

# **RELATIONSHIP BETWEEN INFLATION AND ECONOMIC GROWTH**

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Working Paper

2004/04

December 2004

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The views expressed herein are those of the authors and do not necessarily reflect those of the Reserve Bank of Fiji. The authors are grateful to Edwin Dewan and Alisi Duwai for their valuable assistance in preparing the working paper, as well as other colleagues in the Economics Department for their comments in earlier drafts.

## **Abstract**

Like many countries, industrialised and developing, one of the most fundamental objectives of macroeconomic policies in Fiji is to sustain high economic growth together with low inflation. However, there has been considerable debate on the nature of the inflation and growth relationship.

In this paper, we have reviewed several different economic theories to ascertain consensus on the inflation – growth relationship. Classical economics recalls supply-side theories, which emphasise the need for incentives to save and invest if the nation's economy is to grow. Keynesian theory provided the AD-AS framework, a more comprehensive model for linking inflation to growth. Monetarism reemphasised the critical role of monetary growth in determining inflation, while Neoclassical and Endogenous Growth theories sought to account for the effects of inflation on growth through its impact on investment and capital accumulation.

The paper also reviews recent empirical literature. This includes studies by Sarel (1996), Andres & Hernando (1997) and Ghosh & Phillips (1998) and Khan & Senhadji (2001) amongst others. Ultimately, we tested whether a meaningful relationship held in Fiji's case. The tests revealed that a weak negative correlation exists between inflation and growth, while the change in output gap bears significant bearing. The causality between the two variables ran one-way from GDP growth to inflation.

## **1.0 Introduction**

Like many countries, industrialised and developing, one of the most fundamental objectives of macroeconomic policies in Fiji is to sustain high economic growth together with low inflation. Not surprisingly, there has been considerable debate 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.

Macroeconomists, central bankers and policymakers have often emphasised the costs associated with high and variable inflation. Inflation imposes negative externalities on the economy when it interferes with an economy's efficiency. Examples of these inefficiencies are not hard to find, at least at the theoretical level.

Inflation can lead to uncertainty about the future profitability of investment projects (especially when high inflation is also associated with increased price variability). This leads to more conservative investment strategies than would otherwise be the case, ultimately leading to lower levels of investment and economic growth. Inflation may also reduce a country's international competitiveness, by making its exports relatively more expensive, thus impacting on the balance of payments. Moreover, inflation can interact with the tax system to distort borrowing and lending decisions. Firms may have to devote more resources to dealing with the effects of inflation (for example, more vigilant monitoring of their competitors' prices to see if any increases are part of a general inflationary trend in the economy or due to more industry specific causes).

Having stated the theoretical possibilities, if inflation is indeed detrimental to economic activity and growth, then how low should inflation be? The answer to this question, obviously depends on the nature and structure of the economy, and will vary from country to country. Numerous studies with several theories have been carried out, which specifically aimed at examining the relationship between inflation and growth<sup>1</sup>. These empirical studies have attempted to examine whether the relationship between inflation and long-run growth is linear; non-linear; casual or non-existent<sup>2</sup>.

In Fiji's case, studies by Dewan et al (1999) and Dewan & Hussein (2001) revealed some insights into the inflation growth relationship. Dewan et al (1999) found that changes in the difference between actual GDP and potential GDP (output gap) had a bearing on Fiji's inflation outcome. In another study, Dewan & Hussein (2001) found in a sample of 41 middle-income developing countries including Fiji, that inflation was negatively correlated to growth.

In this paper, we will examine several different economic theories and empirical studies to assess the effect of inflation on economic growth. Ultimately, we will test whether a meaningful relationship between the two variables exists in Fiji. The rest of the paper is structured as follows: Section 2 briefly reviews the theories underpinning the inflation-growth relationship. Section 3 looks at the policy issues for central banks in assessing the effects of inflation on growth. Section 4 reviews the empirical literature done on inflation and growth. Section 5 provides a

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<sup>1</sup> See Barro (1995), Fischer (1993) and Bruno and Easterly (1998).

<sup>2</sup> See Khan and Senhadji (2001).

simple study on Fiji's inflation impact on growth. Section 6 concludes the paper.

## **2.0 What level of inflation is harmful to growth?**

### **Theory**

Economic theories reach a variety of conclusions about the responsiveness of output growth to inflation. Theories are useful, as they account for some observed phenomenon. Historically, in the absence of what is termed 'persistent inflation', the early inflation-growth theories were built on cyclical observations. Persistent inflation is regarded as a post World War II phenomenon. Before then, bouts of inflation were followed by bouts of deflation. Having showed no upward or downward trend, inflation was said to behave like a 'lazy dog'. It stays at a particular level unless and until there is a disturbance. Thereafter, it moves to another level, at which it settles. Theory, therefore sought to account for a positive correlation between inflation and growth<sup>3</sup>.

The aggregate supply-aggregate demand (AS-AD) framework also postulated a positive relationship between inflation and growth where, as growth increased, so did inflation. In the 1970s, however, the concept of stagflation gained prominence, and the validity of the positive relationship was questioned. Widely accepted at that time, the Phillips Curve relationship had appeared to not hold. This was evidenced by periods of low or negative output growth, and inflation rates that were historically high. During this period, prices rose sharply, while the economies around

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<sup>3</sup> See Haslag (1997)

the world experienced massive unemployment.

The following sub-sections will discuss Classical, Keynesian, Neo-keynesian, Monetarist, Neo-classical and Endogenous growth theories, each with their respective contribution to the inflation-growth relationship. Classical economics recalls supply-side theories, which emphasise the need for incentives to save and invest if the nation's economy is to grow, linking it to land, capital and labour. Keynesian and Neo-keynesian theory provided a more comprehensive model for linking inflation to growth under the AD-AS framework. Monetarism updated the Quantity Theory, reemphasising the critical role of monetary growth in determining inflation, while Neo-classical and Endogenous Growth theories sought to account for the effects of inflation on growth through its impact on investment and capital accumulation.

## **2.1 Classical Growth Theory**

Classical theorists laid the foundation for a number of growth theories. The foundation for Classical growth model was laid by Adam Smith who posited a supply side driven model of growth and his production function was as follows:

$$Y = f(L, K, T)$$

Where Y is output, L is labour, K is capital and T is land, so output was related to labour, capital and land inputs. Consequently, output growth ( $g_y$ ) was driven by population growth ( $g_L$ ), investment ( $g_K$ ) and land growth ( $g_T$ ) and increases in overall productivity ( $g_f$ ). Therefore:  $g_y = \phi(g_f, g_K, g_L, g_T)$ .

Smith argued that growth was self-reinforcing as it exhibited increasing returns to scale. Moreover, he viewed savings as a creator of investment and hence growth, therefore, he saw income distribution as being one of the most important determinants of how fast (or slow) a nation would grow. He also posited that profits decline – not because of decreasing marginal productivity, but rather because the competition of capitalists for workers will bid wages up.

The link between the change in price levels (inflation), and its “tax” effects on profit levels and output were not specifically articulated in classical growth theories. However, the relationship between the two variables is implicitly suggested to be negative, as indicated by the reduction in firms’ profit levels through higher wage costs.

