediate causes and long term future trends of inflation could not be identified precisely and the macroeconomic policies almost were not applied appropriately in controlling inflation, consequently, the government's effort towards anti-inflationary and anti-unemployment was not successful as expected (Dang, 1995). After a very short while of deflation, general price level climbed up to 385% in 1988 and stabilization of CPI level later was also short-lived. Inflation increased again in the period of 1990-1991 when it reached level of over 90% (Vuong and Tran, 2009). Thanks to the restrictive monetary and fiscal policy that had helped to bring inflation down from above 300% in period of 1986-1988 to under 20% in 1992 (Camen, 2006). By the year 1993, inflation sharply reduced to single-digit level at 8.4 % and during the next period 1996 to 2003, it was kept generally under control. Some other Asian countries at that time were suffered by rising in inflation rate as a result of the 1997 Asian financial crisis, in contrast to what happened in Vietnam (Nguyen and Fujita, 2007). During 2000 and 2001, there was even a slight negative level of inflation rate that was seen as the success of government's control of the economy and nonconvertible currency (Le, 2005). In this period, during 10 years before 2002, Vietnam's inflation rate was generally lower than the world average rate as well as the average rate of other developing Asian countries and then it tended to be higher from 2002 onwards (Bui, 2008). Although inflation rate in major countries worldwide has tended to be higher than previous years but still remain at the manageable levels. Inflation rate in major advanced economies rose by 1.3% in 2007, while increased by 2.6% in the same period in emerging Asian countries (Vu, 2009). In Vietnam, due to a large increase in international commodity prices and excess domestic demand, inflation again has risen since 2004, accelerated further and jumped to its pick at 23.1% in 2008. Surging inflation was driven by both domestic and global forces, including food costs and high fuel. Petrol price rose up to

12.87% in May 2008. Price of grain also jumped sharply to 67.8% that led to the increase at 42.4% in overall food costs. Construction material and housing rose 22.9% compared to 2007 (Le, 2011). Thus, after a decade of stabilized prices (1996-2007), the inflation rate once more went up to two-digit level again, consequently, reminding the government and consumers of high/hyper inflation nightmares of last decades. Therefore, up to late 2008, the primary concern of the whole country was still the battle against inflation. All these events led to a series of adjustments in monetary policy and gave an impulse to its implementation at national level because successful disinflation in Vietnam usually requires involvement of a determined stance of monetary policy together with other available requisite tools (Vuong and Tran, 2009). However, many important decisions were made including electricity and petroleum price increases and adjustment of exchange rate which all made CPI increase rapidly in the year 2011 and jumped to 18.7%, the second highest in the last sixteen years and considered as inflation's resurgence. After one year of soaring inflation, price pressures were cooled down due to slowing demand and falling credit growth. The State Bank of Vietnam tracked core inflation to determine policy rates and used administrative measures as the primary tool to target inflation rate (Nguyen and Bunning, 2012). To overcome the bad image of inflation in 2011, the government has focused on reducing budget overspending and trade deficits, tightening monetary policies, and strengthened production and marching towards market price mechanism. In 2012, hence, inflation reduced from 18.7% in 2011 to 6.81% (GSO, 2012). However, inflationary pressures may re-emerge through lagged effects of accommodative policies and heightened global food and oil prices.

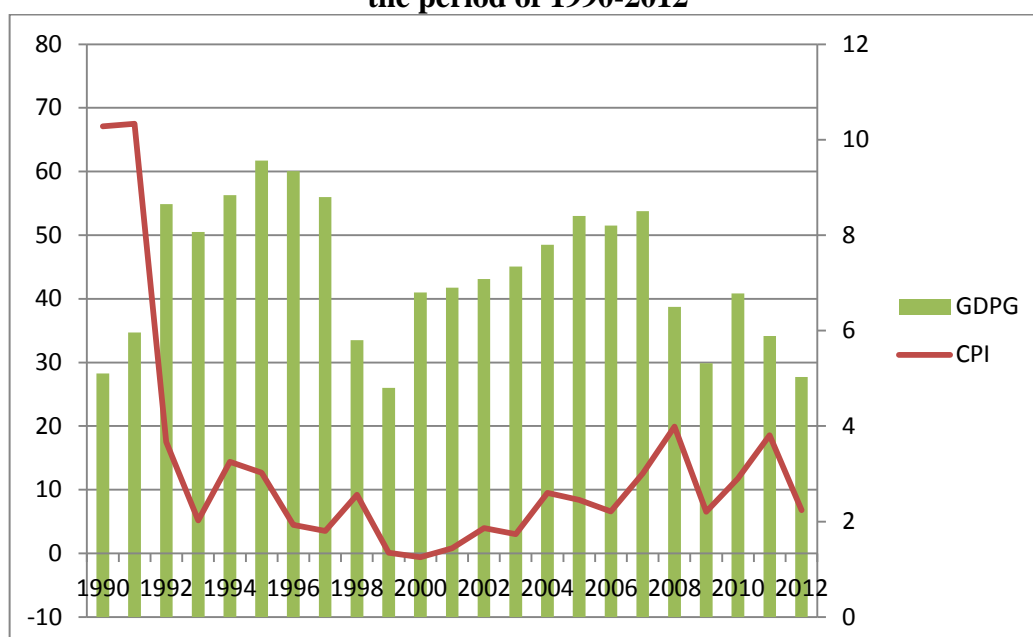
### **2.5.3 Historical trends of inflation and economic growth in Vietnam**

Before 1990s, poverty reduction and competitiveness improvement were central items on Vietnam's macroeconomic policy. As a result, people's living standards were improved significantly, integration process has been implemented comprehensively; however, a new debated topic was arose since inflation has been considered as a persistent problem that has caused the most painful damage to economic performance. Like many other countries in the world, financial crisis affected growth and resulting inflation stained economic performance in Vietnam.

In fact, there have not been many researches on relationship between inflation and economic growth in Vietnam. Both national and international organizations have released Vietnam economic annual reports as well as their own forecasts about Vietnam's potential growth in

short and/or long term, in which some of them also predicted inflation and growth rate. However, these considerations did not place focus on growth-inflation relationship (Vuong and Tran, 2009). Inflation started soaring in 1986 and this trend continued through the end of 1992 when new growth agents, i.e. private and foreign-invested sectors came into efficient production. In term of economic sense, both cash inflows and capital investment significantly helped alleviate shadow banking and financial distress as well as improved inhabitants' income. GDP growth rate went up also meant a better production and purchasing power, or in other words, it played an important role in stabilizing consumer prices (Vuong, 2010).

**Figure 6**Error! Reference source not found.: **Inflation rate and economic growth rate in the period of 1990-2012**



Source: GSO, 2012.

In early 1990s, high inflation rate was considered as a result of a transition into market-oriented economy. After that, by reasonable government spending policies and credit contracts, in late 1990s inflation slowed down remarkably while growth remained. Averaged economic growth rate was at 9% in next years; however, Asian financial crisis broke the economy. Consequently, growth slowed while inflation softened in the late 1990s and early 2000s (Wojciech, 2010). However, as general agreement among economists, regardless hyperinflation's danger, a reasonable inflation level is necessary to push up GDP growth. For example, in Vietnam, an accepted inflation might have several levels, but more importantly, its positive impacts on economic growth. As an agriculture-based economy, the emergence of inflation would likely push up the price of agro products, improve income, stimulate purchasing power for a large part of domestic population. After the well-known Asian



financial crisis, Vietnam's economy experienced a troublesome deflationary trend happening, in which the first time since 1986 reform, the country was faced downward general price tendency, causing headaches of economic downturn and stagnation (Vuong, 2010). Over the period, real GDP growth rate fluctuated slightly before 2002, and gradually became steady at 7-8% whereas inflation rate did not increase considerably (Vuong and Tran, 2009). Vietnam experienced two years 2001-2002 of a light disinflation due to depressed commodity prices and excess capacity. Real GDP went up and inflation increased sharply during 2004-2007. This fairly output growth was the result of industrialization from 1990. In spite of the narrowing agricultural area and increasing demand on labour, problem of food shortage has not appeared over the period 1990-2007. In addition, nominal wage increased but not much while underemployment rate was still high. Thus, relationship between inflation and real GDP growth was probably explained as demand-pull rather than cost-push (Bui, 2008). Despite number of supply shocks, floating consumption and export expansion helped to spurred economic growth. Besides, large demand and sustained strength of international commodity prices made inflation rose strongly (Wojciech, 2010). At the end of 2007, two-digit inflation rate returned, resulting accumulated inflation was close to 20% in 2008; super import went to US\$ 17 billion while GDP growth reduced to 6.5%. There were complex changes in the financial market and intricate exchange rates for the Vietnam Dong against US Dollar (Hoang et al., 2009). In 2011, growth was easing in most of emerging economies in East Asia as authorities wended down fiscal stimulus measures and tightened monetary policies to counter rising inflation (Iwan, 2011).

#### **2.5.4 Previous studies on Vietnam's inflation and economic growth**

There are various researches from non-quantitative to extensive empirical works that have been done in attempt to explain inflation dynamics in Vietnam.

A comprehensive and quantitative study was conducted by Vo et al., (2001) using monthly data from 1992 to 1999 and vector autoregressive and error correction models to studied the relationship between four variables as money, CPI, exchange rate and real industrial output. The findings indicated the passive monetary policy during the studies period since it has showed the response of money growth to past movements in inflation and output. The money aggregates did not seem to play any role in forecasting the future movements of prices while exchange rate influence significantly on inflation.

Similarly, the study using quarterly data for the period of 1995:1-2003:2 and VAR model shows that the import price is affected significantly from the exchange rate, but import price is not any affected by CPI; the domestic price is fed by import price with indirect way. Finally, they show the headline inflation is affected by international rice prices, domestic demand conditions and broad money growth.

However, the IMF's study (2006) employing the quarterly data during 2001 to 2006 has shown the substantial role of money aggregates on inflation. Although the result also point out that the money and credit growth started to have correlation with inflation in since 2002. In the part of this exchange can be explained with liberalization of various important prices during the early 2000s. This analysis also had shown that while inflation expectation and output gap have affected on inflation, oil price shock and exchange rate had a modest role in explaining inflation during the period of researched. In addition, inflation of Vietnam had an inertia component higher than in the other regional countries.

Camen, (2006); Nguyen and Fujita, (2007) and Pham, (2008) used the structure VAR technique for analysis inflation rate relations to other economy indicators: interest rate, exchange rate, money supply, and output, price of goods and services, and other. Goujon, (2006) used US Dollar, by focusing on inflation is influenced by dollarization, it conclude that given dollarization nature of economy, money only matter to inflation if dollar holdings were included. Furthermore, Nguyen and Pfau, (2008) analyzed monetary transmission mechanisms in Vietnam, with employed data during 1996:2 to 2005:4. The result shows that there is robust link between money supply and real output but no robust relation between money supply and inflation.

In summary of IMF report of inflation determinants in Vietnam shows a few key points, first most researches only take international oil price (and occasionally international rice price) as representative for the supply side factors, ignoring other factors such as cost, make-up, and other rigidities; second most of the researches (except the study done by Pham, (2009) which cover until the end of 2008) are out of dated and thus did not take into account the recent surge in inflation as well as the world economic crisis of 2008-2009 that has led to various changes in macroeconomic environment and policy; third empirical result on the role of money as determinants are mixed probably due to partly to different studied periods, different frequencies of data, and different estimation method techniques and forth on the other hand, the researchers are quite consistent about the important role of inflation lags, the modest role of exchange rate and international price.

By using co-integration, error correction and VAR models, Tran, (2009) suggested that in long run inflation effect positively on economic growth with the correlation coefficient 0.58. The method of variance decomposition based on VAR model suggested that in short run the inflationary variability affect growth more than the rebound effect of growth on inflation.

## **III. OBJECTIVES**

### **3.1. Main Objectives**

Throughout the history, there have been many arguments about effect of inflation to economic growth. In which, most ideas believe that inflation was harmful to economic growth; therefore, it may also cause negative effects to people's life while the rest part has confirmed that effects can be both negative or positive depending on the inflation rate in long-term or short-term economic growth. Therefore, the main objective of the thesis is to analyze the relationship between inflation and economic growth; thereby, help to suggest recommendation in controlling inflation in the case of Vietnam.

### **3.2. Specific Objectives**

Similarly, the specific objectives focus on people's attitude and opinion towards inflation.

To achieve all objectives of the thesis, it is necessary to fulfil the following aims:

- To generalise the basic theoretical study of inflation and economic growth;
- To find out the cause and trend of inflation in Vietnam;
- To understand why people are so concerned by inflation, the price increase and decline in value of money;
- To define the consequences of inflation on Vietnamese economic growth.

## **IV. METHODOLOGY**

### **4.1 Study design**

The study design is understood as the structure or overall strategy of any scientific research. It was carried out by integration of different components of the study in a coherent and logical way; thereby, giving the direction and systematization which would help to address effectively research problem as unambiguously as possible. There are various designs which have been used in research, according to the nature of phenomenon and the study's objectives, scientists will select specific method to get advantage in doing research.

