The Effect of Price Stability on Real Sector Performance in Ghana

By

Peter Quartey
University of Ghana
Legon, Ghana

AERC Research Paper 228
African Economic Research Consortium, Nairobi
January 2011
THIS RESEARCH STUDY was supported by a grant from the African Economic

Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 - City Square
Nairobi 00200, Kenya

Printed by: Modern Lithographic (K) Ltd.
PO Box 52810 – City Square
Nairobi 00200, Kenya

ISBN 978-9966-023-00-1

Contents

List of tables iv
List of figures iv
Abstract v
Acknowledgements vi

1. Introduction 1

2. Price stability or low inflation and the real sector 5

3. Methodology 11

4. Findings 18

5. Conclusion and policy implications 29

Notes 30

References 31

Appendix A: Results for optimal rate of inflation 34

List of tables

1. Sectoral growth rates (1990-2006) 3
2. Seigniorage and inflation tax (% of GDP) 18
3. Results of the unit root tests 20
4. Results of the unit root tests (first difference) 21
5. Cointegration tests 21
6. Vector error-correction estimates (dependent variable – Real GDP growth) 22

A1. Definition of variables 34
A2. Results of the unit root tests (levels) 34
A3. Results of the unit root tests (first difference) 34
A4. Cointegration tests 35
A5. Cointegration results (dependent variable – real money balances) 35

List of figures

1. Real GDP and real per capita GDP growth rates (1970-2006) 2
2. Interest rate margins 3
3. Transmission mechanism from inflation to real sector growth 9
4. The Laffer Curve 13
5. Credit to the private sector as a share of GDP (1970-2006) 24
6. GDP growth rates under different inflation regimes (1970-2007) 24
7. Inflation variability and GDP growth (1970-2006) 25
8. Inflation and sectoral growth rates (1998-2006) 25
9. Inflation and business expectations 27
10. Inflation, exchange rate and sales movements 28

Abstract

Monetary policy in Ghana has, over the years, focused on ensuring price stability or low inflation. The aim of the price stability policy is to provide a stable environment for real sector activities to flourish. However, the outcome of the policy on real sector activities has not been subjected to any empirical investigation and this forms the focus of this study. The study, specifically, examines how the policy of price stability, pursued by the Bank of Ghana, has affected real sector performance. It also examines the revenue and "growth maximizing" rate of inflation for Ghana using data from Bank of Ghana as well as from World Development Indicators (WDI). Subsequently, the relationship between inflation thresholds and real sector performance is examined. This is complemented with bimonthly data to discuss the trends in business confidence during the recent price stability regime. The study finds that economic performance is higher under low inflation periods than when inflation is high. It also establishes the existence of threshold effects of inflation on economic growth.

Acknowledgements

I am very much obliged for African Economic Research Consortium (AERC) financial, material and technical assistance through the useful suggestions and comments during the AERC biannual research workshops. I am also grateful to Dr. Samuel Donyina-Ameyaw, Bank of Ghana, who made useful contributions to this report and research fellows for their contribution to the improvement of this paper. I remain solely responsible for all errors.

1. Introduction

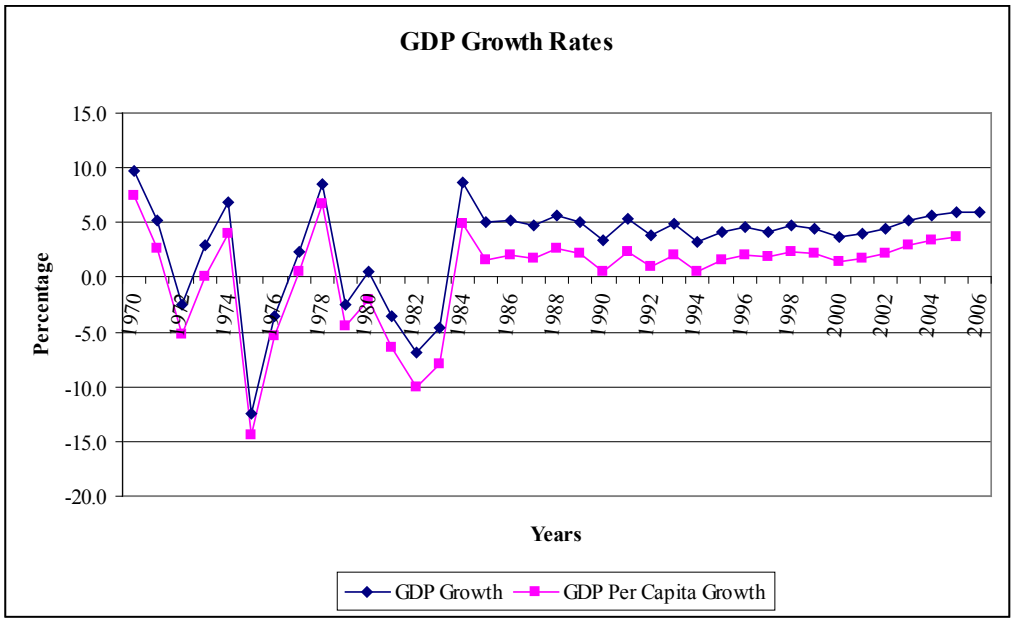
The maintenance of low inflation and/or price stability has been the focus of many countries. Evidence abound that sustained and predictable high rates of inflation can have adverse effects on economic growth or real sector activities (Boyd et al., 2001). Although there is no general consensus on the effect of inflation on growth, several empirical studies have found that inflation negatively affects the real sector (Mariotti, 2002). Of particular interest is a study on both industrialized and developing countries on the inflation growth nexus which found the existence of a threshold level of inflation beyond which the inflation growth relationship is negative (Khan and Senhadji, 2001; Nell, 2000).

Many developing countries have historically recorded persistently high rates of inflation particularly from the early 1970s to the 1990s. Similarly, Ghana has had a long history of very high rates of inflation over the same period. In 1971, inflation, measured as the change in the consumer price index, was 9.6% but rose consistently and by 1977 it had reached 116.4% (Bank of Ghana, 2007). Although the rate of inflation declined thereafter, it was shortlived and by 1983 it had reached 122.9%. The introduction of the Economic Recovery Programme (ERP) saw inflation declining to 40% in 1984. Subsequently, the rate of inflation has been within 10% to 40% except in 1995 when the rate of inflation increased to 59.5% but declined consistently to 12.4% in 1999. The year 2000 was an election year and many of the macroeconomic fundamentals including inflation were unstable. It is not surprising that the high inflationary period also coincided with low real sector performance in Ghana (see Figure 1).

In view of the inverse relationship between inflation and economic performance, the Bank of Ghana has consistently pursued low inflation policies in order to accelerate real sector performance. The Bank of Ghana has since 2002 adopted the policy of price stability[1], particularly low inflation and a fairly stable exchange rate (see Sowa and Abradu-Otoo, 2007). It must be emphasized that, although the Bank of Ghana has been pursuing low inflation policies since 2002, it does not follow an explicit inflation targeting framework. The current framework, however, mimics an inflation targeting regime in which a specific level of inflation is set and targeted jointly by the Bank of Ghana and the Ministry of Finance, but the target does not involve the usual modelling and minimizing of the loss functions as is typically done under inflation targeting regimes (Sowa and Abradu-Otoo, 2007). The rationale for promoting price stability is that it will enhance private sector activities which will in turn increase real sector economic activities through increased output, employment, income and consequently lead to poverty reduction. The outcome of the price stability policy on the real sector critically depends on the extent to which private sector activities respond to these incentives. However, the absence of this

will imply that a trade-off between inflation and unemployment will occur in the short run. As Fischer (1996) argued, while there may be good political reasons to wish there were no short-run trade-offs between inflation and unemployment, empirical evidence confirms its existence.

Figure 1: Real GDP and real per capita GDP growth rates (1970-2006)



Source: World Development Indicators, 2007

Following the introduction of the price stability policy in Ghana, inflation declined from 40.5% in 2000 to 21.3% and 15.2% in 2001 and 2002, respectively. However, petroleum price increases of about 100% in the first quarter of 2003 led to an increased demand for higher wages which in turn led to an increase in end-of-period inflation to 23.6% in 2003. But, thereafter, it fell to 11.8% in 2004. Although inflation had increased to 13.5% by September 2005, it declined to 10.7% by June 2007. The rate of depreciation in the exchange rate was also relatively stable compared with the period preceding the price stability policy. The local currency (cedi) depreciated by 49.8% against the US dollar in 2000 but, again, due to the price stability policy, the rate of depreciation in the local currency declined to 8.3% and 9.3% in 2002 and 2003, respectively. The Cedi depreciated by 2.3%, 0.4% and 0.2% against the US dollar[2] in 2004, 2005, and 2006 respectively. The cedi also depreciated by 23% against the euro in 2002 but the rate of depreciation declined subsequently and, by the end of 2006, it had depreciated by 14.4%. A similar trend was observed for the pound sterling (Bank of Ghana, 2007).

In terms of real sector performance, GDP and GDP per capita growth rates demonstrate consistent and appreciable increases during the period 2001-2006 (see Table 1 and Figure 1).

Table 1: Sectoral growth rates (1990-2006)

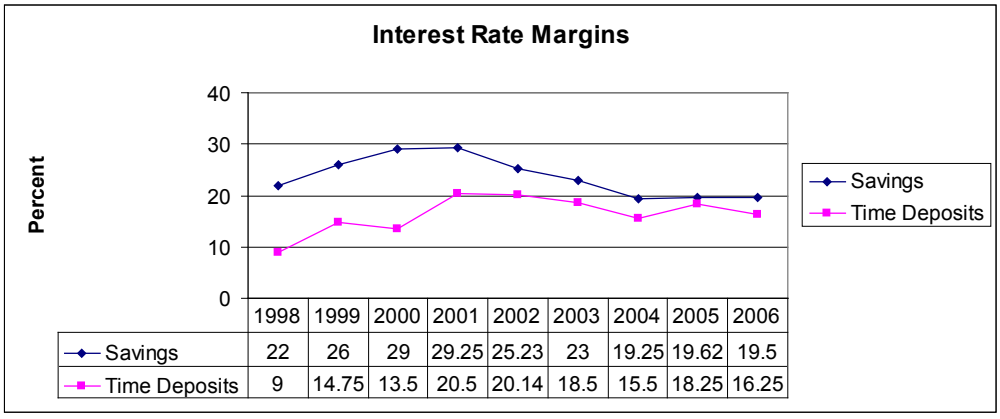
	Sectors			
Period	**Agriculture**	**Industry**	**Services**	**All**
1998	5.1	3.2	6.0	4.7

1999	3.9	4.9	5.0	4.4
2000	2.1	3.8	5.4	3.7
2001	4.0	2.9	5.1	4.2
2002	4.4	4.7	4.7	4.5
2003	6.1	5.1	4.7	5.2
2004	7.5	5.1	4.7	5.8
2005	6.5	5.6	5.4	5.8
2006	5.7	7.3	6.5	6.2
Averages				
1990-94	1.1	4.1	7.0	4.3
1995-99	4.4	4.7	5.3	4.4
2000-06	5.2	4.9	5.2	5.1

Source: Computed from GoG Budget Statements 1997-2007, Ministry of Finance, Ghana

It is also expected that under price stability, the lending rates will decline as inflation and the exchange rates remain stable. This will increase access to credit by the private sector which, in turn, will stimulate real sector activity. The average lending rate was 47% in 2000, but declined consistently thereafter and by the end of 2004, the lending rate was 28.75% declining further to 27.75% by September 2005. As of March 2007, lending rates ranged from 15% to 33.5%. The decline in the prime rate and the lending rate between 2001 and 2007 also led to marginal declines in the interest rate margins (Figure 2). From the above, it is intuitively obvious that the key macroeconomic fundamentals (especially inflation, exchange rate and the interest rate margin) have been stable, but whether this has translated into improved real sector performance remains to be investigated.

Figure 2: Interest rate margins



	1998	1999	2000	2001	2002	2003	2004	2005	2006
Savings	22	26	29	29.25	25.23	23	19.25	19.62	19.5
Time Deposits	9	14.75	13.5	20.5	20.14	18.5	15.5	18.25	16.25

Source: ISSER State of Ghanaian Economy Report, 2006

Research questions

Evidently, since the Bank of Ghana adopted price stability or low inflation as its major objective, the economy has witnessed stable exchange rate, low inflation and a rising trend in economic activity. However, although the trends observed above imply correlation between price stability and economic performance, they do not imply causation. Thus, it is not too evident whether the price stability policy has provided the necessary incentives for the real sector to flourish. This raises a number of issues

that the study aims to address: (a) Has the policy of price stability or low inflation led to significant increases in economic activity in the real sector? (b) What is the revenue maximizing rate of inflation for Ghana? (c) Is the revenue maximizing rate of inflation growth maximizing? (d) What is the policy mix necessary to stimulate real sector activities in Ghana?