## **2.2 Keynesian Theory**

The Traditional Keynesian model comprises of the Aggregate Demand (*AD*) and Aggregate Supply (*AS*) curves, which aptly illustrates the inflation – growth relationship. According to this model, in the short-run, the (*AS*) curve is upward sloping rather than vertical, which is its critical feature. If the *AS* curve is vertical, changes on the demand side of the economy affect only prices. However, if it is upward sloping, changes in *AD* affect both prices and output, (Dornbusch, et al, 1996). This holds with the fact that many factors drive the inflation rate and the level of output in the short-run. These include changes in: expectations; labour force; prices of other factors of production, fiscal and/or monetary policy.

In moving from the short-run to the hypothetical long-run, the above-mentioned factors, and its ‘shock’ on the ‘steady state’ of the

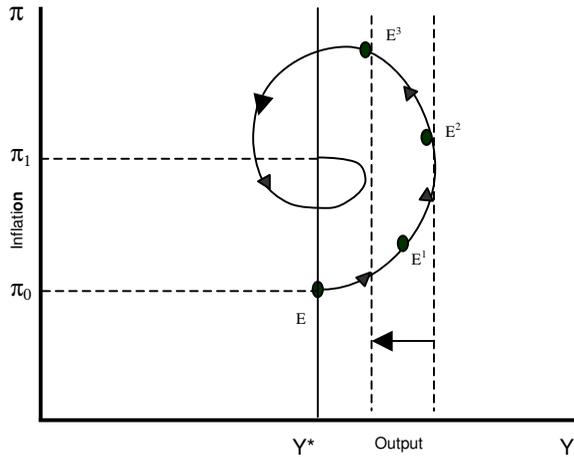
economy are assumed to balance out. In this ‘steady state’ situation, ‘nothing is changing’, as the name suggests. The ‘dynamic adjustment’ of the short-run AD and AS curves yields an ‘adjustment path<sup>4</sup>’ which exhibits an initial positive relationship between inflation and growth, however, turns negative towards the latter part of the adjustment path.

The initial positive relationship between output and inflation, illustrated by the movement from point  $E^0$  to  $E^1$  in Figure 1, usually happens due to the ‘time-inconsistency problem’. According to this concept, producers feel that only the prices of their products have increased while the other producers are operating at the same price level. However in reality, overall prices have risen. Thus, the producer continues to produce more and output continues to rise. Blanchard and Kiyotaki (1987) also believe that the positive relationship can be due to agreements by some firms to supply goods at a later date at an agreed price. Therefore, even if the prices of goods in the economy have increased, output would not decline, as the producer has to fulfil the demand of the consumer with whom the agreement was made.

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<sup>4</sup> See Dornbusch, et al, 1996.

**FIGURE 1**



Two further features of the adjustment process are also important to note. Firstly, there are times when the output decreases and the inflation rate increases, for example, between  $E^2$  and  $E^3$ . This negative relationship between inflation and growth is important, as it quite often occurs in practise, as ascertained by empirical literature. This phenomenon is stagflation, when inflation rises as output falls or remains stable. Secondly, the economy does not move directly to a higher inflation rate, but follows a transitional path where inflation rises then falls.

Under this model, there is a short-run trade-off between output and the change in inflation, but no permanent trade-off between output and inflation. For inflation to be held steady at any level, output must equal the natural rate ( $Y^*$ ). Any level of inflation is sustainable; however, for inflation to fall there must be a period when output is below the natural rate.

## 2.3 Money & Monetarism

Monetarism has several essential features, with its focus on the long-run supply-side properties of the economy as opposed to short-run dynamics.<sup>5</sup> Milton Friedman, who coined the term “Monetarism”, emphasised several key long-run properties of the economy, including the Quantity Theory of Money and the Neutrality of Money. The Quantity Theory of Money linked inflation and economic growth by simply equating the total amount of spending in the economy to the total amount of money in existence. Friedman proposed that inflation was the product of an increase in the supply or velocity of money at a rate greater than the rate of growth in the economy.

Friedman also challenged the concept of the Phillips Curve. His argument was based on the premise of an economy where the cost of everything doubles. Individuals have to pay twice as much for goods and services, but they don't mind, because their wages are also twice as large. Individuals anticipate the rate of future inflation and incorporate its effects into their behaviour. As such, employment and output is not affected. Economists call this concept the *neutrality of money*. Neutrality holds if the equilibrium values of real variables -including the level of GDP - are independent of the level of the money supply in the long-run. Superneutrality holds when real variables - including the rate of growth of GDP - are independent of the rate of growth in the money supply in the long-run. If inflation worked this way, then it would be harmless. In reality however, inflation does have real consequences for other

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<sup>5</sup> See Dornbusch, et al, 1996.

macroeconomic variables. Through its impact on capital accumulation, investment and exports, inflation can adversely impact a country's growth rate.

In summary, Monetarism suggests that in the long-run, prices are mainly affected by the growth rate in money, while having no real effect on growth. If the growth in the money supply is higher than the economic growth rate, inflation will result.

## **2.4 Neo-classical Theory**

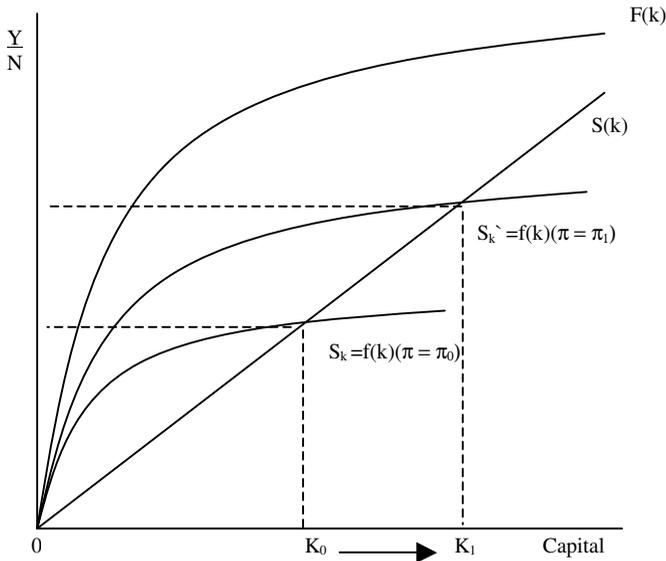
One of the earliest neo-classical models was postulated by Solow (1956) and Swan (1956). The model exhibited diminishing returns to labour and capital separately and constant returns to both factors jointly. Technological change replaced investment (growth of  $K$ ) as the primary factor explaining long-term growth, and its level was assumed by Solow and other growth theorists to be determined exogenously, that is, independently of all other factors, including inflation (Todaro, 2000).

Mundell (1963) was one of the first to articulate a mechanism relating inflation and output growth separate from the excess demand for commodities. According to Mundell's model, an increase in inflation or inflation expectations immediately reduces people's wealth. This works on the premise that the rate of return on individual's real money balances falls. To accumulate the desired wealth, people save more by switching to assets, increasing their price, thus driving down the real interest rate. Greater savings means greater capital accumulation and thus faster output growth.

