



UNIVERSITY *of the*
WESTERN CAPE

FACULTY OF ECONOMIC AND MANAGEMENT SCIENCES
DEPARTMENT OF ECONOMICS

**Inflation Targeting, South Africa and the Great Recession: An Alternative
Perspective**

By

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**A research assignment submitted in fulfillment of the requirement for the
degree of Masters of Commerce in the Department of Economics, University
of the Western Cape**

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DECLARATION

I declare that “Inflation Targeting, South Africa and the Great Recession: An Alternative Perspective” is my own work, that it has not been submitted for any degree or examination in any university, and that all the sources that I have used or quoted have been indicated and acknowledged by complete references.



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Date: 15 December

Abstract

Described by Mohr (2008:1) as “one of the most hotly debated economic issues in South Africa”, the inflation rate is underpinned by its impact on the average South African. A rapid increase in the cost of goods and services could have devastating consequences on the both the growth and development of the country, making it an imperative to effectively manage a change in general prices. The SARB applies an Inflation Targeting (IT) framework to manage the inflation rate and the thesis will interrogate the applicability of this framework within a low growth environment. More specifically, the thesis will ask whether it is prudent to increase the interest rate in a low growth environment.

The thesis will employ a mixed research method, namely, a qualitative and quantitative method. However, the qualitative method will be the primary research method and the conclusions derived thereof will be tested within a qualitative model. The qualitative method will take the form of historical narrative which is designed to investigate the behaviour of the inflation rate at a micro level. The choice of this qualitative historical narrative derives from the inconclusive nature of the existing empirical quantitative studies and the resulting lack of a consensus on the effectiveness of the IT framework. This lack of consensus necessitated the use of a different approach to interrogate the IT framework hence the application of the qualitative historical narrative. The narrative will be primarily derived from the economic reports and data of the main authority on South Africa’s monetary policy, the South Africa Reserve Bank (SARB). The narrative will also utilise the economic reports and data from reputable sources such as Statistics South Africa, the International Monetary Fund (IMF), the World Bank, the European Central Bank (ECB), the US Federal Reserve System, and the People’s Bank of China (PBC).

The qualitative historical narrative concluded that the inflation rate is mainly a function of the price of crude oil and the exchange rate. In addition, these factors were more likely determined by events external to the domestic economy which suggests that the SARB’s monetary policy plays a marginal role in determining the inflation rate. The narrative also noted that the SARB weren’t able to provide reliable approximations of the GDP growth rate, a crucial component of the IT framework. An inability to forecast the GDP growth rate suggests that the IT framework

would not be able to produce reliable approximations of the inflation rate. It was also noted that there is a 'more contemporaneous' and positive relationship between the inflation rate and the interest rate. Although the thesis does not suggest that it can prove causality, it does conclude that it is more likely that the interest rate follows the inflation rate and an increase in the interest rate increases the inflation rate. This conclusion is derived from the relationship between debt and the inflation rate. Introducing debt into the analysis, the final conclusion is that it is more likely that an increase in the interest rate increases the inflation rate and the resulting build-up of debt collapses output which is contrary to the IT framework's objective of producing macroeconomic stability. The qualitative conclusions are applied to a quantitative model and the outputs thereof generally substantiate the qualitative conclusions. The only curious outcome of the quantitative outputs was that the price of crude oil seems to play a marginal role in influencing the inflation rate.

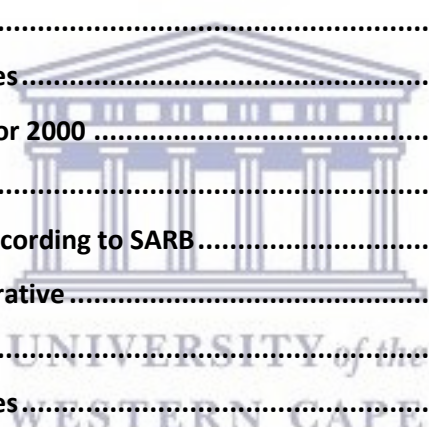


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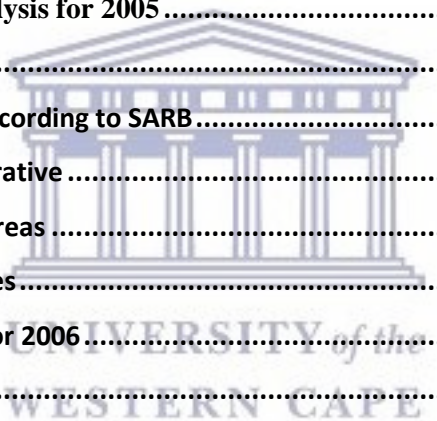
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CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND

Simply defined as an “increase in the overall price level” (Case, Fair, & Oster. 2012:100), the inflation rate is “one of the most hotly debated economic issues in South Africa” (Mohr. 2008:1). Its significance is underpinned by the impact it could have on the average South African and the economy as a whole. A significantly high inflation rate could have a devastating effect on the standard of living of South Africans by cutting into their purchasing power and ultimately undermining South Africa’s ability to grow the economy, reduce unemployment and achieve its developmental goals. It thus becomes necessary to effectively manage inflation in a way that does not impact negatively on the economy and does not cause financial difficulties for the people within that economy. However, economists have grappled with the question of which monetary policy rules should be applied in ensuring greater inflation rate stability “without compromising growth and employment” (Drumond & Porcile. 2012:137).

Much of the debate is primarily focused on the effectiveness of the inflation targeting (IT) framework. When summarized, this framework states that, for example, an increase in the interest rate will reduce domestic output and in doing so, reduce the inflation rate (Smal and de Jager. 2001). Given this basic framework, issues of its applicability within a low economic growth environment with significant external influences become relevant. The thesis will specifically attempt to identify whether the IT approach of increasing interest rates are of value within a low growth environment that is significantly influenced by external inflationary pressures. More importantly, the thesis will include a historical narrative that is primarily derived from the reports and data of the SARB and other central banks. This narrative will produce an in-depth historical analysis of the period under review and identify events and variables that may have influenced both the direction and magnitude of the inflation rate. The introduction of this narrative is necessitated by a need to expand on the current literature due to a lack of empirical consensus on the effectiveness of IT. Although the narrative can’t lay claim to answering the IT conundrum, it does aim to contribute productively to the ongoing debate. The thesis will try to primarily identify the impact of interest rate increases on the inflation rate during and after the 2008 financial crisis period

from 2008 to 2014. However, in order to build a more robust explanation for the behaviour of the inflation rate, the pre-crisis period from 2000 to 2007 will also be included for analysis.

1.2 PROBLEM STATEMENT

On the 29 of January 2014, the Monetary Policy Committee (MPC) announced that it would raise the interest rate from 5% to 5,5% (MPC. 2014a:13). At the time, the economy was characterised by low GDP growth rates, a depreciating rand (MPC. 2014a), and stable to elevated import prices (external inflationary pressures) (SARB. 2014:24). The MPC (2014a:13) asserted that, in making their decisions, they were motivated by their primary mandate which was to “keep inflation under control” within the target inflation rate range of 3% to 6%. They stated that they expected the inflation rate to breach the 6% target in the second quarter of 2014 and peak at 6.6% in the fourth quarter. As expected, the actual inflation rate breached the upper limit in April, (the first month of the second quarter), but quickly accelerated to 6.6% in May and ended the second quarter peaking at 6.6% in June (Statistics South Africa. 2015b). It declined to 6.3% in July, climbed to 6.4% in August and starting in September, began declining, ending off the 4th quarter with an interest rate of 5.3% in December. Three observations are pivotal to understanding the validity of the question being asked.

The first observation is that the expected (or forecasted) inflation rates were considerably different to the actual inflation rates. Whereas the SARB had forecasted a gradually upward trend that would peak in the fourth quarter, the actual trend rapidly accelerated to a peak in the first two quarters and rapidly decelerated to a low in the last two quarters. Given that the SARB’s primary monetary framework is IT, it can be reasonably suggested that the IT framework might have failed in producing reliable forecasts, both in magnitude and direction.

The second observation is that after the interest rate increase, the inflation rate continued to accelerate and by the second quarter, it had already reached the peak that the SARB had forecasted would occur in the fourth quarter. This observation seems to suggest that an increase in the interest rates is followed by an accelerating inflation rate. If this is the case, then the interest rates did not “keep inflation under control”.

The third observation is that, during the second half, the inflation rate decelerated from 6.3% in July to 5.3% in December, despite the SARB's forecasts to the contrary. During the same time, the price oil decelerated from \$103.59 a barrel in July to \$59.29 a barrel in December, suggesting a strong relationship with the inflation rate. This relationship is most pronounced in the December and emphasizes the point that the price of oil, which is set external to the domestic economy, has a relatively significant effect on the inflation rate. The MPC (2014c) stated that the decrease in the domestic oil prices that started in August 2014, had "a significant impact on the medium term outlook for headline inflation". Inflation eventually declined to a trough of 3.9% in February 2015, largely as a result of the decline in the petrol price" (SARB. 2015:21). The third observation suggests that the inflation rate is significantly influenced by factors other than the interest rates, and more notably, by factors external to the South African economy.

The three observations are summarised as follows:

- The IT framework failed to produce reliable forecasts
- The increase in the interest rates might have accelerated the inflation, which is contrary to the IT framework
- The inflation rate might have been significantly influenced by external factors which cannot be controlled by domestic monetary policy

Given that the IT framework generally aims to decrease the GDP growth rate, it becomes necessary to question whether it was prudent to raise the interest rates in a low growth environment. It is especially problematic that the interest rates were increased in a quarter where the GDP grew at a negative rate of 1.6% (SARB. 2015a)

1.3 RESEARCH QUESTIONS AND OBJECTIVES

The general aim of the thesis will be to understand the overall impact of IT on the economy. More specifically the research question asks whether it was feasible for the South African monetary authorities to increase the repo rate, and the impact of those increases on inflation and output. Although the thesis will generally cover the period from 2000 to 2014, to create focus, the specific question is anchored to the events and conditions surrounding the SARB's interest rate hikes of 29 January 2014, and these conditions are listed as follows:

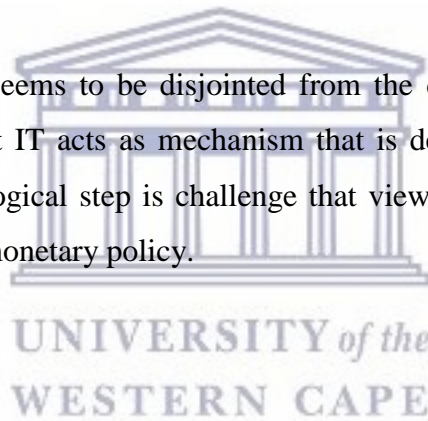
1. Weak Economic Growth
2. Weak and Volatile Exchange Rates
3. Significant External Inflationary Pressures

The objective of the thesis will be to:

1. To identify if increasing the interest rates produces a positive or negative outcome in terms of both inflation and output, during an economic downturn where the economic fundamentals are not favourable.
2. If the outcome is negative, to propose an alternative perspective that may contribute to a more realistic framework and may be conducive to the objective of strengthening the South African economy

1.4 RATIONALE AND SIGNIFICANCE OF RESEARCH

The current approach of IT seems to be disjointed from the dynamic behavior of the real world. If it can be found that IT acts as mechanism that is detrimental to the economy of South Africa, then the next logical step is challenge that view and ensure that the ordinary South African benefits from monetary policy.



1.5 THESIS OUTLINE

The thesis is composed of eight chapters. Chapter one provides an introduction to the thesis as well as the question that will be answered and the justification for asking this question. Chapter two will summarise the relevant theoretical literature whereas Chapter three will delve into the empirical literature. Chapter four will provide a summary of the South African economy and elaborate on the events that led up to the 2008 financial crises and the events that followed. Chapter five will introduce the methodology, which include both the qualitative and quantitative approaches, as well as the details of each approach. Chapter six will present the qualitative study whereas Chapter seven will present the quantitative outputs. Chapter eight will conclude the thesis with the main findings and the policy recommendations.

CHAPTER TWO: THE THEORETICAL LITERATURE REVIEW

2.1 INTRODUCTION

To understand the impact of inflation targeting on the economy, it is necessary to take a step back and understand the theoretical and hypothetical perspectives that led policy makers to adopt the IT framework. The sub-sections below will summarise the most relevant theories and hypothesis starting with the definitions of the most relevant concepts.

2.2 DEFINING INFLATION AND INFLATION TARGETING

2.2.1 Inflation Theory: The Textbook Definition

Inflation is simply defined as the “increase in the overall price level”, (Case, Fair, & Oster. 2012:100), the most typical measure of this price level being the Consumer Price Index (CPI) (Case, et al. 2012:136). CPI represents the price of a basket of goods purchased each month by the “typical urban consumer” (Case, Fair, & Oster. 2012:136). Inflation can either be anticipated or unanticipated (Case, et al. 2012:139). If inflation is anticipated, one could for example, make investment decisions that would hedge one’s wealth against inflation. One could also demand higher wages in anticipation of higher inflation rates eroding the real value of wages. However, unanticipated inflation could result in the erosion of wealth, given the fact that holders of wealth or workers were not privy to sufficient information to plan for inflation movements. However, most input prices, including labour inputs, tend to rise with inflation (Case, et al. 2012:138).

Suggested causes of inflation include, demand-pull inflation, cost push inflation, expectations, and money supply (Case, et al. 2012).

Demand-pull inflation is where an increase in the aggregate demand increases both output and prices (Case, et al. 2012:255), whilst cost-push (supply side) inflation says that the increase in costs decreases output and increases prices (Case, et al. 2012:256). Firms may also set their prices according to expected inflation hence, if they expect inflation to rise by 10%, they may increase their prices by 10% (Case, et al. 2012:256). Lastly, inflation may also be caused by changes in the money supply (Case, et al. 2012:257). In other words, for example, an increase in the money supply and the subsequent decrease in the interest rate would lead to an increase in the inflation rate.

2.1.2 Inflation Theory: Orthodox vs Heterodox Theories

The “backbone” of orthodox thought on inflation rates is premised on the quantity theory of money which posits that, over the long term, all nominal values is neutral and cannot change real values (Smithin. 2011, Wray. 2000). These nominal values include money and interest rates whereas the real values include unemployment and output. For example, an increase in the money supply would only lead to an increase in output and decrease in unemployment over the short term. Over the long term, these two real values (output and unemployment) would eventually revert back to the values that they were at prior to the change in the money supply. The increase in money would however increase the inflation rate over the short and long term, hence changes in nominal values only leads to permanent changes in other nominal values. Furthermore, non-Central Banks are required to hold a certain percentage of their deposit liabilities with the Central Bank. This percentage is known as the “reserve ratio” and it is legally required for non-Central Banks to maintain this ratio. As a result of this “legally required reserve ratio”, the supply of money is generally “determined” by the Central Bank. The Central Bank also has a certain degree of control over the amount of money that the general public decides to hold as liquid cash and deposits. By raising the interest rates, it induces the public into depositing their money with the non-Central Banks and a decrease in the interest rates would induce the public into converting its deposits to liquid cash. As noted above, the interest rate is a nominal value and would, according to the orthodox view, only impact on other nominal values over the long term. For example, over the long term, an increase in the interest rates would decrease the inflation rate while holding unemployment and output constant at its original “optimal” value.

