AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP AND TRANSMISSION MECHANISM BETWEEN INFLATION AND ECONOMIC GROWTH: THE CASE OF INDONESIA, 1980-2012

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ABSTRAK

Banyak ekonom sepakat bahwa tingkat inflasi yang tinggi menghambat pertumbuhan ekonomi, rendahnya konsensus tentang hubungan yang tepat antara inflasi dan kinerja ekonomi, dan mekanisme inflasi yang mempengaruhi kegiatan ekonomi di tingkat makro. Tujuan utama dari penelitian ini adalah untuk mengetahui adakah hubungan yang bermakna antara inflasi dan pertumbuhan ekonomi dalam kasus Indonesia dan untuk lebih memastikan mekanisme transmisi dimana inflasi mempengaruhi pertumbuhan ekonomi. Sebagian besar analisis dilakukan dengan menggunakan pandangan ekonometrik (Eviews7). Sebuah tes stasioneritas dilakukan dengan menggunakan Augmented Dickey-Fuller (ADF) test dengan tujuan mencari tahu urutan integrasi seri individu yang sedang dipertimbangkan. GDP dan CPI yang digunakan sebagai proxy yang sempurna untuk pertumbuhan ekonomi dan inflasi masing-masing ditemukan stasioner setelah first difference. Dua variabel juga ditemukan berkointegrasi dan setelah menjalankan tes Kausalitas Granger melalui VECM, sebuah kausalitas searah jangka panjang dari pertumbuhan ekonomi terhadap inflasi terdeteksi. Atas dasar fungsi impuls respon (IRF) dan jangka panjang kointegrasi persamaan, itu juga ditemukan bahwa inflasi dan pertumbuhan ekonomi menunjukkan hubungan terbalik baik dalam jangka pendek dan jangka panjang. Semua peristiwa ini menunjukkan bahwa hubungan yang bermakna antara pertumbuhan ekonomi dan inflasi memang ada.

Hasil mekanisme transmisi menunjukkan bahwa jika inflasi meningkat sebesar 1%, tingkat investasi menurun dengan 0,091680% sedangkan produktivitas faktor total (TFP) menurun dengan 0,003295% maka mengkonfirmasikan postulasi literatur teoritis dan empiris bahwa tingkat investasi dan TFP memang bertindak sebagai saluran transmisi dari inflasi ke pertumbuhan ekonomi.

Kata kunci: *Inflasi, Pertumbuhan Ekonomi, Indonesia, Kointegrasi, Kausalitas Granger, mekanisme Transmisi, Tingkat investasi, TFP.*

ABSTRACT

Much as economists seem to be in total agreement that high rates of inflation impede economic growth, there is less consensus about the precise relationship between inflation and economic performance, and the mechanism by which inflation affects economic activity at the macroeconomic level. The cardinal aim of this study was henceforth to find out if a meaningful relationship does exist between inflation and economic growth in Indonesia's case and to further ascertain the transmission mechanism by which inflation affects economic growth. Most of the analyses herein were done using Econometric Views (Eviews7). A stationarity test was carried out using the Augmented Dickey-Fuller (ADF) test with the aim of finding out the order of integration of the individual series under consideration. GDP and CPI which were used as perfect proxies for economic growth and inflation respectively were found to be stationary after first difference. The two variables were also found to be Cointegrated and upon running Granger Causality tests under VECM environment, a long-run unidirectional causality from economic growth to inflation was detected. On the basis of the impulse response function (IRF) and the long-run Cointegrating equations, it was also found out that inflation and economic growth exhibit an inverse relationship both in the short and long-run. All these events showed that a meaningful relationship between economic growth and inflation does exist.

The results of the transmission mechanism showed that if inflation increases by 1%, the level of investment decreases by 0.091680% whereas total factor productivity (TFP) decreases by 0.003295% hence confirming the theoretical and empirical literature postulations that the level of investment and TFP indeed serve as transmission channels from inflation to economic growth.

Keywords: *Inflation, Economic Growth, Indonesia, Cointegration, Granger Causality, Transmission mechanism, Level of investment, TFP.*

INTRODUCTION:

Indonesia is the Southeast Asia's biggest economy and a member of the G-20 major economies. It is classified as a newly industrialized country. The country is the world's largest archipelago state comprising 17,508 islands. It is the fourth most populated country in the world with a population of over 238 million people on its 34 provinces. Indonesia is a country that is well endowed with so many natural resources and raw materials. The country has been enjoying relatively high rates of economic growth but the rates of inflation have also been equally high. This study henceforth aims at empirically ascertaining whether a meaningful relationship between economic growth and inflation holds in Indonesia's case and further investigate the transmission mechanism by which inflation affects economic activity at macroeconomic level. The Indonesian economy has been doing so well to the extent that the only time since 1980 when the country witnessed extremely low and negative economic growth rates was in 1997-1999 due to the Asian financial crisis of 1997-98. Nevertheless, Indonesia's good economic growth has been accompanied by sustained problems of inflation. Indonesia experienced rapid economic growth and transformation since the late 1960s but the country also experienced moderately high and volatile inflation for most of the period since the 1950s. Such volatility originated from both policy reasons and supply/external shocks to an increasingly open economy. It remains an issue whether inflation has had any impact on economic growth in Indonesia (Hossain, 2005). On June 22, 2013, the Indonesian government removed the subsidies on refined oil, locally called *Bahan Bakar Minyak* (BBM) with the aim of dealing with the budget and current account deficits that were putting pressure on the country's currency, the rupiah. Consequently, fuel prices shot up and there is further fear that the country might face its highest inflation rate in years. By July 2013, the second round effects of fuel price hikes of June 2013 were already hitting the country severely. Generally, the level and volatility of Indonesia's inflation rate have historically been higher than some of its peer emerging nations. Following the Asian financial crisis in 1997-98, Indonesia adopted inflation targeting in the subsequent years. According to IMF, (2012), Indonesia started inflation targeting in 2005 and its target has rotated around 5 +/- 1 percent and 4 +/-1 percent but those targets have always been missed. Actual inflation has always been higher than the targeted inflation. Muhammad, A., Imran, S.C., and Fatima, F. (2011) assert that high and sustained economic growth with low inflation is the central objective of the macroeconomic policymakers. According to Vikesh, G., and Subrina, H. (2004), it is not surprising that there has been considerable debates on the existence and nature of the inflation and growth relationship. Some consensus exists, suggesting that macroeconomic stability, specifically defined as low inflation, is positively related to economic growth.

LITERATURE REVIEW:

The controversial nature of the relationship between inflation and economic growth is not only found in the theoretical underpinnings but in the empirical findings too. Economic theories about the inflation-economic growth relationship are in stark contrast as they reach a variety of conclusions about the responsiveness of output growth to inflation and so are the empirical studies. The studies on this topic carried out on various countries also give varying results. At this juncture, it suffices to say that no single theory or empirical study can fully and satisfactorily explain the relationship between inflation and economic growth as it is going to be seen below.

Theoretical literature review.