## The Tobin Effect

Tobin, another neoclassical economist, (1965) developed Mundell's model further by following Solow (1956) and Swan (1956) in making money a store of value in the economy. Individuals in this model, substitute current consumption for future consumption by either holding money or acquiring capital. Under this setup, individuals maintain precautionary balances, in spite of capital offering a higher rate of return.

FIGURE 2



The above figure depicts the portfolio mechanism. If the inflation rate increases from  $\pi_0$  to  $\pi_1$  ( $\pi_1 > \pi_0$ ), the return to money falls. According to Tobin's portfolio mechanism, people will substitute away from money, with its lower return, and move towards capital. In Figure 2, this substitution is depicted by a shift in the  $S_k$  line to  $S_k'$ . The portfolio

mechanism results in a higher steady state capital stock (from  $K_0$  to  $K_1$ ). Tobin's framework shows that a higher inflation rate permanently raises the level of output. However, the effect on output growth is temporary, occurring during the transition from steady state capital stock,  $K_0$ , to the new steady state capital stock,  $K_1$ . The impact of inflation can be classed as having a "lazy dog effect" where it induces greater capital accumulation and higher growth, only until the return to capital falls. Thereafter higher investment will cease and only steady state growth will result. Indeed, growth in the neoclassical economy is ultimately driven by exogenous technological advancement - upward shifts in the  $F(k)$  curve - not by a one-off change in the inflation rate.

Quite simply, the Tobin effect suggests that inflation causes individuals to substitute out of money and into interest earning assets, which leads to greater capital intensity and promotes economic growth. In effect, inflation exhibits a positive relationship to economic growth. Tobin (1972) also argued that, because of the downward rigidity of prices (including wages), the adjustment in relative prices during economic growth could be better achieved by the upward price movement of some individual prices.

At this juncture, it is important to discuss the role of money in the neoclassical economy to appropriately understand subsequent literature. Sidrauski (1967) proposed the next major development, with his seminal work on the context of an infinitely-lived representative agent model where money is 'Superneutral'. Superneutrality, as mentioned earlier, holds when real variables, including the growth rate of output, are independent of the growth rate in the money supply in the long-run. The main result in

Sidrauski's economy is that an increase in the inflation rate does not affect the steady state capital stock. As such, neither output nor economic growth is affected.

Stockman (1981) developed a model in which an increase in the inflation rate results in a lower steady state level of output and people's welfare declines. In Stockman's model, money is a complement to capital, accounting for a negative relationship between the steady-state level of output and the inflation rate. Stockman's insight is prompted by the fact that firms put up some cash in financing their investment projects. Sometimes the cash is directly part of the financing package, whereas other times, banks require compensating balances. Stockman models this cash investment as a cash-in-advance restriction on both consumption and capital purchases. Since inflation erodes the purchasing power of money balances, people reduce their purchases of both cash goods and capital when the inflation rate rises. Correspondingly, the steady-state level of output falls in response to an increase in the inflation rate.

The *Stockman Effect* can also operate through the effects on the labour-leisure decision. Greenwood and Huffman (1987) develop the basic labour-leisure mechanism, and Cooley and Hansen (1989) identify the implication for capital accumulation. In Greenwood and Huffman's research, people hold money to purchase consumption goods and derive utility both from consumption and leisure. Fiat money<sup>6</sup> is used because there is a cash-in-advance constraint on consumption goods. Greenwood and Huffman show that the return to labour falls when the inflation rate

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<sup>6</sup> Money or currency issued by the Government or Central Bank, which is not covered by a special reserve, deposit or issue of securities.

rises. As such, people substitute away from consumption to leisure, because the return on labour falls.

Cooley and Hansen (1989) extend the mechanism to consider capital accumulation. The key assumption is that the marginal product of capital is positively related to the quantity of labour. Thus, when the quantity of labour declines in response to a rise in inflation, the return to capital falls and the steady-state quantities of capital and output decline. Cooley and Hansen show that the level of output permanently falls as the inflation rate increases.

This theoretical review demonstrates that models in the neoclassical framework can yield very different results with regard to inflation and growth. An increase in inflation can result in higher output (Tobin Effect) or lower output (Stockman Effect) or no change in output (Sidrauski).

## **2.5 Neo-Keynesian**

Neo-Keynesians initially emerged from the ideas of the Keynesians. One of the major developments under Neo-keynesianism was the concept of ‘potential output’, which at times is referred to as natural output. This is a level of output where the economy is at its optimal level of production, given the institutional and natural constraints.<sup>7</sup> This level of output also corresponds to the natural rate of unemployment, or what is also referred to as the non-accelerating inflation rate of unemployment (NAIRU). NAIRU is the unemployment rate at which the inflation rate is

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<sup>7</sup> In other words, the factors of production are fully utilised.

neither rising nor falling. In this particular framework, the ‘built-in inflation rate’<sup>8</sup> is determined endogenously, that is by the normal workings of the economy. According to this theory, inflation depends on the level of actual output (GDP) and the natural rate of employment.

Firstly, if GDP exceeds its potential and unemployment is below the natural rate of unemployment, all else equal, inflation will accelerate as suppliers increase their prices and built-in inflation worsens. This causes the Phillips curve to shift in the stagflationary direction; towards greater inflation and greater unemployment.

Secondly, if the GDP falls below its potential level and unemployment is above the natural rate of unemployment, holding other factors constant, inflation will decelerate as suppliers attempt to fill excess capacity, reducing prices and undermining built-in inflation, leading to disinflation. This causes the Phillips curve to shift in the desired direction, towards less inflation and less unemployment.

Finally, if GDP is equal to its potential and the unemployment rate is equal to NAIRU, then the inflation rate will not change, as long as there are no supply shocks. In the long-run, the Neo Keynesians believe that the Phillips curve is vertical. That is, the unemployment rate is given and equal to the natural rate of unemployment, while there are a large number of possible inflation rates that can prevail at that unemployment rate.

However, one problem with this theory is that, the exact level of potential output and natural rate of unemployment is generally unknown and tends to change over time. Inflation also seems to act in an asymmetric

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<sup>8</sup> Built-in inflation is often linked to the price/wage spiral because it involves workers trying to keep their wages up with prices and then employers passing higher costs on to consumers as higher prices as part of a vicious circle.

way, rising more quickly than it falls, mainly due to the downward rigidity in prices.

## **2.6 Endogenous Growth Theory**

Endogenous growth theories describe economic growth which is generated by factors within the production process, for example; economies of scale, increasing returns or induced technological change; as opposed to outside (exogenous) factors such as the increases in population. In endogenous growth theory, the growth rate has depended on one variable: the rate of return on capital<sup>9</sup>. Variables, like inflation, that decrease that rate of return, which in turn reduces capital accumulation and decreases the growth rate.

One feature accounts for the foremost difference between the endogenous growth models and the neo-classical economies. In the neo-classical economies, the return on capital declines as more capital is accumulated. In the simplest versions of the endogenous growth models, per capita output continues to increase because the return on capital does not fall below a positive lower bound. The basic intuition is that only if the return on capital is sufficiently high, will people be induced to continue accumulating it. Models of endogenous growth also permit increasing returns to scale in aggregate productions, and also focus on the role of externalities in determining the rate of return on capital.