Objective of the study

The principal objective of the study is to ascertain the effect of the price stability policy on the real sector of the economy. The specific objectives of the study are to, among others:

- Ascertain the revenue maximizing inflation rate for Ghana;
- Investigate the effect of price stability or low inflation on business confidence and real sector performance;
- Ascertain the inter-relationship between inflation thresholds and real sector performance in Ghana; and,
- Discuss how other key policies in addition to price stability, can substantially stimulate real sector economic activities in Ghana.

Relevance of the study

The government of Ghana has been pursuing the policy of price stabilization since 2002 but the efficacy of this policy has not been subjected to any empirical investigation. It is this gap in our knowledge that the study intends to fill. The study will significantly influence monetary policy in Ghana. For example, one of the three key areas of the Growth and Poverty Reduction Strategy (GPRS II) is private sector development. Under this sub-theme, the policy is to use both fiscal and monetary policies to stimulate private sector growth and employment creation. The key focus of monetary policy under the GPRS II is to ensure single-digit inflation. It is believed that a low inflation economy can stimulate private sector businesses to create more jobs by expanding output. But how significant will the private sector respond to this price incentive? The outcome of this study will provide useful information for deciding on whether to continue with the price stability policy or to employ alternative policies. It will also provide information on what the revenue maximizing and growth maximizing rate of inflation should be for Ghana. The study will not only provide plausible explanations to the efficacy of the inflation targeting policy on real sector economic activities, but also provide valuable information for policy makers in designing effective strategies to manage inflation, exchange rate, interest rate, unemployment and poverty.

2. Price stability or low inflation and the real sector

Definitional issues – price stability and inflation targeting

Price stability[3] is a monetary policy option pursued by most central banks with the aim of controlling inflation, exchange rate and providing the enabling environment for businesses to expand. This policy was adopted by many developed countries in the 1990s and later most developing countries also followed the approach. Industrialized countries like Canada, United Kingdom, New Zealand and Spain have recorded low inflation and stable exchange rate by pursuing the price stability policy. It must be emphasized that countries which have embraced explicit targets for price stability have adopted inflation targets rather than price level targets (Saxton, 2004).

On the other hand, inflation targeting is a monetary policy regime that makes low inflation its primary objective (Svensson, 1999a; King, 1997). Under inflation targeting, the monetary authorities commit to maintaining inflation rate around its target with no other variables in their objective function (Svensson, 1999b). Also, under an inflation targeting regime, the interest rate changes in response to deviations of the output gap from zero. It has been observed that inflation targeting improves the credibility of central banks by becoming more transparent and accountable through better communication of policies. Ammer and Freeman (1995), Freeman and Willis (1995) and Mishkin and Posen (1997) found that economic performance improves significantly under inflation targeting. Similarly, Khan and Parish (1998) found evidence in support of the assertion that inflation targeting led to improved policy credibility in New Zealand and Canada. On the contrary, Cocchetti and Ehrmann (2000) did not find large benefits of inflation targeting in terms of inflation performance in European countries, cost of inflation or the credibility of monetary policy. Siklos (1999) found mixed evidence with inflation targeting improving inflation performance in Australia, Canada and Sweden but not in Finland, New Zealand, Spain and United Kingdom.

Under an inflation targeting regime, the target inflation rate anchors expectations about inflation to changes in actual inflation. Inflation targeting affects the public expectations about inflation, which can produce a self-fulfilling outcome as expected inflation is included in various contracts, such as labour contracts. In such cases, anchoring inflation expectations to target inflation keeps inflation low and stable.

Inflation targeting has its limitations and has been criticized by some authors. First, since monetary policy affects inflation only with a lag, monitoring inflation performance can be a real challenge (Svensson, 1997). Secondly, it will be ideal to know the optimal inflation rate so that targets could be set around it but the optimal inflation is not known. Howitt (1990) argued that the optimal inflation target exceeds zero. A fully credible monetary policy should minimize the cost associated with targeting price stability (Blinder, 1999, also cited in Apergis et al., 2005). For instance, some countries that introduced inflation targeting experienced an increase in revealed aversion to inflation variability, thereby raising output variability (Arestis et al., 2002).

Even though most countries have pursued inflation targeting monetary policy, often target the CPI, Apergis et al. (2005) argues that core inflation targets, which remove

volatility components from the overall price index, could be used. Breuss (2002) has argued that monetary policy, based on core inflation in the euro area, would lead to lower inflation volatility which will lead to lower interest rates and, therefore, higher output. Apergis et al. (2005) found that forward looking rules contribute to macro-stability and monetary policy credibility and also a positive, as opposed to a zero inflation target, is superior in terms of higher and less volatile output.

The distinction between the two forms of targets for price stability can be made; in the case of price level targets, when there is an increase in prices, it requires an offsetting decline in (deflation of) price whereas inflation targets are merely an end to the price increase. The distinction has different implications. For example, inflation targets allow for more policy flexibility in responding to (one-time) supply-side shocks since no price deflation is required. Thus, the enhanced policy flexibility under inflation targeting ensures that inflation targets are viewed as more realistic politically and hence more credible.

Inflation and real sector performance

Inflation leads to a reduction in future profitability of investment, especially when inflation is associated with price variability. It leads to conservative investment strategies, slows down investment and economic growth (Gockal and Hanif, 2004). Inflation affects the international competitiveness of a country by making exports more expensive, which in turn leads to balance of payment problems. Although the general consensus is that inflation has a negative impact on growth in the long run, there have been studies that have found the inflation-output-growth relationship to be either positive or non-existent. Tobin (1965), for example, derives a positive effect of inflation on growth by augmenting the classical model of growth to allow for substitution between physical capital and money. His theoretical framework suggests that an increase in the inflation rate would cause economic agents to shift away from holding money and to move towards more capital investments thereby increasing output. The money-in-utility function model developed by Sidrauski (1967), on the other hand, finds that in the long run, money is neutral such that a rise in the rate of monetary expansion would raise prices but leave the capital stock and output level unaffected.

One of the early works that established a negative long-run association between inflation and growth is that of Stockman (1981), who presented a cash-in-advance model of an economy in which money complemented capital. A later work by Fischer (1993) reinforced this negative relationship by stressing the role of macroeconomic uncertainty in reducing the level of productivity and the rate of investment. Rousseau and Wachtel (2000) empirically explored the indirect role of financial sector development in explaining the negative relationship between inflation and growth. They argue that a well-developed and active financial sector encourages a higher level of capital formation and, most importantly, leads to improved allocation of capital.

In an inflationary environment, however, financial intermediaries would be reluctant to offer long-term financing for capital formation and growth, and the various measures (e.g., interest rate ceilings and credit allocation) instituted by government to protect certain sectors of the economy would lead to inefficient allocation of capital that inhibit

growth. Other studies have also found a negative link between inflation and growth. For example, Gillman and Michal (2002) studied 29 OECD and 18 APEC (Asia-Pacific Economic Cooperation) countries from 1961 to 1997 and found a negative relationship between inflation and economic performance. Similarly, Barro (1995) examined over 100 countries between 1960 and 1990 and found a negative relationship between inflation and growth.

Recent literature on the inflation-growth relationship has focused on the threshold effects of inflation on growth. The possibility of this non-linear effect of inflation on growth was first examined by Fischer (1993), who found that the association between inflation and growth weakens as inflation rises. The general view now, however, is that there exists a threshold level of inflation below which the effect of inflation on growth is either positive or zero, and above which inflation has a negative impact on growth. Bruno and Easterly (1998), for example, have cited evidence of a negative, short- to medium-term relationship between high inflation (i.e., an inflation rate of 40% or more) and growth, and no evidence of a relationship between inflation and growth at annual inflation rates less than 40%.

Khan and Senhadji (2001), using a sample of 140 developing and industrialized countries between 1960 and 1998, also found evidence of the existence of a threshold level of inflation beyond which the inflation-growth relationship is negative. Their findings also indicated that this threshold level of inflation is higher for developing countries (at 7%-11%) than for industrialized ones (1%-3%). Similarly, the Nell (2000) study on the inflationary episodes in South Africa (over the period 1960-1999) also found that single digit inflation may be beneficial to growth while double-digit inflation rates may be growth retarding. Mariotti (2002) using the Johansen cointegration approach, found an inverse relationship between inflation and economic growth. Similarly, Hodge (2006), in examining the inflation-growth nexus for South Africa over the period 1950-2002, confirmed the negative relationship between inflation and growth over the medium to long run using the OLS method. He also adds that countries that maintain low inflation enjoy higher rates of economic growth than countries with high rates of inflation. It is important to add that "a certain amount of inflation may help grease the wheels of the economy" (Akerlof et al., 1996; 2000).

Thus, evidence abounds from the above literature that inflation negatively affects economic performance and goes to confirm the existence of the threshold effect. Unfortunately, these studies are mostly cross country, used simple OLS and have not been applied to Ghana except in the case of Adam et al. (1996), where the optimal rate of inflation from 1970 to 1993 were estimated. It must be noted that a lot has happened after this period and the optimal rate of inflation as well as the inflation growth nexus may have changed. It is this gap in our knowledge that this study intends to fill.

The transmission mechanism from inflation to real variables

The process through which changes in the monetary policy get transmitted to the ultimate objectives like inflation or growth has come to be known as “monetary transmission mechanism”. Interestingly, economists often refer to the channels of “monetary

transmission" as a black box – implying that we know that monetary policy does influence output and inflation but we do not know for certain how precisely it does so. Similarly, the transmission mechanism from inflation to real variables appears contentious.

Nevertheless, in the literature, a number of transmission channels have been identified: (a) the quantum channel (e.g., relating to money supply and credit); (b) the interest rate channel; (c) the exchange rate channel; and (d) the asset price channel. How these channels function in a given economy depends on the stage of development of the economy and its underlying financial structure. Illustratively, in an open economy, one would expect the exchange rate channel to be important; similarly, in an economy where banks are the major source of finance — as against the capital market — the credit channel seems to be a major conduit for monetary transmission. Besides, it needs to be noted that these channels are not mutually exclusive. In fact, there could be considerable feedbacks and interactions among them.

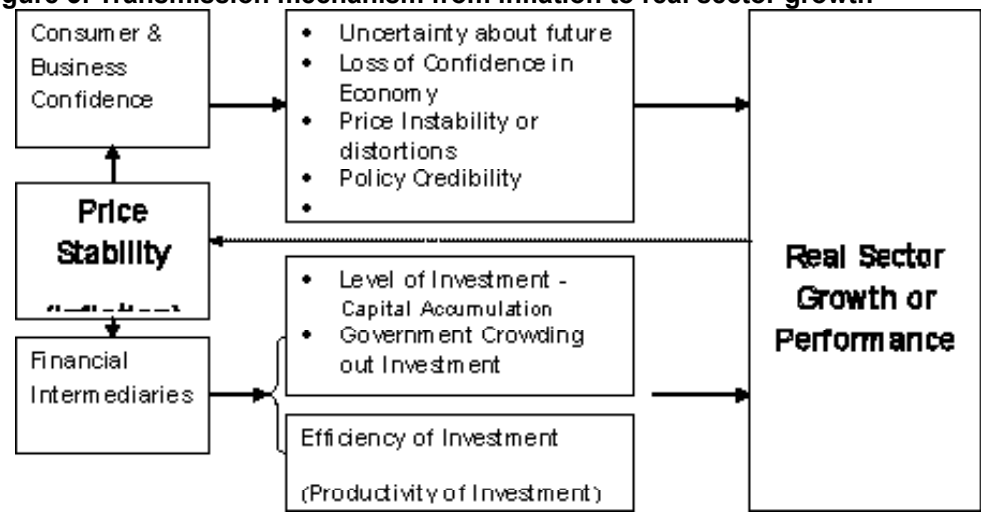
Although the channels explain how inflation or price stability affects the real sector, there is lack of consensus on the adverse effect of inflation on real sector variables. Studies have shown that at lower rates of inflation, the relationship is not significant and can be positive; but at higher rates, inflation has a significantly negative effect on growth. For example, Bruno and Easterly (1998) demonstrated that a number of economies have experienced sustained inflation between 20%-30% with no major adverse consequences on the real sector but once the rate of inflation exceeds a critical level, estimated at 40% inflation, significant declines in the level of real sector activity is recorded. Khan and Senhadji (2001) estimated the inflation threshold level to be 1%-3% for industrialized countries and 11%-12% for developing countries. Thus, there is some kind of consensus that excessively high rates of inflation adversely affect real sector activities. However, the main channel through which this occurs is yet to be established. Empirical studies have suggested that the financial market might be an important channel through which inflation affects growth. Under this hypothesis, there is a critical rate beyond which inflation has a significantly negative effect on financial markets, but below which inflation has no significant effect on financial markets (Boyd, Levine and Smith, 1998; Huybens and Smith, 1998; 1999; Boyd et al., 2001)

If the inflation-finance nexus is true, then one would expect that the effect of inflation on growth to show a similar pattern to that of inflation on financial market performance. The general transmission mechanism is as follows: Inflation reduces the real return on savings and therefore exacerbates an informational friction afflicting the financial system (Boyd et al., 2001; Choi et al., 1996). This financial market friction can cause credit rationing which will affect the level of investment, reduce the efficiency of investment and, consequently, affect real sector performance. Boyd and Champ (2006) argue that inflation exacerbates the frictions in the credit markets. However, in a well functioning credit market, banks can easily adjust nominal interest rates when they need to but frictions create obstacles that impede this adjustment. Ceilings on interest rates imposed by governments are typical examples of such obstacles.