Theoretical models mainly examine the effects of inflation on economic growth with the attention on the impacts of inflation on the steady state investment and output but with differing results ranging from the nature of the relationship between these two variables being positive, neutral, negative or nonlinear. The economic theories explaining the inflation-growth nexus are as follows;

1. Neo-classical growth theory.

The neoclassical growth model is also sometimes called the Solow–Swan growth model or exogenous growth model. It is a class of economic models of long-run economic growth set within the framework of neoclassical economics. This model attempts to explain long-run economic growth by looking at productivity, capital accumulation, population growth, and technological progress. The neo-classical model is an extension of the 1946 Harrod–Domar model that coins a new terminology called productivity growth. The main contributors to this model are Robert Solow and T.W. Swan who independently developed relatively simple growth models in 1956. The key assumption of the neoclassical growth model is that capital is subject to

diminishing returns in a closed economy. The model exhibits diminishing returns to labour and capital separately and constant returns to both factors jointly. In this model, the key determinant of long-run growth is no longer investment (growth of capital) but technological progress. According to Todaro (2000), this technological progress is assumed by Solow and other growth theorists to be independent of all other factors including inflation, i.e. it is exogenously determined. There are many models under neo-classical growth theory which include;

a) Mundell model.

Among the first neo-classical economists to formulate a mechanism relating inflation and output growth independent from excess demand of commodities was Mundell (1963). According to Mundell's model, an increase in inflation or inflation expectations immediately reduce people's wealth. This is based on the premise that inflation has the negative effect of reducing the rate of return on individual's real money balances. Under such situation, Mundell postulates that people have got to save more by switching to assets if they are to accumulate the desired wealth. The higher demand for assets leads to an increase in their prices but a decrease in the real interest rate. If people are saving more by switching to assets, it means there is greater capital accumulation and thus faster growth of output.

b) The Tobin effect.

James Tobin was another neoclassical economist who developed the Mundell's model further on the basis of the Solow–Swan growth model in making money a store of value in the economy. According to Tobin, J. (1965), people substitute current consumption for future consumption by either holding money or acquiring capital implying that individuals hold money for precautionary reasons despite capital offering a higher rate of return. Tobin effect suggests that inflation causes individuals to acquire more capital than holding money. This is because inflation reduces the return to money hence making people to substitute away from money, with its lower return, and move towards capital. According to Tobin's portfolio mechanism, this results in a higher steady state capital stock. Higher inflation rate permanently raises the level of output according to Tobin's framework but the effect on output growth is temporary, occurring during the transition from one steady state capital stock to the new steady state capital stock. Inflation's effect on growth can be viewed as having a "lazy dog effect" where it induces greater capital accumulation and higher growth, only until the return to capital falls. This means that when the return to capital begins falling, higher investment stops but the steady state growth will continue. In short, the Tobin effect postulates a positive relationship between inflation and economic growth as people substitute away from money into interest earning assets, which leads to greater capital accumulation and the promotion of economic growth.

c) Sidrauski model.

Sidrauski (1967) is another neoclassical economist who contributed greatly to understanding the nature of the relationship between inflation and economic growth. He analyzes the super-neutrality of money in his seminal work on the context of an infinitely-lived representative agent model. Super-neutrality holds when real variables, including the growth rate of output, are independent of the growth rate in the money supply in the long run. To Sidrauski, the steady state capital stock is unaffected by an increase in the rate of inflation because the representative individual's real discount rate is unaffected by inflation. This implies that neither output nor economic growth is affected by inflation.

d) Stockman model.

Stockman (1981) is yet another neoclassical economist who developed a cash in advance constraint model (a requirement that each consumer or firm must have sufficient cash available before they can buy goods) where money is viewed as a capital complement accounting for a negative relationship between the steady-state level of output and the inflation rate. This means that an increase in inflation leads to a lower steady state level of output and people's welfare declines too. Stockman bases his argument on the premise that firms always provide in advance (put up or hold) some funds for financing their investment projects and even if the investment money is got directly as a bank loan, banks also quite often demand compensating balances. All in all, money for investment projects is held at some time and in case there is a high rate of inflation during such a time, the real purchase of investment and other goods reduces since inflation reduces the purchasing power of money balances. In other words, increase in the inflation rate results in a lower steady state level of output implying that inflation is harmful to economic growth. As seen above, we have many models under neoclassical growth theory trying to explain

the inflation-economic growth nexus. However, there is no ultimate consensus among these models on the exact nature of the relationship between inflation and economic growth. Various models give differing results. According to the Mundell model and the Tobin effect, a rise in inflation can lead to increased output. The Stockman effect on the other hand shows that output reduces when inflation rises while the Sidrauskic model shows that inflation is harmless to economic growth.

2. Classical growth theory.

Classical growth theory emphasises the pivotal role of saving and investment if growth is to be achieved. This theory is in agreement with the supply side theory which asserts that bolstering an economy's ability to supply more goods is the most effective way to stimulate economic growth. Many growth theories have been credited to classical theorists and as such, the foundation of this particular classical growth model was laid by Adam Smith. Smith constructed a supply-side driven model where growth is a function of labour, capital, and land. This production function is as follows; Y = f (L, K, T) Where; Y is output, L is labour, K is capital, and T is land. This means that the drivers of output growth (gY) are; Population growth (gL), investment (gK), land growth (gT), and the overall increase in productivity (gf). In short, gy = ϕ (gf,gk, gL, gT). To Smith, growth exhibits increasing returns to scale therefore it is self-reinforcing. He opined that saving led to investment hence growth implying that income distribution was a major determinant of a country's growth. Smith posits that the major reason profits decline is because of the capitalists' competition for workers which pushes the wages up meaning that the decreasing marginal productivity is not responsible for the reduction of profits. As such, the relationship between inflation and growth is not explicitly stated but it is implicitly suggested to be negative because higher wage costs lead to a decrease in a firm's profits.

3. The Keynesian theory.

To illustrate the growth-inflation relationship, the traditional Keynesian model makes use of the aggregate demand (*AD*) and aggregate supply (*AS*) curves. The critical feature of this model is that in the short run, the AS curve is upward sloping but vertical in the long run. According to Dornbusch, et al, (1996), the upward slope of the AS curve implies that changes in aggregate demand affect both prices and output while if the AS curve is vertical, only prices are affected by the changes in aggregate demand. In the short run, prices and output are affected by many factors like; expectations, labour forces, monetary policies, prices of other products, fiscal policies etc. It is assumed that the factors that affect output and prices in the short run and their shock on the steady state of the economy balance out when moving from the short-run to the hypothetical long-run. Nothing changes in the steady state. The short-run aggregate demand and aggregate supply curves dynamic adjustment gives rise to an adjustment path which exhibits an initial positive relationship between inflation and growth but turns negative towards the end of the adjustment path. Time inconsistency problem is always responsible for the initial positive relationship between the two variables. The concept of time inconsistency has it that producers feel that only the prices of their products have increased while the other producers are operating at the same price level yet in reality, overall prices have risen hence the producer continues to produce more and output continues to rise. The positive relationship can also be due to agreements by some firms to supply goods at a later date at an agreed price hence even if the prices of goods in the economy have increased, output would not decline, as the producer has to respect the agreement made with the consumers of supplying the goods at a later date (Blanchard and Kiyotaki, 1987). The negative relationship between the two variables at the end of the adjustment path has been evidenced in many empirical studies. This phenomenon where inflation is rising and output is decreasing or remains stable leading to a rise in unemployment is called stagflation. It should be noted that inflation does not abruptly rise in the economy but it rather follows a transition path where it rises and then falls. The Keynesian model a nutshell postulates a short-run trade-off between output and inflation but not a permanent trade-off between the two variables.