Endogenous Models that explain growth further with human capital, develop growth theory by implying that the growth rate also

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<sup>9</sup> See Gillman, Harris and Matyas (2002).

depends on the rate of return to human capital, as well as physical capital. The rate of return on all forms of capital must be equal in the balanced-growth equilibrium. A tax on either form of capital induces a lower return. 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.

A tax on capital income directly reduces the growth rate, while a tax on human capital would cause labour to leisure substitution that lowers the rate of return on human capital and can also lower the growth rate.

Some versions of the endogenous growth economies find that the inflation rate effects on growth are small. Gomme (1993) studied an economy similar to the one specified by Cooley and Hansen; that is, an inflation rate increase results in a decline in employment. According to Gomme's research, efficient allocations satisfy the condition that the marginal value of the last unit of today's consumption equals the marginal cost of the last unit of work. A rise in inflation reduces the marginal value of today's last unit of consumption, thus inducing people to work less. With less labour, the marginal product of capital is permanently reduced, resulting in a slower rate of capital accumulation. Gomme found that in this economy, eliminating a moderate inflation rate (for example, 10 percent) results in only a very small (less than 0.01 percentage point) gain in the growth of output.

Alternative models examine how inflation might directly affect capital accumulation and hence output growth. Marquis and Reffert (1995) and Haslag (1995) specify economies in which capital and money are

complementary goods. Marquis and Reffert examine inflation rate effects in a Stockman economy: there is a cash-in-advance constraint on capital. In Haslag's research, banks pool small savers but are required to hold money as deposits to satisfy a reserve requirement. Thus, an inflation rate increase drives down the return to deposits, resulting in deposits being accumulated at a slower rate. Since capital is a fraction of deposits, capital accumulation and output growth are slow. In both the Marquis and Reffert, and Haslag studies, the inflation rate effects on growth are substantially greater than those calculated in Gomme.<sup>10</sup>

### **3.0 Inflation, Growth and Central Banks**

Traditional economic analysis takes the behaviour of monetary policymakers, as exogenous. Currently, consensus exists on the view that inflation is a monetary phenomenon, in the sense that there would be no inflation without sustained increases in the money supply. This leads to the obvious policy statement that long-run price stability can be achieved by limiting that rate of money growth to long-run real rate of growth in the economy. However, monetary authorities across the world have allowed monetary growth in excess of real growth rates.

The dominant trend in theory and practice of monetary policy over the last two decades has been its dedication to price stability. Central Banks from New Zealand to Finland have undertaken this commitment, either by mandates from their Governments or by exercises of discretion granted to them by their governments. The consequence to dedicating

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<sup>10</sup> For instance, Haslag finds that economies with 10 percent inflation will grow 0.2 percentage points slower than economies with zero inflation.

monetary policy to price stability is the perceived indifference to real macroeconomic outcomes –unemployment, real GDP and its growth rate. These are seemingly ignored or drastically subordinated in the priorities of most central banks. Real outcomes become a policy concern only after the central bank is confident the objective of price stability is met.

Having stated the primary central bank objective, most people interested in the conduct of monetary policy would acknowledge that central bank actions can and do affect measures of real economic activity, especially in the short-run. The two way economic interactions between monetary policy and economic behaviour is a process that operates over sometime. Some consequences of central bank actions are permanent, others only transitory. These complex and crudely understood dynamics present particular difficulties for monetary policymakers, especially in the face of the short-run inflation and output trade off.

General consensus exists amongst policymakers and central banks that inflation is indeed harmful to economic growth. Many central banks around the world are becoming more transparent in their dealings and operations to instil confidence in the economy that the central bank is committed to maintaining price stability. Since 1990, when the Reserve Bank of New Zealand became the first central bank to adopt an inflation targeting regime, the numbers have steadily increased, with at least 19 other central banks operating under the same regime. The common belief being that price stability or low inflation would lay the foundation for higher economic growth.

## **4.0 Empirical Literature Review: What Level of Inflation is Harmful to Growth?**

While few doubt that very high inflation is bad for growth, there have been mixed empirical studies presented, as to their precise relationship. Is the empirical inflation-growth relationship primarily a long-run relationship across countries, a short-run relationship across time, or both?

Among the first authors to analyse the inflation-growth relationship included Kormendi & Meguire (1985) who helped to shift the conventional empirical wisdom about the effects of inflation on economic growth: from a positive one, as some interpret the Tobin (1965) effect, to a negative one, as Stockman's (1981) cash-in-advance economy with capital, has been interpreted.<sup>11</sup> They found a significant negative effect of inflation on growth. In pooled cross-section time series regressions for a large set of countries, Fischer (1993) and De Gregorio (1993) found evidence for a negative link between inflation and growth. This was also confirmed by Barro (1995, 1996). Barro's studies also found that the relationship may not be linear. Studies by Levine & Zervos (1993) and Sala-i-Martin (1997) suggested that inflation was not a robust determinant of economic growth. Inflation's significance declined, as other conditioning variables are included.

The next round of cross-country studies mainly focussed on the nonlinearities and threshold effects of inflation on growth. These studies included papers by Sarel (1996), Andres & Hernando (1997) and Ghosh &

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<sup>11</sup> Stockman (1981) finds a negative effect of inflation on output, not on the growth rate of output.

Phillips (1998). Andres & Hernando (1997) found a significant negative effect of inflation on economic growth. They also found that there exists a nonlinear relationship. Their main policy message stated that reducing inflation by 1 percent could raise output by between 0.5 and 2.5 percent. Sarel (1996), Ghosh & Phillips (1998) and other empirical studies are discussed in further detail in the following section. Amongst the most recent ones include the paper by Khan & Senhadji (2001). The following sub-section provides an in-detail revision on the recent work done on the inflation-growth relationship.

## **4.1 Survey**

### ***i. Threshold effects in the Relationship between Inflation & Growth***

*Mohsin S. Khan and Abdelhak S. Senhadji*

*IMF Staff Papers Vol. 48, No. 1 (2001)*

Khan & Senhadji (2001) analysed the inflation and growth relationship separately for industrial and developing countries. What made this investigation particularly interesting from a methodological point of view is the use of new econometrical tools. The authors re-examine the issue of the existence of “threshold” effects in the relationship between inflation and growth, using econometric techniques initially developed by Chan and Tsay (1998), and Hansen (1999, 2000). The paper specifically focused on the following questions:

- Is there a statistically significant threshold level of inflation above which inflation affects growth differently than at a lower rate?

- Is the threshold effect similar across developing and industrial countries?
- Are these threshold values statistically different?
- How robust is the Bruno-Easterly finding that the negative relationship between inflation and growth exists only for high-inflation observations and high-frequency data.

### **Data**

The data set included 140 countries (comprising both industrial developing countries) and generally covered the period 1960-98. The authors stated that some data for some developing countries had a shorter span. As such, analysis had to be conducted by them using ‘unbalanced panels’. The data came primarily from the World Economic Outlook (WEO) database, with the growth rate in GDP recorded in local currencies at constant 1987 prices and inflation measured by the percentage change in the CPI index.