This study followed the inflation issues and the economic trends recently in Vietnam. It was based on experimental and relationship-based research designs in quantitative approach. To meet the objectives the study adopted analytical and correlation methodology that described degree of relationship between inflation and economic growth in quantitative terms. Quarterly time series data covered the period of 1995:1 to 2012:4 was utilized for econometric model.

On the other hand, to go deeply on the specific objectives of this study that is try to understand what people think about inflation and why they are so concerned by increase in price level and/or decline in value of money, a questionnaire was designed including short and long, simple and difficult multiple choice questions, some of them were in open-ended form where respondents were given space to write their answers. It contained questions to elicit intergenerational and occupational differences in attitudes towards inflation and economic growth as well as in popular ideas and public knowledge about these issues. The questionnaire were distributed to three groups of people such as business mans, lecturers and students, who have knowledge on economic to understand the given issues. Therefore, their professional opinions would be contrasted respectively. Further, the study of public attitudes towards the micro or/and macro-economic factors may help to learn whether differences across classes in concern or understanding towards the national economy. Therefore, the fourth group was selected randomly from the public who are not in the three given groups. All of these four groups would give the overall comparison that we will see from the coming results that people have definite opinions about inflation in people's living and national economy. These opinions, however, differ among generations, classes and even more remarkably, between group of the general public and people who research in economic sector.

## **4.2 Study area**

The study investigated effects of inflation on economic growth in Vietnam. The country is a strip of land like letter “S” stretching for the length of Indochinese Peninsula with geographical area of approximately 331, 210 km<sup>2</sup>. Vietnam is bordered by South China Sea to the East, Laos to the Northwest, Cambodia to the Southwest and China to the North. Due to geographical location, Vietnam is a transport junction from the Indian Ocean to the Pacific Ocean. Hanoi is the capital and also the second largest city of the country. This study focuses mostly on economic sector with two most important issues of any economy inflation and economic growth. The country is now known as one of Asian’s worst inflation that seems to be out of government control. Its results have marred Vietnamese economic performance and increased inflationary pressure on the growth. Besides, by using econometric model to provide an overview of the economics, the study also used a questionnaire to deeply understand awareness and opinion of the public on the research issue. The questionnaire was designed and distributed mainly in the Hanoi capital and a southern city known as the economic strength of the country, Ho Chi Minh City. The four target groups of people are businessmen, teachers, students and the last group with people who are not in the first three groups. In fact, there is also lack of comparable studies and concrete information on linkage between inflation and economic growth. Therefore, this study was built in hope that it will contribute to the list of the country’s economic research.

**Figure 7: Vietnam map**



Sources: Vietnamroughguide, 2012

### **4.3 Methods of data collection**

Data collection is process of gathering data and wide variety of information sources to address identified issues using different methods of data collection. This study involves collection method of both primary data and secondary data accordingly.

Primary data method: a questionnaire was build and mailed to respondents who are expected to read, understand questions and willing to write down their answer in the space corresponding to the purpose of questionnaire itself. It was conducted from July to September 2012, 175 survey questionnaires were sent to 50 lecturers, 50 businessmen, 50 students who study in the field of economics and 25 people who work in other fields such as artists, doctors, architects, etc. Fortunately, most of Vietnamese are very interested in issue of

inflation, and therefore the obtained results are very great since 100% feedback for 100% email sent. Thus, information is collected by sending a set of questions in questionnaire.

Secondary data method: the research is mostly depended on secondary data obtained from the GSO. Moreover, most of the data used in theoretical framework is collected from published sources like books, articles, journals and previous researches.

#### **4.4 Sources of information**

As we all know that the appropriate data from adequate source and the construction of variables are very important for any empirical analysis as well as the validity of research.

The data used for this study were mostly taken from the official statistics provide by Vietnamese government such as Vietnamese General Statistics Office (GSO), Vietnamese National Financial Supervisory Commission (NFSC), International Monetary Fund (IMF), Asian Development Bank Statistics databases and World Bank Database (WB), etc.

#### **4.5 Data analysis**

The study carried out the relationship between inflation and economic growth in Vietnam, the data came primarily from the Vietnamese General Statistics Office and International Monetary Fund (IMF), covered period of 1995:1-2012:4 that will be used as quarterly time series data (from the first quarter of 1995 to the fourth quarter of 2012 based on constant price of 2005). In order to avoid the problem of multicollinearity and to maintain an acceptable degree of freedom, the study includes two variables such as economic growth that computed as log of real Gross Domestic Product (GDP); inflation denoted as log of Consumer Price Index (CPI). All the data in this study were transformed to logarithm form in order to reduce the high dispersion, as well as a number of observations that have abnormal values of the original data. In addition, using data as the logarithm form would be easier in identifying and analysis.

##### **4.5.1 Econometric specification**

Albright et al., (2006) stated that “regression analysis is the most common method for a study of relationships between variables”. In order to investigate relationship between inflation and GDP growth and furthermore, to analyze mechanism through which inflation affects to economic growth in short-run and long-run, econometric models have been build. Economic analysis, however, proposed that there is existence of a long-run, short-run or equilibrium



relationship between variables involved in investigative research papers under the economic theory. The econometric model is applied to try to estimate these relationships under constancy doctrine of all variables involved, which means that variances and means are constant or not dependent on time (Seddighi et al., 2006). However, there are many empirical studies showing that most of the time series data are not stationary that consequently lead to a spurious regression problem. As a result, from many researchers in the field, since facing with this imperfect estimation, some methods and new techniques were proposed to revise traditional estimation approaches in order to solve this problem. These revisions included systematic examination of non-stationary and co-integration among variables.

The inflation-economic growth relationship is presented through the relationship between CPI and real GDP. The study firstly employed two econometric models to examine the short-run and long-run relationship between CPI and real GDP. As mentioned above, most of the time series data are not stationary and problem of co-integration might occur among variables. Thus, the Error Correction Model (ECM) proposed by Engle and Granger (1987) and the theory of co-integration were applied. If both time series are integrated of the same order then the linear estimation of co-integration regression were described as the two following equations:

$$GDPGR_t = \alpha_{11} + \beta_{11}INF_t + \mu_t \quad (4.1)$$

$$INF_t = \alpha_{21} + \beta_{21}GDPGR_t + \epsilon_t \quad (4.2)$$

Where,  $GDPGR = \log$  of real GDP;  $INF = \log$  of CPI;  $t$  is time variable;  $\alpha_i$  and  $\beta_i$  are parameters;  $\epsilon_t$  and  $\mu_t$  are error terms. Hence the model reflects the long-term relationship between  $INF$  and  $GDPGR$ . However, if these two variables are non-stationary then the spurious regression might occur and obtained results will not reflect the true relationship between  $INF$  and  $GDPGR$ . Unless they satisfy the condition of first-ordered integration  $I(1)$  (also known as difference stationary) and error terms  $\epsilon_t$  and  $\mu_t$  are stationary  $I(0)$  (also known as integration of order zero) then models still reflect effects of  $INF$  and  $GDPGR$  properly and regression results are significant. In that case, the two variables  $INF$  and  $GDPGR$  are called co-integration and not expected to remain apart in long-run. Also, according to Campbell and Perron, (1991), in a bivariate relationship there can be an equilibrium or long-run relationship between two series if and only if they are stationary or each series is integrated of the same order,  $I(d)$  for  $d = 0,1,2,3,\dots$  then these two series are co-integrated and the regression on the same levels of the two variables is meaningful.

In the first stage, to test for the non-stationary property of these two concerned time series variables in both the first difference and the levels, four most common techniques were used

such as the Augmented Dickey-Fuller (ADF, 1981) test, and the Phillips-Perron (PP, 1988) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992) test.

The ADF test allows the possibility that the error term is higher auto-correlated. In which, the lagged values of dependent variable are added in the following representative equation:

$$\Delta y_t = \chi + \rho y_{t-1} + \lambda T + \sum_{i=1}^n \delta_i \Delta y_{t-i} + e_{1t} \quad (4.3)$$

However, lately there have been many arguments that ADF test is unable to distinguish clearly between stationary and non-stationary series in the case of high degree of auto-regression. For instance, variable CPI which denotes inflation is in fact stationary time series in spite of the fact that it is likely to be highly auto-correlated, but the ADF test might get an opposite result. Similarly, it is widely believed that this test also does not consider the issues that frequently revealed in raw data of economic time series variables such as heteroscedasticity and non-normality. Consequently the Phillips-Perron (PP) test for unit root was applied in the case of structural break and the time series has time-dependent heteroscedasticity and serial correlation. Thus, the PP test based on the following model would give robust estimates over ADF tests.

$$\Delta y_t = \varphi + \beta y_{t-1} + \lambda \left(t - \frac{T}{2}\right) + \sum_{i=1}^m \psi_i \Delta y_{t-i} + e_{2t} \quad (4.4)$$

MacKinnon (1991) found out the appropriate critical values for the null hypothesis t-test in non-stationary time series. Further, an alternative test introduced by Kwiatkowski et al. (1992) that called thereafter the KPSS test, has been used to test the null hypothesis of stationary series around either mean or a linear trend against the unit root alternative. In term of sense, it is seen as an innovation in comparison with previous ADF or PP tests when the null hypothesis assumes presence of a unit root.

$$y_t = \xi_t + r_t + v_t \quad (4.5)$$

$$r_t = r_{t-1} + u_t \quad , \text{with } u_t \sim iid(0, \sigma_u^2) \quad (4.6)$$

In equations (4.3) and (4.4)  $e_{1t}$ ,  $e_{2t}$  are respective covariance stationary random error terms and  $\Delta$  is defined as the first difference operator. The lag length  $n$  and  $m$  in equation (4.3), (4.4) is respectively defined by Schwarz Information Criterion (SIC) (Schwarz, 1978) to ensure serially uncorrelated residuals and determined by Newley-West's suggestions (Newley and West, 1987). All these tests were carried out for both variables by replacing  $y_t$  with  $GDPGR_t$  and  $INF_t$  respectively in equations (4.3) (for the ADF tests), (4.4) (for the PP test) and (4.5) (for the KPSS test).

The t-statistic with MacKinnon critical values mentioned above was used to test the null hypothesis ( $H_0$ ) of non-stationary time series for INF and GDPGR. Accordingly,  $H_0$  is rejected if  $\rho$  and  $\beta$  (in ADF and PP test) are less than 0 and statistical significant.

Finally, the three unit root tests ADF, PP and KPSS above were also employed for residuals  $\mu_t$  and  $\varepsilon_t$  (from equations (4.1), (4.2)) which will instead of  $y_t$  in equations (4.3), (4.4), (4.5). If  $\mu_t$ ,  $\varepsilon_t$  are found to be integrated of order zero,  $I(0)$ , then it can be concluded that the two series variables of INF and GDPGR are co-integrated. The hypothesis of co-integration is not rejected, if so, there will be a stable long run relationship between inflation and economic growth. Likewise, Johansen, (1988); Jonhansen and Juselius, (1990) also provided maximum-likelihood test procedure to test the co-integration between two random variables. This procedure offers two likelihood-ratio tests (LR) for the number of co-integrating vectors, namely, the maximum Eigen value test and the trace test with the null hypothesis ( $H_0$ ) assumes that there are at least  $r$  co-integrated vectors and alternative hypothesis ( $H_1$ ) assumes the existence of  $r+1$  co-integrated vectors.

Further, the Engle-Grange (1987) two-stage co-integration procedure was employed to test the presence of co-integration between two variables. Accordingly, when INF and GDPGR are found to be co-integrated, i.e., there is a valid long- term relationship, then a corresponding short-term relationship must be exist as well. These two variables mutually interact through the following Error Correction Model (ECM) form:

$$\Delta \text{GDPGR}_t = \alpha_{10} + \sum_{i=0}^p \alpha_{11i} \Delta \text{INF}_{t-i} + \sum_{j=1}^q \alpha_{12j} \Delta \text{GDPGR}_{t-j} + \mathbf{k}_1 \mu_{t-1} + \mathbf{e}_{3t} \quad (4.7)$$

$$\Delta \text{INF}_t = \alpha_{20} + \sum_{i=0}^p \alpha_{21i} \Delta \text{GDPGR}_{t-i} + \sum_{j=1}^q \alpha_{22j} \Delta \text{INF}_{t-j} + \mathbf{k}_1 \varepsilon_{t-1} + \mathbf{e}_{4t} \quad (4.8)$$

Where,  $\Delta$  presents the first difference operator that reflect the change of INF and GDPGR in short-term;  $p$ ,  $q$  are the number of lag lengths determined by Akaike's Information Criterion (AIC);  $\mu_{t-1}$ ,  $\varepsilon_{t-1}$  are error correction terms (residual series of the co-integrated vector normalized for INF and GDPGR) measure deviations of these two series from long-term equilibrium relations (Mallik and Chowdhury, 2001);  $e_{3t}$ ,  $e_{4t}$  are random disturbance term s. Finally, the two series with  $0 \leq k_1, k_2$  would converge to the long-term equilibrium relation, however, both  $k_1, k_2$  should not be zero in the case of co-integration. This approach, therefore, includes one lag of residual and three lags of both dependent and independent variables from the co-integrated regression. Afterward, the insignificant variables would be removed in order to get the most concise and meaning model. (Hendry, 1995).