4. Money and Monetarism.

The theory of monetarism pays more attention on the long-run supply features of the economy and not the short-run dynamics. The term Monetarism was coined by Milton Friedman who emphasised several important properties of an economy. Important among these properties is neutrality of money and the quantity theory of money. Under the quantity theory of money, the two variables are linked by equating the total amount of spending in the economy to the total amount of money in existence. To Friedman, inflation in the economy is a result of an increase in money supply or its velocity at a rate greater than the rate of

growth in the economy. Consequently, the concept of the Phillips curve was brought into question by Milton Friedman who based his argument on the premise that during inflation, the cost of everything doubles in the economy. Much as consumers have to pay twice as much for goods and services, they do not mind because their wages have doubled too. It is further assumed that individuals are rational to the extent that they clearly anticipate the future inflation and incorporate it in their consumption decisions. This means that employment and output are not affected during inflation according to this school of thought, a concept termed by economists as the neutrality of money. Neutrality holds if an increase in the money stock leads to a proportional and permanent increase in prices and leaves real economic activity (such as output, investment and employment) unaffected. So, a rise in the steady growth rate of the money stock is said to lead to an identical rise in the steady growth rate of prices in the long run while super-neutrality holds if changes in the growth rate of the money supply exert no effects on output. In other words, the hypothesis of the superneutrality of money would say that economic activity is *independent* of money growth in the long-run. If at all inflation works in this way, then it is harmless, i.e. it has no impact on economic growth. Neutrality of money is an important idea in that it implies the central bank does not affect the real economy (e.g., the number of jobs, the size of real GDP, the amount of real investment) by printing money. Rather, any increase in the supply of money would be offset by an equal rise in prices and wages. In a nutshell, the theory of monetarism is of the view that in the long run, inflation has no effect on growth and that prices are driven up mainly by the growth of money supply implying that inflation is bound to occur should the growth rate of money supply outweigh economic growth rate.

5. Endogenous growth theory.

This theory is concerned with economic growth that is generated by factors within the production process. Such endogenous factors include increasing returns to scale, economies of scale, induced technological change etc. According to this theory, the economic growth rate depends on one variable: the rate of return on capital. Variables like inflation decrease the rate of return on capital and this in turn reduces capital accumulation and hence reduces the growth rate. Other endogenous growth models explain growth further by asserting that investment in human capital, innovation, and knowledge are significant contributors to economic growth. Such models imply that growth depends on both the rate of return on human capital, as well as physical capital. In a balanced-growth equilibrium where all variables like the capital stock, real GDP, and output per worker are assumed to be growing at a constant rate, the rate of return on all forms of capital must be equal. Inflation is assumed to act as a tax hence reduces the return on all capital. A tax on capital income directly reduces the growth rate while a tax on human capital leads to the substitution of leisure for labour which lowers the rate of return on human capital and can also lower the growth rate. Indeed, when such endogenous growth models are set within a monetary exchange framework of Lucas (1980), Lucas and Stokey (1987), or McCallum and Goodfriend (1987), the inflation rate (tax) lowers both the return on all capital and the growth rate. However, to some versions of the endogenous economies, the impact of inflation on economic growth is very minimal. For example, Gomme (1993) found that eliminating a moderate inflation rate of for example 10 percent results in only a very small gain in the growth of output of less than 0.01 percentage point. Some endogenous growth models like Marquis and Reffert (1995) and Haslag (1995) seek to analyse how inflation might directly affect capital accumulation and hence output growth. In their analysis, money and capital are treated as complementary goods. Marquis and Reffert analyse the effects of inflation on capital accumulation in a stockman economy i.e. there is a cash-in-advance constraint on capital. That means that to acquire capital, people must have ready cash which they have to hold and in case this is during inflation, then the purchasing power of that cash is reduced meaning less capital is acquired. Haslag on the other hand bases his arguments on the fact banks pool small savers by accepting deposits but are required to hold part of these deposits as a reserve requirement. An increase in inflation rate henceforth reduces the return to deposits resulting into a slower rate of deposits accumulation. It is assumed that capital is just a fraction of deposits meaning that holding of these deposits as reserve requirements during inflation will definitely reduce capital accumulation and economic growth will be undermined eventually. Unlike in Gomme (1993), the impact of inflation on economic growth in both Marquis and Reffert (1995), and Haslag (1995) is far much greater. In short, the endogenous growth theory henceforth opines that inflation hurts growth meaning the two variables exhibit a negative relationship.

Review of related empirical literature.

The empirical findings about the precise nature of the relationships between inflation and economic growth have differing results just like in the theory. No single empirical finding can be taken as having the definite answers pertaining to the inflation-economic growth nexus. One is left wondering if the relationship between the two variables is negative, positive, non-existent, a short or long-term affair and if at all the results are the same across countries. This is how chaotic this inflation-economic growth relationship can get. Kormendi & Meguire (1985) were among the first authors to analyse this relationship. Their analysis helped to shift the conventional empirical wisdom about the effects of inflation on economic growth from a positive one as per the Tobin (1965) effect to a negative one as per Stockman's (1981) cash-in-advance economy with capital. They came to this conclusion basing on a cross-section of 47 countries during the period 1950-1977 where the inflation-economic growth relationship was found to be substantially negative. However, upon including the rate of investment in the regression, the effect of inflation on economic growth loses explanatory power i.e. it is insignificant. This indicates that the effect of inflation mainly manifests itself in a reduction in investment but not in the productivity of capital. A number of other empirical studies have supported the negative relationship between inflation and economic growth. Fischer (1993) and De Gregorio (1993) in a pooled cross-section time series regressions for a large set of countries also found evidence for a negative link between inflation and growth. Fisher (1993) argued that inflation hampers the efficient allocation of resources due to harmful changes of relative prices. The finding of Barro (1995, 1996) confirmed this negative relationship but he also observed that the inflation-economic growth relationship may not be linear. Singh and Kalirajan (2003) re-affirm this negative relationship using data on India. The data they use are annual ranging from 1997-1998 and their focus is on the threshold effect of inflation on economic growth. Their results suggest that the increase in inflation from any level has negative effect on economic growth. Their policy advice is that price stability through monetary policy should be maintained if substantial gains are to be realised. Further evidence of negative relation between inflation and economic growth is found in the study of Andres and Hernando (1997). They find a significant negative effect of inflation on economic growth. They also find out that the relationship is nonlinear. Their main policy prescription is that that reducing inflation by 1 percent could raise output by between 0.5 and 2.5 percent. *Inflation* not only *reduces the level* of business *investment,* but also the *efficiency* with which productive *factors* are put to use. Conclusively, Andres and Hernando are of the view that the long-run cost of inflation is very large and it's imperative that the inflation rate is kept low if economic growth is to be achieved. Erbaykal and Okuyan (2008) explored the relationship between inflation and economic growth using the data from 1987:1-2006:2 on Turkey. Using Bound Test developed by Pesaran et al. (2001), they examine the existence of the long term relationship between these two variables and following the results, the existence of a cointegration relationship between the two series is detected. No statistically significant long term relationship is found with the formed ARDL models but a negative and statistically significant short term relationship is observed. Furthermore, the causality relationship between the two series is analysed in the framework of the causality test developed by Toda Yamamoto (1995). A causality relationship is found to only run from inflation to economic growth. Saaed (2007) also analyses the inflation-economic growth in the context of Kuwait. He uses annual data set on real GDP and CPI as proxy for economic growth and inflation respectively for the period of 1985 to 2005. The results show a long-run and strong inverse relationship between CPI and real GDP. In a research conducted on IMF member countries, Ghosh and Phillips (1998) find out that inflation and economic growth exhibit a positive relationship at low inflation rates but a negative one at higher inflation rates. The negative effect they find, however, is nonlinear. The findings of Ghosh and Phillips are corroborated by those of Khan and Senhadji (2001) who examine the threshold effect between inflation and economic growth for developed and developing countries separately. Their data set comprises 140 countries from a period of 1960-1998. They find out that the threshold level of inflation above which inflation significantly slows growth is estimated at 1–3 percent for industrial countries and 11–12 percent for developing countries and continues for all higher rates. The two variables, however, exhibit a positive relationship below these rates. It is interesting to note under Khan and Senhadji that developed countries have got a smaller threshold level of inflation than the developing ones. Using data of 87 countries, Sarel (1995) finds that the appropriate threshold level of inflation is 8 percent and that the relationship is nonlinear. Above the threshold level, inflation