However, Choi et al. (1996) suggest that credit market friction is less harmful at low rates of inflation; that is, at low inflationary environments, credit rationing might not occur at all and the adverse effect of inflation on capital accumulation is no more. In such a case, higher inflation reduces the rate of return on savings and, consequently, increases capital accumulation — a Mundell-Tobin effect that makes higher inflation

lead to higher long-run levels of real activity. However, once inflation exceeds a critical level, credit rationing occurs and higher rates of inflation can have adverse consequence on the real sector. The transmission from low inflation to real sector performance is described in Figure 3.

Figure 3: Transmission mechanism from inflation to real sector growth



Source: Adopted from Celine and Li (2006); Huybens and Smith (1998; 1999); Boyd, Levine and Smith (1998), (2001); Adam et al. (1996)

Inflation can affect the real sector through financial intermediaries and, subsequently, directly affect growth. Empirical studies have shown that different measures of financial sector development are strongly and positively correlated with the level of investment, the efficiency of investment and real economic growth (King and Levine, 1993; Levine and Zervos, 1998; Xu, 2000). A major channel through which inflation affects the real sector via the banking system is by reducing the overall amount of credit available to businesses. Higher inflation can decrease the real rate of return on assets, which will in turn discourage saving but encourage borrowing. New borrowers who enter the market are likely to be of lesser quality and are more likely to default on their loans. Banks may respond to the low real rates coupled with the influx of riskier borrowers by rationing credit. When financial intermediaries ration credit in this way, the result is lower investment in the economy. Lower investments tend to reduce the present and future productivity of the economy, which in turn lowers real economic activity (Boyd and Champ, 2006). It must be emphasized that the effect of inflation on the financial sector occurs at a certain threshold of inflation. Credit rationing occurs when inflation rises above some critical level but beneath a certain threshold; higher inflation might actually lead to increased real economic activity.

Inflation can also affect the real sector by reducing business or consumer confidence through future price uncertainties, general loss of confidence in the economy, or through price distortions (Figure 3). Inflation confuses price signals and makes it difficult for firms to ascertain whether an increase in their price reflects a general increase in the overall price level (shared by all goods) or an increase in their price relative to all other prices – this increases uncertainty and reduces economic activity. Inflation also increases the

effective tax to firms and individuals. For firms, inflation reduces the value of depreciation allowance thereby increasing the effective tax rate. For individuals, inflation increases the effective tax rate on capital income and discourages capital formation and long-term growth.

From the discussions so far, evidence strongly support the view that high inflation, above a certain threshold, negatively affect real sector performance and low inflation spurs real sector activity. The next section adopts the above transmission mechanism or framework in Figure 3 to ascertain the effect of low inflation policy or price stability on the real sector in Ghana.

3. Methodology

Theoretical framework

The framework of analysis is that of Sowa (1994) and Adam et al. (1996) where a revenue maximizing rate of inflation is derived by estimating the Laffer curve. Subsequently, an inflation-growth relationship is estimated to obtain a growth maximizing rate of inflation. The two rates are then compared and, using existing literature and

economic theory, one of these estimates is used to define inflation thresholds. In this study, four categories are identified: (a) 0<Inflation<22.2; (b) 22.2<Inflation<40; (c) 40<Inflation<100; and (d) Inflation>100. Subsequently, real sector performance within these inflationary thresholds are calculated and graphed. The robustness of the estimates is done for other factors. The strength of this approach over the conventional linear inflation and growth relationship is that: (a) Countries can manage to live with low inflation but no country can manage to keep stable or otherwise live with high rates of inflation; (b) The non-parametric form is robust to any monotonic functional relationship between inflation and growth as well as threshold functions in which only high inflation matters; (c) The distribution of inflation is skewed to the right, with a small number of extreme positive values; and, (d) Cross section averages for inflation and growth discard the influence of what happens to growth before and after the crisis.

The revenue maximizing rate of inflation

In recent times, the Bank of Ghana has placed greater emphasis on maintaining low inflation; but how low should inflation be? Whereas some have argued that the current level of inflation is acceptable, others, including the government of Ghana, hold the view that the acceptable level of inflation should be a single digit. To obtain the revenue maximizing rate of inflation, the study makes use of the inflation seigniorage revenue relationship (Adam et al., 1996). Seigniorage can be defined as the value of real resources acquired by the government through its ability to print money. For example, let *SE* represent the real seigniorage revenue, *M* nominal money balances or the non-interest bearing high powered money and *P* price level. The real money balances and seigniorage relationship is:

$$SE = \frac{\Delta M}{M}\frac{M}{P} = \mu m \tag{1}$$

Where μ is the change in nominal money balances, *m* the real money balances and Δ the difference operator. Intuitively, the larger the real money balances held in the economy, the higher the amount of seigniorage corresponding to a given rate of money growth. A distinction can also be made between inflation tax and seigniorage revenue. Inflation tax refers to the increase in nominal money balances which individuals have to accumulate to keep their real balances constant in an inflationary framework. This can also be represented as:

$$IT = \frac{\Delta P}{P}\frac{M}{P} = \pi m \tag{2}$$

Where *IT* is the inflation tax and π is the inflation rate. Equation 2 shows that government can reduce the real value of the non-interest-bearing part of the government debt by using inflation. In this sense, we can interpret π as the inflation tax rate and *m* as the tax base. When the inflation rate is zero, the government gets no revenue from inflation but the amount of inflation tax received by the government would increase as the inflation rate rises. However, as the inflation rate rises, people would reduce their holdings of the money base because the monetary base is now more costly to hold. Thus, individuals hold less currency, and banks hold as little excess reserves as possible, and, eventually, the real monetary base falls so much that the total amount of inflation tax revenue received by the government falls.

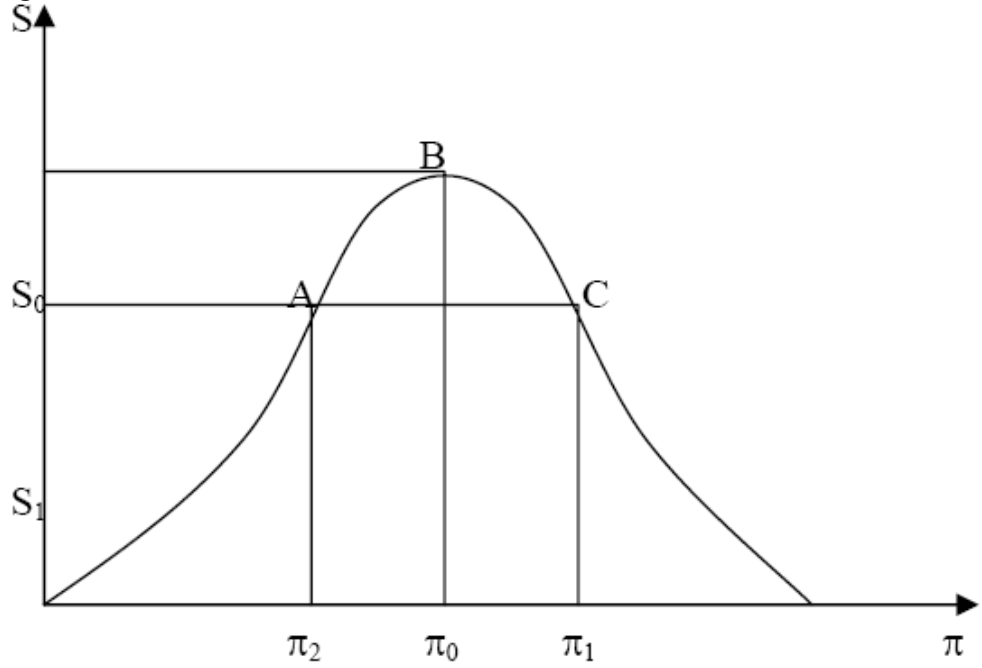
Clearly, the difference between seigniorage and inflation tax arises from changes in real money demand, which may in turn be the consequence of financial liberalization or changes in the inflation rate, real income and interest rates. This difference is sometimes referred to as the non-inflationary component of seigniorage, as it is the increase in money demand that is consistent with a zero inflation rate. As the economy grows, the government can obtain some revenue from seigniorage even if there is no inflation. This is because as the demand for real money grows, the government can create some base without producing inflation. In the literature (see Adam et al., 1996), a Laffer curve is usually used to show how seigniorage revenue changes with the inflation rate with an analogy to the conventional tax revenues and tax rate. On the Laffer curve, there is a critical level of inflation at which the government can "maximize its seigniorage revenue". This critical level is called the revenue maximizing inflation rate.

If the observed inflation rate is less than the estimated seigniorage-maximizing inflation (optimal inflation rate), the economy is said to be on the "correct side" of the Laffer curve; thus, there is still opportunity for a higher seigniorage at higher inflation rates. Also, there is an implicit loss of seigniorage revenue if the economy moves to a lower level of inflation. However, this might have serious implications if the current inflation is perceived to be less than the estimated critical level. Any attempt to raise seigniorage revenue higher than the critical level by printing money may put the economy in a higher inflationary path, which could lead to hyperinflation. A typical Laffer curve is depicted in Figure 4.

The vertical axis measures the seigniorage revenue as a proportion of GDP, while the horizontal axis (π) measures the domestic inflation rate. In Figure 4, it is evident that the seigniorage maximizing inflation rate is B with a corresponding inflation rate of π_0. Below this point the higher the inflation rate, the larger the seigniorage revenue by means of an increase in the base money. However, to the right of point B the higher the domestic inflation, the lower the seigniorage revenue since economic agents would try to avoid holding base money balances so as to protect them from incurring inflation tax. Furthermore, from Figure 4, it is evident that the same seigniorage revenue can be collected by imposing different inflation rates such as π_2 and π_1, where the tax rate is

higher but the tax base is lower; that is the wrong side of the seigniorage maximizing Laffer curve in the latter case with respect to the former. In this line, the former coincides with the correct or efficient side of the Laffer curve in which there is still opportunity for a higher seigniorage at higher inflation rates and there is an implicit loss of seigniorage revenue if the economy moves to a lower level of inflation.

Figure 4: The Laffer curve



There have been a number of estimates of the magnitude of seigniorage revenue from both developed and developing economies. It is important, however, to distinguish between measures of pure inflation tax and measures of seigniorage revenue, since only in the static steady state will the two estimates be equivalent (Adam et al., 1996). Fischer (1982) provides two benchmark estimates of seigniorage and inflation tax for a range of countries. He found that seigniorage usually accounts for approximately 0.5% of GDP per annum. Adam et al. (1996) also found that seigniorage revenue accounted for 2.5% of GDP in Ghana, using quarterly data from 1970 to 1993.

The dynamic case – cointegration approach

At this stage, it is important to determine what rate of inflation will maximize seigniorage revenue. According to Cagan (1956), seigniorage revenue is maximized at the rate of inflation at which point the elasticity of demand for money is unity. This holds when the economy is in the static steady state, where the demand for real balances is a function solely of inflation (Adam et al., 1996). Implicitly, when the economy is growing, the revenue maximizing rate of inflation must lie below the optimal value. This is because while the revenue from taxation of a given stock of real balances is increasing in inflation, the real value of additional money balances held by agents in a growing economy is

monotonically decreasing in inflation. In other words, π and M/P move in opposite directions.

In the quantity theory of money framework, government can raise revenue without any inflationary pressure by a parallel money growth to the rate of real growth. Hence, an accompanying increase in the demand for real money balances provides government with some "free" resources. However, an excessive monetary growth beyond this real growth rate leads to inflation reducing the purchasing power of the outstanding stock of real balances. This second phenomenon is the inflation tax, emphasizing this involuntary tax-like loss in the value of money holdings although governments issue new currency through a set of voluntary transactions.