### **Methodology**

To test for the existence of a threshold effect, a log model of inflation was estimated. The log of inflation was preferred, as the inflation-growth relationship was relatively more apparent. The authors suggested that regressions of real GDP growth on the level of inflation instead of the log, would give greater weight to the extreme observations, with the potential to skew the results. They proposed that the log transformation eliminated, at least partially, the strong asymmetry in the inflation distribution. With the threshold level of inflation unknown, the authors estimated it along with the other regression parameters. The estimation method used in their case was the non-linear least squares (NLLS).

Furthermore, since the threshold level of inflation enters the regression in a non-linear and non-differentiable manner, conventional gradient search techniques to implement NLLS were inappropriate. Instead, estimation was carried out with a method called conditional least squares.

### **Findings/Conclusions**

The empirical results presented in the paper, strongly suggest the existence of a threshold beyond which inflation exerts a negative effect on growth. Inflation levels below the threshold levels of inflation have no effect on growth, while inflation rates above the threshold have a significant negative effect on growth.

The authors' results find that the threshold is lower for industrialised countries than it is for developing countries (the estimates are 1-3 percent and 11-12 percent for industrial and developing countries respectively, depending on the estimation method used). The thresholds were statistically significant at 1 percent or less, implying that the threshold estimates are very precise. The negative and significant relationship between inflation and growth above the threshold level is argued to be robust with respect to type of estimation method used.

The authors suggest that while the results of the paper are important, some caution should be borne in mind. The estimated relationship between inflation and growth does not provide the precise channel through which inflation affects growth, beyond the fact that, because investment and employment are controlled for, the effect is primarily through productivity. This also implies that the total negative effect may be understated. The results in this paper provide strong evidence for supporting the view of low inflation for sustainable growth.

**ii. *Warning: Inflation May Be Harmful to Your Growth***

*Atish Ghosh and Steven Phillips*

*IMF Staff Papers Vol. 45, No. 4 (1998)*

The authors argue that if a relationship exists between inflation and growth, it is not likely to be a simple one. The bivariate relationship may not be linear; and the correlation between inflation/disinflation and growth maybe quite different from the steady-state inflation-growth relationship. Ghosh and Phillips argue further, that in a multivariate case, the relationship becomes even more complicated. The inclusion of other determinants of growth reduces the apparent effect of growth, for a number of reasons. These include amongst others, the idea that some of the other determinants may be functions of inflation themselves. In this paper, they attempt to address these various methodological problems in an attempt to examine the relationship between inflation, disinflation and output growth.

**Data**

Their complete data set consists of 3,603 annual observations on real per capita GDP growth, and period average consumer price inflation, corresponding to 145 countries, over the 1960-96 period.

**Methodology**

Their primary analytical tool is a panel regression, in which their main contribution was to combine a nonlinear treatment of the inflation growth relationship with an extensive examination of robustness. They check whether the inflation-growth relationship appears in multivariate regression analysis. The intent was not to develop an explanatory model of GDP growth, but rather to determine whether the inflation-growth

correlation is robust. Their analysis also checked for nonlinearity of the inflation-growth relationship.

### **Findings/Conclusions**

In general, the findings reveal that there is a negative relationship between inflation and growth that is statistically significant and of an economically interesting magnitude. These findings were put through numerous robustness checks. As an interesting by-product of their studies, the authors developed a sequential decision “tree” technique in order to prove that inflation is not only a statistically significant determinant but also one of the most important determinants of growth. At very low rates of inflation (around 2 -3 percent a year or lower), inflation and growth are positively correlated. Otherwise, inflation and growth are negatively correlated, but the relationship is convex, so that the decline in growth associated with an increase from 10 percent to 20 percent inflation is much larger than that associated with moving from 40 percent to 50 percent. Taking both these nonlinearities into account, they find that the negative inflation-growth relationship is evident in both the time and cross-section dimensions of the data, and that it is quite robust. The authors also found a threshold at 2.5 percent, and a significant negative effect above this level. The negative relation survived all additional robustness checks and tests for endogeneity. Their policy message suggests that even lowering moderate inflation rates can yield gains in GDP growth of up to 0.8-0.9 percentage points.

### ***iii. From Inflation to Growth: Eight Years of Transition***

*Peter Christoffersen and Peter Doyle*

## *IMF Working Paper 100 (1998)*

This paper addresses some issues on panel data studies of growth in transition and highlights some areas of concern. It focuses on the role of export market growth and structural reforms and tries to ascertain the relationship between output and inflation as well as the impact of disinflation. These issues according to Christoffersen and Doyle are fundamental to understanding transition and therefore to the design of policy in transition economies.

### **Data**

The panel data is somewhat 'unbalanced' where the longest series is from 1990 to 1997. This research consists of data such as annual real GDP data, population, the share of exports, transition reform index, the direction of trade to 1996, war dummy and export market growth rates.

### **Methodology**

Christoffersen and Doyle adopted a similar approach to Sarel (1995), modelling the linked relationship between inflation and output. Thus, two inflation terms are used; namely log inflation and log inflation less a threshold. The second series was set to zero below the threshold.

Their first step involved reproducing the key findings of the earlier work and if possible, encompass it. Secondly, investigated how disinflation affected output as described in the earlier work. Thirdly, conducted robustness tests and checked how parameter estimates were affected by inflation outliers and the exclusion of countries one at a time from the panel. Finally, the reported  $p$ -values were computed using White's heteroskedasticity-consistent standard errors.

## **Findings/Conclusions**

Export market growth is strongly associated with output transition unlike previous studies, which omitted export market growth and therefore overstated the output costs of inflation, as well as the short-run costs of structural reform and its long-run benefits. According to Christoffersen and Doyle, even given the external shocks, structural reform and disinflation can stimulate growth. Moreover, they found that there is no evidence that disinflation necessarily incurs significant output costs, even at moderate inflation rates. Losses only appear to arise when moderate inflation is stabilised in the presence of exchange rate pegs. They also found no evidence of countries closer to the inflation-output threshold simply aiming to stay there without proceeding further towards industrial country inflation rates. The authors suggest that, for countries now well below the estimated inflation-output threshold, no evidence is found that output will be boosted by raising inflation. Thus, such countries should aim to lock in their low rates of inflation.

### ***iv. Non-linear effects of inflation on economic growth***

*Michael Sarel*

*IMF Working Paper/95/96 (1995)*

The paper examines the possibility of non-linear effects on economic growth, it finds evidence of a significant structural break in the function that relates economic growth to inflation. The study was conducted to confirm the changing view, from the 1970s and 80s, that inflation had a negative effect on growth. The transformation in views raised three important questions:

- Why did it take so long to uncover the link between inflation and growth?
- As the estimated effects of inflation on growth are relatively small, should the results of these studies affect policy priorities and institutional arrangements?
- If a specific range for inflation is adopted as a policy target, what should this range be?

Motivated by these questions, Sarel explores the possibility of nonlinear effects of inflation on growth.

### **Data**

The study uses data on population, GDP, consumer price indices, terms of trade, real exchange rates, government expenditures and investment rates. The CPI and terms of trade data are used in order to reduce the problem of negative correlation between inflation and growth, that is not directly caused by inflation effects on growth. A joint panel database was produced combining continuous annual data from 87 countries, during the period 1970 - 1990. The 20-year sample is divided into four equal periods of five years each, obtaining a total of 248 observations.