Besides, in order to clearly analyze the fluctuation of inflation and economic growth in short run, method of variance decomposition based on vector autoregressive model (VAR) :

$$\Delta GDPGR_t = a_1 + \sum_{i=1}^m \theta_{1i} \Delta INF_{t-i} + \sum_{j=1}^n \rho_{1j} \Delta GDPGR_{t-j} + \omega_t \quad (4.9)$$

$$\Delta INF_t = a_2 + \sum_{i=1}^m \theta_{2i} \Delta GDPGR_{t-i} + \sum_{j=1}^n \rho_{2j} \Delta INF_{t-j} + \omega'_t \quad (4.10)$$

The Granger Causality Test proposed by Granger (1969) is commonly used in order to identify the VAR model as well as determine the direction of causality between INF and GDPGR.

#### 4.6 Limitations

Because the study is rather complex and up to now it has been always a focal argument among economists while author's knowledge is limited, the study can not avoid shortcomings. There are many macro-economy variables affecting economic growth but the study only used inflation variable to explain the relationship between growth and inflation. Such limited variables more or less affects the result of the study model (because the study may miss some other important explanatory variables which affects the result of proposing the most suitable study model). However, collecting observation data is very difficult, the author could not choose any other variable to apply in the model because it could not meet the requirement of the sample's size. The model's results, thus, was not the same as the author's expectation.

The supporting study target of the theme is to understand attitude and opinion of the public to inflation. Fortunately 100% of respondents all sent feedback; however, due to limited condition to interview each person directly, the results are just a part answer to the given problem.

## V. RESULTS AND DISCUSSIONS

### 5.1 Econometric verification

The relationship between inflation and economic growth has been considered with two variables GDPGR (logs of real GDP) and INF (logs of CPI).

#### 5.1.1 Elementary data analysis

The elementary data analysis performs an important role as it helps the researchers and viewers firstly understand general information of the study and then prepare their minds for further explanation of econometric analysis in each specified model of the research.

The summary statistics for INF and GDPGR are reported in Table 1:

**Table 1: Summary Statistics of Inflation and Growth rate (1995:1 – 2012:4)**

Variable	INF	GDPGR
Mean	4.6389	12.135
Median	4.4729	12.121
Minimum	4.1692	11.364
Maximum	5.4025	12.903
Std. Dev.	0.35882	0.3845
C.V.	0.07735	0.031685
Skewness	0.76443	0.05561
Ex. kurtosis	-0.7268	-0.96394

Source: Author's calculation, 2013.

The descriptive statistics indicate that average value (mean) of GDP growth rate is 12.1 % which is an encouraging indicator for the Vietnamese developing economy. The maximum level observed at 12.9 % whereas the minimum level remained at 11.36 %. The standard deviation is known as an absolute measure of dispersion, it however does not take into consideration magnitude of observed values. In this manner, the coefficient of variation (CV) provides a relative measure of dispersion, in which dispersion is given as a proportion of the mean. Therefore, the low level of standard deviation (0.38%) indicated that the data points of GDP growth rate tend to be close to the mean. In other words, it means there are fewer deviations from the mean value of GDPGR.

Similarly, value of CPI inflation has the mean greater than median; therefore, distribution of CPI inflation is skewed to the right (which means, bunched up toward the left with a tail stretching toward the right) or it is understood as this distribution is asymmetrical. The level

of coefficient of variation (CV) of CPI inflation (0.07) is greater compared to the coefficient of variation level of GDP growth (0.03). Thus, it conveys the information that CPI inflation is more variable than GDP growth. Additionally, CPI inflation attained the maximum value of 5.4 and minimum value of 4.2 which showed that the range of CPI inflation is having small scatter in the data.

Two statistical values Skewness and Kurtosis in table 1 helped to visualize clearly shape of distribution. Skewness measures deviation of distribution that is also known as the coefficient of asymmetry.

Skewness = 0: mean = median, the distribution is symmetrical around the mean.

Skewness > 0: right (positive) skewed distribution - most values are concentrated on left of the mean, with extreme values to the right.

Skewness < 0: left (negative) skewed distribution - most values are concentrated on the right of the mean, with extreme values to the left.

Similarly, Kurtosis describes shape of a probability distribution or it can be understood as a measure of whether the data are peaked or flat relative to a normal distribution.

Kurtosis = 3: Mesokurtic distribution - normal distribution.

Kurtosis > 3: Leptokurtic distribution, sharper than a normal distribution, with values concentrated around the mean and thicker tails. This means high probability for extreme values.

Kurtosis < 3: Platykurtic distribution, flatter than a normal distribution with a wider peak. The probability for extreme values is less than for a normal distribution, and the values are wider spread around the mean.

From the above two criteria and results of the descriptive statistics in table 1:

The Skewness value of both inflation and economic growth > 0 so right skewed distribution while Kurtosis value both < 3 so the shape of distributed polygon are flatter with a wider peak; thus, these two variables are less variations or not high variation ranges during the period survey research taken.

### **5.1.2 Stationary test**

Before testing for causality and co-integration, the stationary properties of the concerned variables would be test by using ADF, PP and KPSS test. In which, Schwarz Information Criterion (SIC) (Schwarz, 1978) is used to determine duration of delays. Both level variable (INF = log of CPI, GDPGR = log of real GDP) and the first different variables ( $\Delta$ INF=  $\Delta$ log

of CPI,  $\Delta\text{GDPGR} = \Delta\log$  of real GDP) are applied for all tests. Results of unit root tests are presented in table 2.

**Table 2: Unit root tests with DF, ADF, PP and KPSS**

Variables	ADF			PP			KPSS		Decision
	C	C&T	None	C	C&T	None	C	C&T	
<b>INF</b>	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	<b>I(1)</b>
<b>GDPGR</b>	I(1)	I(1)	I(1)	I(0)	I(0)	I(1)	I(1)	I(0)	<b>I(1)</b>
$\Delta\text{INF}$	I(0)	I(0)	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	<b>I(0)</b>
$\Delta\text{GDPGR}$	I(1)	I(1)	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	<b>I(0)</b>

Source: Author's calculation, 2013.

Notes: 1. **C** denotes testing with constant; **C&T** expresses testing with constant and trend; **None** means testing without both constant and trend; \*\*\*, \*\* means significant at 1% and 5% levels respectively.

2. Lag length have been decided on the basic of SIC.

3. Bandwidth for PP and KPSS tests has been decided on Newey-West (1994) using Bartlett kernel.

4. The DF, ADF and PP tests assume the null hypothesis  $H_0$ : variable has a unit root while the KPSS test is based on the null hypothesis  $H_0$ : variable is stationary.

5. All tests have been performed on comparing critical t-statistics as computed by MacKinnon, (1996) (basis of 1 and 5% significant levels) using Eviews software.

The estimation results in table 2 showed that the null hypothesis ( $H_0$ ) is rejected at 1% level of significance in case of ADF, PP tests and non-rejected for KPSS test except INF and GDPGR. In case of  $\Delta\text{GDPGR}$  (the first difference of GDPGR), both PP and KPSS tests succeed although the ADF test failed. However, since the PP and KPSS tests are preferable to ADF, variable  $\Delta\text{GDPGR}$  can be concluded as stationary, I(0). Therefore, findings of unit root tests suggested that both variables INF and GDPGR are first-ordered integrations I(1) or non-stationary while  $\Delta\text{INF}$  and  $\Delta\text{GDPGR}$  are integrated of order zero I(0) that also means stationary.

Thus, from now on the time series data of all variables INF and GDPGR has met the requirement of non-stationary process and the same order in integration to applying the Johansen test of co-integration.

### 5.1.3 Co-integration test

From above results, both desired variables GDPGR, INF are non-stationary and integrated of the same order I(1). Then, the next step would be co-integration testing in order to find out the long run relationship between inflation and economic growth.

The lag optimal selection for both variables (INF, GDPGR) is carried out by Akaike Information Criteria (AIC) with the guidelines is the lower AIC value, the better model is. The result shows that the optimal lag is 5 (Appendix 3).

Further, the Johansen (1988) maximum likelihood test is used to consider the co-integration between INF and GDPGR.

**Table 3: Johansen test for co-integration**

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.219041	19.80786	15.49471	0.0105
At most 1	0.051512	3.490484	3.841466	0.0617
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.219041	16.31738	14.26460	0.0234
At most 1	0.051512	3.490484	3.841466	0.0617
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's calculation, 2013.

The results for Johansen co-integration test reported in table 3 confirm the rejection of null hypothesis that no co-integration between the two variables. Both trace and maximum eigenvalue tests indicate one co-integrating equation at both 5% level significant. This proves that there is a long-term relationship between inflation and economic growth in Vietnam.

### 5.1.4 Estimation of co-integrating regression

In order to examine the relationship between inflation and economic growth in long run, the co-integration regression will be estimated.

$$GDPGR_t = \alpha_{11} + \beta_{11}INF_t + \mu_t \quad (4.1)$$



$$INF_t = \alpha_{21} + \beta_{21}GDPGR_t + \epsilon_t \quad (4.2)$$

**Table 4: Co-integrating regression**

Dependent variable: GDPGR

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	7.72623	0.275264	28.0684	<0.00001	***
INF	0.950379	0.0591643	16.0634	<0.00001	***
R-squared	0.786607		Adjusted R-squared	0.783558	
rho	0.021402		Durbin-Watson	1.909315	

Source: Author's calculation, 2013.

**Table 5: Co-integrating regression**

Dependent variable: INF

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-5.40491	0.625569	-8.6400	<0.00001	***
GDPGR	0.827677	0.0515256	16.0634	<0.00001	***
R-squared	0.786607		Adjusted R-squared	0.783558	
rho	0.229175		Durbin-Watson	1.522533	

Source: Author's calculation, 2013.

The estimated results of the co-integrating relationship between two variables INF and GDPGR are reported in table 4 and 5 (see more in Appendix 4). They show that it exist a long-term positive and strong inverse between inflation and economic growth in Vietnam. The intercept terms ( $\alpha_{11}$  and  $\alpha_{21}$ ) and partial regression coefficients ( $\beta_{11}$  and  $\beta_{21}$ ) are statistically highly significant and positive for both regressions (4.1) and (4.2).

In table 4, Durbin-Watson test  $d = 1.91$

Critical values for Durbin-Watson test (5% significant level):

T	K	dl	dh	4-dh	4-dl
72	2	1.58949	1.64571	2.35429	2.41051

$d = 1.91 \rightarrow d \in (dl, dh)$ : no autocorrelation.

$R^2 (0.78) < d$  Durbin (1.91)  $\rightarrow$  reject the null hypothesis of spurious regression, i.e. the model is accepted (meaning that the model reflect the true relationship between involved variables).

Coefficient of determination  $R^2 = 0.78$ , i.e. 78 % of the variation in economic growth can be explained by inflation.

**Table 6: Unit root test for the residual  $\mu_t, \varepsilon_t$** 

	ADF	PP	KPSS	Decision
$\mu_t$	I(1)	I(0)	I(0)	<b>I(0)</b>
$\varepsilon_t$	I(1)	I(0)	I(0)	<b>I(0)</b>
$GDPGR_t = \alpha_{11} + \beta_{11}INF_t + \mu_t \quad (4.1)$ $INF_t = \alpha_{21} + \beta_{21}GDPGR_t + \varepsilon_t \quad (4.2)$				
	Co-integrating coefficient $\beta_{11}$	Co-integrating coefficient $\beta_{21}$	Unit root test for $\mu_t, \varepsilon_t$	
Estimation	0.950379 (16.0634) ***	0.827677 (16.0634) ***	I(0)	

Source: Author's calculation, 2013.

The result in table 6 shows that residuals are integrated of order zero I(0); therefore, it again confirms that the two series variables INF and GDPGR are co-integrated. Thus, it can be concluded that it exists a valid and stable long-term relationship between them. Besides, result also indicates that GDPGR and INF are co-integrated with coefficient  $\beta_{11}$  estimated by 0.950379 and coefficient  $\beta_{21}$  estimated by 0.827677 (both are positive sign and significant at 1% level). This, therefore, illustrate that on average a 1% increase in CPI in Vietnam leads to a rising in real GDP by 0.95%. On the other hand, on average, a 1% increase in real GDP also leads to a rising in CPI by 0.83%. In other words, it implies that inflation and economic growth affect each other positively, i.e. inflation is favourable for economic growth, they are both go up or down together. In addition, due to the co-integrating coefficient is smaller than 1 and  $\beta_{21} < \beta_{11}$  then in long-term economic growth will go up faster than inflation.