The inflation tax (IT) can be measured as:

$$IT = \left[\frac{P - P_{-1}}{P}\right]\frac{M}{P} \tag{3}$$

The demand for real money balances takes a central place in the study of seigniorage. However, other factors, apart from inflation, explain the demand for money. In the standard analysis, the money demand is mainly a function of inflation and real income:

$$\left(\frac{M}{P}\right)^{D} = \theta(Y\ \Pi) \tag{4}$$

Domestic and foreign assets substitution effects affect the demand for money. Thus, the demand for money function can be expressed in a homogenous logarithmic form as:

$$\left(\frac{M}{P}\right) = \phi_{m}\ y + \phi_{m\pi}\Pi + \phi_{bm}\ b + \phi_{m}\ r \tag{5}$$

Where *M* and *P* are the log of nominal money and prices respectively, *y* is real income, Π is the rate of inflation, *b* is the rate of return on foreign assets (expected depreciation in the parallel exchange rate) and *r* is the domestic interest rate (opportunity cost of domestic base money). *b* and *r* have been expressed in the form of log *(1+x)*. Rearranging (5) and taking its time derivative gives the growth in nominal money demand as:

$$M^{g} = \phi_{m}\ y^{g} + \phi_{m\pi}\Pi^{g} + \phi_{bm}\ b^{g} + \phi_{m}\ r^{g} \tag{6}$$

Where, *g* denotes the growth rate (approximated by dlog x/dt) of the variables. Substituting the above into (1), the long run seigniorage revenue expression is derived as:

$$S = \dot{M} \quad ^{g} = m\left[\phi_{ym}\, y^{g} + \phi_{m\pi}\Pi^{g} + \phi_{bm}\, b^{g} + \phi_{m}\, r^{g}\right] \tag{7}$$

Assuming a money market equilibrium where $\Pi^{g} = 0$ so that maximizing S with respect to Π and rearranging the first order conditions, a revenue maximizing value of inflation rate is obtained as:

$$\Pi^{*} = \frac{m}{\partial m / \partial \pi} - \left(\phi_{ym}\, y^{g} + \phi_{bm}\, b^{g} + \phi_{m}\, r^{g}\right) \tag{8}$$

Where Π* measures the revenue maximizing inflation rate. The first term on the right represents the inverse of the semi-elasticity of the demand for money with respect to inflation, since the demand for money function is the semi-logarithm form in inflation. Cagan's unit-elasticity result is arrived at by imposing the restrictions $y^{g} = b^{g} + r^{g} = 0$. However, unit-elasticity only holds in the static steady state. However, in general, the overall tax rate on real balances is the sum of the inflation tax component and the real money balances component. The revenue maximizing rate of inflation will be affected by the rate of income growth. Thus, when income is growing, all other things constant, the overall tax rate is above the inflation rate. This occurs when inflation elasticity is monotonically increasing the inflation rate; the rate at which revenue remains the same on the margin must be less than the value which will yield unit elasticity. Thus, once asset market effects are incorporated in the demand for money function, it becomes impossible to ascertain analytically where it will lie but it is possible to examine a number of stylized facts such as periods of stagnation or stabilization and liberalization (See Adam et al., 1996:538-9).

Using an econometric approach, the money demand function above is estimated. Two key issues worth noting are that the results are derived from the long-run equilibrium demand for money function. Also, the possibility of implicit weak exogeneity of the regressors of the conditional model derived above is violated if inflation is endogenous. To address these two issues, the Johansen (1988; 1992) cointegration method is employed.

The long-run money demand function can be reformulated in a cointegrating system as:

$$X_{t} = \Pi_{1}X_{t-1} + \ldots.. + \Pi_{k}X_{t-k} + \mu + \theta D_{t} + \varepsilon_{t} \tag{9}$$

Where X is a p x 1 non-stationary vector of variables, namely, real money balances, real income, the domestic interest rate, the premium on the parallel market rate and the rate of inflation. Whereas μ contains the constants of the system, D is a vector of centred seasonal dummies while $\varepsilon_1 \ldots \varepsilon_T$ are error terms which are assumed to be independently normally distributed. The variables are integrated of order one and, therefore, a first difference operator (Δ) is applied. Subsequently, the equation in first difference can be written as

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \ldots.. + \Gamma_k \Delta X_{t-k} + \Gamma_k \Delta X_{t-k-1} + \Pi_k X_{t-k} + \mu + \theta D_t + \varepsilon_t \quad (10)$$

Where $\Gamma_1 = -(I - \Pi_i - \Pi_i)$ $(i = 1 \ldots k-1)$, and $\Pi_= - (I - \Pi_i - \Pi_i)$

The above equation shows the stationary error-correction first difference Vector Autogressive (VAR) framework where the $\Gamma_i \Delta X_{t-k}$ measures the short-run dynamic behaviour of the system while the $\Pi_i X_{t-k}$ is the long-run information (in levels) between the variables in the VAR. $\Pi_i X_{t-k}$ will be consistent with the stationary VAR as long as it is also stationary and also the elements of X are cointegrated. Thus, the number of cointegrated vectors v between the elements of X will determine the rank of the vector Π. $\Pi = -\alpha\beta'$ where α and β are v x p, with β containing the cointegrating vectors while α measures the speed of adjustment from disequilibrium or the feedback mechanism.

The next section will estimate the revenue maximizing rate of inflation for Ghana from 1990 to 2006 using the following data sources:

1. Domestic Money Bank Credit (1970-2006) obtained from WDI and ISSER SGER;
2. GDP (1970-2006) available from the World Development Indicators 2007;
3. Lending and deposit rates (from 1970 to 2006) obtained from the Bank of Ghana;
4. Inflation (both monthly, quarterly and annual from 1970 to 2006) obtained from World Development Indicators and/or Bank of Ghana;
5. Business Confidence Index (Available from June 2003 to June 2007). This is a bi-monthly data collected by the Central Bank on business perceptions about economic progress; and,
6. World Development Indicators (investment, population growth, income per capita, secondary enrolment).

4. Findings

The optimal rate of inflation

The evidence from the early 1990s to date is particularly interesting: Although inflation has declined, seigniorage revenues have fallen further. As shown in Table 2, seigniorage revenues averaged 0.9 per cent of GDP from 2001 to end of 2006 with inflation tax revenues averaging approximately 2.3% of GDP over the same period. The

results are particularly striking because the liberalization pursued to date has lowered transaction cost and increased the opportunities for substitution between domestic base money and foreign currency holding.

Table A2, in the Appendix, presents the estimates of the unit root test and the cointegrating system. The VAR is estimated with a constant, seasonal dummy and six lags on each variable (real income, real money balances, rate of inflation, rate of return on foreign assets proxied by the expected depreciation of the parallel exchange rate and the domestic interest rate) over the period 1990.1 to 2006.4.

Table 2: Seigniorage and inflation tax (% of GDP)

	Seigniorage and inflation tax as proportions of GDP

Year	Seigniorage % of DP	Inflation tax % of GDP	Year	Seigniorage % of GDP	Inflation tax % of GDP
90:01					
90:02	-0.33	1.13	00:01	-0.10	0.66
90:03	0.15	1.00	00:02	0.35	1.05
90:04	0.19	0.79	00:03	1.09	1.80
91:01	-0.15	0.47	00:04	1.49	2.68
91:02	-0.20	0.34	Mar-01	-0.36	3.37
91:03	0.06	0.23	Jun-01	-0.14	2.80
91:04	0.32	0.19	Sep-01	0.69	2.09
92:01	-0.02	0.14	Dec-01	2.24	1.70
92:02	0.17	0.19	Mar-02	-0.95	1.62
92:03	0.01	0.27	Jun-02	0.00	1.24
92:04	1.61	0.28	Sep-02	0.37	1.16
93:01	-0.73	0.76	Dec-02	4.74	1.40
93:02	0.39	0.75	Mar-03	-2.35	4.14
93:03	-0.01	0.64	Jun-03	0.70	3.36
93:04	0.41	0.57	Sep-03	0.14	3.19
94:01	-0.03	0.46	Dec-03	5.90	2.80

continued next page

Table 2 Continued

	Seigniorage and inflation tax as proportions of GDP				
Year	Seigniorage % of DP	Inflation tax % of GDP	Year	Seigniorage % of GDP	Inflation tax % of GDP
94:02	0.25	0.52	Mar-04	-2.77	1.85
94:03	0.26	0.63	Jun-04	0.92	1.74
94:04	1.22	0.86	Sept-04	0.40	1.93
95:01	-0.41	1.57	Dec-04	4.48	1.82
95:02	0.21	1.35	Mar-05	-2.22	3.28
95:03	-0.18	1.92	Jun-05	-0.25	2.71
95:04	1.21	1.77	Sept-05	0.97	2.50
96:01	-0.19	1.76	Dec-05	3.53	2.59
96:02	0.08	1.22	Mar-06	-1.69	2.04
96:03	0.20	0.81	Jun-06	0.45	1.96
96:04	0.90	0.76	Sept-06	0.61	2.04
97:01	-0.15	0.79	Dec-06	6.96	2.02
97:02	0.06	0.92			
97:03	0.03	1.02			
97:04	0.97	0.52			
98:01	-0.19	0.60			
98:02	-0.01	0.62			
98:03	-0.06	0.42			
98:04	0.68	0.38			
99:01	-0.13	0.40			
99:02	0.08	0.35			

99:03	0.04	0.37
99:04	1.33	0.41

Source: Author's calculation

The lag length was selected based on the SBC and the Akaike Criteria. Unit root tests were carried out on the variables and those found to be non-stationary were differenced (Table A3 in the Appendix). The VAR was estimated employing the modified Cagan framework and the revenue maximizing rate of inflation for Ghana is computed (See Table A4 in the Appendix). The results are robust and show that the revenue maximizing rate of inflation for Ghana is 9.14% using quarterly data over the period 1990-2006. The results also compare favourably with those of other studies (Adams et al., 1996) where the revenue maximizing rate of inflation between 1973 and 1990 was estimated to be around 15% for Ghana. The study shows that the seigniorage maximizing inflation rate for Ghana is below the actual inflation rate, thus making the economy to lie on the "wrong side" of the Laffer curve. The current inflation of 12.8% is above the optimum level of 9.14%. Another key issue yet to be addressed is whether the revenue maximizing rate of inflation is also the growth maximizing rate. This forms the focus of the next section.

The growth maximizing rate of inflation – cointegration approach

To address the issue of whether the revenue maximizing rate of inflation is also growth maximizing, a cointegration framework is used to analyse the inter-relationships between growth and inflation. The approach is to build a non-linear model which includes the squared term on inflation as an explanatory variable. Thus, the regression equation is estimated as a second-degree polynomial. This is a widely used technique for estimating non-linear relationships by allowing for changes in slopes as a function of changes in the independent variable (see Pollin and Zhu, 2005). Hence, the slope of the estimated equation can vary with changes in the inflation rate. This enables the observation of the turning point in the relationship between inflation and growth.

The empirical model is specified as:

$$\begin{aligned}\text{Real GDP Growth} = {} & \beta_0 + \beta_1(\text{real balances}) + \beta_2(\text{Exports/GDP}) + \\ & \beta_3(\text{Deficit/GDP}) + \beta_4(\text{Private Investment/GDP}) + \\ & \beta_5(\text{Inflation}) + \beta_6(\text{Human Capital}) + \\ & \beta_7(\text{Inflation})^2\beta_8(\text{Dummies}) + ei \end{aligned} \quad (11)$$

Three period dummies were introduced (1983-1992; 1993-2000; and 2001-2006). These three periods mark important economic regimes in Ghana. The period 1983-1992 marks the Economic Programme Era, while 1993-2000 refers to the Structural Adjustment Era which also includes the Financial Sector Adjustment Programme (FINSAP) period. The period 2001-2006 marks the Millennium period and the implementation of the PRSPs and the Ghana Poverty Reduction Strategy (GPRS) programme. The list of variables

and their definitions are provided in the Appendix (Table A1).

Annual data from 1970 to 2006 were used and the results are reported in Tables 3 and 4. Both the ADF and the Phillips-Perron test confirm the existence of unit root in the variables. The I(1) variables were therefore differenced to make them stationary and the results are presented in Table 4. The human capital variable was dropped since it provided inconsistent estimates.