Smithin (2011) describes the general orthodox view on inflation as “mono-causal”. This means that a change in inflation generally emanates from one cause, which is the change of money. The heterodox view is primarily derived from the Post Keynesian theory of inflation and “allows for multiple causes”. The Heterodox view employs a more realistic view of money creation derived from the Post-Keynesian formula that prices are “to be found in the relation between money-wage rates” and productivity. According to this formula, an increase in the inflation rate is the result of wages increasing at a faster rate than the growth in productivity. This suggests that inflation can only be curbed if a policy places a ‘cap’ on the rate at which wages increases. Public policy for this cap might be unrealistic given the high probability that there would very little public support for it, so the equation in its original form is not particularly useful. However, what it does suggest is that inflation is not determined by an exogenous change in the money supply but rather, opens up the possibility

that the inflation rate is susceptible to anything (multiple causes) that increases the cost of production. More importantly, it creates space for the formulations of theories that presents money as an endogenous rather than exogenous creation. For example, a business that incurs additional costs due to an increase in the general price level has access to the credit market from which debt is incurred to finance the additional costs. The debt is issued by non-Central banks in the form of an 'IOU' liability and simultaneously shows up as an "asset of the borrower", thereby simultaneously creating both a debtor and creditor (Wray. 2000).

2.1.3 How does South Africa define inflation?

South Africa uses three measures of inflation, namely, the headline consumer price index, the core consumer price index" and the CPIX (Van Der Merwe. 2004:2). Furthermore, there is also a differentiation between geographical areas (urban, rural, metropolitan), with the "total consumer price index" measuring inflation for the "country as a whole".

Statistics South Africa (2013:40), described the CPI as a "current social and economic indicator that is constructed to measure changes over time in the general level of prices of consumer goods and services that households acquire, use, or pay for" (Statistics South Africa. 2013:1). Headline inflation is measured using the "CPI for all urban areas", CPIX is measured using the "CPI excluding interest rates on mortgage bonds" (Statistics South Africa. 2013:1) and core inflation is the CPI, excluding any item that are "seasonal or volatile" (Statistics South Africa. 2013:39) and "directly affected" by monetary policy decisions (Van Der Merwe. 2004:2). The inflation rate is simply the "percentage change in the CPI" (Statistics South Africa. 2013:40) where headline inflation is used as the measure for inflation targeting (Statistics South Africa. 2013:40).

Prior to January, 2009, the headline consumer price index included mortgage interest costs (SARB. 2008:3). However, as of January 2009, Statistics South Africa decided to exclude interest cost incurred on the mortgage and include the value of the rent received (had the owners decided to rent out the asset for which the mortgage pays).

2.1.4 Inflation Targeting

Described as a “policy framework, designed to tame inflation” (Angeriz & Arestis. 2006:559), IT targets a certain level of inflation to maintain macroeconomic stability over the long run (Nell. 2004:1431).

The textbook logic behind IT is as follows. When inflation is relatively high, “real growth and employment” will be impeded in the long run (Smal & de Jager. 2001:2). The SARB would then need to ‘tame’ inflation as a necessary step to maintain “a climate of reasonable domestic price stability”. If, for example, the SARB increases the repo rate, banks such as ABSA will do the same by increasing the interest rate they charge on money borrowed to their clients (Smal & de Jager. 2001:2:6). A change in the repo rate effects the interest rates charged on “retail financial products”, such as mortgage bonds. The banks may choose to increase the interest rate by the same amount as the repo rate (this does not necessarily have to be the case in practice), and “firms and individuals respond” to these changes by reducing investment (Fixed Capital Formation) and consumer spending, ultimately reducing output. The reduction in output constrains price increases and eventually translates into inflation being ‘tamed’. If, for example, monetary policy aims to reduce inflation and inflation is caused by demand-pull, the reduced demand will only be evident over the short term, to be replaced by more robust long term growth as a result of the “more stable macroeconomic environment” (Nell. 2004:1431).

The monetary authorities will either aim to maintain the inflation rate at a single point inflation rate target or within an inflation rate range (Van Der Merwe. 2004:5). For example, keeping the inflation rate at 6% would be a single point target whereas keeping the inflation rate within a band of 3 to 6% would be a target range. Although a single target rate would provide focus, this objective is difficult to achieve (Van Der Merwe. 2004:5). A range would provide the central bank with enough flexibility and discretion to respond to different economic shocks and it must not be too wide or too narrow for it remain credible (Smal & de Jager. 2001:2:4).

IT does not require of the SARB to actually respond to changes in inflation and they need only react when inflation “is expected to remain out of the target for an extended time period” (Van Der Merwe. 2004:6). In other words, monetary policy focuses on the expected trends of inflation rates. In addition, IT has an escape clause which allows the SARB to remain neutral

when an external shock, like petrol prices, preventing it from effectively influencing inflation through the repo rate (Bonga-Bonga & Kabundi. 2015:8).

2.3 OTHER RELEVANT THEORIES AND HYPOTHESES

Despite the numerous theories and hypothesis, the three most relevant concepts to this paper are Phillip's Curve, The Taylor Rule, and Okun's Law.

2.3.1 The Phillip's Curve

In his 1958 paper, economist, A.W. Phillips, demonstrated that there was a “strong and relatively stable negative relationship between unemployment and wage inflation” in the United Kingdom (UK) during the 97 years that preceded the paper (Romer. 2012:256). Subsequent research by other researchers established a “similar relationship between unemployment and price inflation”, a relationship that has been dubbed “The Phillips Curve”. Furthermore, this also implied a positive relationship between output and inflation. For policymakers and economists, this meant that if a certain level of inflation is tolerated, the unemployment rate could be kept low “indefinitely” (Abel & Bernanke. 2001:436). However, the Phillips curve was challenged in 1968 by Friedman and Phelps who argued that nominal values like inflation could not permanently affect real values and that these real values would be “determined by real forces” in the long run (Romer. 2012:257). This argument, known as the, natural-rate hypothesis, states that there is some “natural rate of unemployment” and if the unemployment rate is below this natural rate, real forces will eventually succeed in returning the unemployment rate to its natural rate, regardless of the inflation rate. Furthermore, they argued that there should be a negative relationship between the unanticipated inflation rate and the cyclical unemployment rate (Abel & Bernanke. 2001:437). The unanticipated inflation rate is the difference between the actual and expected inflation rate and the cyclical unemployment rate is the difference between the actual and natural unemployment rate. According to this hypothesis, under conditions of equilibrium, both the unexpected inflation and cyclical unemployment rates are equal to zero. In addition, where cyclical unemployment is equal to zero, the economy is producing output at its potential (full-employment output). If, using the example of Abel and Bernanke (2001:438), aggregate demand increases at 10% a year, inflation is expected to increase at 10% a year and

hence, unexpected inflation remains at zero which means that cyclical unemployment is zero and the economy continues to produce at its potential. However, if demand unexpectedly increases by 15% in the following year, and inflation is expected to increase by 10% a year, the actual unemployment rate will be lower than the natural unemployment rate and the inflation rate will increase above 10% as a result. If inflation increases by 13%, the unanticipated inflation rate will be 3% higher and thus there is a negative correlation between the unanticipated inflation rate and the cyclical unemployment rate. The example above is an example of an expectations augmented Phillips curve, and can be summarized in the equation below (Romer. 2012:257):

$$\pi_t = \pi_t^* + \lambda(\ln Y_t - \ln Y_t) + \varepsilon_t^S$$

Where:

π_t is actual inflation

π_t^* is expected inflation

Y_t is actual output

Y_t is full employment output

ε_t^S is the error term that captures supply shocks



During the 1970's, the validity of the Phillip's curve experienced a permanent setback when the unemployment and inflation rate no longer displayed a "fairly stable downward-sloping relationship". Romer (2012:258) identifies two possible reasons for the failure of the Phillips curve. The first is that supply shocks distorted the relationship between unemployment and inflation. These shocks included a rapid acceleration in the price of oil or a sudden influx of new entrants into the workforce. The second reason is that Friedman and Phelps may have been right and the higher inflation rates in 1970's may "change how prices and wages were set". In other words, the real values would eventually return to its natural rate or optimal level whereas the nominal values would remain at the level that it is at. For example, if the unemployment rate falls below its natural or optimal level and inflation increases to a rate of 'x', the unemployment rate would eventually return to its natural rate while inflation would either remain at or continue to increase from a rate of 'x'.

2.3.2 The Taylor Rule

Money stock rules have generally been the “traditional” prescription for “monetary policy focus” (Romer. 2012:543). One of these rules include the k-percent rule, which advocates for the supply of money to grow at a steady “annual rate of k percent”. This rule further prescribes that no other “attempts to stabilize the economy” should be made, presumably because of the orthodox view that real values should be kept steady at its natural level which is also its optimal level. However, money stock is both “not closely linked to aggregate demand” and difficult to control. As a result, central bank’s has a preference for using short term interest rates as a pro-active method by which they can respond to shocks. One such rule is John Taylor’s flexible Taylor rule (Romer. 2012:544). Taylor does not advocate for the slavish and mechanical application of his rule (Abel & Bernanke. 2001:545) with the rule itself premised on two elements (Romer. 2012:544). The first elements says that the nominal interest rate has to rise by “more than one-for-one” with the inflation rates, so that the real interest rates “increases when inflation rises”. The second element states that the interest rate has to rise if output growth is above its natural rate and vice versa. The rule is summarized mathematically as:

$$i_t = r^n + \phi_\pi(\pi_t - \pi^*) + \phi_y(\ln Y_t - \ln Y_t^n), \quad \phi_\pi > 0, \phi_y > 0$$

Where

i_t is the nominal interest rate

r^n is the real interest rate where output is at its natural rate ($Y_t = Y_t^n$)

π_t is the actual inflation rate

π^* is the target inflation rate ($\pi^* = [r^n - a] / \phi_\pi$, where a is a constant if

Y_t is the actual output growth rate

Y_t^n is the natural output growth rate

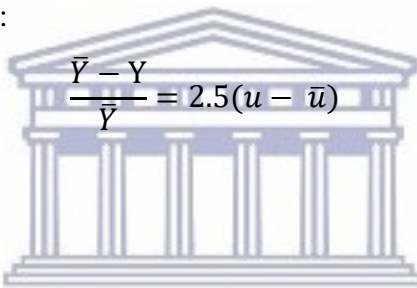
However, there are four issues related to this rule (Romer. 2012:545). The first is that r^n varies over time which necessitates that the real interest rate should control for this time variation. The second is that the contemporaneous variables included in the Taylor rule, including the natural rates, are not “known with certainty”. A solution to this first problem of the second issue is the inclusion of lagged variables whilst solutions for the second problem remain unclear. The third is that estimating the natural rates is closely related to its respective

coefficients, and deciding on the size of these coefficients remains problematic. The last issue is that current policy decisions do not affect past and present “values of inflation and the output gap”. A possible solution is the forward-looking interest-rate rule, which bases current policy decision on the expected future values of inflation and the output gap.

Other variables that have been included in the rule include the “exchange rate, lagged interest rates, and measures of asset prices” (Romer. 2012:546).

2.3.3 Okun’s Law

Arthur Okun originated Okun’s Law during the 1960’s as a means by which to measure the relationship between output and the unemployment rate (Abel & Bernanke. 2001:96). The law states that if the cyclical unemployment is 1%, or if the actual unemployment rate is 1% above its natural rate, then actual output will be 2.5% below its full employment level. It is mathematically summarized as:


$$\frac{\bar{Y} - Y}{\bar{Y}} = 2.5(u - \bar{u})$$

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CHAPTER THREE: THE EMPIRICAL LITERATURE REVIEW

3.1 A SHORT HISTORY OF INFLATION TARGETING

Inflation targeting was first implemented in New Zealand in 1990, and is a widely used “monetary policy framework”. It is used by countries such as Canada, Mexico and Sweden (Van Der Merwe. 2004:1). Ayres, Belasen, and Kutan (2014:375) asserts that explicit inflation targeting is practiced by 22 countries, which include “fourteen developing countries and eight industrial countries”. Each country is structurally heterogeneous with different levels of economic and institutional development.

Prior to its introduction in South Africa, inflation targeting had already been informally utilized with money supply growth being used as the “intermediate target”, to anchor “monetary policy decisions” (Van Der Merwe. 2004:1). It was towards the end of the 1990s, that additional “financial and real indicators” were included as part of the decision making process of setting the “short-term interest rates”. However, the adoption of explicit inflation targeting was done for many reasons, one of which was to create certainty. The money supply had grown to levels that would have suggested that the interest rates should rise. However, this growth had been attributed to the “liberalisation of the financial system”, thus impeding on the reserve bank’s ability to take proactive measures.

When it was announced in February 2000, that South Africa would formally implement inflation targeting, it was decided that “CPIX in metropolitan and other urban areas” would be the target variable (Van Der Merwe. 2004:1). The reasons for this decision included removing any factors that is directly affected by monetary policy. A “multi-year target approach” had been decided upon, which meant that the target range would be specified as an “average annual rate of increase of between” 3% and 6% from 2002 to 2003 and between 3% and 5% from 2004 to 2005 (Van Der Merwe. 2004:6). However, after the SARB realized that the upper end of the target range would be breached “for a fairly protracted period due to a sharp depreciation” of the rand as well as other external shocks, the target was kept within the 3-6% range for 2005. However, after it was redefined in January 2009, headline inflation became the new target variable with the range remaining at 3-6% (SARB. 2008:3).

The period following the financial crisis saw no significant changes in the monetary frameworks within the various countries (Rose, 2014:6). Countries with IT frameworks, including South Africa, generally followed the same doctrine of increasing interest rates to decrease the inflation rate. However, Comert and Epstein (2011:S96) asserts that explicit IT application came to an end with the advent of the 2008 financial crises, with the SARB adopting an approach that is seen as violating the traditional approach to IT monetary policy. The SARB adopted a more flexible approach to monetary policy by “placing more emphasis on economic growth and financial stability” and included “an attempt to manage asset prices”.

3.2 DOES INFLATION TARGETING WORK?

According to Brito and Bystedt (2010:198), there are generally 3 strands of thought on the impact of IT in developing countries like South Africa. The first is that “these economies' lack of institutional maturity and consistency of macroeconomic fundamentals could undermine credibility and give worse results”. The second is that the implementation of IT should improve the credibility of the central bank and “lead to better macroeconomic outcomes”. The third is that IT contributes “very little to lower inflation” and only succeeds in acting as “conservative window-dressing”. The question posed by this section tries to identify whether there is a consensus view on the effectiveness of inflation target, what that consensus view is, and criticism of the consensus. However, as will be shown below, the studies conducted generally provide varied outcomes, with some concluding that IT does not generate the intended outcomes whilst other conclude that IT generates “favourable results”¹. Furthermore, where studies do conclude that IT does have a noticeable effect, the effect is strong, weak or mixed. This mixed outcome is even more pronounced in developing countries, where the “unique and diverse” nature of these countries produces drastic variation in IT outcomes (Ayres, et al. 2014:376).

¹ Ayres, et al (2014) cites the studies of Mishkin and Schmidt-Hebbel (2007), Neumann and von Hagen (2002), Siklos (2008), Abo-Zaid and Tuzemen (2012), Mollick, Cabral, and Carneiro (2011), Levin et al. (2004), Us (2004), Us (2007), and Holub and Hurnik(2008), Batini and Laxton (2007), Brito and Bystedt (2006), as showing “favourable results” from implementing IT while Ball and Sheridan (2005) Angeriz and Arestis (2006), and Brito and Bystedt (2010) finds against IT.

3.2.1 The Debate

As mentioned above, the debate about the effectiveness of IT is still ongoing and the opinions vary. Blanchard, Dell’Ariccia, and Mauro (2010:3) writes that the popular stream of thought within academic circles is that monetary policy should aim to reduce the output gap by reducing inflation volatility with IT as the policy tool. The “intellectual support” for IT came from the New Keynesian model which presented “constant inflation” as the “optimal policy”, a policy that would reduce the output gap to zero. The belief was thus that a stable inflation rate was the overriding objective, regardless of output concerns, because output concerns would inevitably be addressed by a stable inflation rate. However, the concept of an output gap is still hypothetical in nature since it cannot be observed (Blanchard, et al. 2010:7). Even if it can be observed, and even if inflation and the output gap are stable, other factors such as asset prices may still produce instability in the long run. Nevertheless, a strict application was not applied and central bankers opted to use what is termed, “flexible inflation targeting”, which in itself was an acknowledgment of the various other economic priorities, such as output growth (Blanchard, et al. 2010:4). This acknowledgement however, was done with “some unease, and often with strong public denial”.