exhibits a negative relationship with economic growth whereas below that threshold level, inflation has an insignificant or sometimes little positive effect on growth. An analysis of the inflation-economic growth relationship on China by Hwang and Wu (2011) suggests that the inflation threshold level is 2.50 percent and that every 1 percent point increase in inflation above the threshold level hurts growth by 0.6 percent while below this threshold level, every 1 percentage point increase in inflation rate stimulates growth by 0.53 percent. Hwang and Wu seem to imply that for the case of China, moderate inflation rates are good for growth while high inflation rates are harmful to economic growth. Faria and Carneiro (2001) seek to analyse the inflation-economic growth relationship in the context of Brazil which has been experiencing persistently high inflation shocks until recently. They make use of the idea that inflation shocks can be broken down into two components i.e. the permanent and temporary components. In analyzing the short-run model for changes in output in response to inflation, they find out that inflation negatively affects output. However, in the long run, the response of output to a permanent inflation shock is not significantly different from zero. These long-run results seem to suggest that inflation and economic growth are not associated in the long run and hence support the hypothesis of Sidrauski (1967) that money is superneutral in the long run. Their findings also provide empirical evidence against the view that inflation affects economic growth in the long run. Levine & Zervos (1993) and Sala-i-Martin (1997) in their studies also suggest that inflation is not a robust determinant of growth because upon including other variables (conditioning variables), the significance of inflation declines. Sarel (1995) asserts that before 1970s, inflation rates were somewhat modest but the world started experiencing high inflation rates thereafter. This implies that the positive relationship between the two variables as evidenced in most studies before 1970s was due to modest inflation while the negative relationship thereafter is due to severe rise in inflation. All in all, despite the many intensive empirical studies carried out on this topic, the debate about the precise relationship between these two variables is still open. It is, however, important to note that many of the empirical studies seem to depict high inflation rates as bad for economic growth unlike moderate inflation rates which seem to be good for growth.

Empirical studies on the transmission mechanism between inflation and economic growth.

The available empirical studies pertaining to the transmission mechanism between inflation and economic growth seem to suggest that the financial market is the main channel through which inflation affects economic growth in a nonlinear fashion. Above all, this existing literature basically suggests a transmission mechanism from inflation to economic growth. Inflation affects economic growth through the financial market by affecting investment. However, there's no agreement among the studies on whether the effect of inflation on economic growth is through the channel of either the level of investment (capital accumulation) or the efficiency of investment (Total factor productivity) or both. It should be noted that there is a strong positive correlation between the level of development of financial markets and real economic performance and this is why many studies analyse the transmission mechanism from inflation to economic growth through the financial markets. Empirical studies show that the level of investment, the efficiency of investment, and real economic growth are strongly and positively correlated with different measures of financial market development (King and Levine, 1993a, b; Levine and Zervos, 1998; Atje and Jovanovic, 1993). Barro (1995) is of the view that the most likely channel by which inflation decreases growth is through a reduction in the propensity to invest (level of investment). Barro shows that a rise in the average inflation by 10 percentage points per year results into a decrease in the ratio of investment to GDP by 0.4-0.6 percentage points and a reduction of the real per capita GDP by 0.2-0.3 percentage points per year. Barro's study in short concurs with the hypothesis that inflation affects growth by reducing the level of investment which consequently adversely affects economic growth. Xu (2000) also demonstrates that investment is an important channel through which financial development affects growth. Another empirical study comes from McClain and Nichols (1994). Using U.S. time series data from 1929 to 1987, they apply the newly developed time series techniques to test for a long-run relationship between inflation and investment. The shocking results are that inflation and investment are positively correlated. To them, these results are consistent with the interpretation that the income effect of inflation increases savings, the incomplete Fisher effect lowers the real cost of funds, and that bond price movements from inflation

increase real corporate wealth, all leading to higher real investment. These results suggest that the relationship between inflation and investment is not precise. It should also be noted that low to moderate inflation has a significantly positive effect on the level of investment. In another study by Min Li (2006), the two possible transmission mechanism channels i.e. the capital accumulation/level of investment channel and the Total Factor Productivity (TFP)/ efficiency of investment channel are examined using a linear model and a model with threshold effects on both developing and developed countries. The results suggest that inflation has a significantly negative impact on the level of investment in developing countries implying that the level of investment has a transmission role. To be exact, a 10-percent-point increase in the inflation rate will cause a 0.01 percentage-point decrease in the level of investment in developing countries. However, for the developed countries, results suggest that the level of investment has no transmission role. On the relationship between inflation and the TFP growth, results again suggest that inflation has a significantly negative effect on the TFP growth in developing countries with a 10-percent-point increase in the inflation rate causing a 0.01-percentage-point decrease in the growth of TFP while for the developed countries, the impact of inflation on TFP growth is even worse. A 10-percent-point increase in the inflation rate will cause about a 0.06-0.16-percentage point decease in the TFP growth. The findings above suggest that inflation probably affects growth in developing countries through both the level of investment and TFP growth mechanisms while in the developed countries, TFP growth is probably the only mechanism through which inflation affects growth in the developed countries since the relationship between inflation and level of investment is insignificant. The literature available basically suggests the following transmission mechanism from inflation to economic growth

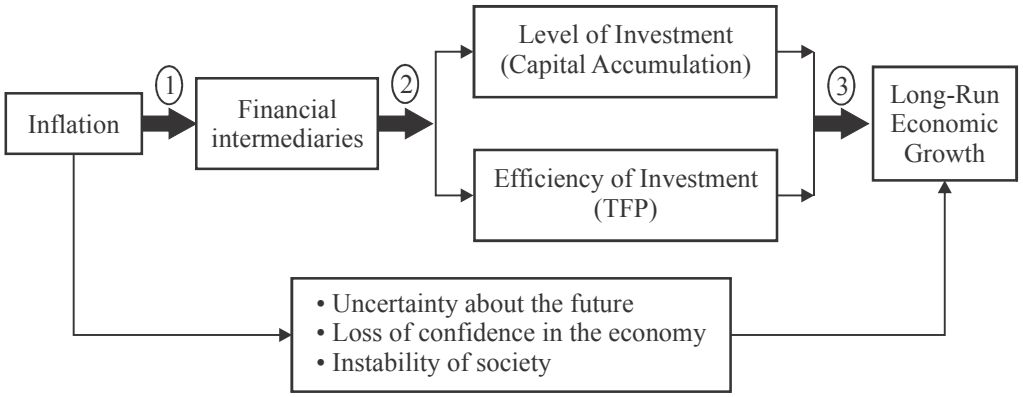


Figure 1: Transmission Mechanism from Inflation to Economic Growth.
Source: Min Li (2006).