Table 3: Results of the unit root tests

Variable	Augmented Dickey Fuller (ADF) Test		Phillips-Perron (PP) Test	
	Constant No Trend	Constant Trend	Constant No Trend	Constant Trend
rgdpg	-1.826258	-1.687995	-3.774095	-2.410277
m/p	0.249605	-1.916955	0.852840	-2.979962
deft	-2.234099	-2.899822	-2.234099	-2.948491
lexpt	-2.010599	-1.842804	-1.864397	-1.842804
Pvtinv	-0.966095	-3.007251	-0.694917	-2.779045
infl	-2.183748	-2.559441	-2.425247	-2.56546
Test critical values:				
	1% level	-3.540198	1% level	-4.100935
	5% level	-2.909206	5% level	-3.478305
	10% level	-2.592215	10% level	-3.166788

Table 4: Results of the unit root tests (first difference)

VARIABLE	Augmented Dickey Fuller (ADF) Test		Phillips Perron (PP) Test	
	Constant No Trend	Constant Trend	Constant No Trend	Constant Trend
rgdpg	-3.155835	-3.30395	-16.02544**	-15.64752**
m/p	-10.056064**	-10.090342**	-11.35171**	-11.92295**
deft	-6.319811**	-6.243196**	-6.7806**	-6.653737**
lexpt	-7.062333**	-7.281371**	-7.083831**	-7.649226**
Pvtinv	-7.677549**	-6.478208**	-8.439228**	-16.62738**
infl	-3.911792**	-6.275686**	-4.376691**	-4.344887**
Test critical values:				
	1% level	-4.110440	1% level	-4.10320
	5% level	-3.482763	5% level	-3.47937
	10% level	-3.169372	10% level	-3.16740

The long-run equation (Equation 10) was estimated using Johansen cointegration method and the results indicate that there is one cointegrating vector and this is confirmed by both the trace statistics and the eigenvalues (Table 5). Subsequently, restrictions such as unit elasticity (see Appendix) are tested. The vector error-correction estimates of the inflation growth relationship are presented in Table 6. GDP growth is negatively affected by inflation with a one year lag. This finding corroborates the work of Mariotti (2002) and Hodge (2006). Higher rates of inflation affect business confidence and also

money loses its value as a store of wealth and these negatively affect economic growth. It is against this background that the Bank of Ghana has focused its attention on price stability. Contrary to expectation, private investment has significantly negative effect on GDP growth. From Table 6, the error-correction term or the speed of adjustment carries the right sign (negative) and it is significant. The three period dummies were insignificant except for the period 1983-1992, which was weakly significant.

Table 5: Cointegration tests

	Unrestricted cointegration rank test (Trace)			
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.852706	132.8203	95.75366	0.0003
At most 1	0.530721	65.78386	69.81889	0.1006
At most 2	0.404756	39.30433	47.85613	0.2484
At most 3	0.269686	21.14692	29.79707	0.3486
At most 4	0.248448	10.14711	15.49471	0.2696

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

continued next page

Table 5 Continued

	Unrestricted cointegration rank test (Maximum eigenvalue)			
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.852706	67.03642	40.07757	0.2923
At most 1	0.530721	26.47953	33.87687	0.4821
At most 2	0.404756	18.15742	27.58434	0.6474
At most 3	0.269686	10.99981	21.13162	0.2121
At most 4	0.248448	9.996537	14.2646	0.2923

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 6: Vector error-correction estimates (dependent variable – Real GDP growth)

Variable	**Cointegration Equation**	**Variable**	**Error Correction Cointegration Equation**
EXPT(-1)	-0.107658** [-1.6902]	D(EXPT(-1))	0.440554** [1.66582]
DEFT(-1)	0.261287**] [1.85443	D(DEFT(-1))	-0.042573 [-0.10911]
INFL(-1)	-0.083947** [-1.85164]	D(DINFL(-1))	-0.037792 [-0.33322]
PVTINV(-1)	-0.32954* [-1.97759]	D(PVTINV(-1))	-0.671995 [-1.56096]

INFL SQD (-1)	0.001429*** [3.85709]	D(INFL SQD (-1))	0.000851 [1.09857]
C	1.361557	C	-0.850047 [-0.52506]
		Dum1	3.494951 [1.45799]
		Dum2	0.00236 [0.00094]
		Dum3	1.362836 [0.47463]
		EC Term	-0.51846* [-1.72435]
		R-Squared	0.50473
		Adj. R-Squared	0.298367
		Sum sq. resids	617.6098
		S.E Equation	5.072844
		F-statistic	2.445838
		Log likelihood	-99.89675
		Akaike AIC	6.336957
		Schwarz SC	6.825781
		Mean Dependent	0.011429
		S.D Dependent	6.056148
		Log Likelihood	-750.2182
		Akaike Information Criterion	46.9839
		Schwarz Criterion	50.18347

From Table 6, the turning point for the inflation-growth relationship is calculated as follows:

Turning Point = - (Inflation Coefficient)/2*Inflation Squared Coefficient).

For the long-run model, the turning point or growth maximizing rate of inflation is 22.2% while for the short-run model, the growth maximizing rate of inflation is 29.4%. From the above, it can be concluded that the revenue maximizing rate of inflation (9.14%) is not growth maximizing but rather, the growth maximizing rate of inflation is 22.2%. Thus, any inflation rate above 22.2% will lead to moderate gains in GDP growth. This corroborates the work of Pollin and Zhu (2005) who found that for middle-income countries, the inflation threshold is 14%-16%, while for low-income countries, a range of 15%-23% was obtained. For the entire sample, they consistently found that higher inflation is associated with moderate gains in GDP growth up to 15%-18% inflation threshold. The finding that the growth maximizing rate of inflation for Ghana is 22.2% is further analysed graphically using the financial market channel and the growth maximizing rate of inflation.

Price stability and real sector performance – The financial sector channel

Using the inflation threshold computed in the foregoing, four inflation growth scenarios are identified: (a) 0<Inflation<22.2; (b) 22.2<Inflation<40; (c) 40<Inflation<100; and (d) Inflation >100. These categories are used to discuss the financial market channel through which inflation affects real sector activities. Thus, the following relationships

are computed and graphed:

(a) Mean and median values of commercial bank lending to the private sector as a percentage of GDP graphed over the different inflation thresholds to ascertain how inflation affects the financial systems and, subsequently, real sector activity from 1970 to 2006;
(b) Mean and median values for real bank net interest margin are graphed over the different inflation regimes;
(c) Comparison of the means and variances of inflation and economic performance (growth) over the period 1970-2006; and,
(d) Graphically show the trends between the business confidence index and inflation expectations.

The key findings are: First, credit to the private sector has been better under low inflationary regimes than during the period when inflation was high. For example, when inflation was less than the growth maximizing rate of 22.2%, credit to the private sector, as a proportion of GDP, was 15.8%. It declined to 5.8% during the period when inflation was between 22.2% and 40%. Credit to the private sector, as a proportion of GDP, was 3.96% when inflation was between 40% and 100%. During the period when inflation was above 100%, credit to the private sector as a percentage of GDP was only 2.8% (Figure 5). This is intuitively obvious. High inflation encourages borrowing but discourages savings since the return to assets fall. Also, under high inflation, new borrowers who are likely to be of less quality and more likely to default on the loans, enter the market. Banks respond to this development by rationing credit which in turn leads to lower investment, low productivity and, consequently, a decline in real sector activity or performance. It is evident from Figure 6 that, in Ghana, real GDP growth was higher under low inflation regimes than under high inflation periods. Mean GDP growth was 4.2% when inflation was below the growth maximizing rate (22.2%) which compares with a lower GDP growth of (2.6%) when inflation is between 22.2% and 40%. As inflation increased, GDP growth or real sector performance declined. For example, GDP growth was less than 1% (0.11%) when inflation was above 100%.

Figure 5: Credit to the private sector as a share of GDP (1970-2006)

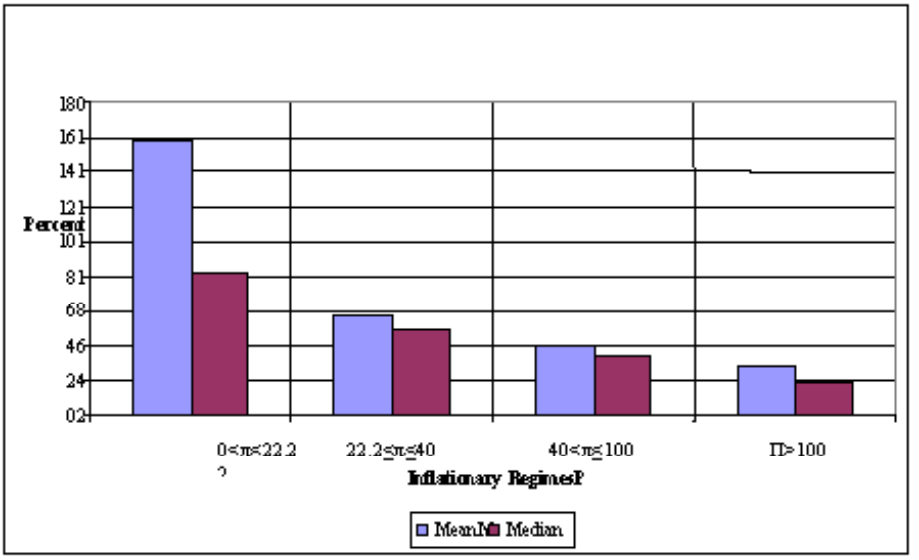


Figure 6: GDP growth rates under different inflation regimes (1970-2007)

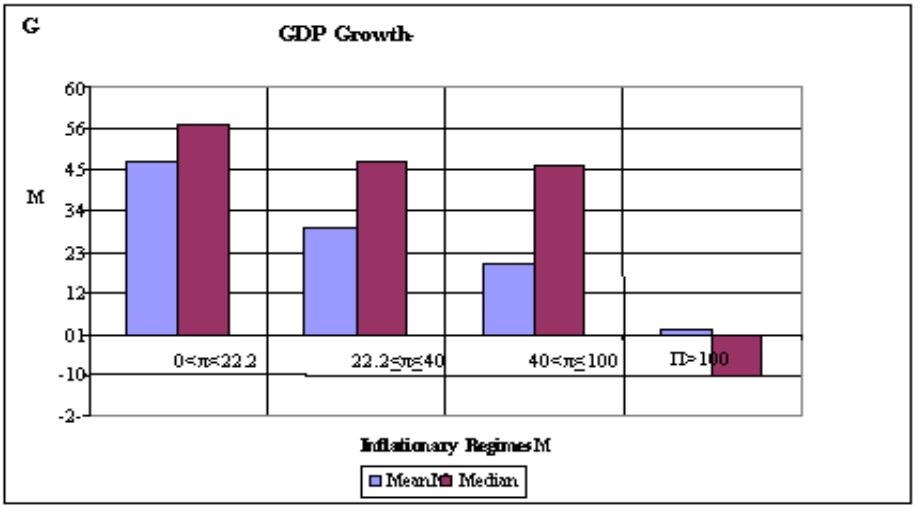
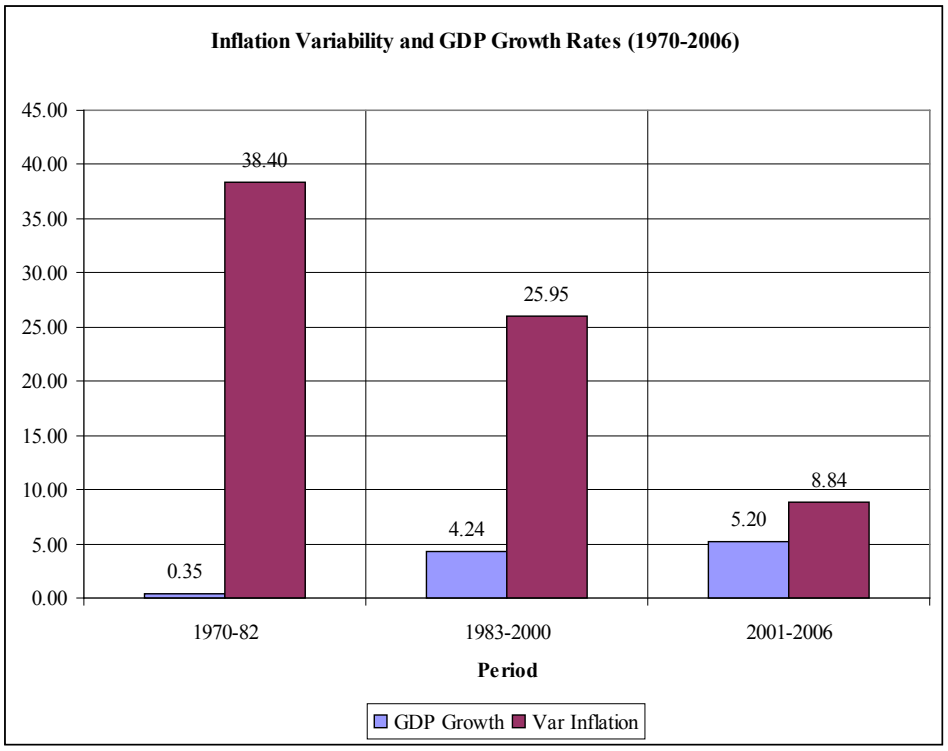
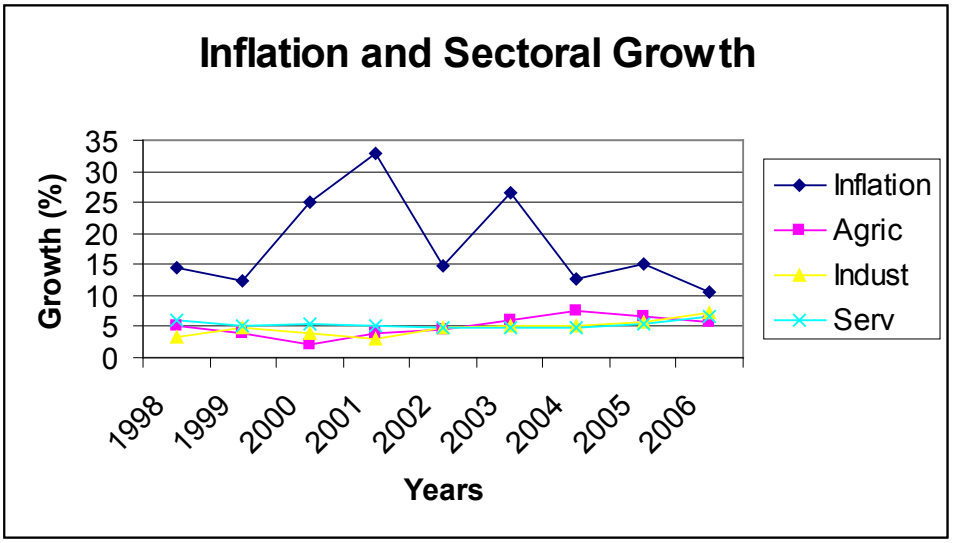