Ball and Sheridan (2003:9) note that it is more likely that central banks within high inflation countries would adopt inflation targeting as a different approach to other failed approaches. This seems to have been the case with countries who had adopted inflation targeting during the 90’s. Furthermore, it makes it more likely that the inflation rates of these high inflation, IT adopting countries would improve more drastically towards the mean, simply because high inflation countries have scope for greater improvements. The room for improvement by poor performers implies that the cause of declining inflation was not necessarily IT. Instead, the performance with regard to lower inflation may have had more to do with a country’s distance from the mean.

3.2.2 How Does the SARB View IT?

The Deputy Governor of the Reserve Bank states that IT is a mechanism by which output is stabilized “in periods when the economy may be faced with a shock”, such as “excessive growth in aggregate demand” (Mminele. 2012). He goes on further to say that the goal of lowering inflation during these periods of shock is “important for long-run economic growth

and stability”. He asserts that, contrary to what is thought, central banks do care about factors such output, practicing a flexible form of IT which allows for shifts away from the target, given other factors. However, it can be argued that this confidence in the IT framework may not be substantiated when looking at the interactions of inflation and IT over the longer term. Mminele (2012) correctly asserted that inflation peaked at 13.7% in August, 2008, and that the repo rate peaked at 12%. He also correctly asserts that “global inflation had started edging lower and policy rates in advanced economies were being reduced”, and that the SARB responded to the impact of global financial crises by reducing the interest rates. Although he does not do this explicitly, he does not reject the idea that there is a link between the changes in the interest rates and the inflation rates, post August 2008. He does however explicitly state that South Africa’s experience with IT “has been a positive one”. By stating the experience to be positive and by not rejecting the link as stated above, he implies that the changes in the repo rate had the desired effects on inflation rates. However, he downplays the fact that world inflation had come down at the same time that South Africa’s inflation rate came down. This suggests that world economic conditions were driving inflation and that the behaviour of inflation had relatively little to do with IT. Furthermore, as stated above, inflation rates escalated quite significantly during the repo rate hikes with no indication that the hikes had any significant effect on ‘taming’ the inflation rate. Rather, it is more feasible to suggest that factors external to the economy, factors that aren’t influenced by the domestic interest rates, collapsed demand which fed into the inflation rate. It is perhaps this lack of critical introspection that is problematic in developing a feasible analysis of the relevance of IT. The reserve banks blind adherence is perhaps best summed up by Mminele (2012) when he concludes that, “flexible inflation targeting may not be perfect, but compared to whatever else there is to choose from currently, it is probably the closest you can get based on what we know today”.

3.3.3 The Empirical Results

Angeriz and Arestis (2006:560), confirms that research pertaining to the 1990’s generally concluded that the introduction of inflation targeting produced the desired results of reducing inflation. For example, Neumann and von Hagen (2002:144) looked at “six IT countries and three non-IT countries” over a “pre-IT period (1978-92) and a post-IT period (1993-2001)” and finds that IT reduced both inflation and inflation volatility. Similar results were also found by authors such as Arestis et al (2002), Bernanke et al. (1999) and Clifton et al. (2001)

(cited in Angeriz & Arestis. 2006). However, Angeriz and Arestis (2006:560), indicates that these conclusions have several weaknesses. Firstly, the international economic environment was stable which suggests that inflation would have been under control regardless of the monetary policy position. Secondly, inflation was trending downwards prior to the introduction of inflation targeting and thirdly, in countries such as New Zealand and Canada, inflation had already been brought under control prior to the introduction of IT.

Ball and Sheridan (2003) addresses the weaknesses listed by Angeriz and Arestis above, by using a difference-in-difference approach. This approach controls for the “regression to the mean” by including the initial value of output or inflation in the equation:

$$X_{\text{post}} - X_{\text{pre}} = a_0 + a_1D + a_2X_{\text{pre}} + e$$

Where

X_{post} is the dependent variable (output or inflation) prior to the implementation of IT

X_{pre} is the dependent variable after the implementation of IT and controls for the regression of the mean where a_2 will determine whether an initial high value had a significant outcome on X

D is the dummy variable where 1 denotes an IT country during a particular year and 0 denotes a non-IT country

Using this equation, they look at 7 IT and 13 non-IT countries to determine the impact of IT (Ball & Sheridan. 2003:4). The sample includes only countries that were members of the Organisation for Economic Cooperation and Development as of 1990, hence no “emerging-market economies” were included (Ball & Sheridan. 2003:6). They also look at constant and non-constant inflation targeting periods (Ball & Sheridan. 2003:7). Constant targeting requires that the target remains the same throughout a certain study period where non-constant targeters vary their targets throughout this period.

After controlling for regression to the mean, the impact of IT on inflation volatility is eliminated. (Ball & Sheridan. 2003:11). In other words, the inflation rates of countries that adopted IT reverted to the mean rather than being influenced by IT. Although they find that persistence patterns is less pronounced in the targeting period than in the non-targeting period, this trend is the same for both targeters and non-targeters. During the non-targeting period, a one unit increase in inflation in quarter, t , increases inflation by 0.4 units in quarter, $t+1$. During the targeting period, this increase is reduced to 0.2 units. The results for output growth and output variability are inconclusive.

Ayres, Belasen, and Kutan (2014:374) explore “the effectiveness of inflation targeting on inflation and output growth” on different regions using a “large sample of developing countries”. The sample is made up of “fifty-one developing countries” which include 17 countries that have an explicit inflation targeting regime (Ayres, et al. 2014:380). They find evidence that the introduction of IT only reduces inflation in the “Middle Eastern and North African and Southern and Eastern European nations”, whereas it increases inflation in the “Asian, Sub-Saharan African, and Oceanic nations” (Ayres, et al. 2014:387). They also find that inflation targeting has no impact on the GDP growth rates of the Oceanic region and a negative growth impact on Asian regions (Ayres, et al. 2014:387). Although they find that IT has a positive impact on the growth of Middle Eastern and North African and Southern and Eastern European, Latin American and Caribbean nations, the impact is fairly limited and short term (Ayres, et al. 2014:387). Overall, they find that, although IT is a “helpful tool in reducing inflation”, its impact on output growth is “fairly limited” (Ayres, et al. 2014:387). They conclude that given the generally diverse outcomes within the different regions, monetary policy that targets inflation should be implemented in a way that takes into consideration these regional differences.

Angeriz and Arestis (2006:560), find that, where countries had a downward trending inflation rate, the trend had either been sustained or reversed after the introduction of IT. Of course, they did find that in Canada and South Korea, an upward inflationary trend had been reversed but this reversal was not significant in the case of South Korea.

Mishkin (1995:3) asserts that the Central Bank of the US, the Federal Reserve System (Fed) monetary tightening in the US (which is not an IT country) during the 1980’s not only contributed to the decline of double digit inflation, but also “dragged the economy into a deep recession”. The lowering of interest rates extended the upswing in the economy, fueling inflation and prompted the Fed to increase the interest rates. A recession followed during 1990-91 period, but it should be noted that Mishkin does not elaborate on whether the increased interest rates contributed to this recession.

Gonçalves and Salles (2008:313), looks at 36 developing economies, 13 of which implemented IT, from 1980 to 2005 to determine the impact of inflation and output. They implemented Ball and Sheridan’s difference-in-difference approach.

They find that both the inflation rates and output volatility fell by more than the non-IT countries Gonçalves and Salles (2008:317). However, despite suggesting that IT countries are “better able to cope with adverse shocks”, it should be noted that the “initial growth volatility” of IT countries was lower than that of non-IT countries. In addition, they removed all years where the inflation rate was above 50% (Gonçalves & Salles. 2008:313), a procedure which Brito and Bystedt (2010:201) do not recommend for time series analysis.

There are two additional problems that is associated with the results of authors such as Gonçalves and Salles (2008). The first is that they only look at output volatility and they do not account for factors such as selection bias. Brito and Bystedt (2010:199) suggests that it is not enough to asses volatility and in order to fully understand the impact of IT, studies have to take focus on actual output growth.

Bruto and Bystedt (2010:199) look at the impact of IT in 46 developing countries, between 1980 and 2006 on both inflation and output growth. They apply a panel methodology and control for “time-varying effects, country fixed effects and endogeneity”. The control for endogeneity in itself controls for self-selection bias due to a countries decision to implement IT “taken at different times by countries with different unobservable characteristics”. In other words, the model takes into account the country specific factors that led to the decision to implement IT. In order to control for mean reversion, a “threshold dummy” is applied for “inflation rates higher than a certain ceiling” and they apply a natural logarithm to the inflation rate (Bruto & Bystedt. 2010:201). For “methodological consistency”, they also apply this natural logarithm to the “real output growth rate”.

The results for the fixed effect OLS estimation shows that IT adoption is “more probable when inflation performance disappoints” (Bruto & Bystedt. 2010:204). More specifically, the results shows that IT adoption is driven by “inflation concerns and not by output growth concerns”. They conclude that they find no statistical evidence that improves output performance.

They utilize the following partial adjustment model (Bruto & Bystedt. 2010:202):

$$Y_{n,t} = \alpha y_{n,t-1} + \beta IT_{n,t} + \gamma X_{n,t} + \delta_t + \eta_n + v_{n,t}$$

Where:

$Y_{n,t}$ is the “macroeconomic performance indicator of interest” (inflation rate, real output growth rate, inflation volatility or output growth volatility)

n denotes a country ($n = 1, 2, \dots, N$)

t denotes time ($t = 1, 2, \dots, T$)

$y_{n,t-1}$ controls for “persistence and mean-reverting dynamics”

IT is the dummy variable that indicates whether country, n , is an IT country or non-IT country at time t , where an IT country, n , at time, t , is identified as 1 and where it is 0 otherwise

$X_{n,t}$ is a vector of endogenous variables

δ_t controls for “time effects that capture common shocks to all countries”

η_n controls for “cross-country fixed effects, and

$v_{n,t}$ is the error term.

The variable of interest is the IT dummy, which measures the “the average effect of the IT across all targeting countries” (Brito & Bystedt. 2010:202). The variable, X , is a control dummy for when inflation is exceptional high at above the natural logarithm of 0.4 (1 for above 0.4 and 0 otherwise).

The results for the pooled cross-section OLS shows that, when “omitting time and country effects”, the implementation of IT has been successful in reducing average inflation, inflation volatility and output growth volatility, without imposing a significant cost on real output growth (Brito & Bystedt. 2010:203). Furthermore, the inflation control dummy, X , indicates that countries with higher inflation experiences lower growth rates and greater growth volatility (Brito & Bystedt. 2010:204). However, when including the time effect variation, δ_t , the impact on of IT lowering both inflation and the loss of output becomes less pronounced, suggesting lower output growth for countries that dopted IT. In addition, the estimates for the volatilities and the IT dummy becomes “less negative and not significant” for output growth. IT effectively reduces annual output by a “significant-0.6%”.

Brito and Bystedt (2010:208) specifically asks whether IT regimes have lower output costs than non-IT regimes. To answer this question, they employ the following rate of output growth equation:

$$g_{n,t} = \alpha \cdot g_{n,t-1} + \beta^S \cdot IT_{n,t} + \gamma^S_h \cdot high_{n,t} + \gamma^S_{\Delta\pi} \cdot \Delta\pi_{n,t} + \delta^S_t + \eta^S_n + v^S_{n,t}$$

Where

$\pi_{n,t}$ is equal to the inflation rate and

$\Delta\pi_{n,t}$ is the inflation variation of one period to the next.

The above equation is rewritten as to determine the impact of IT on inflation variation. The equation is as follows, which is effectively, a Phillips curve:

$$\Delta\pi_{n,t} = \beta^P \cdot IT_{n,t} + \gamma^P_h \cdot high_{n,t} + \gamma^P_0 \cdot g_{n,t} + \gamma^P_1 \cdot g_{n,t-1} + \delta^P_t + \eta^P_n + v^P_{n,t}$$

After controlling for inflation reduction, the equation aims to look at the “short-term tradeoff between inflation and economic activity” (Brito & Bystedt. 2010:208). Before controlling for

country and time effects, the OLS estimates suggests that IT has a negative effect on output. However, the estimates are not significant the 5% level. In addition, the estimates for the Philips curve suggest that the application of IT did not reduce inflation, but rather, increased the inflation rate. The results are similar when controlling for country and time effects. However, most of the results are not significant, which suggests that at best, “IT does not cause significant harm”.

Tawadro (2009:328) aims to examine the impact of IT on inflation for 27 countries using quarterly data for the period from the first month of 1980 to the third month of 2006. He lists four categories, with each category showing the effect that inflation targeting had on inflation at a 5% level of significance (Tawadro. 2009:338). The first category shows that IT pushed an “already decreasing trend in inflation upwards rather than downwards”, the second category showing a rise in inflation, the third category showing that inflation had already begun a downward trend before the introduction of IT, and the fourth showing that IT reduced inflation. Of the 27 countries, 14 fell within the first category, 4 within the second, 7 within the third and two within second. The overall conclusion is that IT did not have significant effect on inflation. It should be noted however that the results for the first category and third category was not significant at the 5% level.

The countries are listed per category, below:

- First Category: Australia, Brazil, Finland, Israel, Mexico, New Zealand, Norway, Peru, Poland, Romania, South Africa, Spain, Switzerland and the UK.
- Second Category: Canada, South Korea, Sweden and the Czech Republic
- Third Category: Colombia, Hungary, Iceland, the Philippines, the Slovak Republic, Thailand and Turkey.
- Fourth Category: Chile and Indonesia

It should be noted that South Africa falls within the first category.

Specifically with regard to South Africa, Bonga-Bonga and Kabundi (2015:1) aims to determine the effects of the monetary policy tool (interest rates) on South Africa’s inflation, credit extension and GDP, through the use of “structural vector error correction (SVEC) model”. They use “seasonally unadjusted monthly data” from “February 2000 to September 2007” (Bonga-Bonga & Kabundi. 2015:5). They find that an increase in the interest rates reduces output after 9 months, with additional cited research suggesting that this effect could

last up to 3 years (Bonga-Bonga & Kabundi. 2015:7). In addition, it increases prices for up to 20 months, and has a minimal effect on the demand for credit. During the period, June 2006 and March 2007, a 1.5% increase in the repo rate did not deter credit demand which increased by 24.5%. Bonga-Bonga and Kabundi (2015:8) asserts that the most important transmission channel should be through the demand for credit and yet, it is only National Credit Act that seems to be more effective in regulating this transmission channel.

Lastly, although their study do not focus on IT, Baharumshah and Soon (2014) does present interesting conclusions regarding the relationship between inflation and output. They investigate the causal relationship between “inflation, inflation uncertainty, output growth and output uncertainty in Malaysia” and take into account the structural breaks (Baharumshah & Soon. 2014:371). What is of particular interest is the model they employ.