### **Methodology**

The paper, first attempts to uncover nonlinear features in the function that relates economic growth to inflation. For this test, the observations were divided into 12 equal groups with dummy variables assigned to each group. Then, an OLS regression was estimated for the growth rate on the inflation dummies and others. This test presented evidence that the function that relates economic growth to inflation may

contain a structural break. Following this preliminary test, the author, using a simple estimation technique (OLS regressions), endeavours to answer relevant questions:

- At what level of inflation does the structural break occur?
- Is the break significant?
- What are the estimated values of the inflation effects on growth?

The author also introduces additional tests as variations to the main test, with the inclusion of other explanatory variables. This was done largely to better understand the effects of inflation on growth, and to use changes in the specifications of the regression to check the robustness of the main test results, regarding the nonlinear effects of inflation on growth.

### **Findings/Conclusions**

It finds that there is evidence of a structural break that is significant. The break is estimated to occur when the inflation rate is 8 percent. Below that rate, inflation does not have any effect on growth or it may even have a slightly positive effect. When the inflation rate is above 8 percent, however, the estimated effect of inflation on growth rates is negative, significant, robust and extremely powerful. This study also demonstrated that when the structural break is taken into account, the estimated effect of inflation on economic growth increases by a factor of three. The results suggest that the existence of a structural break also suggests a specific numerical target for policy: keep inflation below the structural break.

- v. *Does high inflation affect growth in the long and short-run?*

*Joao Ricardo Faria and Francisco Galrao Carneiro*

*Journal of Applied Economics, Vol. IV, No.1 (2001) 89-105*

This paper investigates the relationship between inflation and output in the context of an economy facing persistently high inflation and inflation shocks. The authors highlighted various existing theories, stating three possible results of the impact of inflation on growth; negative, positive or none. The authors also cited a number of studies completed by various other authors including Eckstein and Leiderman (1992), Gillman (1993), Smyth (1992, 1994, and 1995) and De Gregorio (1993). By analyzing the data for Brazil, the authors found that inflation does not impact growth in the long-run, but in the short-run there exists a significant negative effect from inflation on output. The authors imposed minimal structure and made use of the idea that inflation shocks can be broken down into permanent and temporary components.

### **Data**

The data used in this paper, consists of the monthly inflation rate and real output for the period January 1980 to July 1995. The authors sourced the data from the Brazilian Institute of Economics and Geography database.

### **Methodology**

The authors use a bivariate time series model based on methodology following the Blanchard and Quay (1989) decomposition and so the primary concern of the paper was to estimate the long-run response of output to a permanent inflation shock. In sum, the Blanchard and Quay decomposition allows one to assess the effects of temporary and permanent shocks on a variable in a bivariate Vector Autoregression (VAR). They

construct this decomposition by assuming that one type of disturbances has no long-run effect on one of the endogenous variables to decompose transitory from permanent components. In the authors' framework, one shock is associated with permanent changes in inflation and one is restricted to have only temporary effects on inflation. The permanent shock is assumed to be the result of permanent changes in the growth rate of money, the temporary shock to inflation, however, it is allowed to have a permanent effect on inflation.

### **Findings/Conclusions**

The results presented in the paper, find a zero long-run response of output to a permanent inflation shock in the context of a high inflation country, in this case being Brazil. The results could be considered as evidence against the view that inflation and output are reliably related in the long-run. These results are argued to support Sidrauski's (1967) superneutrality of money in the long-run, in that inflation does not affect long-run growth. However, in the short-run, it did provide contradictory evidence against Sidrauski's model. In estimating a short-run model for changes in output against changes in inflation, the authors found that the test statistics were satisfactory and significant. The results indicated that in the short-run, there is a negative impact of inflation on output.

#### ***vi. Inflation Crises and Long-Run Growth***

*Michael Bruno and William Easterly*

*Policy Research Working Paper, The World Bank (1995)*

This paper was initiated basically to examine the determinants of economic growth. Bruno and Easterly in carrying out the research, propose

a nonparametric definition of high inflation crises as “periods when annual inflation is above 40 percent”. Their aim is to make progress on stylised facts that can be used for further theorising.

### **Data**

The data series contained annual CPI inflation of 26 countries that had inflation crises at some point in time over the 1961- 1992 period. The threshold for an inflation crisis is an inflation rate of 40 percent and over.

### **Methodology**

Bruno and Easterly identified countries, which had high inflation crisis of 40 percent and above. This was followed by assessing how the country’s growth has performed before, during and after its high inflation crisis. The robustness of the results was examined by controlling for other factors such as shocks including political crises, terms of trade shocks and wars.

### **Findings/Conclusions**

Bruno and Easterly found a negative relationship between inflation and growth, which is firmly established when looking at the temporal association of growth with discrete high inflation crises. However, they found the case for growth effects of low to moderate rates of inflation very much ambiguous. According to the results obtained, causality remained problematic, but their results are consistent with the view that costs of inflation only become significant at relatively high rates of inflation. At lower rates of inflation, growth and inflation may simply be jointly troubled by various demand and supply shocks and hence shows no consistent pattern.

They also found strong recoveries of growth following successful reduction of high inflation. The authors concluded that if an inflation crisis does not affect the long-run average inflation rate, it would not alter the long-run average growth rates, if there was sufficient time to recover from the crisis in the period over which one is averaging. Inflation crises, as they believe, have a temporary effect on output but no permanent effect on output growth. Thus, inflation crises may after all be just a cyclical phenomenon, although the cyclical swings are large indeed.

**vii. *Inflation and Economic Growth***

*Robert J. Barro*

*NBER Working Paper 5329 (1995)*

This paper attempts to find from empirical analysis the estimated effects of inflation on growth. The analysis provides a presumption that inflation is a bad idea, but the case is not divisive without supporting empirical findings. The paper considers the effect on growth of inflation, and of “other determinants” such as fertility, education etc. Once the effects of the other determinants are removed, the residual growth is plotted against inflation. This plot is at the core of the study by Barro. The paper explores the inflation – growth relationship in a large sample over 30 years.

**Data**

The data set covers over 100 countries from 1960 to 1990. Annual inflation rates were computed in most cases from consumer price indices. Data was also collated for the other determinants of growth, which included the growth rate of real GDP per capita, and the ratio of investment to GDP for the three decades.

## **Methodology**

To assess the effect of inflation on economic growth, a system of regression equations were used, in which many other determinants of growth were held constant. The framework was based on an extended view of the neoclassical growth model, as described in Barro and Sala-i-Martin (1995). A general notion in the framework is that an array of government policies and private-sector choices determine where an economy will go in the long-run.

To get a “first-pass” estimate of the effects of inflation on economic growth, Barro included the inflation rate over each period as an explanatory variable along with the other growth determinants. The results indicated with significance that inflation had a negative effect on growth, with a coefficient of  $-0.024$ . The bottom line from the empirical analysis is that the estimated effects of inflation on growth are negative when some plausible instruments are used in the statistical procedures. Thus, there is some reason to believe that the relations reflect causation from higher long-term inflation to reduced growth.