Figure 7: Inflation variability and GDP growth (1970-2006)



Source: Computed from World Development Indicators, 2007

Figure 8: Inflation and sectoral growth rates (1998-2006)



Source: GoG Budget Statements, various issues

Low inflation variability is associated with high GDP growth, and vice versa. From Figure 7, over the period 1970-1982, inflation variability was 38.4% and GDP growth averaged 0.35%. Meanwhile, over the period 1983-2000, inflation variability was 25.9% while GDP growth averaged 4.24%. During the recent price stability era (2001-2006),

inflation variability was 8.8% and GDP growth or real sector performance averaged 5.20%. Also, sectoral growth rates were higher under low inflation regimes than during higher inflationary periods (Figure 8).

Price stability and real sector performance – Business confidence channel

Inflation also affects business confidence through future price uncertainties which, subsequently, affect real sector performance. Figure 9 graphs actual inflation, business perceptions on industry growth prospects, GDP growth prospects, and perceptions on current price movements, sales and employment expectations. As inflation declined from 29.6% in June 2003 to 10.7% in June 2007, the proportion of industry respondents who held positive views that the industry will record growth increased from 54.5% to 91.3% over the same period. Similarly, the proportion of industry respondents who were positive that the economy will grow increased from 22.7% to 69.6% over the same period. As actual inflation declined, businesses were positive about stable price, exchange rate and interest rate movements. For example, 59.1% of businesses in June 2003 were positive about a stable exchange rate movement and by June 2007, it had increased to 87% (Figure 10).

The price stability recorded during the period also translated into positive expectations about employment, sales and profits. In June 2003, 23%, 18% and 14% of respondents were positive that higher employment, sales and profit will be recorded, respectively, and this proportion changed to 14.8%, 51.9% and 44.4%, respectively, in November 2006. However, the proportions declined for all three in June 2007, that is, 13%, 22% and 22% of respondents were positive that they would record growth in employment, sales and profits, respectively. This implies that businesses were not too positive about increasing employment, sales and profits. It is to be noted that the majority were in the "do not know" category rather than those who had negative perceptions. Secondly, the energy crisis that faced the country, which lasted till the third quarter of 2007, may have accounted for the low expectations.

Figure 9: Inflation and business expectations

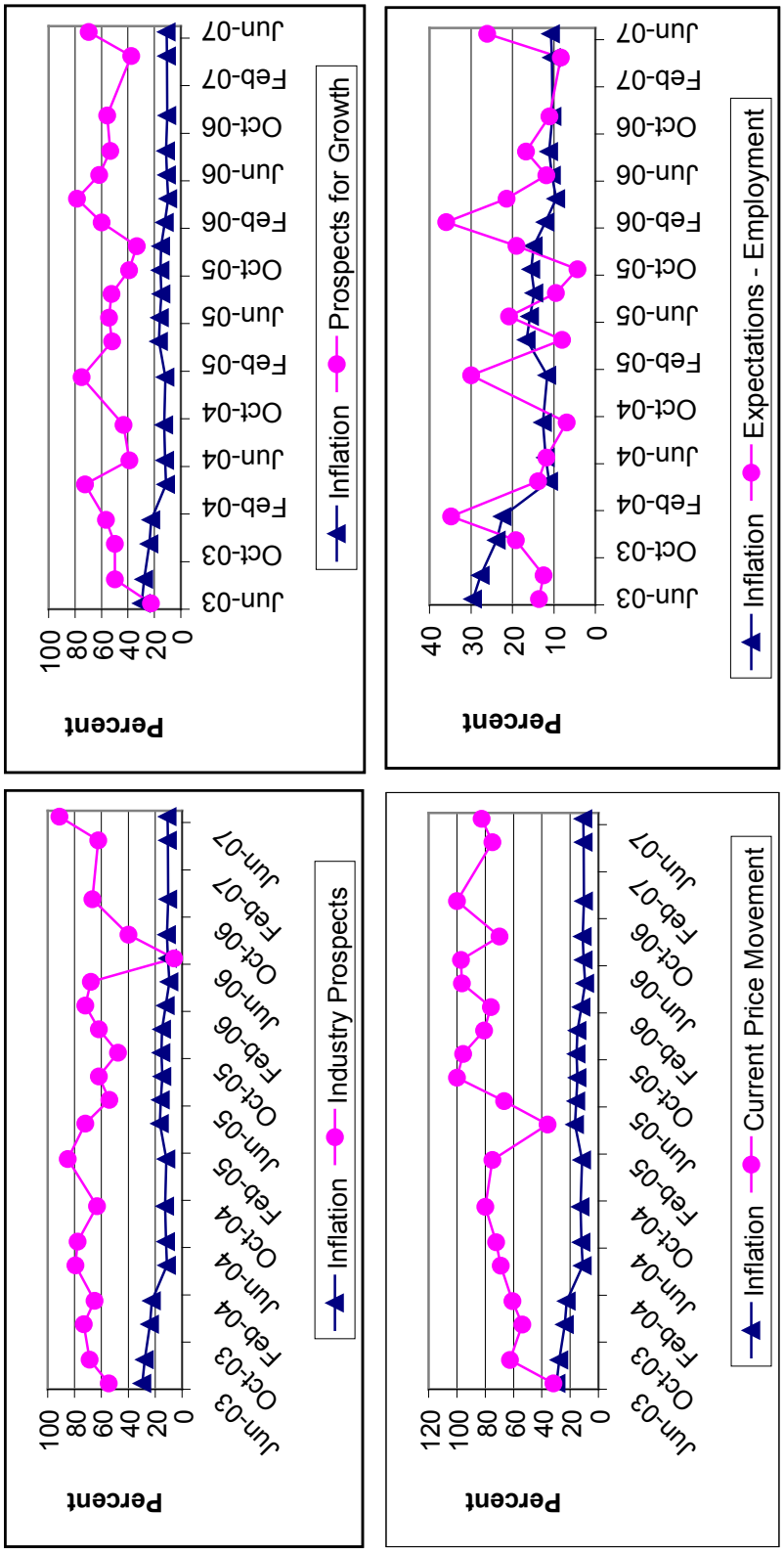
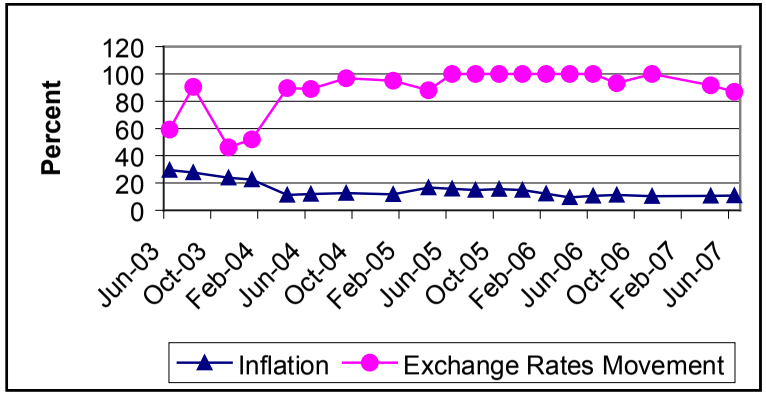
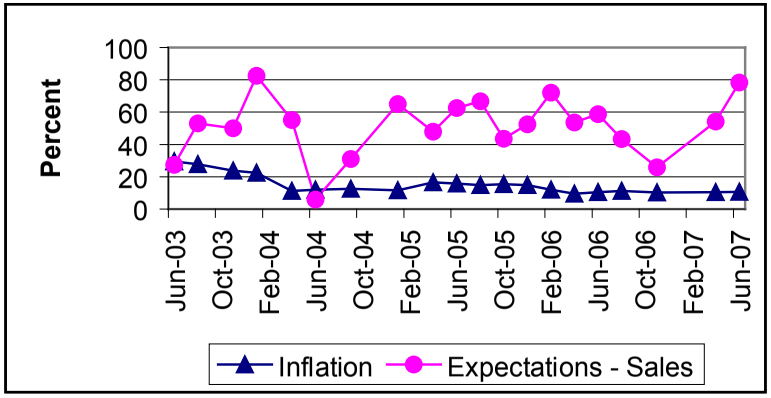


Figure 10: Inflation, exchange rate and sales movements





5. Conclusion and policy implications

The study investigated the effect of price stability on real sector performance in Ghana. Specifically, the study sought to ascertain how low inflation affects business confidence and real sector activities. It also investigated the link between inflation thresholds and real sector performance. Two channels were identified as the processes through which price stability affects the real sector, namely the financial market channel and the business confidence channel. Two sets of data were used: (a) Macro data from 1970-2006; and, (b) the Business Confidence Survey data obtained from the Bank of Ghana covering June 2003 to June 2007. The analysis involved estimating the revenue maximizing and growth maximizing rate of inflation and using it to analyse the relationship between inflation thresholds and real sector performance in Ghana. Also, graphical analysis of means and median of key variables of interest were carried out. The following key findings were made: First, credit to the private sector in Ghana has been low under high inflationary era than during the periods of price stability. Secondly, real GDP growth is higher under low inflation regimes than during high inflation regimes. Also, during periods with high inflation variability, GDP growth or real sector performance tended to be lower, but the reverse occurs under a price stability era. Another interesting revelation is that price stability led to improved business confidence; entrepreneurs were positive about industry, GDP growth and stable price movements. Finally, although entrepreneurs' expectations about sales, employment and profit improved during the price stability era, it declined considerably perhaps due to the energy crisis. The Johansen cointegration approach was also used to analyse the effect of inflation on long-term growth and found that inflation has a negative impact on growth.

In conclusion, the study found that price stability has led to improved real sector performance and suggested that the price stability policy should be complemented with other policies to remove the structural bottlenecks within the economy. For instance, the high cost of credit and the generally high cost of doing business do not promote real sector activities. Secondly, since the growth maximizing rate of inflation for Ghana is not single-digit, it is suggested that the government policy of achieving single-digit inflation should be considered carefully, taking into consideration inflation thresholds.

Notes

1. The Bank of Ghana's mission statement states, "Our mission is to pursue sound monetary and financial policies aimed at price stability and create an enabling environment for sustainable economic growth". See *www.bog.gov.gh/*

2. The dollar was weak against major international currencies during this period.

3. The European Central Bank's Governing Council has defined price stability as "a year-on-year increase in the Harmonized Index of Consumer Prices (HICP) for the euro area of below 2%".