In selecting a model for the study, Baharumshah and Soon (2014:373), confirms that a majority of studies pertaining to inflation uses the GARCH model. However, the model may not “provide an accurate measure of time varying volatility” making it difficult to assess the impact of shocks. The model is essentially “blind as to whether the inflation rate rises or falls. To remedy this problem, they apply a GARCH-M specification which allows for the inclusion of volatility on the AR conditional mean and the lagged effect of inflation on AR variance equation. The conditional mean equation for the inflation rate is as follows:

$$\pi_t = \alpha_0 + \sum_{i=1}^p \alpha_i \pi_{t-i} + \sum_{i=1}^q \lambda_i d_i + \theta_1 \sqrt{h_t^\pi} + \varepsilon^t$$

Where

π_t is equal to the inflation rate ($\log(\text{CPI}_t / \text{CPI}_{t-1}) \times 100$)

α_0 is the constant

d_i is the dummy shifters and

$\sqrt{h_t^\pi}$ is the inflation uncertainty (standard deviation)

The output variable is proxied by the Industrial Output Index (IPI), and its conditional mean equation is as follows:

$$y_t = \beta_0 + \sum_{i=1}^p K_i y_{t-i} + \varphi_1 \sqrt{h_t^y} + \sum_{i=1}^k \omega_i \pi_{t-i} + v_t$$

Where

y_t is equal to the log of the IPI growth rate multiplied by 100 ($\log(\text{IPI}_t / \text{IPI}_{t-1}) \times 100$)

$\sqrt{h_t^y}$ is the output uncertainty (standard deviation)

The study focuses on the period from the first month of 1971 to the tenth month of 2011 (Baharumshah & Soon. 2014:371). The structural breaks include the “the period of high global inflation (1972-1977), the oil glut of 1981-1986, the Asian financial crisis (1997-1998), and the recent oil price shocks and the uncertain global economic environment”.

Over the 40 year study period, Malaysia’s inflation rate has remained relatively low (Baharumshah & Soon. 2014:370). However, the inflation rate escalated to 11% in 1973, following the oil price shocks, and the growth rate of GDP fell to 0.8% by 1975. Inflation escalated once again in the late 1990’s, as a result of an economic slowdown, higher interest rates, and “sharp depreciation of the ringgit Malaysia”. The economy contracted sharply in 1998 with an inflation rate of above 5.3%. The inflation rate stood at 2% in 2007, but escalated to 5.3% in 2008, as a result of “rising crude oil prices, world food crisis and major government efforts to remove price subsidies on food, fuel and natural gas”

Baharumshah and Soon (2014:380) concludes that their findings suggest that reducing inflation, even in low inflation countries, is an important mechanism to boost economic growth. However, they do not elaborate on the mechanism through which inflation should be reduced. (However, if inflation already reduces output, what other mechanism should be applied to reduce output? Would the addition of interest rates not escalate the reduction of output to structurally damaging levels?)

As is shown above, the conclusions on the effectiveness of IT varies and there is no real consensus view. Where papers do find inflation to produce the desired results, a number of viable criticisms have been levelled against these conclusions thereby opening up the space for further analysis. However, for the purpose of this thesis, it can said that there is indeed evidence to suggest that IT does contribute to inflation and output in an adverse way, contrary to the more orthodox view on IT.

3.3.4 The Empirical Results During an Economic Downturn?

The financial crises of 2008, and the subsequent rises in food and energy prices, led to questions being asked about the “suitability and relevance” of IT (Mminele. 2012). However,

the Deputy Governor of the SARB claimed that the “credibility of inflation targeting central banks resulted in stable inflation expectations” and reduced the risk of deflation (Mminele, 2012).

For the purpose of this thesis, the more relevant question that needs to be asked is whether, according to existing studies, IT performs effectively during periods of low to negative (recessionary) growth periods. Andersen, Malchow-Møller, and Nordvig (2014:1) confirm that there are authors who assert that “that IT countries may be better adapted to dealing with an economic crisis”. The Bank of Japan, for example, formally adopted IT in 2013, on the basis that that IT allows for “greater monetary easing without jeopardising the inflation outlook” and to avoid a liquidity trap when risk pertaining to deflation is significant. Furthermore, the ability of the monetary authorities to implement IT decisions unilaterally contrasts with the laborious mechanisations that are evident with other monetary regimes. In other words, IT allowed for a more rapid response to a problem that required an urgent and decisive response. For example, a 2011 OECD report suggests that Sweden weathered the 2008 economic crises by being able to unilaterally lower interest rates which depreciated the currency, improving the competitiveness of its export market (Andersen, et al. 2014:1). In other words, Sweden was able to act rapidly and decisively which would not been possible under competing monetary regimes.

Andersen, et al. (2014:5) look at OECD countries and find that by 2007, 16 OECD countries with flexible exchange rates had adopted IT whereas the remaining 18 countries had not. Using data from 2007 to 2008, their initial findings are that the growth performance of IT OECD countries is better than that of non-IT OECD countries. The six top IT countries (Chile, Israel, Poland, Turkey, Korea and Australia), performed better than the Slovak Republic which is the top performing non-IT country. The countries with the worst growth track record are all non-IT countries. They find that annual average growth of non-IT countries was -0.48%, whereas IT countries grew at annual average growth rate of 1.42%. Eliminating Eurozone countries improves the performance of both IT and non-IT countries, with IT countries still outperforming non-IT countries. They also control for the “overall health of the macroeconomy in 2007” to test for whether the stronger performance of OECD IT countries can be explained by their economic strength going into the recession (Andersen, et al. 2014:8). If it is found that these economies were in a better shape going into the recession, then it might negate the conclusion that IT had a significant effect on the results. By regressing the change in average annual real GDP on an inflation dummy, the 2007

output gap, the growth potential using the period from 1997 to 2007, and the “price-to-rent ratio in 2007”, they once again find similar positive results. Increasing their sample size to 101 countries, which includes all 27 inflation targeting countries such as South Africa, they find similar results as to the results stated above (Andersen, et al. 2014:16). Finally, by regressing the annual change in the exchange rates on IT, Andersen, et al (2014:14), finds that OECD IT countries increased their exports by 1% whereas non-IT countries shrank by 2.4%.

Rose (2014:6), looks at how economies (including South Africa) dealt with the aftermath of the recession, by comparing outcomes of different monetary regimes. These monetary regimes include hard exchange rate fixers, and IT countries with floating exchange rates. The number of countries being scrutinized equals more than 170 and the period under investigation is from 2006 to 2012. Unlike Andersen, et al. (2014), Rose (2014:8) eliminates all “five systematically important economies”, which include the USA, China, Japan, the UK, and the Eurozone, and only focuses on the smaller economies. These five economies accounted for approximately 43% of all international trade (Rose. 2014:8). Inflation targeters are generally larger and richer, constituting approximately 20% of global output, whereas the hard fixers are poorer and smaller, constituting approximately 7% of output (Rose. 2014:10). Rose (2014:19) finds that there does not seem to be any indication that there is a difference in the way hard fixers and IT floaters experienced the recession. The choice of monetary regimes (expressed as a dummy variable) did not have significantly different effect on the regressands, which include, capital flows, exports, imports, international reserves, money supply, “broad measures of fiscal policy”, property prices and bond yields. It should be noted that a sensitivity test which employs matching indicates the possibility that bond yields were lower for both the hard fixers and IT floaters (2014:22). Furthermore, regardless of monetary regime, inflation declined, and the domestic currencies depreciated (Rose. 2014:19). However, he does find that IT countries “received larger net capital flows”, and an increased “ability of their residents to invest freely”, whereas hard fixers experienced greater declines in stock prices (Rose. 2014:19).

3.3 HOW DOES THE EXCHANGE RATE IMPACT ON INFLATION?

Developing economies like South Africa, generally “suffer high exchange rate volatility” which makes it infeasible to ignore the exchange rate as a source of inflation volatility (Mminele. 2012). Volatility in the exchange rate can create difficulties in the “economic decision making” process by inducing instability and increasing uncertainty (Parsley. 2010:1).

Despite its volatility, exchange rates can also act as a stabilising factor. Odhiambo (2015:83) states that the high interest rates of the 2000s, contributed to inflow of portfolio investments which in turn, maintained a strong rand and kept inflation within its target range. However, Civcir and Akcaglayan (2010:340) states that most of the central banks that implements IT “do not openly recognize” the exchange rate as a factor in monetary policy decisions and will only reluctantly acknowledge it if pressed to do so. This reluctance may have its origins in the fact that there is little evidence in the literature to “support including the exchange rate explicitly in the central bank’s policy reaction function” (Taylor. 2001 cited in Garcia, Restrepo, & Roger. 2011:1591). Others have argued that the exchange rate pass-through (defined by Parsley (2010:1) “as the percentage change response of domestic prices to exchange rate changes”) is incomplete in both the short and long term (Auer & Schoenle. 2016:60). In other words, the percentage change in prices is less than the corresponding change in exchange rate. Several authors² have concluded the one of the leading explanations is that firms “accommodate the local market environment” before adjusting their mark-ups. In other words, even though it is the case that the price on an imported good increase by R1, the local sellers cannot sell the product to the local market if an additional R1 is added to the selling price. Instead, the local buyers will only tolerate a price increase of no more than, say, R0.50. If the short run pass-through estimates differs from the long run pass through, it may tell us something about how sticky prices are and the impact of changes in the exchange rate over time (Parsley. 2010:2). However, as suggested above, prices may remain sticky regardless of time.

² Krugman. (1986), Helpman & Krugman (1987) and Dornbusch (1987), Melitz and Ottaviano (2008), Atkeson and Burstein (2008), Chen et al. (2009), Berman et al. (2012), Amity et al. (2014) and Amity et al. (2015), cited in Auer and Schoenle, (2016)

Parsley (2010) attempts to estimate South Africa's exchange rate, pass-through by looking at 158 specific goods and services in Johannesburg. He estimates the pass-through for final consumer goods to be relatively low at between 14 and 27%, .

Civcir and Akcaglayan (2010:340) derives a generalized reaction function for interest rates in Turkey, and estimates it via a VAR model. They primarily aim to study the response of Turkey's monetary policy to exchange rate shocks, before and after the implementation of IT. They find that the depreciating exchange rate acts as the main channel asymmetrically feeding into inflation (Civcir & Akcaglayan. 2010:351). The reason for this asymmetry is that a depreciating currency has a greater impact on inflation than an appreciating currency. The estimated reaction function suggests that significance of this exchange rate pass through resulted in a significant monetary policy response via adjustments in the interest rates.

Beirne and Bijsterbosch (2011:246) uses monthly data from January 1995 to April 2008 to estimate the pass-through rate for "nine central and eastern European EU Member States". A cointegrated VAR framework (VECM) is applied where the estimates are derived via the multivariate cointegration approach and impulse responses. The pass-through rates for the VECM and its impulse responses are 0.6 and 0.5, respectively.

Auer (2015:1646), analysis the pass through of Chinese produced exports on sample of 418 US manufacturing sectors and estimates it to be 0.7. The analysis finds that these exports were a "major contributor to the low-inflation environment during the last decade" and concludes that "a substantial revaluation of the RMB would result in a substantial upward impulse on the prices of U.S. goods".

3.3 HOW DOES THE OIL PRICE IMPACT ON INFLATION?

Although it was the case that large oil price increases were associated with "sharp decreases in output and large increases in inflation" (Blanchard & Riggi. 2013:1032), Chen (2009:126) states that it is "widely observed" that the relationship between the price of oil and the economy has "weakened over time". However, Seka, Teoa, and Wong (2015:630) suggests that the changes in the oil prices are still "particularly influential" on the inflation rates of developing economies because of its vulnerability to external shocks. In addition, policy

makers still view oil price shocks as one of the causes for “macroeconomic instability and inflation” (Ajmi, Gupta, Babalos & Hefer. 2015:63).

Seka, et al (2015:633) modifies an exchange rate-pass through equation to “include the oil price variable” to estimate the annual pass through of oil shocks on 20 countries from 1980 to 2010. Ten of the countries are highly oil dependent whereas the rest have a lower oil dependency. The inflation rates of high dependency oil producers are not significantly dependent on the oil price whereas the opposite is true for low oil dependency countries (Seka, et al. 2015:634). However, the authors suggest that because export production costs have a significant relationship with inflation, the oil price indirectly influences inflation through the production costs of exporters.

Ajmi, et al. (2015) uses monthly data from the first month of 1921 to the tenth month of 2013, to test for the asymmetric causal relationship between “oil price shocks and the price level in South Africa”, by employing “bootstrap simulations with leverage adjustments”. The CPI data, which is split into negative and positive shock components, is transformed by applying a natural logarithm (Ajmi, et al. 2015:69). The oil data is obtained from the West Texas Intermediate (WTI) – Cushing Oklahoma spot prices (quoted for crude oil in US dollars) and is similarly transformed and split into a negative and positive component. Using Engle and Granger’s two-step cointegration test, they find no evidence of cointegration which suggests that the “that the effect of oil shocks on consumer prices is short lived” (Ajmi, et al. 2015:69). ARCH tests reveal that the data does not conform to the assumptions of normality, or more specifically, the data does not reveal behavior that suggests constant variance (Ajmi, et al. 2015:69). The null hypothesis which states that oil prices do not Granger Cause “price level shocks” is rejected at the 10% level (Ajmi, et al. 2015:70). More specifically, the null hypothesis for the relationship between increasing oil prices and increasing price levels is rejected at the 10% level. However, the null hypothesis for the relationship between decreasing oil prices and increasing price levels is also rejected, which suggests that “depreciations in the oil prices would do little to alter the expectations of consumers after periods of price appreciations”.

Chen (2009:127) uses quarterly data for 19 industrialised countries from the first month of 1970 to the fourth month of 2006 to “estimate the degree of oil price pass-through” via an error-correction model. Applying a four quarter lag, they find that pass-through equals 0.5%

after one lag and 17% over the longer term (Chen. 2009:128). They find that countries with higher degree of energy imports tend to exhibit a higher pass-through.



CHAPTER 4: BACKGROUND

In addition to the theoretical foundations, the impact of inflation targeting cannot be understood without a historical perspective outlining both the economic structure of the South African economy and the economic events that occurred during the period under investigation. The following two sections will start by briefly outline the economic structure of South Africa and specifically focusing on the events that resulted in the low growth environment experienced since 2008.

4.1 A BRIEF DESCRIPTION OF THE SOUTH AFRICAN ECONOMY

The OECD (2015:10) describes South Africa as having a “sound macroeconomic framework” with “inflation targeting, a floating exchange rate and largely unimpeded international capital”. However, having grown in real terms by 3.1% from 2000 to 2014, the country has been unable to substantially reduce unemployment (OECD. 2015:14). This insubstantial growth has been especially unremarkable when compared to other emerging economies.

South Africa ranks as the 33rd largest economy in the world and makes up approximately 0.4% of the world economy (World Bank. 2016a). By comparison, the US, China and European Union makes up approximately 24%, 15%, and 24% respectively, totaling more than 60% of the world economy.

4.2 THE FINANCIAL RECESSION OF 2008

On the 15th of September 2008, the world was thrown into economic turmoil after it was announced that Lehman Brothers had made the “largest bankruptcy filing in the history of the United States” ” (Guillén, 2011:1). What followed was the worst global recession since the Great Depression. Rose (2014:6) describes this event as the “most dramatic macroeconomic event in generations” and the “first truly global recession in decades”. Although the recession was mostly felt in larger and richer countries such as the US and the UK, the event found its way into smaller economies in the “form of contractions in the international flow of capital and trade”. The financial markets experienced reduced lending activities and lower profits, both capital flows and the exchange rate have been characterized

as volatile, and the lower demand from developed countries reduced growth and contributed to higher unemployment rates (Comert & Epstein. 2011:S99). This was especially troubling given the fact that South Africa was still defined as a small upper middle income country with its 2014 GDP standing at roughly US\$349.8 billion (World Bank. 2015).