## **Findings/Conclusions**

The results in this paper show that if a number of the country characteristics are held constant, then regression results indicate that the impact effects from an increase in average inflation by 10 percentage points per year are a reduction of the growth rate of real per capita GDP by 0.2-0.3 percentage points per year, and a decrease in the ratio of investment to GDP by 0.4-0.6 percentage points. As mentioned earlier, the statistical procedures use plausible instruments for inflation, leaving reasons to believe that the relationship is causative. However, statistically significant

results emerge only when high-inflation experiences are included in the sample. Although the adverse influence of inflation on growth looks small, the long-term effects on standards of living can be substantial. For example, a shift in monetary policy that raises the long-term average inflation rate by 10 percentage points per year is estimated to lower the level of real GDP after 30 years by 4-7 percent.

### **viii. *Role of Macroeconomic Factors in Growth***

*Stanley Fischer*

*NBER Working Paper No. 4565 (1993)*

In the paper, Fischer established a framework to identify possible channels from macroeconomic policy to growth. The author, in the process, identifies growth's responsiveness with inflation, large budget deficits and distorted foreign exchange markets, and scrutinises the causal relationship and the channels through which it operates. Examination of exceptional cases illustrated that while low inflation was not necessary for high growth even over long periods, high inflation was not consistent with sustained growth.

#### **Data**

Their complete data set consists of several macroeconomic variables including consumer price inflation, corresponding to 93 countries.

#### **Methodology**

In this paper, outside of using simple panel regressions, Fischer also uses a simple alternative to mixed regressions, a production function-based approach pioneered by Victor Elias (1992). The approach is a regression analogue of growth accounting, which helps identify the

channels through which macroeconomic variables affect growth. As a matter of accounting, growth can be attributed to increases in the supply of factors, and to a residual productivity category, reflecting changes in the efficiency with which factors are used. Cross-sectional regressions were run on these to determine the results in the growth accounting framework.

### **Findings/Conclusions**

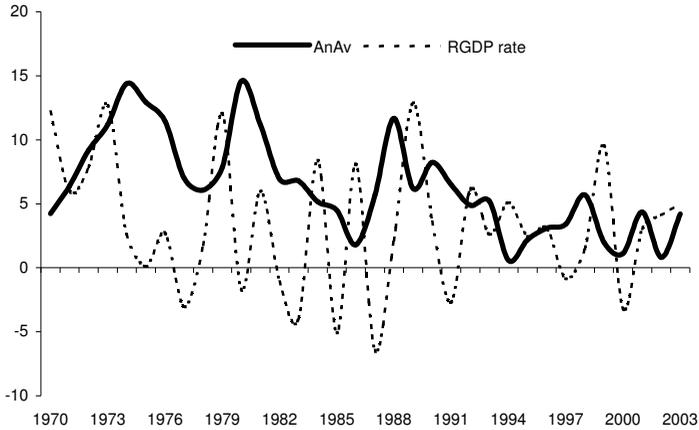
Inflation is significantly correlated with the growth rate. The simple panel regressions confirm the relationships between inflation, inflation variability and growth. The growth accounting framework made it possible to identify the main channels through which inflation reduces growth. The author pointed out that, in line with past theory and studies, the results of the paper implied that inflation impacted on growth by reducing investment, and by reducing the rate of productivity growth. Examination of exceptional cases also showed that while low inflation and small deficits were not necessary for high growth even over long periods, high inflation was not consistent with sustained growth.

## **5.0 Inflation and Growth – Fiji’s Case**

Given the current structure of the Fiji economy and the nature of inflation dynamics in Fiji, it should come as little surprise that historical trends in inflation and economic growth performance fail to reveal any obvious relationship. For the period 1970 – 2003 economic growth in Fiji averaged around 3.3 percent, while per capita GDP grew on average by 1.8 percent. Although, the average growth rate for the period is similar to that of some of the well performing developing countries, there have been

protracted periods of strengths and weaknesses in Fiji's economy. Thus, depicting a volatile economic growth pattern (see Figure 3).

**FIGURE 3**  
**Annual Average Inflation - Growth (1970-2003)**



Inflation in Fiji over the last 30 years has been mainly affected by foreign factors; being trading partner inflation, the nature of our exchange rate arrangement and the country's openness. Whilst inflation has also been underpinned by domestic factors, they have not been as significant over the longer term, outside of a few episodes. As such, there appears to be a very weak correlation with the cyclical pattern of output.

Fiji is a net importer of merchandise goods. Hence, when there is a build up of price pressures in factor or goods markets, a lot of these pressures are dissipated through recourse to increased imports<sup>12</sup>. In other

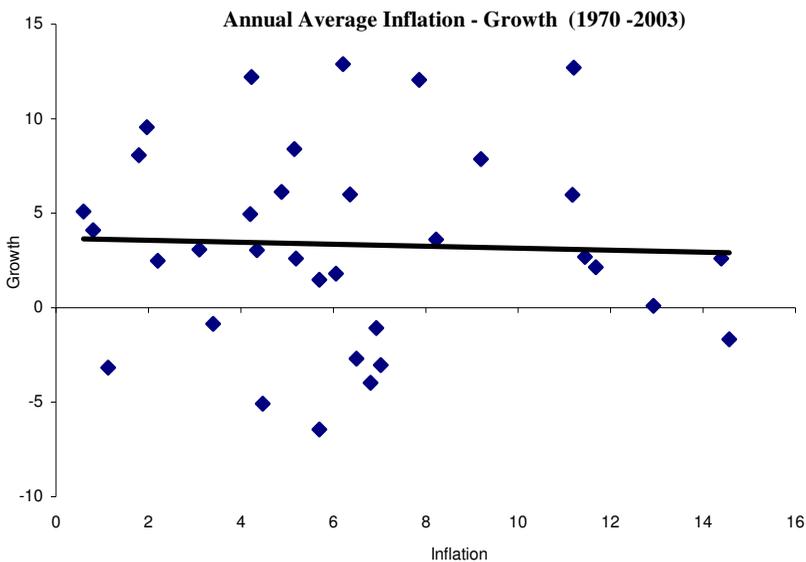
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<sup>12</sup> Dewan et al (1999).

words, the capacity in certain sectors of the economy is not constrained by supply limitations, with the availability of imports. This limits the impact of cost-push inflation, unless it originates abroad. These factors have all contributed towards the less than robust link between inflation and growth.

This is not to say that price pressures don't originate from domestic factors. According to a study by Dewan et al (1999) domestic factors still account for around a quarter of Fiji's long-run movement in prices. According to their study, the output gap (or the difference between potential and actual output or GDP) plays an important role in Fiji's inflation outcome. A one percent rise in the output gap is associated with 0.18 percent rise in inflation in the following year.

**FIGURE 4**



In the following section, we will examine Fiji's data, in regards to the relationship, if any, between inflation and growth, and any causal relationship between the two variables. As a first step of investigating the relationship between the two variables, we will examine the basic statistics between inflation and growth. Then the causal relationship between the two variables will be examined, looking at the correlation between the variables and lastly to test the strength, if any, of the inflation – growth relationship.