References

Adam, C., B. Ndulu, and N.K. Sowa. 1996. "Liberalization, Seigniorage Revenue in Kenya,

Ghana and Tanzania". *Journal of Development Studies*, 34(4): 531-53.
Akerlof, G.A., W. Dickens and G. Perry. 1996. "The Macroeconomics of low inflation". *Brookings Papers on Economic Activity*, 1:1-59.
Akerlof, G.A., W. Dickens and G. Perry. 2000. "Near-rational wage and price setting and the long-run Phillips Curve". *Brookings Papers on Economic Activity*, 1:1-60.
Ammer, J. and R.T. Freeman. 1995. "Inflation targeting in the 1990s: The experience of New Zealand, Canada and the UK". *Journal of Economics and Business*, 47: 165-92.
Apergis, N., S. Miller, A. Panethimitakis and A. Vamvakidis. 2005. "Inflation targeting and output growth: Evidence from the European Union". IMF Working Paper WP/05/89, Washington DC.
Arestis, P., G.M. Corporale and A. Cipollini. 2002. "Does inflation targeting affect the trade-off between output gap and inflation variability". *Manchester School*, 70: 528-45.
Bank of Ghana. 2007. *Statistical Bulletin*.
Barro, R.J. 1995. "Inflation and economic growth". NBER Working Paper No. 5326. Cambridge, USA.
Bates, T. 1990. "Entrepreneur human capital inputs and small business longevity". *The Review of Economics and Statistics*, 72(4): 551-59
Blinder, A.S. 1999. "The economic myths that the 1980s exploded". *Business Week*, 27:22.
Boyd, J.H. and B. Champ. 2006. "Inflation, banking and economic growth". *Economic Commentary*. Ohio, USA: Federal Bank of Cleveland.
Boyd, J.H., R.E. Levine and B.D. Smith. 1998. "Capital market imperfections in a monetary growth model". *Economic Theory*, 11: 241-73
Boyd, J.H., R.E. Levine and B.D. Smith. 2001. "The impact of inflation on financial sector performance". *Journal of Monetary Economics*, 47: 221-48.
Breuss, F. 2002. "Was ECB's monetary policy optimal?" *Atlantic Economic Journal*, 30: 298-321.
Bruno, M. and W. Easterly. 1998. "Inflation crisis and long-run growth". *Journal of Monetary Economics*, 41: 3-26.
Cagan, P. 1956. "The monetary dynamics of hyper inflation". In M. Freedman, ed., *Studies in Quantity Theory of Money*. Chicago: University of Chicago Press.
Choi, S., B. Smith and J.H. Boyd. 1996. "Inflation, financial markets and capital formation". *Federal Reserve Bank of St. Louis Review*, 78: 41-58.
Chutta, E. 1990. "A Nigerian study of firm dynamics". Working Paper No. 38. MSU International Development. East Lansing, Michigan, USA
Cocchetti, S. and M. Ehrmann. 2000. "Does inflation increase output volatility? An international comparison of policymakers' preferences and outcomes". Working Paper No. 69. Central Bank of Chile, Santiago, Chile.
Dawson, J. 1992. "The relevance of the flexible specialization paradigm for small-scale industrial reconstruction in Ghana". *IDS Bulletin*, 23(3): 34-38.
Fischer, S. 1982. "Relative price variability and inflation in the United States and Germany". *European Economic Review*, 18(2): 171-96.
Fischer, S. 1993. "The role of macroeconomic factors in growth". NBER Working Paper No. 4565. Cambridge, Massachusetts, USA

University Press.
MacKinnon, J. G, A.A. Haug and L. Michelis. 1999. “Numerical Distribution Functions of Likelihood Ratio Tests for Cointegration,” *Journal of Applied Econometrics*, 14(5):563-77.
Mariotti, M. 2002. "An examination of the impact of economic policy on long-run economic growth: An application of VECM structure to a middle income context”. *South African Journal of Economics*, 70(4): 689-724.
McPherson, M. 1996. "Growth of micro and small enterprises in South Africa”. *Journal of Development Economics*, 48: 253-77.
Mishkin, F.S. and A.S. Posen. 1997. "Inflation targeting: Lessons from four African Countries”. *Federal Reserve Bank of New York Economic Policy Review*, 3(3): 9-11
Nell, K. 2000. "Is low inflation a recondition for faster growth? The case of South Africa”. Working Paper No. 0011. Studies in Economics, University of Kent, Kent, UK.
Pollin R. and A. Zhu. 2005. "Inflation and economic growth: A cross-country non-linear analysis”. Working Paper Number 109. Political Economy Research Institute, Massachusetts, USA.
Rousseau, P.L. and P. Wachtel. 2000. "Inflation, financial development and growth”. At *http://www.ssrn.com/abstract=251589.*
Saxton, J. 2004. "Price Stability and Inflation Targeting: A Legislative History”. *Joint Economic Committee Report*. Washington D.C. At *www.house.gov/jec/fed/07-14-04.pdf.*
Schmitz, H. 1998. "Responding to global competitive pressure: Local cooperation and upgrading in the Sinos Valley”. Working Paper No. 82. IDS, Brazil.
Sidrauski, M. 1967. "Rational choice and patterns of growth in a monetary economy”. *The American Economic Review*, 57(2): 534-44.
Siklos, P.L. 1999. "Inflation target design: Changing inflation performance and persistence in industrial countries”. *Federal Reserve Bank of St. Louis Review*, 81: 46-58.
Sowa, N.K. 1994. "Fiscal deficits, output and inflation targets in Ghana”. *World Development*, 22: 1105-17.
Sowa, N.K. and P. Abradu-Otoo. 2007. "Inflation management in Ghana – the output factor”. Paper presented at the Bank of England/Cornell University Workshop on New Developments in Monetary Policy in Emerging Economies, London, 17-18 July.
Stockman, A.C. 1981. "Anticipated inflation and the capital stock in a cash-in-advance economy”. *Journal of Monetary Economics*, 8: 387-93.
Svensson, L.E.O. 1997. "Optimal inflation targets, conservative central banks and linear inflation contracts". *American Economic Review*, 87: 98-114.
Svensson, L.E.O. 1999a. "How should monetary policy be conducted in an era of price stability?" In *New Challenges for Monetary Policy*. A Symposium sponsored by the Federal Reserve Bank of Kansas City. Conference Proceedings.
Svensson, L.E.O. 1999b. "Inflation targeting as a monetary policy rule". *Journal of Monetary Economics*, 43: 607-54.
Tobin, J. 1965. "Money and economic growth”. *Econometrica*, 33(4): 671-84
Xu, Z. 2000. "Financial development, investment and economic growth". *Economic Inquiry*, 38(2): 331-44.

Appendix A: Results for optimal rate of inflation

Table A1: Definition of variables

Variable	Definition

Fischer, S. 1996. "Maintaining price stability". *Finance and Development*, 33(4): 34-37

Freeman R.T. and J.L. Willis. 1995. "Targeting Inflation in the 1990s: Recent Challenges". International Finance Discussion Paper No. 1995-525, Board of Governors of the Federal Reserve System, Kansas, USA

Gillman, M. and K. Michal. 2002. "Modelling the effect of inflation: Growth, levels and Tobin". In D.K. Levine, W. Zame, L. Ausubel, P-A. Chiappori, B. Ellickson, A. Rubinstein and L. Samuelson, eds., *Proceedings of the 2002 North American Summer Meetings of the Econometric Society: Money*. At *http://www.dklevine.com/proceedings/money.htm.*

Gockal, V. and S. Hanif. 2004. "Relationship between inflation and economic growth". Working Paper No.WP2004/04. Reserve Bank of Fiji, Fiji.

Hodge, D. 2006. "Inflation and growth in South Africa". *Cambridge Journal of Economics*, 30(2): 163-80.

Howitt, P. 1990. "Zero inflation as a long-term target for monetary policy". In R.G. Lipsey, ed., *Zero inflation: The goal of price stability*. C.D Howe Institute.

Huybens, E. and B. Smith. 1998. "Inflation, financial markets and long-run real activity". *Journal of Monetary Economics*, 43: 283-315.

Huybens, E. and B. Smith.1999. "Financial market frictions, monetary policy and capital accumulation in a small open economy". *Journal of Economic Theory*, 81: 353-400.

ISSER State of Ghanaian Economy Report 2006, University of Ghana.

Johansen, S. 1992. "Domestic and foreign effects on prices in an open economy: The case of Denmark". *Journal of Policy Modelling*, 14: 401-28.

Johansen, S. 1988. "Statistical analysis of cointegrating vectors". *Journal of Economic Dynamics and Control*, 12: 231-54.

Khan, G. and K. Parish. 1998. "Conducting monetary policy with inflation targets". *Federal Reserve Bank of Kansas City Economic Review*, 83: 5-32.

Khan, M.S. and A.S. Senhadji. 2001. "Threshold effects in the relationship between inflation and growth". IMF Staff Papers, 48 (1): 1-21.

King, M. 1997. "Changes in UK monetary policy: Rules and discretion in practice". *Journal of Monetary Economics*, 39: 81-97.

King, R.G. and R. Levine. 1993. "Finance, entrepreneurship and growth: Theory and evidence". *Journal of Monetary Economics*, 32: 513-42.

Levine, R. and S. Zervos. 1998. "Stock markets, banks and economic growth". *American Economic Review*, 88(3): 537-58.

Gauthier, C. and Li, F.C. 2006. "Linking Real Activity and Financial Markets: The Bonds, Equity, and Money (BEAM) Model". Working Papers 06-42, Bank of Canada

Little, I., D. Mazumdar and J.M. Page. 1987. "Small manufacturing enterprises: A comparative analysis of India and other economies". *World Bank Research Publication*. New York: Oxford

	1% level	-4.110440	1% level	-4.10320
	5% level	-3.482763	5% level	-3.47937
	10% level	-3.169372	10% level	-3.16740

Table A4: Cointegration tests

	Unrestricted cointegration rank test (Trace)			
Hypothesized No. of CE(s)	**Eigenvalue Value**	**Trace Statistic**	**0.05 Critical**	**Prob.****
None *	0.62755	85.12111	47.85613	0
At most 1	0.2557	24.87424	29.79707	0.1293
At most 2	0.103953	6.860256	15.49471	0.5257
At most 3	0.002697	0.164745	3.841466	0.6848

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

	Unrestricted cointegration rank test (Maximum eigenvalue)			
Hypothesized No. of CE(s)	**Eigenvalue Statistic**	**Max-Eigen Value**	**0.05 Critical**	**Prob.****
None *	0.62755	60.24687	27.58434	0
At most 1	0.2557	18.01399	21.13162	0.1293
At most 2	0.103953	6.695511	14.2646	0.5257
At most 3	0.002697	0.164745	3.841466	0.6848

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table A5: Cointegration results (dependent variable – real money balances)

Variable	**Cointegration equation**
Y(-1)	-0.9182[-7.00446]
TB(-1)	-0.06088[-3.81129]
INF(-1)	0.117043[6.97001]
C	1.611207

MP =-1.611207 + 0.918y + 0.06tb - 0.117inf
These results yield an optimal inflation rate of (1/0.117 - 0.92*0.03) = 9.14%

rgdpg	Real GDP growth
m/p	Real balances
deft	Budget deficit as a proportion of GDP
lexpt	Exports as a proportion of GDP
Pvtinv	Private investment as a share of GDP
infl	Inflation

Table A2: Results of the unit root tests (levels)

Variable	Augmented Dickey Fuller (ADF) Test		Phillips-Perron (PP) Test	
	Constant No Trend	Constant Trend	Constant No Trend	Constant Trend
y	-1.590757	-2.41212	-1.554287	-2.410277
mp	0.249605	-1.916955	0.85284	-2.979962
p	-1.204028	-1.955673	-1.391407	-0.525549
b	-1.333148	-1.256686	-1.366077	-0.710389
tb	-1.810926	-2.356227	-1.470108	-1.86087
inf	-2.183748	-2.559441	-2.425247	-2.56546
Test critical values:				
	1% level	-3.540198	1% level	-4.100935
	5% level	-2.909206	5% level	-3.478305
	10% level	-2.592215	10% level	-3.166788

Table A3: Results of the unit root tests (first difference)

Variable	Augmented Dickey Fuller (ADF) Test		Phillips-Perron (PP) Test	
No Trend	Constant Trend	Constant No Trend	Constant Trend	Constant
y	-8.748129**	-8.682356'**	-8.788988**	-8.719899**
mp	-10.056064**	-10.090342**	-11.35171**	-11.92295**
p	-2.780503	-3.020105**	-5.361881**	-5.416242**
b	-3.897153**	-4.056473**	-3.97307**	-4.135268**
tb	-5.611537**	-5.724785**	-5.653248**	-5.721981**
inf	-3.911792**	-6.275686**	-4.376691**	-4.344887**
Test critical values:				

Other recent publications in the AERC Research Papers Series:

Trade Reform and Efficiency in Cameroon's Manufacturing Industries, by Ousmanou Njikam, Research Paper 133.

Efficiency of Microenterprises in the Nigerian Economy, by Igbekele A. Ajibefun and Adebiyi G. Daramola, Research Paper 134.

The Impact of Foreign Aid on Public Expenditure: The Case of Kenya, by James Njeru, Research Paper 135.

The Effects of Trade Liberalization on Productive Efficiency: Some Evidence from the Electoral Industry in Cameroon, by Ousmanou Njikam, Research Paper 136.