### 5.1.5 Error correction model

As mentioned above, if two variables (INF, GDPGR) are integrated of order I(1) and co-integrated, then the error correction model (ECM) will be applied in order to consider the short term fluctuation in inflation-growth relationship.

$$\Delta GDPGR_t = \alpha_{10} + \sum_{i=0}^p \alpha_{11i} \Delta INF_{t-i} + \sum_{j=1}^q \alpha_{12j} \Delta GDPGR_{t-j} + k_1 \mu_{t-1} + e_{4t} \quad (4.7)$$

Assuming that the estimative variables are co-integrated then the ECM incorporates both short run and long run effects. Moreover, if all the residual terms in the model are stationary hence the standard regression techniques are valid (Harris, 1995).

**Table 7: Error Correction Model Estimation**  
Dependent variable:  $\Delta GDPGR$

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	0.0250121	0.0179406	1.3942	0.16943	
$\Delta INF_{t-3}$	-0.176264	0.0881743	-1.9990	0.05105	*
EC term (lag=1)	0.0228294	0.00835911	2.7311	0.00870	***
$\Delta GDPGR_{t-1}$	-0.408752	0.139704	-2.9258	0.00515	***
$\Delta GDPGR_{t-2}$	-0.223643	0.0772734	-2.8942	0.00562	***
$\Delta GDPGR_{t-3}$	-0.221782	0.0771654	-2.8741	0.00593	***
$\Delta GDPGR_{t-4}$	0.768074	0.0784556	9.7899	<0.00001	***
Sum squared resid	0.001815		S.E. of regression	0.006025	
R-squared	0.999529		Adjusted R-squared	0.999387	
Serial Correlation	0.778212		Functional Form	0.260808	
Heteroscedascity	0.591659		Durbin-Watson	2.087746	

Source: Author's calculation, 2013.

Note: \*, \*\* and \*\*\* indicates significant at 10 %, 5 % and 1 % levels.

Serial correlation is tested by Godfrey's (1978a, 1978b) LM test.

Functional form is tested by Ramsey's (1960, 1970) RESET test.

Heteroscedasticity is tested by White's (1980) test.

As the result (see more in Appendix 5) shows that short-term changes in inflation affect negatively economic growth by 0.177% (coefficient of variable  $\Delta INF_{t-3} = -0.177161$ ) at 10% level of significance. Furthermore, the estimated coefficient of the error correction term  $k_1$  (EC term) is significant at 1% level. It means that in the long-term if the two series inflation and economic growth are out of equilibrium, the real GDP itself will adjust to reduce the equilibrium error. The other estimated coefficients are all statistically significant at 1 % level, and therefore it indicates that the change in growth in the current time is affected by itself with corresponding lag in earlier time. Interestingly, the seasonal dummy variables are insignificant in the short-term estimation. In other words, the short term relationship between inflation and economic growth is not influenced by seasonal factor.

### 5.1.6 Vector auto-regression (variance decomposition in short run)

In order to better analyze how the change of growth depends on the change of inflation and the change in itself in the previous period, variance decomposition base on VAR model is commonly used. Because  $\Delta GDPGR$  and  $\Delta INF$  are stationary, Granger Causality test is use to analyze the influence of these variables together. The results are reported in table 8.

**Table 8: Pairwise Granger Causality Tests**

Pairwise Granger Causality Tests			
Sample: 1995Q2 2012Q4			
Null Hypothesis:	Obs	F-Statistic	Prob.
$\Delta INF$ does not Granger Cause $\Delta GDPGR$	67	1.98381	0.0655 *
$\Delta GDPGR$ does not Granger Cause $\Delta INF$		5.38290	6.E-06 ***

Source: Author's calculation, 2013.

Note: \* and \*\*\*: statistically significance at 10 and 1% level respectively.

The testing results show that there has interplay between the two involved variables  $\Delta GDPGR$  and  $\Delta INF$ . Therefore, the VAR model with lag length 4 is applied as the following form:

$$\Delta GDPGR_t = a_1 + \sum_{i=1}^3 \theta_{1i} \Delta INF_{t-i} + \sum_{j=1}^3 \rho_{1j} \Delta GDPGR_{t-j} + \omega_t \quad (4.9)$$

$$\Delta INF_t = a_2 + \sum_{i=1}^3 \theta_{2i} \Delta GDPGR_{t-i} + \sum_{j=1}^3 \rho_{2j} \Delta INF_{t-j} + \omega'_t \quad (4.10)$$

**Table 9: VAR estimation**

$\Delta GDPGR_t = a_1 + \sum_{i=1}^3 \theta_{1i} \Delta INF_{t-i} + \sum_{j=1}^3 \rho_{1j} \Delta GDPGR_{t-j} + \omega_t \quad (4.9)$						
	$\theta_{13}$	$\rho_{11}$	$\rho_{12}$	$\rho_{13}$	$\rho_{14}$	$R_2$
Coefficient	-0.201788	-0.160556	-0.171471	-0.163326	0.812969	0.9448
t-ratio	-2.2731 **	-2.3656 **	-2.5023 **	-2.4215 **	11.2308 ***	
$\Delta INF_t = a_2 + \sum_{i=1}^3 \theta_{2i} \Delta GDPGR_{t-i} + \sum_{j=1}^3 \rho_{2j} \Delta INF_{t-j} + \omega'_t \quad (4.10)$						
	$\rho_{21}$	$\rho_{22}$	$\theta_{21}$	$\theta_{22}$	S2	$R_2$
Coefficient	0.0292905	0.188376	0.934687	-0.332978	-0.0334165	0.65265
t-ratio	0.2034	1.2954	6.8159 ***	-1.7955 *	-2.1450 **	

Source: Author's calculation, 2013.

Note: \*\* and \*\*\*: statistically significance at 5 and 1% level respectively.

S2: seasonal dummy variable (the second quarterly).

As the results show the coefficient  $\theta_{13}$  (-0.201788) corresponding to the variable  $\Delta INF_{t-3}$  is statistically significant at 5 % level and has negative sign. This again confirms that short-term inflation has negative effective on economic growth. In the second equation (4.10), the seasonal dummy variable S2 is statistically significant at 5 % level, and therefore seasonal factor affects negatively inflation in short-term .

The analysis shows that VAR models with lag length 4 above are well formatted, both equations are highly relevant. Also, models based on variance decomposition are used to analyze volatility of inflation and growth in the period of four years (lag length 8).

**Table 10: Decomposition of Variance for  $\Delta$ GDPGR and  $\Delta$ INF in two years**

period	Decomposition of Variance for $\Delta$ GDPGR			Decomposition of Variance for $\Delta$ INF		
	std. error	$\Delta$ GDPGR	$\Delta$ INF	std. error	$\Delta$ GDPGR	$\Delta$ INF
1	0.00568127	100.0000	0.0000	0.0120561	0.4866	99.5134
2	0.00575855	99.7288	0.2712	0.0164954	0.4010	99.5990
3	0.00581806	99.7284	0.2716	0.0177432	0.5229	99.4771
4	0.00629646	85.7815	14.2185	0.0180132	0.9831	99.0169
5	0.00810113	90.3073	9.6927	0.018102	1.6917	98.3083
6	0.00824462	90.6285	9.3715	0.018126	1.9247	98.0753
7	0.00837559	90.6029	9.3971	0.0181795	2.2745	97.7255
8	0.00861671	86.8597	13.1403	0.0182369	2.5024	97.4976

Source: Author's calculation, 2013.

The above results show that, in the period of two years, a 13% economic growth's shock is explained by the movement in inflation and 86.86% is explained by movement in its own variance in the past. In contrast, in the same period, 2.5% variability of inflation is accounted for by growth innovations over the time horizon and 97.5% is explained by the variation in its own variation in the previous time. Moreover, the VAR model in table 9 also shows that the fit of the equation (4.9) considering variation of growth is 94% and the fit of the equation (4.10) considering variation of inflation is 65%. This indicate that, in short-term change in inflation affects growth more than influence of growth back to inflation, and thus it can be concluded that inflation depends largely on various factors such as the supply shocks, demand shocks, etc.

### 5.1.7 Discussions with previous researches

The results of the study compared to previous results are just relative because each nation in the world has their own policy, economy, societal mechanism and the operation method of the economy is also different. Even previous Vietnamese studies can not give the same result because they are conducted at different times which means different data chain of study variables. However, science always ensures objectivity in terms of theory in the methodology. The estimations of long-term and short-term models revealed a significant positive effect between inflation and economic growth in long-term and negative effect in short term. This result is consistent with the results of studies by Kigume, (2011). He examined the relationship between inflation and economic growth in Kenya using annual data covering the period of 1963-2003. Also, OLS estimation technique and Granger causality tests were applied to carry out results and finally he found that there was a negative short-term

relationship between inflation and economic growth but this relationship will change to positive in the long-term. The research done by Malik and Chowdhury, (2001) to discover short-term and long-term dynamics of inflation-growth interaction for four South Asian countries also showed a long-term positive sign for all four economies. They also found that impact of inflation on economic growth was more sensitive than that of growth to inflation. This again confirms the conclusion that inflation depends largely on various factors in this study. Similarly, using the co-integration test for quarterly data cover the period of 1995:1-2008:4, Nguyen, (2009) examined effect of inflation on economic growth in Vietnam and found a statistically significant positive long-term relationship between inflation and economic growth. In addition, he also suggested that in short-term changes in inflation affect economic growth more than effects of changes in economic growth on inflation. However, the research using annual data cover the period of 1987-2007, Tran et al., (2010) estimated a negative correlation coefficient between inflation and growth. This again pointed out late consequences of inflation crisis during the late 80s and early 90s when hyperinflation ranged from around 65 to over 300%.

The results also show that the error correction term is statistically significant at 5% level ensuring the attainment of long-term equilibrium following a system shock. In other words, in the long-term, as inflation and growth deviate from the equilibrium position, there will be an adjustment that growth trends to change the elements of the economy return to equilibrium.

## **5.2 Questionnaire results analysis**

The word inflation implants fear in the hearts of billions of people in the world since it has conjured worries of a stagnating economy, rising prices, devaluating currency and the very expensive cost of living that people are unable to pay. This, however, still is a disputable issue in discussions throughout history across the countries. The mainly close-ended questionnaires help to give a more precise description in conclusion and allow accurate comparisons across groups of participants. Accordingly, inflation is considered as an endogenous variable that reflects a number of causal relations itself. The finding's results seem likely to succeed in confirming the central importance in public perceptions of inflation and its effect on their living standard. The respondents were randomly selected in Vietnam and among the poor and the rich, the young and the old, and almost all of them were very concerned with inflation.

**Table 11: Increasing price and public's reaction**

<b>Q1. Are you angry when you go shopping and find that the prices rise?</b>				
	1 Yes, strongly angry	2 Yes, somewhat	3 No/no opinion	n
All	36%	46.3%	17.7%	175
Lecturer	26%	60%	14%	50
Business	14%	56%	30%	50
Student	74%	26%	0%	50
Other	24%	40%	36%	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

Despite the place we are from, our age or the occupation we stand for, the results firstly appear to confirm that most people tend to be angry when they see the prices rise. In table 11, it can be seen from answer to question 1 above that 36% showed their strong angry feeling and 46.3% showed a slight angry feeling while 17.7% had no idea or did not care about this issue. However, in particular, the group of students that had the strongest reaction to the increase in price was 74% strongly angry and 26% a bit angry. The only reason that can be explained is that students completely rely on their family's support, they have no or very limited amount of outside income; therefore, they are the ones who suffer the most heavily when facing the situation of escalating prices. Secondly, the group of teachers also had a high percentage of the answer that reflected negative attitude facing this issue (the overall result 86% of agreement and 14% had no idea or did not care). This is quite consistent with the imbalance in distribution of wages between occupations on the current situation in Vietnam. The fact that the current salary of teachers or state employees is relatively low compared to other liberal professions. Finally, referring to the group of business and other groups (group of people who do not stand for any among three classified categories), their reaction was relatively mild; the proportion of respondents who chose "no opinion" was highest with 30% and 36% respectively.

**Table 12: Inflation and media**

<b>Q2. When you hear or see the media report about inflation, do you find any interest in it?</b>				
	1 Yes, very much	2 Yes, somewhat	3 Neutral	N
All	44.6%	38.3%	17.1%	175

Lecturer	60%	28%	12%	50
Business	56%	34%	10%	50
Student	22%	54%	24%	50
Other	36%	36%	28%	25

Source: Author's calculation, 2013.

\* Note: n is the number of respondents

According to the result above (see table 12), it can be confirmed that inflation is one of the leading public concerns at present. 44.6% of respondents are very much interested when they see or hear the news about inflation, 38.3% of others also tend to show their interest but less strongly and the rest of 17.1% of people have neutral attitude toward the reports about inflation from the media. In fact, public attitudes toward inflation are found largely in media and society and the real reasons for this concern is how leaders treat the issue. The overall results showing many differences in answers to the question are inter-occupational and inter-generational suggests that influence of the media is very large. Lecturers and businessmen shared the same percentage for each of three possible answers. It is also interesting to note that students are people getting extremely angry when facing price increases; however, they also are less concerned with inflation, as the result shows, just 22% are strongly interested in the issue.