4.2.1 Mortgage Backed Securities: The Crises Begins

Traditionally it was the case that US home loans were granted to those who were able to pay back the loan (credit worthy lenders) and who could make a deposit of at least 20% of the value of the home. (Hubbard & Brien 2012:15). However, during the 2000s, home loans became more accessible to those with bad credit records. Furthermore, potential homeowners did not have to provide proof of income and the deposit on the loan became considerably less (Hubbard & Brien 2012:16). In addition, the repayment schedules were adjustable meaning that borrowers could at first, pay low interest rates and as time passes, the interest rate on the bond would increase. The banks reasoned that the price of property would continue to climb thus reducing the chances of a default because the borrowers could always refinance their loans via these capital gains. It was indeed the case that between 2000 and 2006, house prices rose by 90% and home sales rose by 60%. The market was booming and during the course of the housing boom, investment banks bought these mortgages, bundled several of them as mortgage-backed securities (MBS) and resold them in the secondary derivative market (Hubbard & Brien 2012:16). Even Asian governments, in an attempt to avoid a repeat of the East Asian crises, bought these securities as a means of hedging against the possibility of their currencies depreciating as well to peg their exchange rates against the dollar (Brunnermeier 2008:2). In 2005 however, the housing market started to show signs of weakness.

One of the first major signs of an impending crisis came on 7 February, 2007, when HSBC, a multinational banking and financial conglomerate, announced “losses linked to US sub-prime mortgages” (Guillén, 2011:1). Throughout the rest of 2007, the number of American homeowners defaulting on their mortgage rose and several institutions across several countries exposed to these MBS suffered financial losses and bankruptcies. This led the Chairmen of the US Federal Reserve to declare that the “defaults will not seriously harm the US economy.” The companies that suffered losses related to these derivatives included “Merrill Lynch, JPMorgan Chase, Citigroup and Goldman Sachs.” The “first European

victim” of the crises was a small German bank which had invested heavily in the mortgaged backed securities. Banks like these could neither sell nor use as collateral these securities and an eventual “€3.5 billion rescue package involving public and private banks was announced” (Brunnermeier. 2008:10). By May, 2008, “major banks and other financial institutions around the world reported losses of approximately US \$379 billion” (Lee. 2012:41).

On the 11th of September, 2008, another major financial and banking institution announced losses of \$4 billion and on the 15th of September, it made the “largest bankruptcy filing in the history of the United States” ” (Guillén, 2011:1). The collapse of this institution, Lehman Brothers, was the event that finally pushed the global economy over the financial edge.

4.2.2 The Impact on South Africa

The period from the mid-1980’s up to the end of 2007 is “often referred to as the Great Moderation”, a period of “reduced macroeconomic volatility” (Mminele. 2012). At an annualized rate of 4% since September 1999, South Africa had experienced its longest period of recorded economic expansion (SARB. 2009:35). After 99 months of consistent growth, this expansionary path came to an end in November 2007. During the first half of 2008, the economy was hit by electricity shortages and reduced domestic consumption. As a result of the global recession, the South African economy “contracted from the final quarter of 2008 to the second quarter of 2009” (SARB. 2010:2).

In the fourth quarter of 2008, GDP fell by 1.8% and there was an outflow of portfolio capital due to risk averse investors fleeing developing countries (SARB. 2009:36). The outflow of capital led to the depreciation of the rand but the rand managed to regain most of its value, after these outflows were reversed in the first half of 2009. Consumption fell and in a bid to stimulate demand, in December 2008, the SARB started a process of reducing the repo rate (SARB. 2009:36).

During the first half of 2009, the economy contracted “at an annualised rate of” 4.5% and a further 3% during the second half (SARB. 2009:37). All sectors, except for construction, were affected by the recession. After having increased at an annualized rate of 23.9% in the second half of 2008, the agricultural sector declined by 2.3% “in the first half of 2009” (SARB. 2009:37).

As noted above, the recession negatively affected demand for all export goods with mining being one of the heaviest hit sectors. After having reached record highs in the first half of 2008 (SARB, 2009:34), the recessions significantly reversed all gains within this sector and

by the end of 2008, the sector had shrank by 6.5% (SARB. 2009:38). The global recession continued to wreak havoc on the sector and by the end of the first half of 2009, the decline had more than doubled to 16.8%. The resulting weak tax revenues and expansionary fiscal policy responses widened the fiscal deficits.



CHAPTER FIVE: METHODOLOGY

5.1 INTRODUCTION

It was noted in chapter 3.3.3 that the current literature on the IT conundrum is generally characterised by a lack of consensus. Furthermore, studies conducted on the effectiveness of IT are predominantly done by adopting a more quantitative approach. Given the emphasis placed on this approach and its conflicting outputs, it would be reasonable to suggest that researchers should consider going back to the basics, namely, conducting a more a qualitative study. The thesis does not however suggest abandoning the quantitative approach and will in fact combine or mix these two approaches to produce a more balanced conclusion.

The qualitative data will be extracted from Central Bank reports and presented to the reader in the form of a narrative. However, the conclusions derived from this narrative will be confirmed or rejected by the output of the quantitative econometric models. In addition, the qualitative narrative will rely heavily on the quantitative outputs contained within the Central Bank reports, thus highlighting the robustness of triangulating the two approaches.

The thesis will also, where necessary, detail the potential for new hypothesis, although it won't be within the scope of the thesis to convincingly test the validity of these hypotheses. The introduction of these hypothesis will however be justified by arguments derived from the data extracted.

5.2 DEFINING THE QUALITATIVE, QUANTITATIVE AND MIXED METHODS

Marczyk, DeMatteo and Festinger (2005:17) confirm that there are two broad categories of research methods, namely, the quantitative research and qualitative research methods. Gray, Williamson, Karp, and Dalphin (2007:42) give the simplest and most straightforward descriptions of these two methods. They describe quantitative research as using numbers that “may be fed into a computer where they can be counted, stored, and manipulated”. Qualitative research is described as relying on words to “capture subtleties of meaning and interpretation that numbers do not convey”.

Gray, et al (2007:42) notes that researchers are increasingly mixing these two methods “to reap the benefits of both and minimize the deficiencies in each”. The beneficial interaction between mixing these two research methods is best described by Marczyk, et al (2005:17). They state that qualitative research is “often used as a source of hypotheses for later testing in quantitative research”. Quantitative research however “makes it more likely that studies can be replicated and that the results of research are reliable” (Gray, et al. 2007:42).

Hesse-Biber and Johnson (2015:9) states that this mixed method approach is most beneficial when there is a “lack of clarity of the theoretical framework and when exploring areas that have not received much attention”. As will be shown below, there is indeed a lack of clarity on how the IT framework functions and is being implemented. This lack of clarity necessitates the introduction of a narrative analysis to meticulously investigate the framework at its very source, which is the SARB in the case of South Africa.

It is important to emphasise that a generally acknowledged deficiency of the qualitative approach is its subjective nature. Gray, et al (2007:94) elaborates on this by stating that authors’ often acknowledge their own biases within their “personal narratives” and preconceptions. Despite this acknowledgement, authors are never fully aware of the extent of their own bias and “any claim we make to objectivity will be measured by the critical evaluation of others”. Furthermore, being aware of either of these facts “should not deter” the author from “striving for openness in interpreting data nor from including evidence that contradicts what the author might like to find out”.

5.3 DEFINING THE QUALITATIVE HISTORICAL NARRATIVE

As noted in chapter 5.2.1, qualitative research forms the basis for extracting data that will be used in a qualitative study. The quantitative output interrogates the validity of the qualitative conclusions while the qualitative conclusions form the basis for explaining the quantitative outputs. The thesis attempts to add context to the qualitative outputs by focusing on a qualitative centred narrative. According to the Oxford dictionary, a narrative is simply a story or a written account of connected events. In order to evaluate the effectiveness of IT, the narrative attempts to better understand the inflation rate by telling its story in the same way

that a biographical author tries to explain the events that contributed to the behaviour of his or her human subject.

Hesse-Biber and Johnson (2015:9) formalises this narrative approach by introducing the concepts of structural and thematic narrative analysis. The structural narrative analysis aims to evaluate “how a story is told” whereas the “thematic narrative analysis” aims to “provide insight into narratives that do not follow the conventional story form and permits deeper inspection by exploring what is said”. In the case of the Central Bank reports, the story being told is that of the macro economy and the various actors or variables that influences said economy. More specifically, the thesis explores that part of the story that gives insight into the behaviour of inflation and the performance of IT. Close attention is paid to how the wording of the reports is structured to identify the “subtleties of meaning” and interpret it within an objective economic framework. It is also important to note that, within this objective framework, what is not being said will also be scrutinised. The “conventional story form” should be that the inflation rate is responding as would be forecasted within an IT framework. If the inflation rate narrative does not conform to this basic IT framework story form, then a “deeper inspection” is conducted to explore why this might be the case.

Once again, emphasis should be placed on the subjective pitfalls of the qualitative approach. In terms of the thesis, there are two sides to this subjective coin, namely; the side of the Central Bank and the side of the researcher. The researcher constructs a narrative based on the objective qualitative conclusions and quantitative outputs of the Central Banks reports. The reports however may contain ‘opinions’ that are informed by a subjective bias for a certain outcome. For example, the SARB may be of the opinion that their preferred monetary policy framework is working but it is up to the researcher to determine whether this is informed by objective fact or subjective bias. However, the researcher may have a bias in conflict with the bias of the Central Bank. Although it is the responsibility of the researcher to ensure that the qualitative conclusions are objective, it can at times be the case that an unintentional degree of subjectivity creeps into the conclusions. This makes it necessary for these types of research methods to be heavily scrutinised by independent observers.

5.4 THE QUALITATIVE ECONOMETRIC MODEL

5.4.1 The Model

As noted above, it is the qualitative conclusions derived from the narrative that will form the basis for the final quantitative econometric model. The model itself will try to answer the general question on whether IT is working and the more specific question of whether increasing interest rates within a low growth environment produces desirable results.

It was also noted that the thesis is going back to the basics by making the central focus, its qualitative narrative. The same principle will be applied in the sense that the model will not attempt to reinvent the wheel. Several studies using various methods have already been conducted and any method produced would essentially be a reproduction of a study that already exists. The aim will be to keep the model as simple as possible and to focus on two aspects of the coefficients of the explanatory variable, namely, its magnitude and direction. However, the magnitude itself won't be of interest. It is the magnitude of one coefficient relative to the magnitude of another coefficient. Simply put, what will be focused on is whether, for example, the magnitude of the coefficient for the price of oil will be greater than the magnitude of the coefficient for the exchange rate. The reason for using this 'relative magnitude' approach is simply because economic theory on the subject is not at a stage where reliable 'specific' approximations of the magnitude can be made. This lack of theoretical clarity will be elaborated on in the empirical review.

The rest of this section will focus on explaining the model and its relevant explanatory variables. A lengthy explanation of the utilisation of the GDP growth rate will be included because of problems related to its quarterly observations.

5.4.2 The Empirical Model Specification

A simple OLS model will be utilised to estimate the coefficients, the justification for which will be presented later in the thesis. There will be two parts to developing the model. The first part is derived from the events surrounding the interest rate increase on the 29th of January 2014 and the second will be derived from the qualitative narrative.

Although the model will be multivariate, for simplicity, the basic model can be specified within the following framework as follows:

$$Y_{it} = \alpha + x_{it} \beta + \mu_{it} \quad (i=1, \dots, N; t=1, \dots, T)$$

The inflation rate is denoted by Y whereas the subscripts, i and t , refers to the i th observation at a particular time, t . In the first part of developing the model, x will denote the variables that influence the inflation rate, namely, the GDP growth rate, the interest rate, the exchange rate and the price of oil. The random error term μ_{it} is assumed to follow a standard normal distribution. However, it is not the unit values that is of particular interest. What is of particular interest is how a change in the explanatory variables will impact on the change of the inflation rate, hence the basic model will take the form of:

$$\Delta Y_{it} = \alpha + (\Delta x_{it}) + \mu_{it}$$

In this regard, the coefficient, β , will be indicative of the how a change in x will impact on a change of Y . It will also indicate whether the relationship between the dependent and explanatory variables is positive or negative and it will show the relative magnitude of a change in each explanatory variable.

5.4.3 The Explanatory variables

As noted above, the first part of developing the model is based on the events that led to the SARB increasing the interest rates on the 29th of January 2014, hence the chosen variables featured heavily during the quarter preceding the month of January 2014. The variables will consist of monthly observations and include the price of oil, the exchange rate, the interest rate and the GDP growth rate. Some of the variables were chosen to simplify the model, to avoid issues related to multicollinearity, and to introduce shocks into the model emanating from excluded variables.

Like Ajmi, et al. (2015), West Texas Intermediate (WTI) – Cushing Oklahoma dollar spot prices will be used for the price of oil, to avoid issues of multicollinearity. If the price of oil is

inputted as rand spot prices, it will create multicollinearity issues because the rand/dollar exchange rate directly influences the price of oil quoted in rand spot prices.

The exchange rate also acts a mechanism for transmitting international business cycles (Odhiambo. 2015:83), hence the exchange rate can also be seen as a proxy for absorbing or internalizing and outputting international shocks. It is also a useful tool to test for the effects of imported inflation.

In terms of relative magnitude, the model should give some indication as to which explanatory variable has the greater impact on the inflation rate. In terms of direction, it will also indicate whether, for example, an increase in the interest rate decreases or increases the inflation rate.

5.4.4 The GDP growth rate

The GDP data or variable is described by the SARB database as quarterly, seasonally adjusted and annualized at market prices that is kept constant at 2010 prices. As noted in chapter 1.3, one of the primary objectives of the thesis is to see whether it is feasible to increase the interest rate during a low GDP growth period. In that regard, it is important for the model to give some indication as to the relationship between the inflation rate and the GDP growth rate. There are two issues however, namely, 1) what constitutes a low and high growth period and 2) how can quarterly data be included in a model where the remaining variables are monthly?

In an attempt to differentiate between the high and low growth periods, a 3% growth rate threshold will be applied. This means that a low growth period will be where GDP grows at or below 3% and a high growth period will be where GDP grows above 3%. Two justifications for this threshold is elaborated on below, the first of which looks at the employment coefficient and the second of which looks at the growth rates before and after the 2008 economic crises.

The employment coefficient is defined as “the ratio between the rate of growth in employment and the rate of growth of GDP” (Fourie. 2013:3). The coefficient would be equal to 1 if employment and GDP grew at the same rate, less than one if employment grew slower than GDP, and greater than 1 if employment grew faster than GDP. Using labour data from 1946 to 2007, Hodge (2009:497) finds that the employment coefficient averages 0.5. This

means that for the period under review, for every 1% increase in GDP, there has been a 0.5% increase in employment. As a result of this unemployment coefficient, Fourie (2013:6) states that unemployment will remain unchanged if the GDP growth rate remains at 3%. GDP growth is seen as “prime solution to the unemployment problem” (Fourie. 2013:3) and documents like the National Development Plan emphasizes that growth is a priority in reducing the unemployment rate (NDP. 2010). Given the information above, it would be reasonable to conclude that, for the purpose of this thesis, a growth rate that maintains or increases the unemployment rate is a viable indicator of a low growth environment.

The second step is to decide on what constitutes a ‘period’. The first option is to look at each observed quarter individually, and determine whether their GDP growth rates are below or above a stated threshold of 3%. The second option is to take a set of years, and average the annual growth rates over that particular set of years to determine if the observed period is a low growth period. For example, using data obtained from the SARB website, it is calculated that annual GDP growth rate over an 8 year period from 2000 to 2007 averaged 4.3%, with 6 of these 8 years showing growth rates above 3%. Similarly, the growth rate over a 7 year period from 2008 to 2014 averaged 1.7%, with 3 of these 7 years showing growth rates at or above 3%. Using the threshold inevitably leads to a certain level of distortion, and to avoid any distortions, the period will simply be defined as a quarter.