As seen in the figure above, much as inflation can affect growth directly, the main channel is the indirect one through financial intermediaries. As such, theoretical studies have paid less attention on the trivial and difficult-to-model direct channel and instead focus is cast on the indirect and main channel. This main channel is depicted by the bold lines with arrows in figure 2.3. For precise analysis, this theoretically hypothesized main channel can be divided into three parts; i.e. the inflation-finance nexus, the finance-investment nexus, and the investment-growth nexus, which are represented in Figure above as 1, 2, and 3, respectively.

RESEARCH METHODOLOGY:

The research methodology involved two parts. The first part consisted of models testing for the Cointegration and Granger Causality relationships between inflation and economic growth to ascertain if a meaningful relationship does exist between these variables while the second part of the methodology involved a model dealing with the transmission mechanism.

Data description and sources.

This research mainly relied on secondary data as opposed to primary data. These data were time series. The reason for using secondary data was because of the difficulties involved in getting the primary data like poor cooperation between the researchers and the respondents, the problem of time limit, expensive nature of primary data and scarcity of reliable people with knowledge about this complex topic. Such

secondary data helped the researcher to support or reject the research findings. To capture the relationship between growth and inflation, economic growth was proxied by the GDP and the Consumer Price Index (CPI) was used as a proxy for inflation. All the variables were transformed in their natural logarithms in order to avoid the problems of heteroscedasticity and denoted as LGDP and LCPI. On the other hand, the model for the transmission mechanism consisted of two equations. The first equation had the gross fixed capital accumulation (INV_{it}) as a share of GDP as the dependent variable while the independent variable was inflation. The second equation of the transmission mechanism had total factor productivity (TFP_{it}) as the dependent variable while inflation as the independent variable. The aim was to see how inflation affects the level of investment and TPF/efficiency of investment, the two main transmission mechanisms as postulated by the theories and empirical studies.

Econometric Methodology.

As earlier mentioned, the research methodology consisted of two parts. The first part dealt with models testing for the Cointegration and Granger Causality relationship of inflation and economic growth while the second part contained models testing for the transmission mechanism.

Econometric tests for Cointegration and Granger Causality.

The study employed two econometric models to achieve the empirical results as per Ahmed and Mortaza (2005) and Alfred (2007). The first econometric model examined the short-run and long-run relationship between real GDP and CPI by applying the Johansen (1988) Cointegration test and the associated Error Correction Model (ECM) and the second model was the application of the Granger Causality test to determine the direction of causality between the two variables.

Model specification.

The primary model showing the relationship between money and inflation was specified as follows;

$$\mathbf{GDP = f(CPI)} \quad \text{.....(1)}$$

$$\boldsymbol{GDP_t = \alpha_0 + \alpha_1 CPI_t + \varepsilon_t} \quad \text{.....(2)}$$

Where;
GDP is Gross Domestic product as a proxy for growth, CPI is the Consumer Price Index used as a proxy for inflation, α_0 is the constant term, 't' is the time trend, and 'ε' is the random error term.

Estimation Technique.

Whenever time series data are used in econometric analysis, the first task in estimation is always to ascertain the order of integration of each time series employed. For a time series e.g. Y_t to be stationary, its probability distribution has to remain constant over time. For example, if the joint distribution of ($Y_{s+1,}$ $Y_{s+2,.....}$ Y_{s+T}) depends on s, then Y_t is said to be nonstationary otherwise it is stationary. Regression results from nonstationary series would always produce spurious results. As a result, the first obligation was to ensure that the growth rate and inflation rate series are constant.

Unit Root Test.

There are quite a number of methods used to test for the order of integration of the series. However, the most popular methods are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips (1987) and Phillips and Perron (1988). ADF test relies on rejecting a null hypothesis (H_0: $\mu=0$) of unit root (the series are non-stationary) in favour of the alternative hypothesis (H_1: $\mu< 0$) of stationarity around a deterministic linear time trend. To reject the null hypothesis that Y_t has a unit root, μ must be less than zero and statistically significant for each series. The tests were carried out on each of the series with and without a deterministic trend (t). The general form of ADF test is estimated by the following regression;

$$\boldsymbol{\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{t-1}^{n} \alpha \Delta y_t + e_t} \quad \text{.....(3)}$$

$$\boldsymbol{\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{n=1}^{n} \alpha_1 \Delta y_i + \delta_t + e_t} \quad \text{.....(4)}$$

Where;
Y is a time series, t is a linear time trend, Δ is the first difference operator, α_0 is a constant, n is the optimum number of lags in the dependent variable and e is the random error term. The difference between the above two equations is that equation 3 only includes a drift whereas equation 4 includes both a drift and a deterministic linear time trend which is added as an additional regressor.

$$\boldsymbol{\Delta yt = \alpha_0 + \alpha y_{t-1} + e_t} \quad \text{.....(5)}$$

The Cointegration test.

The next procedure was the test for Cointegration. The aim was to see if the two series move together in the long run. Even though the series themselves are trended, the difference between them is constant. Therefore, Cointegration between the series is regarded as defining a long-run equilibrium

relationship because the difference between these series is stationary (Hall and Henry, 1989). If the series are not Cointegrated, it implies that such variables have no long-run relationship i.e. these variables wander arbitrarily far away from each other (Dickey et. al., 1991). To test for Cointegration between the series, the maximum-likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991) were used. Johansen's methodology takes its starting point in the Vector Auto-regression (VAR) of order P given by

$$\boldsymbol{y}_t = \mu + \Delta_1 \boldsymbol{y}_{t-1} + --- + \Delta p \ \boldsymbol{y}_{t-p} + \varepsilon_t \quad \text{..... (6)}$$

Where;
Y_t is an nx1 vector of variables that are integrated of order commonly denoted (1) and ε_t is an nx1 vector of innovations.

This VAR can be rewritten as;

$$\Delta \boldsymbol{y}_t = \mu + \eta_{yt-1} + \sum_{i-1}^{p-1} \tau_i \Delta \boldsymbol{y}_{t-1} + \varepsilon_t \quad \text{..... (7)}$$

Where;

$$\Pi = \sum_{i-1}^{p} A_{i-1} \text{ and } \tau_i = -\sum_{j=i+1}^{p} Aj$$

Johansen (1988, 1989) and Johansen and Juselius (1990) suggested two statistic tests to determine the number of Cointegration vectors i.e. the trace test statistic, and the maximum eigenvalue test statistic.