**Table 13: Inflation and wage**

<b>Q3. Do you think that when the inflation rises your wage should be adjusted immediately?</b>				
	1 Yes, strongly agree	2 Yes, somewhat	3 No/no opinion	N
All	41.7%	51.4%	6.9%	175
Lecturer	44%	56%	--	50
Business	34%	66%	--	50
Student	28%	48%	24%	50
Other	80%	20%	--	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

Many researches were conducted to demonstrate the presumed effects of inflation on human living standard through conceived ideas of the lagged effects on wage and salaries. The impression that people are worried about the effects of inflation on their living standards is further supported by question 3 (see table 13). 100% of the participants except the group of students agree with the response that wage should be adjusted immediately when inflation rises. Especially, 80% of the fourth group named "other" strongly agrees while most of the three groups agree only slightly. The results, therefore, suggest that the public is concerned



with inflation primarily because most of them think that they have a fair wage only at the time when the wages are set and within the year they will fall behind if there is higher inflation. It implies that real wages will be on average less fair when inflation rises. According to Robert (1996), the inflation rate is changing all the time and sometimes there must be wage increases to catch up with the past inflation even those there is no inflation.

**Table 14: Controlling inflation**

<b>Q4. Do you think that inflation control by government should be a high priority?</b>						
	1 Strongly agree	2 Agree	3 Undecided	4 Disagree	5 Strongly disagree	N
All	44.6%	53.7%	1.7%	--	--	175
Lecturer	54%	46%	--	--	--	50
Business	38%	56%	6%	--	--	50
Student	42%	58%	--	--	--	50
Other	22%	28%	--	--	--	25
<b>Q5. If there are some rules for controlling country's inflation, how would you deal with it?</b>						
	1 Yes, strongly respect	2 Yes, respect some	3 Neutral	4 No, it makes me uncomfortable	N	
All	45.7%	54.3%	--	--	175	
Lecturer	44%	56%	--	--	50	
Business	52%	48%	--	--	50	
Student	46%	54%	--	--	50	
Other	36%	64%	--	--	25	

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

Most of the economists and the public, as represented in table 14 agree that controlling inflation would be one of the most important national priorities. The respondents here, among both the young and the old, cover most of the working sectors and they were very concerned with inflation. Lecturers tend to agree more strongly with the above statement than the other groups, but it is emphasizing that except 6% of business group who were not decided, the rest of the groups of respondents 100% agree (strongly agree and agree). This is again confirmed in question 5, the result clearly shows that 100% of Vietnamese people would strongly respect the government promulgating rules to control inflation. The research survey conducted by professor Robert J. S. (1996) also showed that 94% of Germans (76% of respondents chose fully agree, 18% chose agree) thought controlling inflation was one of the most important missions of national economic policy while 84% of US people (56% of respondents fully agreed, 28% chose agree) and 88% of Brazilians (56% of respondents fully agreed and 32%

agreed) also agreed with this. Thus, inflation is always on the front burner everywhere regardless of rich or poor, developed or developing countries and furthermore most people tend to support the policy of controlling inflation.

**Table 15: Kinds of inflation**

<b>Q6. What kind of inflation has negative effect to your country's economy?</b>				
	1 Low inflation	2 Moderate inflation	3 Hyperinflation	n
All	--	31.4%	68.6%	175
Lecturer	--	40%	60%	50
Business	--	26%	74%	50
Student	--	34%	66%	50
Other	--	20%	80%	25
<b>Q7. What kind of inflation has negative effect to your living cost?</b>				
	1 Low inflation	2 Moderate inflation	3 Hyperinflation	n
All	--	28.6%	71.4%	175
Lecturer	--	32%	68%	50
Business	--	30%	70%	50
Student	--	28%	72%	50
Other	--	20%	80%	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

Answers question 6 and 7 in table 15, showed that the public as well as people who research in the field of economics generally have the same opinions on both of these basic theoretical questions. This information is very important in giving a universal assessment about the impact of inflation on the economy as well as living standard of people in the country. Fortunately, almost 70% of respondents supposed hyperinflation will lead to a decline of the national economy and people's lives, namely, the sharp fall of real wages, giving of inaccurate information, and the distortion of market's factors along with the disorder and disorientation of business activities. By looking at the result, one interesting thing is that most people think that when the economy is suffering; people's living standard will suffer as well. Of course, the national economy and standard of people's living have a very close causal relationship but what makes all of them think that hyperinflation or inflationary shocks will hurt their living? This thinking maybe arises just from some observed correlations that in fact hyperinflation tends to come simultaneously at the time when other factors are harming the living standard of people. Due to the influence of this perceived correlation, they always tend to associate their problems with inflation. During the period of 1997-1998, due to natural

disasters and lack of food production that led to raging famine across the North, commodity prices were raised very high and cost-push inflation again continued. Facing that situation, people hoarded goods, food, gold and dollar as much as possible because they were afraid of the continuing devaluation of Vietnamese currency (VND). This all has made the country fall into a dark period with 223.1% of hyperinflation while GDP growth was just 3.78% (GSO, 2012). And people may not remember natural disasters as a cause of the decline of their living standard, but think of the hyperinflation instead.

**Table 16: Victims of unexpected and high inflation**

<b>Q8. Unexpected, high inflation will?</b>						
	1 Hurt borrowers	2 Hurt lenders	3 Hurt consumers	4 Hurt equally for 3 sectors	5 Have no effect	N
All	12.5%	18.3%	50.3%	18.9%	--	175
Lecturer	8%	22%	60%	10%	--	50
Business	20%	16%	50%	14%	--	50
Student	4%	14%	40%	42%	--	50
Other	24%	24%	26%	--	--	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

The table 16 represents that average of 50% of respondents agrees that when inflation runs out of the threshold level, it will hurt consumers. In which, 42% of students believe that under high inflation, the borrowers, lenders and consumers will be hurt equally while over 10% of the two groups of lecturers and business also agree this. There is almost no difference between the percentage of participants choosing answer 1 (hurt borrowers: 24%), 2 (hurt lenders: 24%) and 3 (hurt consumers: 26%), but interestingly since no one thinks these three sectors will be hurt equally. One more thing that there are just 4% of students and 8% of lecturers supposed the borrowers to be victims of high inflation. McMahon, (2007) stated that the biggest losers due to inflation are those willing to lend money. To prove this statement, he gave an extreme example that occurred during the period of hyperinflation 1923 in Germany. He said that, if you had loaned a friend some amount of money to buy a car in early 1923 and at the end of 1923 he had repaid it but with this money you might have been able to buy a box of matches. Therefore, it is not difficult to see clearly that with the same amount of money, the borrower has a car while the lender has just a box of matches then of course he was the big loser. Regarding consumer's pressure under high inflation, Rick, (2011) collected data from the Bureau of Labor Statistics, the Census Bureau and analyzed the obtained result, and

after all he said that inflation when it occurs, varies greatly and how harmful it is depends on what kind of consumer you are. As the price of food and energy rises, retirees and people on low or fixed incomes tend to suffer the most because their income cannot catch up the rising cost of necessity. However, many other consumers do not feel so much price pressure since some things they buy is getting cheaper, for example appliances with microprocessors, and price of computer has decreased by nearly 7% in a single year. Thus, these are often enough to offset higher prices for food and energy.

**Table 17: Purchasing against inflation**

<b>Q9. Do you agree with the following statement: “People protect themselves against inflation by purchasing more goods which have risen in price less than other goods”?</b>						
	1 Strongly agree	2 Agree Somewhat	3 Neutral/no opinion	4 Disagree	5 Strongly disagree	N
All	6.28%	42.86%	14.28%	17.14%	19.43	175
Lecturer	--	34%	30%	16%	20%	50
Business	--	26%	--	26%	48%	50
Student	22%	56%	14%	8%	--	50
Other	--	68%	12%	20%	--	25

Source: Author’s calculation, 2013.

\*Note: n is the number of respondents

There were so many differences in answers to the statement above (see table 17). It is very easy to see that the group of students and the last group have the biggest percentage number of respondents agreeing with the statement (in which 22% of students are strongly agreed). However, it seems the group of lecturers has no idea about the given issue since the answers are about equally distributed around the three possibilities “agree”, “undecided” and “disagree”. The group of businessmen almost disagrees with the statement, even up to 48% of respondent strongly opposed and 26% disagreed. Still, without distinction among groups, the overall results seem that there is a balance between the numbers of protesters and approvers, the rest did not make a decision.

**Table 18: Inflation and income**

<b>Q10. Do you agree with the following statement: “When inflation occurs whether you gain or lose depends on situation your income increases faster or slower than the price of things you buy at that time.”?</b>						
	1 Strongly agree	2 Agree Somewhat	3 Undecided	4 Disagree	5 Strongly disagree	n
All	29.1%	50.3%	20.6%	--	--	175
Lecturer	20%	54%	26%	--	--	50

Business	38%	50%	12%	--	--	50
Student	32%	42%	26%	--	--	50
Other	24%	60%	16%	--	--	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

Related to inflation and income, question 10 represented in table 18) was included to see idea of inflation in people's minds. Despite the fact that most people might not account inflation as an important factor for income change, the following hypothetical question is not about what would happen to income if inflation occurs but the presence of inflationary obsession would depend on income. Around 20% of participants chose "undecided", almost other 80% agree with the statement that even if inflation occurs, it is not a really bad thing; it depends on your income compared to the price of things you buy at that time. Robert, (2011) designed a questionnaire about inflation and distributed it to three countries US, Germany and Brazil; he finally found that the answers appeared to be a presumption that inflation hurt real incomes. And 20% of respondents choosing undecided here generally said that if the increase in income is faster than the increase in prices of things, then inflation would never be a problem but what they worry about was if inflation occurs, it may hurt their income rather than support it.

**Table 19: Effect of automatically increasing price to overall economy**

<b>Q11. Do you agree with the following statement: "Increasing prices automatically hurt all sectors of an economy"?</b>						
	1 Strongly agree	2 Agree somewhat	3 Undecided	4 Disagree	5 Strongly disagree	n
All	4%	27.43%	23.43%	45.14%	--	175
Lecturer	--	24%	18%	58%	--	50
Business	10%	26%	26%	38%	--	50
Student	--	28%	26%	46%	--	50
Other	8%	36%	24%	32%	--	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

Regarding the statement above (see table 19), nearly 1/4 of the responses chose undecided. And yet, everybody knows that price is always a sensitive and complex issue in any economy. They also recognize that price is a "lever" of any economy in market mechanism that is considered to be a signal system on the market. Market price itself has two sides, one can encourage business, promote economic development if there is a reasonable price system. Conversely, the unreasonable operation price system might lead to recession, crisis and even might destroy the whole economic system. Thus, the negative side of price is that it can

allocate the resources of the economy in the wrong way. However, according to the opinion of a majority of the public, the price increase will not result in damage to the whole economy. As the results show, 58% of lecturers did not agree with the statement while in other groups, about 30 to 50% chose that answer. Many spoke of a distribution in price and cost. There are some goods in which the price increases higher than the input cost, then the profit in the field of producing also increases. Conversely, there are areas where the cost of inputs to production activities is higher than the selling price of goods, these areas hence will suffer. Interestingly, the answers are about equally distributed around two possibilities “agree” and “undecided”, almost nearly 30% for each one. The last group has the biggest number of respondents that agree with the statement, some of them are in strong agreement.

**Table 20: A bit more inflation would be a good thing**

<b>Q12. Do you agree with the following statement: “Inflation may redistribute income from lenders to borrowers and reduce the value of money, but moderate inflation does not seem to affect overall economic growth.”?</b>						
	1 Strongly agree	2 Agree somewhat	3 Neutral/no opinion	4 Disagree	5 Strongly disagree	n
All	24.5%	54.3%	8.6%	12.6%	--	175
Lecturer	16%	60%	--	20%	--	50
Business	6%	50%	12%	14%	--	50
Student	36%	48%	10%	6%	--	50
Other	20%	56%	16%	8%	--	25
<b>Q13. Do you agree with the following statement: “Regarding to economic point of view, it would be a good thing, not a bad if there is a bit more inflation”?</b>						
	1 Strongly agree	2 Agree somewhat	3 Neutral/no opinion	4 Disagree	5 Strongly disagree	n
All	25.1%	46.9%	15.4%	12.6%	--	175
Lecturer	--	76%	24%	--	--	50
Business	44%	38%	--	18%	--	50
Student	32%	24%	22%	22%	--	50
Other	24%	52%	16%	8%	--	25

Source: Author’s calculation, 2013.