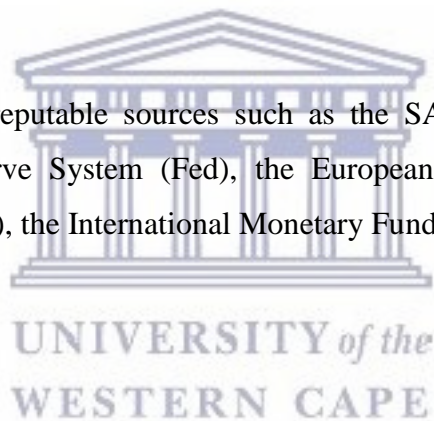
Lastly, for the purpose of inserting the quarterly GDP into a model with monthly observations, the low growth period will be inputted as a dummy variable equalling 1 and the high growth period will be inputted as a dummy variable equalling 0. The dummy variable will then be spread across the quarter by inputting it into each observed month. For example, if the GDP growth rate in quarter 1 of 2014 is below 3%, then each month within that quarter (January, February and March) will be considered as part of a low growth period. In other words, each month will be assigned the dummy variable, 1, and in that way, the quarterly data can be presented as monthly data. The table below illustrates the process of assigning the dummy variables, where GDP_q is the quarterly GDP growth rate and Dummy is the dummy variable that is assigned to each month. As shown by the table, each quarter grew at a rate that was less than 3% thus each month from January to September are assigned a dummy variable of ‘1’. The final quarter grew at a rate that is above 3% and therefore, the months from October to December are assigned a dummy variable of 1.

Table 1: Example of GDP Dummy Variables

Date	GDPq	Dummy
Jan-14	-1.5	1
Feb-14		1
Mar-14		1
Apr-14	0.5	1
May-14		1
Jun-14		1
Jul-14	2.1	1
Aug-14		1
Sep-14		1
Oct-14	4.2	0
Nov-14		0
Dec-14		0

5.4 THE DATA

The data is extracted from reputable sources such as the SARB, Statistics South Africa (StatsSA), the Federal Reserve System (Fed), the European Central Bank, (ECB), The People's Bank of China (PBC), the International Monetary Fund (IMF) and the World Bank.



CHAPTER SIX: FINDINGS - THE QUALITATIVE HISTORICAL NARRATIVE

As was noted, researchers had utilised several quantitative methods, producing a variety of outputs to explain the behaviour of the inflation rate. However, the outputs did not produce a consensus view thus necessitating a different approach, namely, a qualitative approach. As was elaborated on in chapter 5.3, the qualitative approach takes the form of a historical narrative and its purpose is to provide a framework to scrutinize the behaviour of the inflation rate and the effectiveness of IT at a deeper level.

The narrative will provide an in-depth analysis of each year during the observation period from 2000 to 2014. It not only aims to determine whether the selections of the variables listed in chapter 5.4.3 is valid, but also to identify additional explanatory variables. Given that the SARB is the main authority on the inflation rate, the narrative generally starts with what the SARB identified as the main explanatory variables influencing the inflation rate. The additional subsections, namely the graphic narrative, reference countries and interest rates were added to either support or dispute the SARB's narrative as well as find answers that are not provided by the SARB.

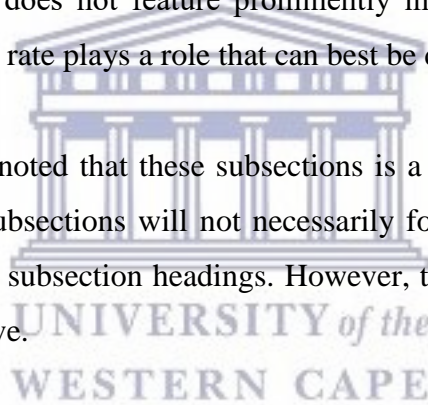
The 'graphic narrative' subsection will present the data for the inflation rate and the initial explanatory variables for each year within a graph. The graph will denote the GDP growth rate as GDPq, the South African inflation rate as INFSA, the rand/dollar exchange rate as Exr, and the price of oil as OilP. The primary objective of this subsection is to observe the behaviour of the explanatory variables and its relationship with the inflation rate.

The 'reference areas' subsection will analyse the behaviour of the inflation rate of South Africa's largest trading partners and compare that against South Africa's inflation rate. The objective will be to identify whether there is an observable relationship between these inflation rates and in doing so, conclude on the possibility of a causal relationship. In other words, it will try to see if the inflation rate of the trading partners influences South Africa's inflation rates.

Finally, the 'interest rate' subsection will primarily look at the behaviour of South Africa's interest rates and compare that against South Africa's inflation rate. It also has a secondary purpose in that it will try see if the question of the relationship of South Africa's inflation rate and interest rate can be answered by observing the behaviour of interest rates of South Africa's largest trading partners.

In chapter 5.3, it was noted that close attention will be paid to the wording of the utilised reports and this might lead to a certain level of monotony and repetition throughout the narrative. However, despite this monotony and repetition, the level of detail within the narrative is pivotal to producing a robust qualitative conclusion. Where there is repetition, it is important to take cognisance of this repetition because it demonstrates a verifiable pattern. If a certain type of event, variable or behaviour gets repeated, it would suggest that this event, variable or pattern plays a vital role in explaining the behaviour of the inflation rate and answering the specific question. It is also important to note the absence of an event, variable or behaviour being repeated, since this would indicate the lack of importance of this particular event, variable or behaviour in answering the specific question. For example, given the IT framework and its implementation by the SARB, it would be expected that the interest rate would play a crucial role in determining the direction and magnitude of the inflation rate. However, if the interest rate does not feature prominently in the SARB's reports, then it would suggest that the interest rate plays a role that can best be described as, marginal.

Lastly, it should however be noted that these subsections is a framework around which the narrative will be built. The subsections will not necessarily follow the same order nor will each section contain the same subsection headings. However, the general framework will be applied throughout the narrative.



6.1 2000

6.1.1 The 2000 Narrative According to SARB

During a year in which the inflation rate increased significantly, the SARB (2000a) stated that the principal factors influencing SA's inflation rate was the "steep rise" in the price of oil (that started in early 1999) and the "upward shift in food prices" (due to the first quarter damage to agricultural crops). Furthermore, the depreciating rand "contributed to the acceleration in the prices of imported goods" (SARB. 2001a).

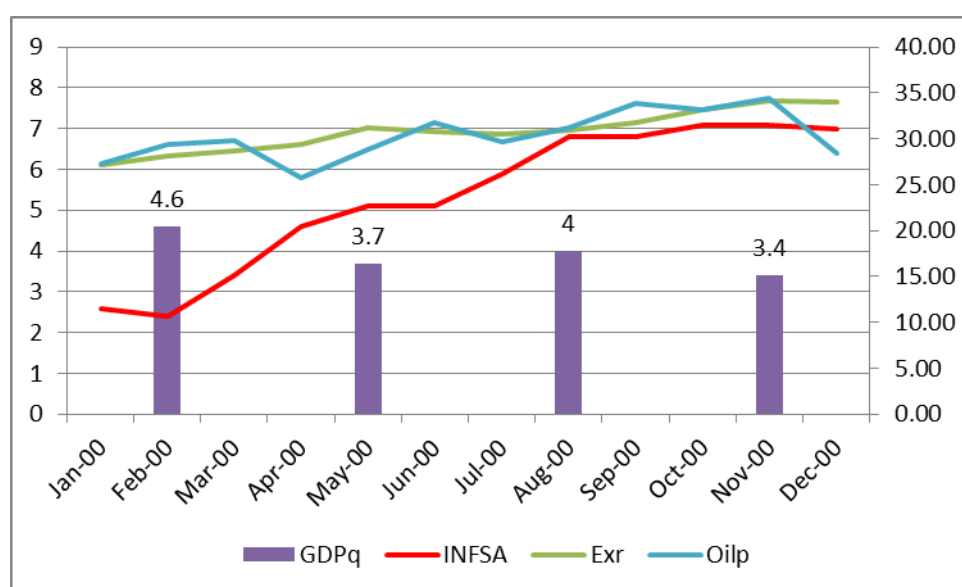
Data extracted from the Federal Reserve Bank of St Louis (Fred. 2015) shows that the West Texas Intermediate (WTI) crude oil prices increased from \$27.26 in January 2000 to a peak of \$34.42 in November 2000, before settling at \$28 a barrel in December 2000. The exchange

rate escalated rapidly from R6.12 to the dollar in January to a peak of R7.67 in November before settling at R7.64 in December. The reasons for the depreciating rand include “slowing activity in the leading industrial countries”, concerns about the possible impact of rising global oil prices and tensions in the Middle East (SARB. 2000a, SARB. 2001a).

The SARB also asserted that there was “little indication of endogenously generated inflation” (2000a).

6.1.2 The Graphic Narrative

Figure 1: 2000 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

The figure above illustrates the relationship between the inflation rate and the principle variables, excluding the interest rates. The price of oil is shown on the right vertical axis and the remaining variables are shown on the left.

What the figure demonstrates is that the inflation rate accelerated significantly from 2.6% in January to 7% in December. This upward trend coincided with the increase in the price of oil and rand/dollar exchange rate.

A cursory glance at the GDP growth rates also suggests that it played a part in subduing the increasing inflation rate. There was a noticeable inflation rate escalation during the first and third quarter, the highest GDP growth rate quarters. There was also a general slowdown in

the inflation rate increase during the second and fourth quarters, the slowest GDP growth quarters. If it is indeed the case that the inflation rate was influenced by changes in GDP, it becomes necessary to look at the factors that influenced GDP and hence, identify events and variables that had an indirect effect on the inflation rate.

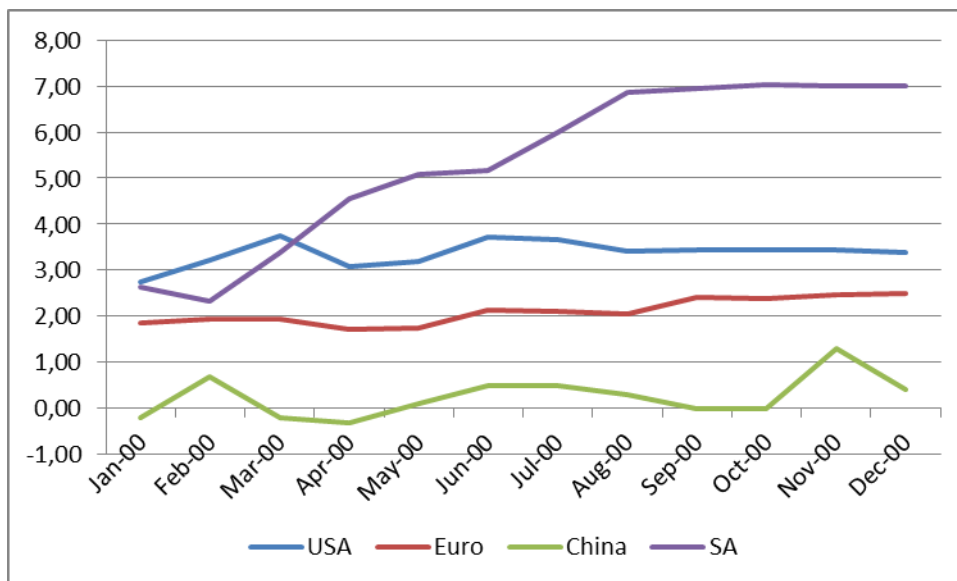
It is noted that the GDP growth rates coincided with growth in the world economy which had begun to experience a downturn (SARB. 2001a). This global downturn however was less evident in South Africa than in the rest of the world. The economy was further characterised by “continued growth in real final household spending”, and household debt that grew faster than household income (SARB. 2000a). Factors contributing to the increase in household spending and debt include the reduction in taxes and the decrease in interest rates respectively.

6.1.3 The Reference Areas

The figure below illustrates the relationship between the South African inflation rate and the inflation rate of the reference area. The initial impression is that there does not seem to be any observable relationship between SA’s inflation rate and the inflation rates of the reference areas. However, as was the case for South Africa, the inflation rates for all reference areas generally increased throughout the year. From January to December, the inflation rates increased from 2.7% to 3.4% for the US, 1.9% to 2.5% for the Euro area, and -0.2% to 0.4% for China.

What can be observed though was that SA’s inflation rate was considerably higher than the reference areas by the end of the year and its increase considerably more pronounced. During the same time, the South African interest rates were also considerably higher which suggests that the inflation rate may be higher if the interest rate is higher.

Figure 2: Inflation Rates - 2000



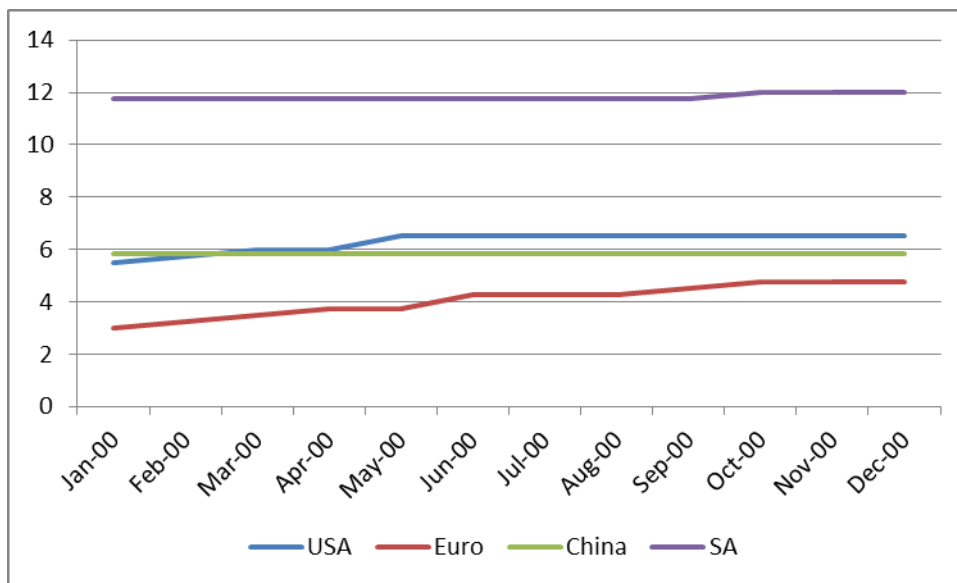
Source: IMF, 2016

6.1.4 The 2000 Interest Rates

The figure below illustrates the interest rate spreads between the respective areas. As noted above, in addition to the significantly higher inflation rates, the interest rates were also significantly high. As an example, for December, the inflation rates for the South Africa, the USA, the Euro area and China was 7%, 3.4%, 2.5%, and 0.4%, respectively. During the same month, the interest rates of these areas were 12%, 6.5%, 4.75%, and 5.85%, respectively.

It should be noted that in 2000, “several central banks around the world” tightened their monetary policies (increased the interest rates) “since the middle of 1999”, as a precautionary measure against the higher petroleum prices (SARB. 2000a). This is evident in the graph above for all areas except for China, where inflation was significantly lower than all reference areas as well as South Africa.

Figure 3: Interest Rates - 2000



Source: IMF. 2017b

6.1.5 Preliminary Analysis for 2000

A few things stand out. Most of the factors that contributed to the domestic inflation rate came from sources external to the economy. Decisions regarding changes in the price of oil are taken outside of the South Africa economy and the behaviour of the rand was generally subject to external forces. The SARB also implied that the only significant domestically produced variable, food, did not produce a significant endogenous influence on the inflation rate. Local output may have influenced the inflation rate, but at this point, this assertion is speculative at best.

Lastly, although there does not seem to any significant influence on the domestic inflation coming from the price movements in the reference countries, what the comparison does potentially demonstrate is that a significantly high interest rate may produce significantly high inflation rates.

6.2 2001

6.2.1 The 2001 Narrative According to SARB

For most of 2001, the inflation rate reversed its trend, peaking at 7.8% in February and troughing at 4% in October. The SARB (2001b:20) states that the primary reason for this decline was the “decrease in transport running cost” which included the retail prices of petrol and diesel. In addition, during the first three quarters of 2001, imported inflation was “restrained” by the declining oil prices and slowed down further by the “low rates of inflation in trading-partner countries” (SARB. 2002a:22).