Trace test statistic.

The trace test statistic can be specified as;

$$\lambda \text{ trace (r)} = -T \sum_{i=r+1} \text{Log}(1-\lambda_t) \quad \text{..... (8)}$$

Where;
T is the number of usable observations, and the λ1,s are the estimated eigenvalue from the matrix. Under the trace test, the H_o is that the number of distinct Cointegrating vector(s) is less or equal to the number of Cointegration relations(r).

Granger Causality test.

The next step after the Cointegration test was testing for Granger Causality between growth and inflation. The two variables were found to have a long-run relationship (Cointegrated), hence an Error Correction term (ECT) was required to be included (Granger, 1988) in the following bivariate auto-regression:

$$\boldsymbol{GDP}_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1t} \boldsymbol{GDP}_{t-1} + \sum_{i=1}^{m} \alpha_{2t} \boldsymbol{CPI}_{t-1} + \delta_1 \boldsymbol{ECT}_{t-1} + \varepsilon_{1t} \quad \text{..... (9)}$$

$$\boldsymbol{CPI}_t = \beta_0 + \sum_{i=1}^{m} \beta_{1t} \boldsymbol{GDP}_{t-1} + \sum_{i=1}^{n} \beta_{2t} \boldsymbol{CPI}_{t-1} + \delta_1 \boldsymbol{ECT}_{t-1} + \varepsilon_{1t} \quad \text{..... (10)}$$

Where:

GDP_t is Gross Domestic Product, CPI is the Consumer Price Index used as proxy for inflation. ECTt-1 is the error correction term derived from the long-run Cointegrating relationship in equation 3 while the estimate δ_1 in both equations can be interpreted as the speed of adjustment. The existence of Cointegration implies the existence of the causality relation between the variables (Johansen and Juselius 1987). If there had been no Cointegration relationship between the variables GDP_t and CPI_t, then the term ECT would have been removed and the bivariate auto-regression equation 9 and 10 would have taken the following form)

$$\boldsymbol{GDP}_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1t} \boldsymbol{GDP}_{t-1} + \sum_{i=1}^{m} \alpha_{2t} \boldsymbol{CPI}_{t-1} + \varepsilon_{1t} \quad \text{..... (11)}$$

$$\boldsymbol{CPI}_t = \beta_0 + \sum_{i=1}^{m} \beta_{1t} \boldsymbol{GDP}_{t-1} + \sum_{i=1}^{n} \beta_{2t} \boldsymbol{CPI}_{t-1} + \varepsilon_{1t} \quad \text{..... (12)}$$

Under the test for causality, there were two sets of hypotheses i.e. the first set of hypotheses had the Ho stating that growth does not Granger Cause inflation while the H_1 stated that growth Granger Causes inflation. The second set of hypotheses had H_0 stating that inflation doesn't Granger Cause growth while H_1 stated that inflation does Granger Cause growth. Rejecting (accepting) H_0; $\alpha_{21} = \alpha_{22} =$ ---------- $= \alpha_{2m}$ in equation (9 and 10) or equation (11 and 12) suggested that Growth does (does not) Granger Cause inflation. On the other hand, rejecting (accepting) H_0; $\alpha_{11} = \alpha_{12} =$ ---------- $= \beta_{1m}$ suggested that inflation does (does not) Granger Cause Growth.

Econometric test for the transmission mechanisms between Inflation and Growth.

The theoretical literature suggests that the level of investment (capital accumulation) is a main transmission channel by which inflation affects economic growth while the empirical literature asserts that in addition to the level of capital accumulation, the efficiency of investment which is measured by total factor productivity (TFP) also serves as a main channel. As such, this study analysed the transmission mechanism focusing on the relationship between inflation and level of investment and the relationship between inflation and TFP. Ordinary Least Squares (OLS) approach was used as the method of estimation.

The model specifications for the transmission mechanism between inflation and growth were as follows;

$$INV_{it} = \beta_0 + \beta_1 * Inflation_{it} + \beta_2 * INV_{i,t-1} + u_{it} \ldots\ldots\ldots (1)$$

$$TFP_{it} = \beta_0 + \beta_1 * Inflation_{it} + \beta_2 * TFP_{i,t-1} + u_{it} \ldots\ldots\ldots (2)$$

The first equation analyses the transmission mechanism from inflation to long- run economic growth through the level of investment while the second equation analyses the transmission mechanism from inflation to long-run growth through TFP. INV_{it} in equation (1) is the gross fixed capital accumulation as a share of GDP, and $INV_{i,t-1}$ is the first lag of INV_{it} which was included to control the economic conditions in the last period. In equation (2), *TFP* is Total Factor Productivity, and $TFP_{i,t-1}$ is the first lag of TFP_{it} which was included to control the trend of the TFP, and u_{it} is the error term.

ANALYSIS OF THE STUDY AND RESEARCH FINDINGS:

a) Analysis and estimation results involving GDP and CPI.

Unit Root Test.

Since the data used in this research were time series, the first task in the estimation was to ascertain the order of each time series employed. This involved testing for the stationarity of the individual variables using the Augmented Dickey-Fuller (ADF) test. The results of the ADF test at both levels and first difference are reported in the tables below;

Table 1: Augmented Dickey-Fuller (ADF) unit root test at levels

Variable	Augmented Dickey-Fuller (Intercept)	Augmented Dickey-Fuller (Intercept and trend)	Remark
LGDP	-0.891340(-3.653730)*	-1.841762(-4.284580)*	NS
LCPI	-2.027469(-3.670170)*	-2.078075(-4.296729)*	NS

Note: Figures within parenthesis indicate critical values and * denotes significance at 1% level. NS stands for non-stationary. Mackinnon (1996) critical value for rejection of hypothesis of unit root applied.

From table 1, it can be seen that both variables were found to be non-stationary at levels. This can be seen by comparing the observed values (in absolute terms) of the ADF test statistic with the critical values (also in absolute terms) of the test statistics at the 1%, 5%, and 10% level of significance. The results from table 1 provide strong evidence of non-stationarity. Therefore, the null hypothesis is accepted and it is sufficient to conclude that there is a presence of unit root in the variables at levels. Consequently, all the variables were differenced once and the ADF test was conducted on them. The results were as follows;

Table 2: Augmented Dickey-Fuller (ADF) unit root test at first difference

Variable	Augmented Dickey-Fuller (Intercept)	Augmented Dickey-Fuller (Intercept and trend)	Remark
LGDP	-4.140231(-3.661661)*	-4.072395(-3.562882)**	I(1)
LCPI	-8.829247(-3.670170)*	-8.681585(-4.296729)*	I(1)

Note: Figures within parenthesis indicate critical values while * and ** denote significance at 1% & 5% levels respectively. I(1) refers to integration of order one. Mackinnon (1996) critical value for rejection of hypothesis of unit root applied.

As seen from table 2, all the variables became stationary after first difference. The observed values (in absolute terms) of the ADF test statistic compared with the absolute critical values (at1%, 5%, and 10% levels) reveal that all the variables were stationary at first difference and on this basis, the null hypothesis of non-stationary was rejected and it was safe to conclude that the variables were stationary. This implies that the variables became integrated of order one, i.e. 1(1).