\*Note: n is the number of respondents

As any other economic phenomenon, inflation is always a widely discussed public issue. In the thinking of majority of public, inflation has always been an obsession. However, just like everything else in life, everything has two sides - positive and negative which cannot be together but in different situation, their impact will definitely change and the same situation with inflation. More inflation would become a nightmare, but modest inflation would help to stimulate economic activities. By looking at the result above (see table 20), over half of

respondents agree with the statement that moderate inflation does not seem to affect to overall economic growth. The group of lecturers has the biggest percentage of people who do not agree with the given statement (20%). Interestingly, no one chose “disagree” for the next statement since 76% of lecturers chose “agree” and the left part of this group had no idea for this. In addition, regard to group of students, only 6% think that moderate inflation might affect overall economic growth but 56% agree with the statement that a bit more inflation would be a wonderful thing. The overall result of such two statements show that there is no more difference between other groups, the percentage of respondents for each answer is quite similar. Therefore, a contradiction is arisen since 78.8% of respondent do not think moderate inflation will affect economic growth but 72% of them suppose that it would be a good thing if there is a bit more inflation.

Krugman, (2012) affirmed that a bit more inflation would be a good thing. How so? A large part of the private sector has been crippled by the accumulated debts during the bubble years. However, the modest inflation would help to erode the real value of those debts and promote the private sector’s recovery. Therefore, the overhang of the accumulated debts would be reduced and the overall recovery would be promoted since moderate inflation has acted as a spur to investment.

**Table 21: Cause of rising prices**

<b>Q14. What do you think about the reason for the change of price level in recent years when you know that in fact level of price today is nearly triple times compared to level of price was in few years ago?</b>				
1. Due to a fundamental change in the nature of the economy				
2. Due to the gradual accumulation of the annual inflation over years				
3. Other				
	1	2	3	n
All	25.7%	59.4%	14.9%	175
Lecturer	18%	56%	26%	50
Business	24%	60%	16%	50
Student	38%	62%	--	50
Other	20%	60%	20%	25

Source: Author’s calculation, 2013.

\*Note: n is the number of respondents

In comparison to the past, the price rises month by month, year by year and the question here is what makes people think of this situation, due to change in the nature of the economy or simply just by accumulative inflation itself over years. Answering to question 14 in table 21, over half of respondents agree with the second statement (due to gradual accumulation of the

annual inflation over years), 25.7% chose the first statement (due to a fundamental change in the nature of the economy) and 14.9% chose none. In research paper that conducted by professor Robert, (1996), he found that 94% of professional economists thought that increase in prices over the years was caused by the gradual accumulation of annual inflation while 42% of the public is in favour of the fundamental change in the nature of the country's economy and 23% did not give the decision for this issue.

**Table 22: Inflation and unemployment**

<b>Q15. Do you agree with the following statement: “If the inflation in a country rise up then unemployment would rise”?</b>						
	1 Strongly agree	2 Agree somewhat	3 Neutral/no opinion	4 Disagree	5 Strongly disagree	N
All	6.29%	17.71%	12%	62.86%	1.14%	175
Lecturer	--	12%	8%	80%	--	50
Business	4%	8%	14%	70%	4%	50
Student	8%	22%	12%	58%	--	50
Other	20%	40%	16%	24%	--	25

Source: Author's calculation, 2013.

\*Note: n is the number of respondents

In the answering question 15 in table 22, over half of respondents (62.86%) chose disagree or no opinion, most of them did not think inflation would cause unemployment in Vietnam. In term of theoretical framework, the economist Phillips, A.W (1958) suggested “the trade off between inflation and unemployment”, accordingly a country can purchase a lower level of unemployment if willing to pay a higher inflation rate. Therefore, as the result shows, 62.86% of the participants have the same point of view with the economic theory which was given through empirical researches. All of them believe that when inflation goes up, the amount of money stored in “State treasury” will be used for financing domestic economic activities. This, hence create more jobs for people, contribute to reduce unemployment and of course, it also lead to inflation increase because reserve decreases, the heat of financial market is fluctuated in short term as a result of imbalance between money demand and money supply and one more reason that can be the closed tape of the real estate market due to the very special nature itself. However, the last group generally almost agrees with the given statement (60%). They said that as inflation raises, the consumer purchases will be decreased, thus when the demand reduces the business or enterprise will be adjusted to limit the supply to the market. This leads to the reduction of human resources in firms or factories, in other words, it leads to reduction of labor-demand then increases unemployment.



**Table 23: The symbol of economic strength and its decline**

<b>Q16. Do you agree with the following statement: “If the exchange rate of VND (Vietnamese currency) falls in comparison with currencies of other countries, it means that an important symbol of your economic strength is weakened.”?</b>						
	1 Strongly agree	2 Agree Somewhat	3 Neutral/no opinion	4 Disagree	5 Strongly disagree	N
All	42.86%	26.29%	17.71%	13.14%	--	175
Lecturer	48%	18%	20%	14%	--	50
Business	48%	30%	14%	8%	--	50
Student	24%	34%	20%	22%	--	50
Other	60%	20%	16%	4%	--	25

Source: Author’s calculation, 2013.

\*Note: n is the number of respondents

The above last question, represented in table 23 refers to the value of national currency that represents symbol of economic strength. As Pennar, (1995) stated, nothing can present a national prestige as strongly as a currency. Like the world’s most powerful currency US dollar - the recognizable symbol of the United States’ economic strength has long been a symbol of a world power. Similarly, one of the most valuable currencies Pound has also excellent performance throughout history. The Pound’s value was still keep in stability even during the very hard period when England had to face up with civil war or political chaos. It is hence argued that, due to strong currency for centuries, England had built the preeminent financial background, safety and reputable credit system throughout the 18<sup>th</sup> century. Go back to the question 16, the finding shows that there are 69.15% of respondents agree with the statement (42.86% of respondents are in strong agreement and 26.29% agree somewhat). Generally, Vietnamese people are quite serious about the international image of the country; they almost tend to think that strengthening national economy and prestige is important.

## **VI. CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Conclusions**

The study has been an attempt to explore the effect of inflation on economic growth in the context of Vietnam, using quarterly time series data for the period 1995:1 to 2012:4. The cointegration and error correction models have been used to examine long-term and short-term dynamics of the inflation-growth relationship. Furthermore, the vector autoregressive model has also been applied to discover the variability of inflation and economic growth in a short-term dynamics of two years. Findings of the study shows that there exists a statistically significant long-term positive relationship between inflation and economic growth in Vietnam and the sensitivity of growth to changes in inflation is greater than that of inflation to changes in growth. This firstly indicates that inflation is influenced by many other factors especially the variability in short-term. Secondly, persistent increase in inflation favours the economic growth, and therefore, it can be justified as the Tobin portfolio shift effect that rising inflation leads people to invest more in physical capital and cut their real balance holdings. On the other hand, the result also shows that inflation affects negatively the economic growth in short-term. Although in short-term, inflation affects negatively the growth but in long-term the correlation coefficient is still positive. This can be shown when inflation starts to signal a boom, with timely preventive measures of the government, the economy itself will adjust to be stable.

In the second part of the study, in order to understand the attitude of people toward inflation, a questionnaire is designed and distributed randomly to the people who live in Hanoi capital and Ho Chi Minh City. The obtained results shows the main perceived costs of inflation since the concerned people have mentioned that inflation hurts their living standard, price increases are not met with wage increases. Also, other concerns are that high inflation can cause anarchy and decline of currency value is harmful to national prestige. The interesting finding in this study is that despite the general public worry about inflation everywhere but they are almost always willing to pay a higher inflation rate to trade off lower unemployment rate. The outcome of the questionnaire gathering clearly showed that inflationary consequences have no strong impact on the high-income class but lower living standard people are more sensitive to inflation.

## 6.2 Recommendations

According to that research, instead of chasing the goal of maintaining the low inflation by any means, the government should focus on the policy of enhancing the growth to shorten industrialization and modernization period of the nation. On the other hand, it is obvious by the research that inflation is caused by many other factors, and therefore the government should carry out the suitable measures to stabilize inflation, to create a platform to push up economic growth sustainably, hence prevent inflation shock which is not beneficial for the economy. The demand and supply shocks are not the reasons for high inflation but they are the causes for increasing price in short term leading to permanent economic chaos. In the last 10 years of Viet Nam, CPI is affected significantly, which is mainly caused by the price of three main branches: food, accommodation and transportation, accounting for 60% of CPI growth monthly. The inflation in Viet Nam is not stable, especially after the economic crisis in 2008 since it is affected by a variety of fluctuated-price- goods (which accounts for more than 50% of CPI basket) hence causing difficulties in forecasting inflation as well as solutions to prevent inflation. To maintain stability of inflation trend as well as of the price market, it should maintain prices of various types of commodities relating to 4 commodity groups, in which ensuring stability of food, oil and petro, transportation fee, price adjustment policy of educational products is the most important.

Over the past years, the world has continuously been suffered from price shocks, especially the shock of oil price in 2008 and the shock of food price currently. These shocks are just temporary and short-term but causing a big change to general price. Thus, monetary policis targeting to restrict inflation also faces with many difficulties such as real trend of inflation can not be seen or they must be continuously changed.

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## VIII. APPENDIX

### Appendix 1: Data in log level

<i>Year</i>	GDPGR	INF	<i>Year</i>	GDPGR	INF	<i>Year</i>	GDPGR	INF
1995 Q1	11.36373	4.169228	2001 Q1	11.73287	4.387658	2007 Q1	12.14665	4.72284
1995 Q2	11.64463	4.205559	2001 Q2	12.03229	4.377882	2007 Q2	12.45596	4.741321
1995 Q3	11.51679	4.220452	2001 Q3	11.93896	4.377321	2007 Q3	12.41738	4.764384
1995 Q4	11.66972	4.227327	2001 Q4	12.0941	4.38348	2007 Q4	12.58604	4.794797
1996 Q1	11.44892	4.257852	2002 Q1	11.7961	4.41285	2008 Q1	12.21916	4.874668
1996 Q2	11.73045	4.267614	2002 Q2	12.09491	4.417351	2008 Q2	12.51254	4.960558
1996 Q3	11.60893	4.254047	2002 Q3	12.01178	4.419391	2008 Q3	12.4801	5.009168
1996 Q4	11.76295	4.26479	2002 Q4	12.16774	4.427104	2008 Q4	12.64008	5.006453
1997 Q1	11.52221	4.292375	2003 Q1	11.86248	4.451076	2009 Q1	12.24992	5.019035
1997 Q2	11.80717	4.285935	2003 Q2	12.16254	4.452654	2009 Q2	12.55584	5.025479
1997 Q3	11.6887	4.289927	2003 Q3	12.08259	4.44712	2009 Q3	12.53048	5.0331
1997 Q4	11.84539	4.302413	2003 Q4	12.24463	4.452654	2009 Q4	12.71359	5.051395
1998 Q1	11.57209	4.333699	2004 Q1	11.93013	4.493208	2010 Q1	12.3063	5.091349
1998 Q2	11.85656	4.360043	2004 Q2	12.2302	4.521568	2010 Q2	12.61693	5.106673
1998 Q3	11.7508	4.370276	2004 Q3	12.16098	4.539797	2010 Q3	12.59982	5.115492
1998 Q4	11.90708	4.386545	2004 Q4	12.32524	4.546996	2010 Q4	12.78442	5.15433
1999 Q1	11.60939	4.41885	2005 Q1	12.00193	4.579809	2011 Q1	12.36054	5.211772
1999 Q2	11.89942	4.409921	2005 Q2	12.30754	4.59906	2011 Q2	12.67232	5.283758
1999 Q3	11.8033	4.397614	2005 Q3	12.24955	4.612588	2011 Q3	12.66144	5.318714
1999 Q4	11.95885	4.385989	2005 Q4	12.4123	4.628583	2011 Q4	12.84917	5.335196
2000 Q1	11.66411	4.401459	2006 Q1	12.07285	4.659505	2012 Q1	12.40108	5.359575
2000 Q2	11.96444	4.385989	2006 Q2	12.37911	4.670343	2012 Q2	12.71798	5.365998
2000 Q3	11.87016	4.37479	2006 Q3	12.33368	4.682006	2012 Q3	12.71434	5.373458
2000 Q4	12.03179	4.381245	2006 Q4	12.49726	4.693534	2012 Q4	12.90307	5.402483

### Appendix 2: Unit Root Tests

#### ADF test

Null Hypothesis: <b>GDPGR</b> has a unit root							
Lag Length: 4 (Automatic based on SIC, MAXLAG=11)							
Exogenous:		<i>Constant</i>		<i>Constant, Linear Trend</i>		<i>None</i>	
		t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.716458	0.8351	-2.021341	0.5791	1.861528	0.9842
<i>Test critical values:</i>	1% level	-3.531592		-4.100935		-2.599934	
	5% level	-2.905519		-3.478305		-1.945745	
	10% level	-2.590262		-3.166788		-1.613633	

Null Hypothesis: <b>D(GDPGR)</b> has a unit root				
Exogenous: Constant				
Lag Length: 3 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.176823	0.2165
Test critical values:	1% level		-3.531592	
	5% level		-2.905519	
	10% level		-2.590262	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(GDPGR,2)				
Method: Least Squares				
Sample (adjusted): 1996Q2 2012Q4				
Included observations: 67 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-0.575137	0.264209	-2.176823	0.0333
D(GDPGR(-1),2)	-0.555218	0.198673	-2.794637	0.0069
D(GDPGR(-2),2)	-0.723029	0.134129	-5.390545	0.0000
D(GDPGR(-3),2)	-0.886267	0.067835	-13.06512	0.0000
C	0.008938	0.004510	1.981952	0.0519
R-squared	0.999791	Mean dependent var		0.006112
Adjusted R-squared	0.999777	S.D. dependent var		0.461609
S.E. of regression	0.006887	Akaike info criterion		-7.046689
Sum squared resid	0.002941	Schwarz criterion		-6.882160
Log likelihood	241.0641	Hannan-Quinn criter.		-6.981585
F-statistic	74112.56	Durbin-Watson stat		1.964307
Prob(F-statistic)	0.000000			

Null Hypothesis: <b>D(GDPGR)</b> has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 3 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.255649	0.4516
Test critical values:	1% level		-4.100935	
	5% level		-3.478305	
	10% level		-3.166788	
*MacKinnon (1996) one-sided p-values.				

Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(GDPGR,2)				
Method: Least Squares				
Sample (adjusted): 1996Q2 2012Q4				
Included observations: 67 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-0.623057	0.276221	-2.255649	0.0277
D(GDPGR(-1),2)	-0.519112	0.207737	-2.498893	0.0152
D(GDPGR(-2),2)	-0.698654	0.140248	-4.981581	0.0000
D(GDPGR(-3),2)	-0.874003	0.070901	-12.32700	0.0000
C	0.010829	0.005439	1.991248	0.0509
@TREND(1995Q1)	-2.86E-05	4.55E-05	-0.628994	0.5317
R-squared	0.999792	Mean dependent var		0.006112
Adjusted R-squared	0.999775	S.D. dependent var		0.461609
S.E. of regression	0.006921	Akaike info criterion		-7.023303
Sum squared resid	0.002922	Schwarz criterion		-6.825868
Log likelihood	241.2807	Hannan-Quinn criter.		-6.945178
F-statistic	58712.17	Durbin-Watson stat		1.953659
Prob(F-statistic)	0.000000			

Null Hypothesis: <b>D(GDPGR)</b> has a unit root				
Exogenous: None				
Lag Length: 3 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.202983	0.2076
Test critical values:	1% level		-2.599934	
	5% level		-1.945745	
	10% level		-1.613633	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(GDPGR,2)				
Method: Least Squares				
Sample (adjusted): 1996Q2 2012Q4				
Included observations: 67 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-0.060690	0.050450	-1.202983	0.2335
D(GDPGR(-1),2)	-0.941960	0.038203	-24.65691	0.0000
D(GDPGR(-2),2)	-0.983981	0.026183	-37.58101	0.0000
D(GDPGR(-3),2)	-1.018145	0.013495	-75.44792	0.0000
R-squared	0.999778	Mean dependent var		0.006112
Adjusted R-squared	0.999767	S.D. dependent var		0.461609
S.E. of regression	0.007045	Akaike info criterion		-7.015109

Sum squared resid	0.003127	Schwarz criterion	-6.883486
Log likelihood	239.0062	Hannan-Quinn criter.	-6.963025
Durbin-Watson stat	2.097687		

Null Hypothesis: <b>INF</b> has a unit root							
Lag Length: 5 (Automatic based on SIC, MAXLAG=11)							
Exogenous:		<i>Constant</i>		<i>Constant, Linear Trend</i>		<i>None</i>	
		t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.744752	1.0000	0.077467	0.9965	3.144127	0.9995
<i>Test critical values:</i>	1% level	-3.533204		-4.103198		-2.598416	
	5% level	-2.906210		-3.479367		-1.945525	
	10% level	-2.590628		-3.16704		-1.613.760	

Null Hypothesis: <b>D(INF)</b> has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)				
		t-Statistic	Prob.*	
Augmented Dickey-Fuller test statistic		-4.651095	0.0003	
Test critical values:	1% level	-3.527045		
	5% level	-2.903566		
	10% level	-2.589227		
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INF,2)				
Method: Least Squares				
Sample (adjusted): 1995Q3 2012Q4				
Included observations: 70 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.478690	0.102920	-4.651095	0.0000
C	0.008131	0.002730	2.977739	0.0040
R-squared	0.241348	Mean dependent var		-0.000104
Adjusted R-squared	0.230192	S.D. dependent var		0.019821
S.E. of regression	0.017391	Akaike info criterion		-5.237574
Sum squared resid	0.020566	Schwarz criterion		-5.173331
Log likelihood	185.3151	Hannan-Quinn criter.		-5.212056
F-statistic	21.63268	Durbin-Watson stat		1.747273
Prob(F-statistic)	0.000016			

Null Hypothesis: <b>D(INF)</b> has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 4 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.716502	0.0016
Test critical values:	1% level		-4.103198	
	5% level		-3.479367	
	10% level		-3.167404	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INF,2)				
Method: Least Squares				
Sample (adjusted): 1996Q3 2012Q4				
Included observations: 66 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.856157	0.181524	-4.716502	0.0000
D(INF(-1),2)	0.481557	0.170991	2.816274	0.0066
D(INF(-2),2)	0.185119	0.154145	1.200936	0.2346
D(INF(-3),2)	0.075991	0.126384	0.601268	0.5500
D(INF(-4),2)	0.400263	0.116106	3.447386	0.0010
C	0.000126	0.004239	0.029833	0.9763
@TREND(1995Q1)	0.000387	0.000129	2.999508	0.0040
R-squared	0.463277	Mean dependent var		0.000292
Adjusted R-squared	0.408694	S.D. dependent var		0.019842
S.E. of regression	0.015258	Akaike info criterion		-5.427485
Sum squared resid	0.013735	Schwarz criterion		-5.195249
Log likelihood	186.1070	Hannan-Quinn criter.		-5.335718
F-statistic	8.487708	Durbin-Watson stat		1.884122
Prob(F-statistic)	0.000001			

Null Hypothesis: <b>D(INF)</b> has a unit root				
Exogenous: None				
Lag Length: 11 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.474240	0.8144
Test critical values:	1% level		-2.604746	
	5% level		-1.946447	
	10% level		-1.613238	
*MacKinnon (1996) one-sided p-values.				

Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INF,2)				
Method: Least Squares				
Sample (adjusted): 1998Q2 2012Q4				
Included observations: 59 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	0.045681	0.096325	0.474240	0.6375
D(INF(-1),2)	-0.243570	0.168970	-1.441494	0.1561
D(INF(-2),2)	-0.601788	0.159527	-3.772332	0.0005
D(INF(-3),2)	-0.553297	0.163104	-3.392306	0.0014
D(INF(-4),2)	-0.381214	0.171852	-2.218266	0.0314
D(INF(-5),2)	-0.538556	0.161298	-3.338879	0.0017
D(INF(-6),2)	-0.451662	0.173315	-2.606021	0.0122
D(INF(-7),2)	-0.531044	0.154734	-3.431994	0.0013
D(INF(-8),2)	-0.184694	0.165873	-1.113466	0.2712
D(INF(-9),2)	-0.604018	0.149443	-4.041785	0.0002
D(INF(-10),2)	-0.359956	0.140661	-2.559028	0.0138
D(INF(-11),2)	-0.323679	0.143153	-2.261075	0.0284
R-squared	0.593630	Mean dependent var		-3.83E-05
Adjusted R-squared	0.498522	S.D. dependent var		0.019689
S.E. of regression	0.013943	Akaike info criterion		-5.528302
Sum squared resid	0.009137	Schwarz criterion		-5.105752
Log likelihood	175.0849	Hannan-Quinn criter.		-5.363356
Durbin-Watson stat	1.847270			

### PP test

Null Hypothesis: <b>GDPGR</b> has a unit root							
		Bandwidth: 24 (Newey-West using Bartlett kernel)		Bandwidth: 14 (Newey-West using Bartlett kernel)		Bandwidth: 12 (Newey-West using Bartlett kernel)	
Exogenous:		<i>Constant</i>		<i>Constant, Linear Trend</i>		<i>None</i>	
		Adj. t-Stat	Prob.*	Adj. t-Stat	Prob.*	Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.552784	0.0093	-22.77502	0.0001	2.586098	0.9974
<i>Test critical values:</i>	1% level	-3.525618		-4.092547		-2.597939	
	5% level	-2.902953		-3.474363		-1.945456	
	10% level	-2.588902		-3.164499		-1.613799	

Null Hypothesis: **D(GDPGR)** has a unit root  
 Exogenous: Constant  
 Bandwidth: 12 (Newey-West using Bartlett kernel)



			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-69.82675	0.0001
Test critical values:	1% level		-3.527045	
	5% level		-2.903566	
	10% level		-2.589227	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				0.021525
HAC corrected variance (Bartlett kernel)				0.002112
Phillips-Perron Test Equation				
Dependent Variable: D(GDPGR,2)				
Method: Least Squares				
Sample (adjusted): 1995Q3 2012Q4				
Included observations: 70 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-1.786545	0.073916	-24.17003	0.0000
C	0.033154	0.017849	1.857468	0.0676
R-squared	0.895736	Mean dependent var		-0.001317
Adjusted R-squared	0.894203	S.D. dependent var		0.457647
S.E. of regression	0.148857	Akaike info criterion		-0.943510
Sum squared resid	1.506766	Schwarz criterion		-0.879267
Log likelihood	35.02284	Hannan-Quinn criter.		-0.917992
F-statistic	584.1903	Durbin-Watson stat		2.128441
Prob(F-statistic)	0.000000			

			Adj. t-Stat	Prob.*
Null Hypothesis: <b>D(GDPGR)</b> has a unit root				
Exogenous: Constant, Linear Trend				
Bandwidth: 12 (Newey-West using Bartlett kernel)				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-69.20826	0.0001
Test critical values:	1% level		-4.094550	
	5% level		-3.475305	
	10% level		-3.165046	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				0.021516
HAC corrected variance (Bartlett kernel)				0.002113
Phillips-Perron Test Equation				
Dependent Variable: D(GDPGR,2)				
Method: Least Squares				
Sample (adjusted): 1995Q3 2012Q4				
Included observations: 70 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-1.786319	0.074461	-23.99009	0.0000
C	0.027602	0.037056	0.744876	0.4590

@TREND(1995Q1)	0.000152	0.000887	0.171335	0.8645
R-squared	0.895782	Mean dependent var		-0.001317
Adjusted R-squared	0.892671	S.D. dependent var		0.457647
S.E. of regression	0.149931	Akaike info criterion		-0.915376
Sum squared resid	1.506106	Schwarz criterion		-0.819012
Log likelihood	35.03817	Hannan-Quinn criter.		-0.877099
F-statistic	287.9404	Durbin-Watson stat		2.129769
Prob(F-statistic)	0.000000			

Null Hypothesis: <b>D(GDPGR)</b> has a unit root				
Exogenous: None				
Bandwidth: 14 (Newey-West using Bartlett kernel)				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-27.32953	0.0000
Test critical values:	1% level		-2.598416	
	5% level		-1.945525	
	10% level		-1.613760	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				0.022617
HAC corrected variance (Bartlett kernel)				0.015889
Phillips-Perron Test Equation				
Dependent Variable: D(GDPGR,2)				
Method: Least Squares				
Sample (adjusted): 1995Q3 2012Q4				
Included observations: 70 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPGR(-1))	-1.775575	0.074976	-23.68186	0.0000
R-squared	0.890446	Mean dependent var		-0.001317
Adjusted R-squared	0.890446	S.D. dependent var		0.457647
S.E. of regression	0.151477	Akaike info criterion		-0.922588
Sum squared resid	1.583216	Schwarz criterion		-0.890467
Log likelihood	33.29059	Hannan-Quinn criter.		-0.909829
Durbin-Watson stat	2.045785			

Null Hypothesis: <b>INF</b> has a unit root							
		Bandwidth: 1 (Newey-West using Bartlett kernel)		Bandwidth: 1 (Newey-West using Bartlett kernel)		Bandwidth: 3 (Newey-West using Bartlett kernel)	
Exogenous:		<i>Constant</i>		<i>Constant, Linear Trend</i>		<i>None</i>	
		Adj. t-Stat	Prob.*	Adj. t-Stat	Prob.*	Adj. t-Stat	Prob.*
Phillips-Perron test statistic		2.438603	1.0000	-0.272603	0.9900	5.538287	1.0000
<i>Test</i>	1% level	-3.525618		-4.092547		-2.597939	

<i>critical value</i> s:	5% level	-2.902953		-3.474363		-1.945456	
	10% level	-2.588902		-3.164499		-1.613799	