During the last few months of 2001, the progress made in stabilising the inflation rate was halted when a “sharp depreciation of the rand and rising food prices” accelerated the inflation rate from 4% in October to 4.6% in December (SARB. 2002a:22). This sharp depreciation increased the cost of imported goods, giving “rise to potential inflationary pressures in the economy” (SARB. 2002a:4). The depreciation also resulted in a sharp increase of bond yields in December which prompted the reserve bank to increase the interest rates in January of the following year in a bid to negate a “succession of rapid rises in the general price level” (SARB. 2002a:4). This increase in the interest rate was presumably an attempt to protect the value of the rand against any potential currency outflows resulting from lower demand for bonds (as demonstrated by the the increase in yields). These outflows would depreciate the rand and lead to the stated “succession of rapid rises in the general price level”. It should be added that the yields on government bonds “declined sharply” from April to August, and during this time, the interest rate had been reduced on two occasions.

It was noted that the increasing food prices was generally associated with the depreciating rand. It was also noted that “the domestic price of food has closely tracked international food prices since about 1993”. In this particular case however, according to the SARB, the food price were primarily a function of exchange rate rather than international food prices.

What is of interest was that the cause of the sharp depreciation of the rand could not be explained. At the time, numerous possible reason was given but it was also speculated that that the depreciation was a result of currency manipulation (SARB. 2002a:36). The fact that the “speed and the extent of the depreciation” could not be explained, “influenced President

Mbeki to appoint a Commission of Inquiry into the Rapid Depreciation of the Exchange Rate of the Rand and Related Matters, chaired by Adv J Myburgh”.

It should be noted that the SARB (2002a:26) described the sharp depreciation of the rand as “a severe supply-side shock”, which, in addition to the increasing inflation, would also serve to ‘contain’ the growth in aggregate domestic demand and ultimately, contain “domestically generated inflation”. However, it goes further to imply that this process leading up to a decline in the inflation rate is not automatic. The inflation rate needs to be managed in order to attain the desired stable inflationary outcomes and avoid a sustained and ingrained inflation escalation. Presumably, this means that the SARB should employ monetary tools at its disposal to manage the inflation rate and at the time, this tool was primarily adjusting the interest rate within an IT framework. The reserve bank did in fact utilise this tool when it raised the interest in January of 2002.

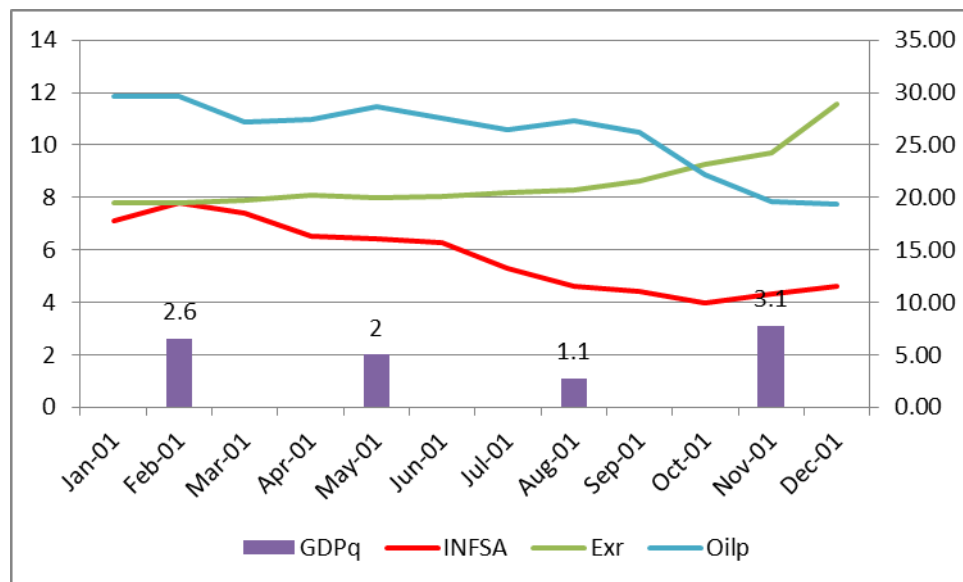
Lastly, the (SARB. 2001b:20) asserted that the decline in the inflation rate was also significantly influenced by “declines in mortgage bond rates following reductions in the Reserve Bank’s repurchase rate in June and September”. It should however be noted that this assertion with regard to mortgage bond rates is based on the headline inflation definition prior to 2009. As explained in section 2.1c, the headline inflation index included the “interest cost incurred on the mortgage” which was later excluded from January 2009. However, despite this exclusion, the reduction in the inflation rate could, to a certain extent, be explained by a reduction in debt costs as a result of the reduction in the interest rates. Using the year-on-year rate of change for October 2001, the SARB (2001b:21) states that omitting home mortgage interest cost from the inflation calculation will increase the inflation rate for consumer services by 3 times as much as when mortgage interest cost are included. This possibly highlights the profound effect that an interest rate decrease would have on decreasing inflation. The interest rate for 2001 was reduced from 12% in May to 11% in June and 9.5% in September.

6.2.2 The 2001 Graphic Narrative

In the graph below, it is shown that inflation rate generally trended with the price of oil up until October, when both the price of oil and the exchange rate exhibited sharp changes. From

November, the inflation rate started to trend with the exchange rate, which suggests that sharp changes in the exchange rate have a more profound impact on the behaviour of the inflation rate than sharp changes in the price of oil.

Figure 4: 2001 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

It is also observed that changes in the inflation rate coincided with changes in the GDP growth rates. Whereas this assertion was speculative in 2000, it is more substantive and observable in 2001. During the first three quarters, when GDP growth rates were declining, the inflation rates peaked at 7.8%, 6.5%, and 5.3% in the first, second and third quarter respectively. During the fourth quarter, when the inflation rate returned to a positive trend, the GDP growth rate also increased from 1.1% in the third quarter to 3.1% in the fourth quarter. Once again, if this relationship between GDP changes and inflation rates does exist, once again, it is necessary to look at GDP.

The SARB (2002a:1) states that, whereas the South African economy “held up well in the face of the global slowdown” in the first half of 2001, the second half was highly influenced by international factors. As an example, the 1.1% GDP growth trough in the third quarter was as a result of export volumes bearing the “full brunt of the weakening international economic conditions”.

The South African economy in general, was however characterised by weak growth, the same weak growth experienced by the world economy. Generally growing at a rate of below 3%, this weak growth was made worse by the attacks on the World Trade Centre during the third

quarter. The attacks pushed the US “economy into a recession”, dragging “other economies into its slump” and reducing the combined output of the Organisation for Economic Cooperation and Development member states (SARB. 2002a:1). These combined conditions prompted an expansionary fiscal policy and the easing of monetary policy. The resulting reduction in interest rates led to “relatively strong growth in demand” in the fourth quarter (SARB. 2002a:1)

Annual GDP growth rate data³ extracted from the World Bank database shows that the world growth rate more than halved from 4.3% in 2000 to 2% in 2001 (World Bank. 2016). The South African economy also followed the same downward trajectory, significantly decreasing from 4.2% in 2000 to 2.7% in 2001.

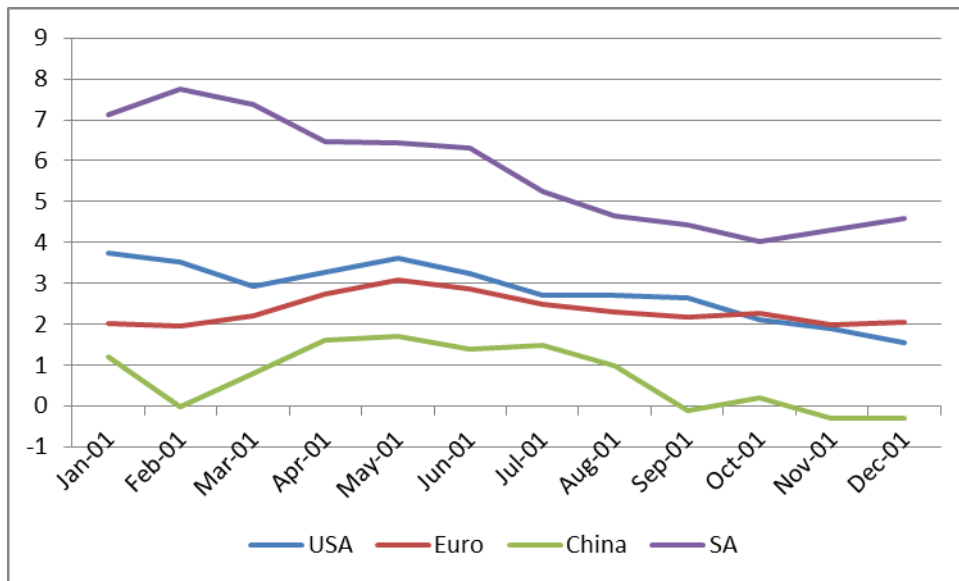
6.2.3 The Reference Areas

The figure below confirms the SARB’s assertion that domestic inflation rates were heavily influenced by external inflationary pressures. The domestic inflation rate generally trended downwards with the inflation rates of the reference countries. However, once again, South Africa’s inflation rate was substantially higher than that of the reference areas and once again, despite the interest rate being lowered in June and September, South Africa’s interest rate was still considerably higher than that of the reference countries.

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³ “Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources”.

Figure 5: Inflation Rates - 2001

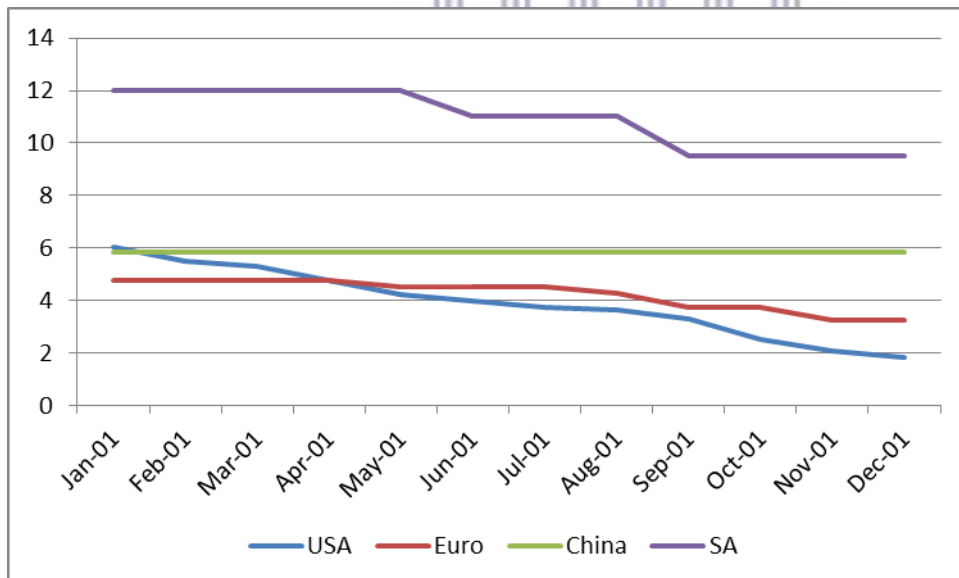


Source: IMF, 2016

6.2.4 The 2001 Interest Rates



Figure 6: Interest Rate - 2001



Source: IMF, 2017b

As shown by the graph above, the downward trend of the South African interest rates followed that of the inflation rate, which suggests that the SARB reduced these rates in response to the inflation rate. It is also observed that the interest rates for US and Euro area

trended downwards, which could also suggest that external interest rates factored significantly into the SARB's decision to lower inflation rates.

It is interesting to note that China's inflation rate experienced volatile movements independent of the interest rates which remained unchanged in 2000 and 2001.

6.2.5 Preliminary Analysis for 2001

The factors that were cited as the primary reasons for the behaviour of the inflation rate were transport costs, inflation rates from trading partner countries, the exchange rate and the food price. In the case of transport cost, the SARB stated that the price of oil played a role, but did not specify how prominent this role was. However, as shown by the graph above, the inflation rate seemingly trended quite significantly with the price of oil for most of the year. The graph also shows that there does seem to be a noticeable relationship between the GDP growth rate and the inflation rate, but since the SARB did not mention this relationship, it is once again, mere speculation. Where food played a mentionable role, it was the case that it was primarily influenced by the exchange rate, the behaviour of which could not be explained.

It is also demonstrated that the SARB adjusted its interest rates in response to a change in the bond yield and very likely, the inflation rate. Even in the case where this interest adjustment was in response to the inflation rate, the SARB were always mindful of the impact such a change would have on the bond yield. Furthermore, where the change was in response to the bond yield, the bond yield in fact responded to the change in the exchange rate, and the effort to bolster the yield was in fact, an attempt to influence the exchange rate. This suggests that the interest rate were in actual fact, primarily a response to a change in the exchange rate, since the exchange has thus far, played a fundamental part in the narrative.

The SARB (2001b:40) did not elaborate on why it reduced the interest rates in 2001, other than asserting that "the risk of missing the inflation target in 2002 was small". As noted above, it could be a case of the interest rates responding to changes in the inflation rate, which implies that, in this case, causality runs from the inflation rate to the interest rate. Where there might be a case for suggesting that causality runs from the interest rate to the

inflation rate, the relationship may be distinctly positive, as opposed to the negative relationship, as envisaged by the IT framework. As shown by the pre-2009 headline definition example above, a decrease in the interest rate could decrease the inflation rate and an increase could increase the inflation rate. It generally comes down to how pervasive interest rate costs are in determining consumer prices.

It might have also been in response to the bull market that emerged from April to August, although it should be noted that the SARB does not state this explicitly. At this point, a direct link between interest rate changes and the yields during this period can only be speculated on. The interest rates did however trend downward with the interest rates of the US and Euro area. The SARB seemingly maintained a significant spread which suggests that it considered the impact on bond yields.

What stands out about 2001 is that there seems to be very little application of the IT framework in applying interest rate adjustments. Where these adjustments are seemingly in response to the inflation rate, the adjustments are more contemporaneous rather than forward looking. It is also interesting to note that the possibility of currency manipulation presents the opportunity of studying the exchange rate in a theoretical test isolation environment. If the currency was being manipulated, then, within this theoretical isolated environment, its fourth quarter depreciation suggests that it has a more profound shock impact than, for example, the price of oil.



6.3 2002

6.3.1 The 2002 Narrative According to SARB

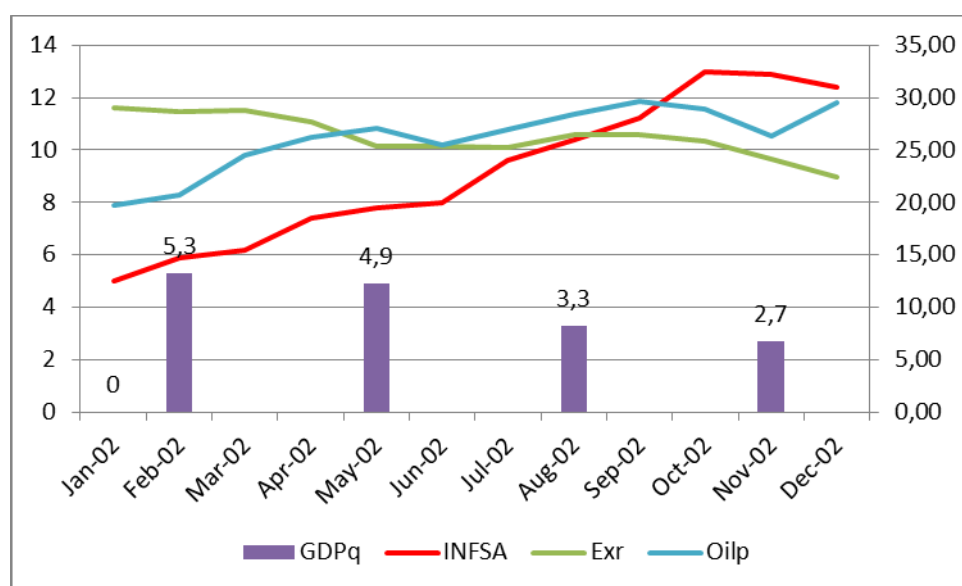
During the 2002 period, the inflation rate accelerated from 5% in January to a peak of 13% in October, and settled at 12.4% in December. The SARB (2003a:2) states that the higher inflation rates were “largely as a result” of the sharp depreciation of the rand in the closing months of 2001 and the “steep increases in food and fuel prices”. Imported inflation ‘substantially inflated’ the domestic inflation rate but “petered out” in the “months following April 2002” due a “recovery of the exchange rate” (SARB. 2003a:25).