## **5.1 Examination of Basic Statistics**

Our complete data set consists of 34 years of annual observations (from 1970-2003) on the following variables: Real GDP growth, Annual Average CPI Inflation Rate and Year-on-Year (YoY) CPI inflation rate.

As a first step in exploring the bivariate relationship between inflation and growth, Table.1 depicts the joint frequency distribution of the two variables. This is Annual Average Inflation. In Table 2, the YoY inflation rate is compared with growth. Interestingly, annual average inflation appears to exhibit a negative relationship with growth, where the mean and median growth rates fall as inflation rises. The YoY inflation rate, on the other hand exhibits no obvious relationship with growth.

**Table 1. Basic Statistics (In Annual Percentage)**

	Number of Observation	Annual Average Inflation		GDP Growth	
		Mean	Median	Mean	Median
All Observations	34	6.4	5.9	3.3	2.9
$0 < \Pi < 3$	6	1.4	1.5	4.4	4.6
$3 < \Pi < 5$	7	4.1	4.2	3.1	3.4
$5 < \Pi < 10$	14	6.6	6.4	2.8	2.2
$10 < \Pi < \infty$	7	12.5	11.7	3.5	2.6

The annual average inflation rate could be argued to be a more stable inflation measure than the year on year measure, because its calculation involves the averaging of two years of CPI data. This leads to a less volatile inflation rate, one, which is not subject to the extreme effects of one-off shocks to prices, whether, they be demand or supply driven. As such, the annual average inflation rate may be a more appropriate measure to use in examining the growth relationship.

**Table 2. Basic Statistics (In Annual Percentage)**

	Number of Observation	YoY Inflation		GDP Growth	
		Mean	Median	Mean	Median
All Observations	34	6.8	5.6	3.3	2.9
$0 < \Pi < 3$	10	2.2	2.3	2.1	2.8
$3 < \Pi < 5$	4	3.9	3.9	4.7	6.5
$5 < \Pi < 10$	13	7.2	6.8	3.5	2.7
$10 < \Pi < \infty$	7	14.4	13.2	4.2	2.6

## 5.2 Empirical Tests

Before testing the causal relationship, it is necessary to examine the time-series properties of the data. These are determined using the testing

strategy recommended by Perron (1988). Table 3 shows the standard Augmented Dickey-Fuller test (ADF) (Said and Dickey 1984) and the Phillips and Perron (1988) test where a unit root null hypothesis is tested against a stationary alternative. Empirically, each of the original variables appears to be integrated of order I(0) or I(1). It is necessary that the data be tested for the above properties, before we can make any meaningful inferences about the causal relationship between inflation and growth.

**Table 3: Unit Root Test**

Variables	Augmented Dickey-Fuller Test		Phillips-Perron Test	
	I(0)	I(1)	I(0)	I(1)
Year-on-Year Inflation	-3.11*	-7.80**	-3.56*	-12.11**
Annual Average Inflation	-2.22	-4.80**	-2.52	-6.34**
Real GDP growth rate	-4.72**	-8.31**	-7.41**	-15.94**

Notes: \*\*(\*) denotes significance at the one (five) percent levels. The critical values for the Augmented Dickey-Fuller tests are - 3.4783 and - 2.8822 at one and five percent respectively.<sup>13</sup>

In Table 4 the correlation between inflation and growth is scrutinised. The correlation matrix measures the two-way relation between the two inflation measures and the GDP growth rate. It can be seen that both inflation measures share a negative, albeit weak relationship with growth.

<sup>13</sup> The Akaike Information and Schwarz Criteria were used to determine the suitable lag length.

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**Table 4: Correlation Matrix**

<b>Variables</b>	<b>Year- on- Year Inflation</b>	<b>Annual Average Inflation</b>	<b>Real GDP growth rate</b>
Year- on- Year Inflation	1.00	0.73	-0.01
Annual Average Inflation		1.00	-0.04
Real GDP growth rate			1.00

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This negative relationship holds consistent with traditional Keynesian theory, Stockman's neoclassical model and some endogenous growth theories, which imply that higher inflation, is negatively correlated to growth.

In many previous studies which examine causality, Granger Causality tests have been the most commonly used method. This is because it not only tests the correlation between two variables (as is tested by traditional approaches such as OLS regression), but also specifies the direction of causality. Table 5 below reveals the test results. Table 5 depicts that the null hypothesis that GDP does not Granger Cause annual average inflation can be rejected at the five percent level of significance. At the same time, the null hypothesis that annual average inflation does not Granger Cause GDP cannot be rejected. Hence, the results suggest that Granger causality runs one way, from growth to inflation in Fiji, also referred to as uni-directional causality. This ties in with the study by Dewan et al (1999) where the inflation outcome is influenced by changes in the output gap (difference between actual GDP and potential GDP). To put

the results in perspective, the output gap would have to rise by 18 percent to cause a 1 percent point increase in inflation in the following year<sup>14</sup>

Sarel (1996) found a structural break in economic growth at an inflation rate of 8 percent. This study could be used in reference to Fiji, where as inflation rises, particularly above 5 percent, the mean and median growth rate tend to fall. As evident from Table 1, inflation rates between 5 and 10 percent yielded lower growth rates than inflation rates between 0 and 5 percent.

	<b>Null Hypothesis</b>	<b>F Statistic</b>
GDP	GDP does not Granger cause AAI	3.43*
AAI	AAI does not Granger cause GDP	2.58
YoY	YoY does not Granger cause GDP	1.33

Note: \* Null Hypothesis rejected for five percent level of significance

Another important point to mention, postulated by Ghosh & Phillips (1998) is that the relationship between inflation and growth can be negative and convex. In other words, the decline associated with an increase in inflation from 10 to 20 percent is greater than the fall in growth from a move in inflation from 40 to 50 percent. This could possibly account for the higher mean and median growth rate at inflation rates above 10 percent, in Fiji’s case.

<sup>14</sup> If labour costs are removed from the equation, the estimated coefficient on the output gap term sums to 0.35 (spread evenly over two years). Dewan et al (1999).

## **6.0 Conclusion**

The objective of this paper was to determine whether a significant connection between inflation and economic growth exists, according to theory and empirical literature. The literature survey provided some useful insights into the effects of inflation on growth, including the magnitude. In Michael Sarel's paper (1996), he found a structural break at 8 percent, where after inflation impacted negatively on growth. Khan and Senhadji (2001) found that the threshold inflation levels for industrial and developing countries at 1-3 percent and 11-12 percent respectively. These results amongst others provide useful insights into the relationship between the two variables and to determine the advantages of maintaining price stability.

Looking specifically at Fiji's economic and inflation performance, the less than robust link between the two variables is not surprising, given the current structure of the economy and factors which influence inflation. Correlation coefficients showed only a weak negative link, while causality was shown to run from economic growth to inflation. With the majority of Fiji's inflation being imported, the influence of domestic factors (being unit labour costs and to a lesser extent the output gap) is limited.

The findings of other empirical studies, however, provide some guidance for Fiji policymakers on the importance of maintaining low inflation, in order to foster higher economic growth. For its part, the Reserve Bank of Fiji will need to maintain monetary policy consistent with low inflation and inflation expectations.

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