Cointegration test result and analysis.
The Cointegration condition results (that is the existence of a long term linear relation) are presented in tables below using the methodology proposed by Johansen and Juselius (1990):

Table 3: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.591127	28.09633	15.49471	0.0004
At most 1	0.011911	0.371449	3.841466	0.5422

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Table 4: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.591127	27.72488	14.26460	0.0002
At most 1	0.011911	0.371449	3.841466	0.5422

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

In the Cointegration tables 3 and 4, both trace statistic and maximum Eigenvalue statistic indicated the presence of Cointegration at 5 percent level of significance, suggesting there is a Cointegrating (or long run) relationship between growth and inflation. Since the null hypothesis was rejected, there was need to further subject the variables to error correction test. Consequently, the variables were analysed under the Vector error correction model (VECM) environment.

Short-run Granger Causality tests.

To test the short-run Granger Causality between CPI and GDP, the Chi Square value of the Wald statistic was employed. The null hypothesis was that the lagged coefficients of GDP of a given lag could not jointly influence CPI. Likewise, the lagged coefficients of CPI of a given lag could not jointly influence GDP.

Table 5: Granger Causality Wald Test Results (Short-run Causality)

Causal variable	Chi-square	P-value	Null hypothesis	Decision
GDP	2.438826	0.1184	GDP does not Granger Cause CPI	Fail to reject null hypothesis
CPI	0.105948	0.7448	CPI does not Granger Cause GDP	Fail to reject null hypothesis

From table 5, it can be clearly seen that no short-run causality between GDP and CPI was found. So it is safe to say that the lagged values of inflation are not helpful in predicting economic growth in the short run. Likewise, the lagged values of economic growth cannot be of any help in predicting inflation in the short run.

Long-run Granger Causality tests.

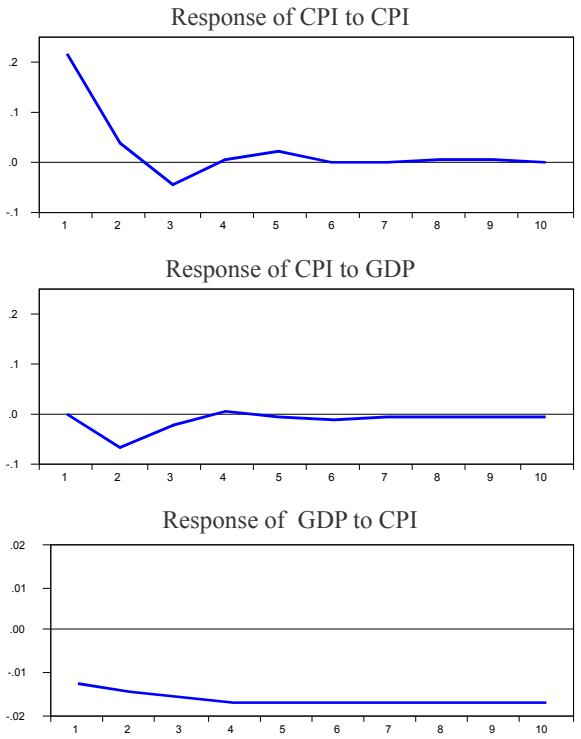
To determine if there is a long-run causality, the coefficient of the error correction term in the VECM is analysed. If the coefficient is negative and significant, it means a long-run causality exists. The results were as follows;

Table 6: Long-run Granger Causality test results

Causal Variable	ECT coefficient	P-value	Null hypothesis	Decision
GDP	-1.345230	0.0001	GDP does not Granger Cause CPI	Reject null hypothesis
CPI	0.001059	0.8331	CPI does not Granger Cause GDP	Fail to reject null hypothesis

In table 6 above, it can be seen that a long-run causality from GDP to CPI was detected because the coefficient of the error correction term was negative and significant. This means that the lagged values of economic growth can help in predicting inflation in the long run. However, no long-run causality from CPI to GDP was found meaning that the lagged values of inflation cannot help in predicting economic growth in the long run. In short, the two Vector error correction models show that there is only a unidirectional causality running from economic growth to inflation.

Response to Cholesky One S. D. Innovations



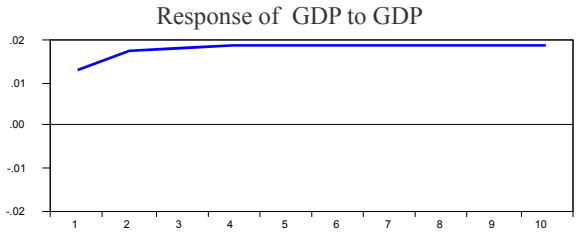


Figure 2: Impulse response function (IRF)

In figure 2 above, response of CPI to GDP refers to the reaction of CPI to a shock in GDP. It can be seen that in case of a positive shock of one standard deviation to GDP, then the response of CPI will always be negative except for the fourth year. This points to the negative relationship between economic growth and inflation. In the same vein, response of GDP to CPI denotes the reaction of GDP to a shock in CPI and according to the figure above, if there is a positive shock of one standard deviation to CPI, GDP will go down i.e. GDP and CPI have negative relationship. If CPI goes up, GDP will be reacting negatively.

Long-run Cointegrating models.

The aim of the long-run Cointegrating models is to help us know whether inflation and economic growth have a negative or positive relationship long-run relationship. Since the VECM system comprises two models, all the two Cointegrating equations were analysed and the results were as follows;

Table 7: Long-run Cointegration with (GDP) Vector Error Correction Model (VECM)

Cointegrating Eq:	CointEq1
GDP(-1)	1.000000
CPI(-1)	4.769870
Standard errors	0.73388
t-statistics	6.49951

t-table=1.693889

Table 8: Long-run Cointegration with (CPI) Vector Error Correction Model (VECM)

Cointegrating Eq:	CointEq1
CPI(-1)	1.000000
GDP(-1)	0.209649
Standard errors	0.11152
t-statistics	1.87986

t-table=1.693889

When the t-statistic is larger than the t-table (absolute value), then the independent variable has an effect on the dependent variable (significant). In the GDP long-run Cointegrating VECM, the t-statistic is 6.49951 while in the CPI long-run Contegrating model, the t-statistic is 1.87986. The t-table for both models at 10% level of significance is 1.693889. This means the t-statistic of all the two equations is larger than the t-table implying that in the first table, CPI which is the independent variable has an effect on the dependent variable (GDP). It also means that GDP which is the independent variable in the second table has an effect on the dependent variable (CPI). To know if the effect is negative or positive, we look at the sign of the coefficient and the sign of the t-statistic. If the sign of the coefficient and the sign of the t-statistic are positive, then the impact of the independent variable on the dependent variable is negative and vice versa. In all the two models, the sign of the coefficient and the sign of t-statistic are positive implying that the independent variables negatively affect the dependent variables. It means that the impact of GDP on CPI in the first model is negative and in the second model, the impact of GDP on CPI is also negative. This means that inflation and economic growth have an inverse relationship. In the first model, when inflation increases by 1%, economic growth slows down by 4.769870. The second model shows that when economic growth increases by 1%, inflation slows down by 0.209649.

b) Analysis and Estimation Result of the Transmision Mecanism Between Inflation and Growth:

Table 9: Estimation results of the transmission mechanism from inflation to investment

Dependent Variable: INV

Independent Variable	Coefficient	Prob.
INFLATION	-0.091680	0.0075
INV(-1)	0.954941	0.0000

R-squared=0.818650, Prob(F-statistic)=0.000000

Based on the results above, it can be seen that the coefficient of inflation is negative and significant meaning that inflation indeed negatively affects investment. This confirms the theoretical postulation that the level of capital accumulation (level of investment) is a channel through which inflation adversely affects real economic growth. The coefficient of inflation above means that if inflation increases by one percent, the level of investment decreases by 0.091680 percent. The R-squared is also big enough. i.e. 81 percent implying that the model above explains 81 percent of the variation in the level of investment and other

factors outside this model only account for 19 percent of the change in the level of investment.