How Tied Aid Affects the Cost of Aid-Funded Projects in Ghana, by Barfour Osei, Research Paper 137.

Exchange Rate Regimes and Inflation in Tanzania, by Longinus Rutasitara, Research Paper 138.

Private Returns to Higher Education in Nigeria, by O.B. Okuwa, Research Paper 139.

Uganda's Equilibrium Real Exchange Rate and Its Implications for Non-Traditional Export Performance, by Michael Atingi-Ego and Rachel Kaggwa Sebudde, Research Paper 140.

Dynamic Inter-Links among the Exchange Rate, Price Level and Terms of Trade in a Managed Floating Exchange Rate System: The Case of Ghana, by Vijay K. Bhasin, Research Paper 141.

Financial Deepening, Economic Growth and Development: Evidence from Selected Sub-Saharan African Countries, by John E. Udo Ndebbio, Research Paper 142.

The Determinants of Inflation in South Africa: An Econometric Analysis, by Oludele A. Akinboade, Franz K. Siebrits and Elizabeth W. Niedermeier, Research Paper 143.

The Cost of Aid Tying to Ghana, by Barfour Osei, Research Paper 144.

A Positive and Normative Analysis of Bank Supervision in Nigeria, by A. Soyibo, S.O. Alashi and M.K. Ahmad, Research Paper 145.

The Determinants of the Real Exchange Rate in Zambia, by Kombe O. Mungule, Research Paper 146.

An Evaluation of the Viability of a Single Monetary Zone in ECOWAS, by Olawale Ogunkola, Research Paper 147.

Analysis of the Cost of Infrastructure Failures in a Developing Economy: The Case of Electricity Sector in Nigeria, by Adeola Adenikinju, Research Paper 148.

Corporate Governance Mechanisms and Firm Financial Performance in Nigeria, by Ahmadu Sanda, Aminu S. Mikailu and Tukur Garba, Research Paper 149.

Female Labour Force Participation in Ghana: The Effects of Education, by Harry A. Sackey, Research Paper 150.

The Integration of Nigeria's Rural and Urban Foodstuffs Market, by Rosemary Okoh and P.C. Egbon, Research Paper 151.

Determinants of Technical Efficiency Differentials amongst Small- and Medium-Scale Farmers in Uganda: A Case of Tobacco Growers, by Marios Obwona, Research Paper 152.

Land Conservation in Kenya: The Role of Property Rights, by Jane Kabubo-Mariara, Research Paper 153.

Technical Efficiency Differentials in Rice Production Technologies in Nigeria, by Olorunfemi Ogundele, and Victor Okoruwa, Research Paper 154.

The Determinants of Health Care Demand in Uganda: The Case Study of Lira District, Northern Uganda, by Jonathan Odwee, Francis Okurut and Asaf Adebua, Research Paper 155.

Incidence and Determinants of Child Labour in Nigeria: Implications for Poverty Alleviation, by Benjamin C. Okpukpara and Ngozi Odurukwe, Research Paper 156.

Female Participation in the Labour Market: The Case of the Informal Sector in Kenya, by Rosemary Atieno, Research Paper 157.

The Impact of Migrant Remittances on Household Welfare in Ghana, by Peter Quartey, Research Paper 158.

Food Production in Zambia: The Impact of Selected Structural Adjustment Policies, by Muacinga C.H. Simatele, Research Paper 159.

Poverty, Inequality and Welfare Effects of Trade Liberalization in Côte d'Ivoire: A Computable General Equilibrium Model Analysis, by Bédia F. Aka, Research Paper 160.

The Distribution of Expenditure Tax Burden before and after Tax Reform: The Case of Cameroon, by Tabi Atemnkeng Johennes, Atabongawung Joseph Nju and Afeani Azia Theresia, Research Paper 161.

Macroeconomic and Distributional Consequences of Energy Supply Shocks in Nigeria, by Adeola F. Adenikinju and Niyi Falobi, Research Paper 162.

Analysis of Factors Affecting the Technical Efficiency of Arabica Coffee Producers in Cameroon, by Amadou Nchare, Research Paper 163.

Fiscal Policy and Poverty Alleviation: Some Policy Options for Nigeria, by Benneth O. Obi, Research Paper 164.

FDI and Economic Growth: Evidence from Nigeria, by Adeolu B. Ayanwale, Research Paper 165.

An Econometric Analysis of Capital Flight from Nigeria: A Portfolio Approach, by Akanni Lawanson, Research Paper 166.

Extent and Determinants of Child Labour in Uganda, by Tom Mwebaze, Research Paper 167.
Oil Wealth and Economic Growth in Oil Exporting African Countries, by Olomola Philip Akanni, Research Paper 168.
Implications of Rainfall Shocks for Household Income and Consumption in Uganda, by John Bosco Asiimwe, Research Paper 169.
Relative Price Variability and Inflation: Evidence from the Agricultural Sector in Nigeria, by Obasi O. Ukoha, Research Paper 170.
A Modelling of Ghana's Inflation: 1960–2003, by Mathew Kofi Ocran, Research Paper 171.
The Determinants of School and Attainment in Ghana: A Gender Perspective, by Harry A. Sackey, Research Paper 172.
Private Returns to Education in Ghana: Implications for Investments in Schooling and Migration, by Harry A. Sackey, Research Paper 173.
Oil Wealth and Economic Growth in Oil Exporting African Countries, by Olomola Philip Akanni, Research Paper 174.
Private Investment Behaviour and Trade Policy Practice in Nigeria, by Dipo T. Busari and Phillip C. Omoke, Research Paper 175.
Determinants of the Capital Structure of Ghanaian Firms, by Joshua Abor, Research Paper 176.
Privatization and Enterprise Performance in Nigeria: Case Study of Some Privatized Enterprises, by Afeikhena Jerome, Research Paper 177.
Sources of Technical Efficiency among Smallholder Maize Farmers in Southern Malawi, by Ephraim W. Chirwa, Research Paper 178.
Technical Efficiency of Farmers Growing Rice in Northern Ghana, by Seidu Al-hassan, Research Paper 179.
Empirical Analysis of Tariff Line-Level Trade, Tariff Revenue and Welfare Effects of Reciprocity under an Economic Partnership Agreement with the EU: Evidence from Malawi and Tanzania, by Evious K. Zgovu and Josaphat P. Kweka, Research Paper 180.
Effect of Import Liberalization on Tariff Revenue in Ghana, by William Gabriel Brafu-Insaidoo and Camara Kwasi Obeng, Research Paper 181.
Distribution Impact of Public Spending in Cameroon: The Case of Health Care, by Bernadette Dia Kamgnia, Research Paper 182.
Social Welfare and Demand for Health Care in the Urban Areas of Côte d'Ivoire, by Arsène Kouadio, Vincent Monsan and Mamadou Gbongue, Research Paper 183.
Modelling the Inflation Process in Nigeria, by Olusanya E. Olubusoye and Rasheed Oyaromade, Research Paper 184.
Determinants of Expected Poverty Among Rural Households in Nigeria, by O.A. Oni and S.A. Yusuf, Research Paper 185.
Exchange Rate Volatility and Non-Traditional Exports Performance: Zambia, 1965–1999, by Anthony Musonda, Research Paper 186.
Macroeconomic Fluctuations in the West African Monetary Union: A Dynamic Structural Factor Model Approach, by Romain Houssa, Research Paper 187.
Price Reactions to Dividend Announcements on the Nigerian Stock Market, by Olatundun Janet Adelegan, Research Paper 188.
Does Corporate Leadership Matter? Evidence from Nigeria, by Olatundun Janet Adelegan, Research Paper 189.
Determinants of Child Labour and Schooling in the Native Cocoa Households of Côte d'Ivoire, by Guy Blaise Nkamleu, Research Paper 190.
Poverty and the Anthropometric Status of Children: A Comparative Analysis of Rural and Urban Household in Togo, by Kodjo Abalo, Research Paper 191.
Measuring Bank Efficiency in Developing Countries: The Case of the West African Economic and Monetary Union (WAEMU), by Sandrine Kablan, Research Paper 192.
Economic Liberalization, Monetary and Money Demand in Rwanda: 1980–2005, by Musoni J. Rutayisire, Research Paper 193.
Determinants of Employment in the Formal and Informal Sectors of the Urban Areas of Kenya, by Wambui R. Wamuthenya, Research Paper 194.
An Empirical Analysis of the Determinants of Food Imports in Congo, by Léonard Nkouka Safoulanitou and Mathias Marie Adrien Ndinga, Research Paper 195.

and Richard Tuyiragize, Research Paper 196.

Supply Response, Risk and Institutional Change in Nigerian Agriculture, by Joshua Olusegun Ajetomobi, Research Paper 197.

Multidimensional Spatial Poverty Comparisons in Cameroon, by Aloysius Mom Njong, Research Paper 198.

Earnings and Employment Sector Choice in Kenya, by Robert Kivuti Nyaga, Research Paper 199.

Convergence and Economic Integration in Africa: the Case of the Franc Zone Countries, by Latif A.G. Dramani, Research Paper 200.

Analysis of Health Care Utilization in Côte d'Ivoire, by Alimatou Cisse, Research Paper 201.

Financial Sector Liberalization and Productivity Change in Uganda's Commercial Banking Sector, by Kenneth Alpha Egesa, Research Paper 202.

Competition and performace in Uganda's Banking System, by Adam Mugume, Research Paper 203.

Parallel Market Exchange Premiums and Customs and Excise Revenue in Nigeria, by Olumide S. Ayodele and Frances N. Obafemi, Research Paper 204.

Fiscal Reforms and Income Inequality in Senegal and Burkina Faso: A Comparative Study, by Mbaye Diene, Research Paper 205.

Factors Influencing Technical Efficiencies among Selected Wheat Farmers in Uasin Gishu District, Kenya, by James Njeru, Research Paper 206.

Exact Configuration of Poverty, Inequality and Polarization Trends in the Distribution of well-being in Cameroon, by Francis Menjo Baye, Research Paper 207.

Child Labour and Poverty Linkages: A Micro Analysis from Rural Malawian Data, by Levision S. Chiwaula, Research Paper 208.

The Determinants of Private Investment in Benin: A Panel Data Analysis, by Sosthène Ulrich Gnansounou, Research Paper 209.

Contingent Valuation in Community-Based Project Planning: The Case of Lake Bamendjim Fishery Restocking in Cameroon, by William M. Fonta et al., Research Paper 210.

Multidimensional Poverty in Cameroon: Determinants and Spatial Distribution, by Paul Ningaye et al., Research Paper 211.

What Drives Private Saving in Nigeria, by Tochukwu E. Nwachukwu and Peter Odigie, Research Paper 212.

Board Independence and Firm Financial Performance: Evidence from Nigeria, by Ahmadu U. Sanda et al., Research Paper 213.

Quality and Demand for Health Care in Rural Uganda: Evidence from 2002/03 Household Survey, by Darlison Kaija and Paul Okiira Okwi, Research Paper 214.

Capital Flight and its Determinants in the Franc Zone, by Ameth Saloum Ndiaye, Research Paper 215.

The Efficacy of Foreign Exchange Market Intervention in Malawi, by Kisukyabo Simwaka and Leslie Mkandawire, Research Paper 216.

The Determinants of Child Schooling in Nigeria, by Olanrewaju Olaniyan, Research Paper 217.

Influence of the Fiscal System on Income Distribution in Regions and Small Areas: Microsimulated CGE Model for Côte d'Ivoire, by Bédia F. Aka and Souleymane S. Diallo, Research Paper 218.

Asset Price Developments in an Emerging Stock Market:The Case of Mauritius, by Sunil K. Bundoo, Research Paper 219.

Intrahousehold Resource Allocation in Kenya, by Miriam Omolo, Research Paper 220.

Volatility of Resource Inflows and Domestic Investment in Cameroon, by Sunday A. Khan, Research Paper 221.

Efficiency Wage, Rent-sharing Theories and Wage Determination in the Manufacturing Sector in Nigeria, by Ben E. Aigbokhan, Research Paper 222.

Government Wage Review Policy and Public-Private Sector Wage Differential in Nigeria, by Alarudeen Aminu, Research Paper 223.

Rural Non-Farm Incomes and Poverty Reduction in Nigeria, by Awoyemi Taiwo Timothy, Research Paper 224.

What Do We Know After 15 Years of Using the United Nations Development Programme Human Development Index? By Jean Claude Saha, Research Paper 225.

Uncertainty and Investment Behaviour in the Democratic Republic of Congo, by Xavier Bitemo Ndiwulu and Jean-Papy Manika Manzongani, Research Paper 226.

An Analysis of Stock Market Anomalies and Momentum Strategies on the Stock Exchange of Mauritius, by S.K. Bundoo, Research Paper 227.