Null Hypothesis: <b>D(INF)</b> has a unit root				
Exogenous: Constant				
Bandwidth: 6 (Newey-West using Bartlett kernel)				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-4.622154	0.0003
Test critical values:	1% level		-3.527045	
	5% level		-2.903566	
	10% level		-2.589227	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				0.000294
HAC corrected variance (Bartlett kernel)				0.000287
Phillips-Perron Test Equation				
Dependent Variable: D(INF,2)				
Method: Least Squares				
Sample (adjusted): 1995Q3 2012Q4				
Included observations: 70 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.478690	0.102920	-4.651095	0.0000
C	0.008131	0.002730	2.977739	0.0040
R-squared	0.241348	Mean dependent var		-0.000104
Adjusted R-squared	0.230192	S.D. dependent var		0.019821
S.E. of regression	0.017391	Akaike info criterion		-5.237574
Sum squared resid	0.020566	Schwarz criterion		-5.173331
Log likelihood	185.3151	Hannan-Quinn criter.		-5.212056
F-statistic	21.63268	Durbin-Watson stat		1.747273
Prob(F-statistic)	0.000016			

Null Hypothesis: <b>D(INF)</b> has a unit root				
Exogenous: Constant, Linear Trend				
Bandwidth: 11 (Newey-West using Bartlett kernel)				
			Adj. t-Stat	Prob.*
Phillips-Perron test statistic			-4.843817	0.0010
Test critical values:	1% level		-4.094550	
	5% level		-3.475305	
	10% level		-3.165046	
*MacKinnon (1996) one-sided p-values.				
Residual variance (no correction)				0.000274
HAC corrected variance (Bartlett kernel)				0.000124

Phillips-Perron Test Equation				
Dependent Variable: D(INF,2)				
Method: Least Squares				
Sample (adjusted): 1995Q3 2012Q4				
Included observations: 70 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INF(-1))	-0.563658	0.107052	-5.265273	0.0000
C	0.000884	0.004196	0.210621	0.8338
@TREND(1995Q1)	0.000239	0.000107	2.229709	0.0291
R-squared	0.293754	Mean dependent var		-0.000104
Adjusted R-squared	0.272672	S.D. dependent var		0.019821
S.E. of regression	0.016904	Akaike info criterion		-5.280581
Sum squared resid	0.019146	Schwarz criterion		-5.184217
Log likelihood	187.8204	Hannan-Quinn criter.		-5.242304
F-statistic	13.93388	Durbin-Watson stat		1.745825
Prob(F-statistic)	0.000009			

Null Hypothesis: <b>D(INF)</b> has a unit root			
Exogenous: None			
Bandwidth: 8 (Newey-West using Bartlett kernel)			
		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.457798	0.0008
Test critical values:	1% level	-2.598416	
	5% level	-1.945525	
	10% level	-1.613760	
*MacKinnon (1996) one-sided p-values.			
Residual variance (no correction)			0.000332
HAC corrected variance (Bartlett kernel)			0.000353
Phillips-Perron Test Equation			
Dependent Variable: D(INF,2)			
Method: Least Squares			
Sample (adjusted): 1995Q3 2012Q4			
Included observations: 70 after adjustments			
Variable	Coefficient	Std. Error	t-Statistic
D(INF(-1))	-0.279963	0.082695	-3.385485
R-squared	0.142423	Mean dependent var	-0.000104
Adjusted R-squared	0.142423	S.D. dependent var	0.019821
S.E. of regression	0.018356	Akaike info criterion	-5.143577
Sum squared resid	0.023248	Schwarz criterion	-5.111456
Log likelihood	181.0252	Hannan-Quinn criter.	-5.130818
Durbin-Watson stat	1.861961		

**KPSS test**

Null Hypothesis: <b>GDPGR</b> is stationary				
		Bandwidth: 6 (Newey-West using Bartlett kernel)	Bandwidth: 12 (Newey-West using Bartlett kernel)	Bandwidth: 12 (Newey-West using Bartlett kernel)
Exogenous:		<i>Constant</i>	<i>Constant, Linear Trend</i>	<i>None</i>
		LM-Stat.	LM-Stat.	LM-Stat.
Kwiatkowski-Phillips- Schmidt-Shin test statistic		1.146087	0.067222	0.077202
<i>Asymptotic critical values*</i> :	1% level	0.739000	0.216000	0.739000
	5% level	0.463000	0.146000	0.463000
	10% level	0.347000	0.119000	0.347000

Null Hypothesis: <b>D(GDPGR)</b> is stationary			
Exogenous: Constant, Linear Trend			
Bandwidth: 12 (Newey-West using Bartlett kernel)			
			LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic			0.077203
<i>Asymptotic critical values*</i> :	1% level		0.216000
	5% level		0.146000
	10% level		0.119000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)			

Null Hypothesis: <b>INF</b> is stationary				
		Bandwidth: 6 (Newey-West using Bartlett kernel)	Bandwidth: 6 (Newey-West using Bartlett kernel)	Bandwidth: 4 (Newey-West using Bartlett kernel)
Exogenous:		<i>Constant</i>	<i>Constant, Linear Trend</i>	<i>None</i>
		1.051664	LM-Stat.	LM-Stat.
Kwiatkowski-Phillips- Schmidt-Shin test statistic		0.739000	0.277270	0.570289
<i>Asymptotic critical values*</i> :	0.463000	0.739000	0.216000	0.739000
	0.347000	0.463000	0.146000	0.463000
	0.739000	0.347000	0.119000	0.347000

Null Hypothesis: <b>D(INF)</b> is stationary			
Exogenous: Constant, Linear Trend			
Bandwidth: 1 (Newey-West using Bartlett kernel)			
			LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic			0.106486
Asymptotic critical values*:	1% level		0.216000
	5% level		0.146000
	10% level		0.119000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)			

### Appendix 3: VAR Lag Order Selection Criteria

VAR system, maximum lag order 6					
The asterisks below indicate the best (that is, minimized) values of the respective information criteria, AIC = Akaike criterion, BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion.					
lags	loglik	p(LR)	AIC	BIC	HQC
1	129.66418		-3.747399	-3.548340	-3.668741
2	129.67000	0.91405	-3.717273	-3.485037	-3.625505
3	164.59335	0.00000	-4.745253	-4.479840	-4.640376
4	212.35252	0.00000	-6.162198	-5.863608	-6.044211
5	244.57351	0.00000	-7.108288*	-6.713052	-6.977192*
6	244.57383	0.97983	-7.077995	-6.713052	-6.933789

### Appendix 4: Cointegrating Regression

OLS, using observations 1995:1-2012:4 (T = 72)

Dependent variable: GDPGR

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	7.72623	0.275264	28.0684	<0.00001	***
INF	0.950379	0.0591643	16.0634	<0.00001	***

Mean dependent var	12.13492		S.D. dependent var	0.384495
Sum squared resid	2.239862		S.E. of regression	0.178880
R-squared	0.786607		Adjusted R-squared	0.783558
F(1, 70)	258.0330		P-value(F)	3.55e-25
Log-likelihood	22.76550		Akaike criterion	-41.53100
Schwarz criterion	-36.97767		Hannan-Quinn	-39.71831
rho	0.021402		Durbin-Watson	1.909315

OLS, using observations 1995:1-2012:4 (T = 72)

Dependent variable: INF

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-5.40491	0.625569	-8.6400	<0.00001	***
GDPGR	0.827677	0.0515256	16.0634	<0.00001	***

Mean dependent var	4.638882		S.D. dependent var	0.358817
Sum squared resid	1.950675		S.E. of regression	0.166933
R-squared	0.786607		Adjusted R-squared	0.783558
F(1, 70)	258.0330		P-value(F)	3.55e-25
Log-likelihood	27.74209		Akaike criterion	-51.48418
Schwarz criterion	-46.93085		Hannan-Quinn	-49.67149
rho	0.229175		Durbin-Watson	1.522533

## Appendix 5: Error Correction Model

Dependent variable:  $\Delta$ GDPGR

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	0.0251074	0.0179743	1.3969	0.16863	
$\Delta$ INF	-0.0854005	0.0649143	-1.3156	0.19431	
$\Delta$ INF <sub>t-1</sub>	0.0346096	0.086605	0.3996	0.69113	
$\Delta$ INF <sub>t-2</sub>	0.0040281	0.0872165	0.0462	0.96335	
$\Delta$ INF <sub>t-3</sub>	-0.176264	0.0881743	-1.9990	0.05105	*
$\Delta$ INF <sub>t-4</sub>	-0.0210082	0.0919538	-0.2285	0.82022	
$\Delta$ INF <sub>t-5</sub>	0.0962495	0.0678248	1.4191	0.16208	
EC term (lag=1)	0.0228294	0.00835911	2.7311	0.00870	***
S <sub>1</sub>	-0.0209479	0.0348357	-0.6013	0.55033	
S <sub>2</sub>	-0.0136448	0.00893532	-1.5271	0.13305	
S <sub>3</sub>	0.00158527	0.0343794	0.0461	0.96341	
$\Delta$ GDPGR <sub>t-1</sub>	-0.408752	0.139704	-2.9258	0.00515	***
$\Delta$ GDPGR <sub>t-2</sub>	-0.223643	0.0772734	-2.8942	0.00562	***
$\Delta$ GDPGR <sub>t-3</sub>	-0.221782	0.0771654	-2.8741	0.00593	***
$\Delta$ GDPGR <sub>t-4</sub>	0.768074	0.0784556	9.7899	<0.00001	***
$\Delta$ GDPGR <sub>t-5</sub>	0.16177	0.128586	1.2581	0.21421	

Mean dependent var	0.017767		S.D. dependent var	0.243370
Sum squared resid	0.001821		S.E. of regression	0.006035
R-squared	0.999527		Adjusted R-squared	0.999385
F(15, 50)	7042.597		P-value(F)	1.19e-77
Log-likelihood	252.7790		Akaike criterion	-473.5580
Schwarz criterion	-438.5236		Hannan-Quinn	-459.7143
rho	-0.045886		Durbin-Watson	2.086010

## Appendix 6: VAR system

Equation 1:  $\Delta$ GDPGR

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
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const	0.025639	0.0178277	1.4382	0.15606	
$\Delta\text{GDPGR}_{t-1}$	-0.160556	0.067872	-2.3656	0.02155	**
$\Delta\text{GDPGR}_{t-2}$	-0.171471	0.0685253	-2.5023	0.01534	**
$\Delta\text{GDPGR}_{t-3}$	-0.163326	0.0674469	-2.4215	0.01878	**
$\Delta\text{GDPGR}_{t-4}$	0.812969	0.0723873	11.2308	<0.00001	***
$\Delta\text{INF}_{t-1}$	-0.0249367	0.0646225	-0.3859	0.70107	
$\Delta\text{INF}_{t-2}$	0.0156051	0.0873931	0.1786	0.85894	
$\Delta\text{INF}_{t-3}$	-0.201788	0.088771	-2.2731	0.02695	**
$\Delta\text{INF}_{t-4}$	0.0791862	0.0657123	1.2050	0.23335	
S1	-0.0355987	0.0334918	-1.0629	0.29247	
S2	-0.00316837	0.00734139	-0.4316	0.66774	
S3	-0.0117269	0.0330004	-0.3554	0.72368	

Mean dependent var	0.021704	S.D. dependent var	0.243659
Sum squared resid	0.002163	S.E. of regression	0.006270
R-squared	0.94480	Adjusted R-squared	0.999338
F(11, 55)	9054.710	P-value(F)	2.20e-85
rho	-0.112526	Durbin-Watson	2.208525

### Equation 2: $\Delta\text{INF}$

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-0.0392972	0.0378319	-1.0387	0.30347	
$\Delta\text{GDPGR}_{t-1}$	0.0292905	0.14403	0.2034	0.83960	
$\Delta\text{GDPGR}_{t-2}$	0.188376	0.145416	1.2954	0.20058	
$\Delta\text{GDPGR}_{t-3}$	0.100759	0.143128	0.7040	0.48441	
$\Delta\text{GDPGR}_{t-4}$	0.160303	0.153612	1.0436	0.30125	
$\Delta\text{INF}_{t-1}$	0.934687	0.137134	6.8159	<0.00001	***
$\Delta\text{INF}_{t-2}$	-0.332978	0.185455	-1.7955	0.07807	*
$\Delta\text{INF}_{t-3}$	0.0481553	0.188379	0.2556	0.79919	
$\Delta\text{INF}_{t-4}$	-0.00076703	0.139447	-0.0055	0.99563	
S1	0.0919478	0.0710723	1.2937	0.20117	
S2	-0.0334165	0.015579	-2.1450	0.03639	**
S3	0.0916903	0.0700294	1.3093	0.19587	

Mean dependent var	0.017084	S.D. dependent var	0.020611
Sum squared resid	0.009738	S.E. of regression	0.013306
R-squared	0.652650	Adjusted R-squared	0.583180
F(11, 55)	9.394713	P-value(F)	3.29e-09
rho	-0.000229	Durbin-Watson	1.967821