Table 10: Estimation results of the transmission mechanism from inflation to TFP.

Dependent Variable: TFP

Independent Variable	Coefficient	Prob.
INFLATION	-0.003295	0.0000
INV(-1)	0.884639	0.0000

R-squared=0.854651, Prob(F-statistic)=0.000000

The results above confirm the assertion of the empirical literature that in addition to the level of investment, total factor productivity (TFP) is another transmission channel through which inflation affects economic growth. The coefficient of inflation in the estimated model above is negative and significant meaning again that inflation negatively affects the efficiency of investment. If inflation increases by 1 percent, the efficiency of investment decreases by 0.003295 percent. The R-squared of 85 percent implies that the model above explains 85 percent of the change in TFP which is a very good attribute. Other factors outside this model only explain 15 percent of the variance in TPF.

CONCLUSION:

The main objective of this study was to find out if a meaningful relationship does exist between inflation and economic growth in Indonesia's case and to further ascertain the transmission mechanism by which inflation affects economic growth. It was discovered that indeed meaningful short-run and long-run relationships exist between the two variables. The two variables were found to be Cointegrated and there was a unidirectional long-run causality from economic growth to inflation. On the basis of the impulse response function (IRF) and the long-run Cointegrating vector error correction models (VECM), it was also found out that inflation and economic growth exhibit an inverse relationship both in the short and long-run. On the other side, the results of the transmission mechanism confirmed the theoretical and empirical literature postulations that the level of capital accumulation and the efficiency of investment serve as channels through which inflation adversely affects growth.

REFERENCES:

Andres J. and I. Hernando (1997). Does inflation harm Economic Growth? Evidence for the OECD, *Banco de Espana Working Paper 9706.*

Barro R. J. (1995). Inflation and Economic Growth, *NBER Working Paper 5326.*

BPS (2002), 'Dasar-dasar Analisis Kemiskinan' [The Basics of Poverty Analysis], Statistics Indonesia (BPS) and World Bank Institute, Jakarta: Badan Pusat Statistik.

Cooley, T.F. and G.D. Hansen. (1989). "The Inflation Tax in a Real Business Cycle Model", *American Economic Review,* Vol 79, pp.733-48.

De Gregorio, J. (1 993): "Inflation, taxation, and long-run growth", Journal of Monetary Economics.

Dickey, D.A. and Fuller, W.A. (1981), "Likelihood Ratio Statistics for Autoregressive Time Series

with a Unit Root", Econometrica, Vol. 49, pp. 1057-1072.

Dornbusch, R., S. Fischer and C. Kearney. (1996). Macroeconomics. The Mc-Graw-Hill Companies, Inc., Sydney.

Fischer, S. (1993). The Role of Macroeconomic Factors in Growth*, NBER Working Paper No. 4565.*

Friedman, M. (1963). *A Monetary History of the United States 1867–1960 (1963)*

Ghosh, A and S. Philips. (1998). Inflation, Disinflation, and Growth, *IMF Working Paper*.

Gomme, Paul (1993), "Money and Growth Revisited: Measuring the Costs of Inflation in an Endogenous Growth Model," Journal of Monetary Economics 32 (August): 51–77.

Haslag H. (1995): "Inflation and Intermediation in a Model with Endogenous Growth", Federal Reserve Bank of Dallas working paper, Vol. 95 No. 02.

Henderson D. (1999): "Does Growth Cause Inflation?" Cato Institute Policy Report, Vol. 21 No. 6

Hossain, A (2005). The granger-causality between money growth, inflation, currency devaluation and economic growth in indonesia: 1954-2002.

Hwang T. and Wu J. (2011): Inflation and Economic Growth in China: An Empirical Analysis, China and World Economy, Vol. 19 No. 5, 67-84.

Johansen, S. and K. Juselius. (1990), "Maximum Likelihood Estimation and Inference on Co-integration with the Application to the Demand for Money", Oxford Bulletin of Economics and Statistics, Vol. 52, pp. 169-210.

Khan S. and Senhadji S. (2001): "Threshold Effects in the Relationship between Inflation and Growth", IMF Staff Papers, WP. 48 No. 1, 1-21.

King, R.G.. and Levine, R., 1993a, *"Finance and Growth: Schumpeter might be Right."*Quarterly Journal of Economics 108, 717-738.

Kormendi, R.C. and P.G. Meguire. (1985). "Macroeconomic Determinants of Growth: Cross-Country Evidence", Journal of Monetary Economics, Vol. 16, pp. 141-63.

Levine, R. and Zervos, S. (1993): "What have we learned about policy and growthfrom cross-country regressions?" American Economic Review. 83, 426430.

Lucas, Robert E., Jr., 1980, "Equilibrium in a Pure Currency Economy", *Economic*

Inquiry, 18: 203-222.

Marquis, Milton H., and Kevin L. Reffert (1995), "The Inflation Tax in a Convex Model of Equilibrium Growth," Economica 62 (February): 109–22.

McKinsey Global Institute (MGI). (September, 2012). The archipelago economy: Unleashing Indonesia's potentials.

Min Li (2006), Inflation and Economic Growth: Threshold Effects and Transmission Mechanisms.

Muhammad, A., Imran, S.C., and Fatima, F. (2011), Does Inflation Affect Economic Growth? The case of Pakistan.

Phillips, A. W. (1958). "The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957".

QUARTERLY ANALYSIS: The Progress of Monetary, Banking and Payment System, Quarter IV – 2012. *Author Team of Quarterly Report, Bank Indonesia*

Sarel, M. (1995). Non-Linear Effects of Inflation on Economic Growth, *IMF Working Paper No. WP/95/56.*

Sidrauski, M. (1967). Inflation and Economic Growth, *Journal of Political Economy*.

Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth". *Quarterly Journal of Economics* (The MIT Press) 70 (1): 65–94.

Stockman C. (1981): Anticipated inflation and the capital stock in a cash in advance economy, Journal of Monetary Economics, Vol. 8, 387-393.

Tobin, J. (1965). "Money and Economic Growth", *Econometrica,* Vol.33, pp. 671-684.

Todaro, M.P. (2000). Economic Development. Addison Wesley Longman, Inc., New York.

Vikesh, G., and Subrina, H. (2004), Relationship between inflation and economic growth.

Wimanda, R.E. (2010), 'Inflation and Monetary Policy Rules: Evidence from Indonesia,' Doctoral Thesis, Loughborough University.

World Bank (2010), Indonesia Rising: Policy Priorities for 2010 and Beyond, No. 53482, The World Bank Office Jakarta.