The SARB stated that the improvement in the “rand coincided with surpluses on the current and financial accounts” (SARB. 2003a:36). They also attributed the improvement to “sound

macroeconomic policies”, higher interest rates relative to other economies, an improved credit outlook and “a general reduction in risk aversion towards emerging-market asset classes” (SARB. 2003a:37).

6.3.2 The 2002 Graphic Narrative

Figure 7: 2002 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

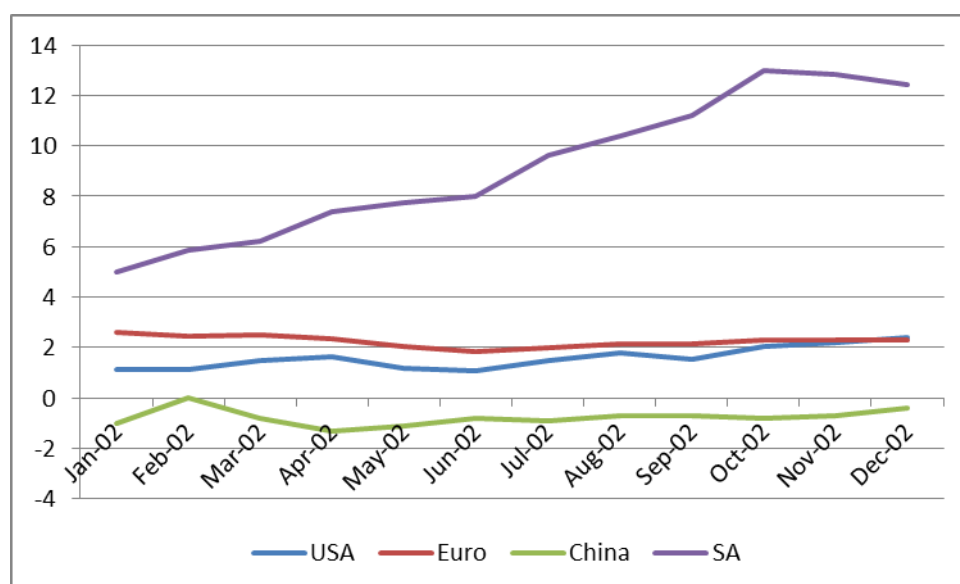
As shown by the graph above, while the rand/dollar exchange rate decelerated from R11.61 in January to R9.65 in December, the oil price trended upwards from \$19.71 a barrel in January to \$29.46 in December. The SARB (2003a:1) suggests that the appreciating exchange rate curtailed the inflation rate from accelerating any further by reducing the “cost of imported intermediate and final goods”. It is also observed that an accelerated dip in the exchange rate from R10.60/\$ in September to R8.96/\$ in December, possibly contributed significantly to the changing trend in the inflation rate from increasing to decreasing.

The graph also suggests that, whereas the relationship between the GDP growth rate and the inflation rate was tentatively observed in 2000 and 2001, in 2002, no such relationship was evident. However, compared to the last two years, the growth rates were substantial in the first two quarters, suggesting that a growth rate above a certain level may correlate with an acceleration in the inflation rate. For example, where the growth rates were above 4% (in 2000, 2001 and 2002), the increase in the inflation rate seemingly accelerated. Once again,

the validity of this statement can only be speculated on and is only meant to stimulate the formulation of possible questions and answers. Another observed behaviour is that, if the GDP growth rate falls below 3%, the inflation rate seemingly experienced a sharp downward trend. This was the case for the first 3 quarters of 2001 and the last quarter of 2002. In addition, during the last quarter of 2001, when the GDP started to grow at a rate of above 3%, the inflation rate reversed its downward trend. Although it should once again be noted that this is merely a hypothesis, going forward, it may add some weight to the suggestion in section 5.1a, that the hypothesized threshold of 3% is valid.

6.3.3 The Reference Areas

Figure 8: 2002 Inflation Rates



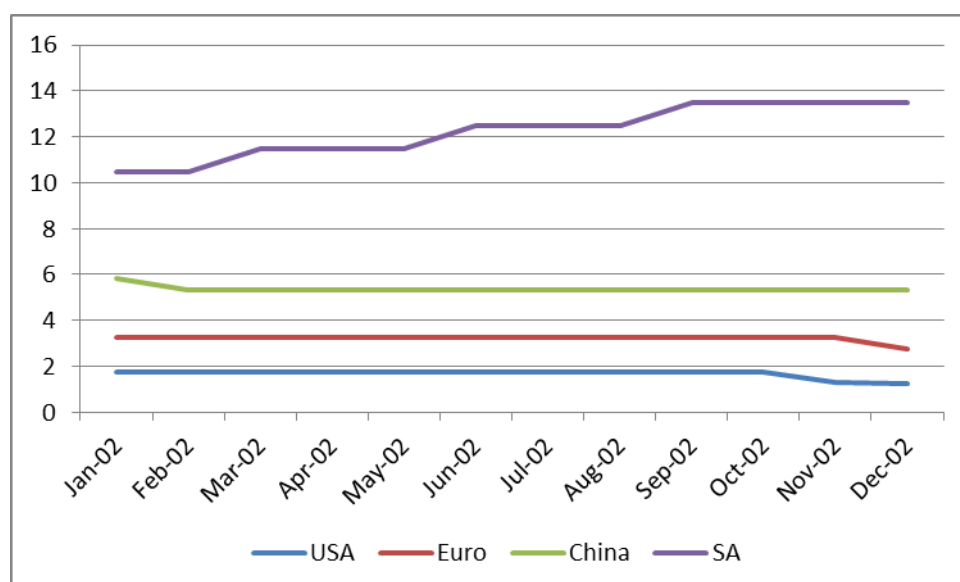
Source: IMF, 2016

At first glance in the graph above, there does not seem to be any significant relationship with the inflation rates of South Africa and the reference countries. However, like in South Africa, inflation rates for the US and China more than doubled (although China experienced deflation). It is only the Euro area's inflation rate that fell from 2.6% in January to 2.3% in December. What does stand out is that once again, South Africa's inflation rate is substantially higher than that of the reference areas. In addition, as shown in the graph below, South Africa's interest rate is again substantially higher and trends upwards with the inflation rate. There is relatively very little change in the interest rates of the reference areas as is the case with their inflation rates.

6.3.4 The 2002 Interest Rates

It should be noted that at the end of March, the month in which the first interest increase occurred, a bull market in bonds emerged which drove “long-term bond yields to their lowest level since 1980” (SARB. 2003a:3). This was followed by an acceleration in the appreciation of the exchange rate, from R11.49/\$ in March to R11.08 in April and R10.15/\$ in May. This suggests that the increasing interest rates increased the demand for bonds which in turn increased currency inflows, the final outcome of which is the appreciation of the rand. As suggested by the SARB, the rand appreciation would have curtailed the acceleration of the inflation rate increases.

Figure 9: Interest Rates - 2001



Source: IMF. 2017b

6.3.5 Preliminary Analysis for 2002

The SARB stated that the higher inflation rates were as a result of the exchange rate, food prices and oil prices. These variables were mostly determined externally, except for the sharp depreciation of the exchange rate which could not be explained. Where domestic conditions do play a role in influencing the inflation rate, it is based on perceptions of a sound macroeconomic environment and the impact of these perceptions is transmitted through the exchange rate. It is thus implied that it is the exchange rate that plays a pivotal role in transmitting the domestic environment to the inflation rate. This further implies that the

interest rate is only useful in transmitting the impact of output to the domestic inflation rate through the exchange rate.

It was also observed that there might be some validity in suggesting that a GDP growth rate of 3% could be used as a threshold in determining the direction of the trend that the inflation rate might follow. Lastly, once again there seems to be a more contemporaneous and positive relationship between inflation rates and interest rates. What is notable about the relationship between the inflation and interest rates is what the SARB said in 2001. The SARB stated with a fair amount of certainty that “the risk of missing the inflation target in 2002 was small”. Presumably, this assumption would have been produced within a statistical model that uses IT as its primary framework. If this is the case, using this framework may produce approximations that are patently false and unable to forecast within any reasonable margin of error, the most probable outcome.

6.4 2003

6.4.1 The 2003 Narrative According to SARB

The 2003 inflation rate, which began to decelerate in the 4th quarter of 2002, peaked in January at 11.6% and troughed in December at a “historically low” 0.3% (SARB. 2004a:14). The SARB attributed this considerable fall in the inflation rate to “the substantial appreciation” of the rand that started in the second half of 2002. The appreciating rand and its base effects decreased imported inflation by 4.2% for 2003 after increasing by 15,5% in 2002.

The SARB (2004a:27) stated that the “factors that probably contributed “ to the rand strength included dollar weakness, the ratings agencies upgrading of South Africa’s sovereign debt, the high interest rates relative to foreign rates, prudent fiscal and monetary policy, and the closing out of the net open foreign-currency position(OFCP).

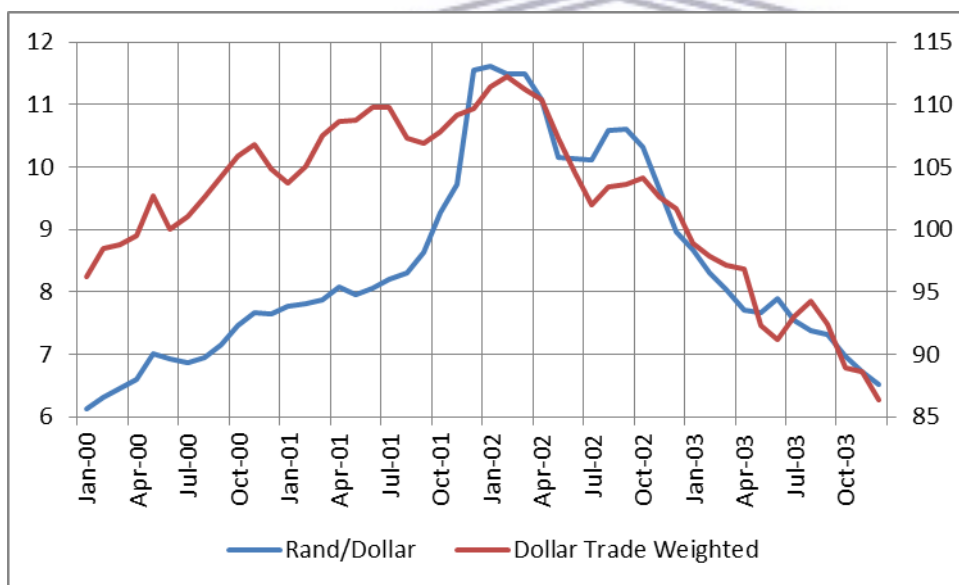
In an effort to better understand the exchange rate contribution, the graph below illustrates the relationship between the rand and the dollar from first month of 2000 to the last month of 2003. The left axis shows the rand/dollar exchange rate and the right axis shows “a weighted



average of the foreign exchange value of the U.S. dollar against a subset of the broad index currencies' (Fed. 2005). The index (March 1973=100) include the “euro, Canadian dollar, Japanese yen, British pound, Swiss franc, Australian dollar, and Swedish krona”.

As can be observed by the graph below, not only is it demonstrated that, during the 2003 period, there is a clear correlation between these two currency variables, but also during the previous periods. The only odd behavioural event happened during the fourth quarter of 2001, which was noted above as an event which cannot be explained. It was also noted that the event might have been sparked by currency manipulation. As was suggested, causality most likely runs from the dollar to the rand, hence it can be concluded that the behaviour of the rand is more likely a function of the behaviour of the dollar than a function of other factors.

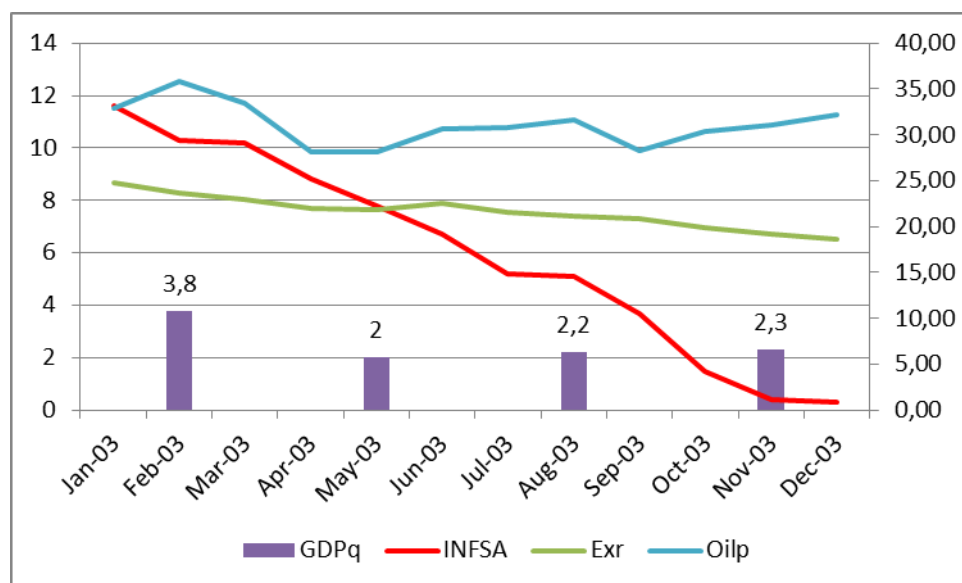
Figure 10: Relationship Between the Rand and Dollar



Source 1: Fred. 2017

6.4.2 The 2003 Graphic Narrative

Figure 11: 2003 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

As shown by the graph above and below, the considerable fall in the inflation rate was accompanied by a 550 basis point reduction in the interest rates, an appreciating exchange rate and an oil price that generally fluctuated between \$30 and \$35 a barrel. It is also observed that the GDP growth rate increased from 2.7% in December 2002 to 3.8% in January 2003, before once again declining to below 3% for the next three quarters. It is once again interesting to note that when the GDP growth rate fell below 3%, the decrease in the interest rate accelerated.

Focusing on the GDP growth rate, no clear correlation with the inflation rate is observed other than both variables generally trending downwards. It is also noted that the inflation rate trended downward, in a year where, for most of the year, GDP grew a rate of below 3%. This downward inflationary trend was also observed in the previous years where the GDP grew at below 3%.

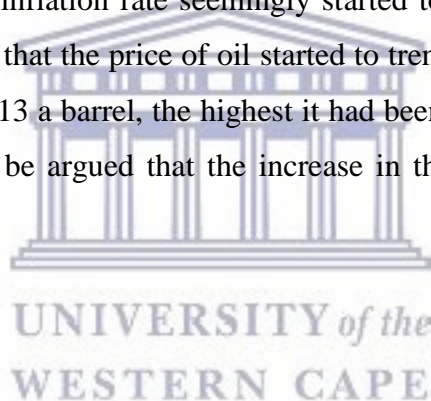
The weak domestic GDP growth rate was in contrast to the world economy, which grew from 2.2% in 2002 to 2.9% in 2003, as opposed to South Africa, which fell from 3.7% to 2.9% (World Bank. 2016).

The SARB (2004a:1) states that the reason for low growth in South Africa were partly as a result of a “time delay” experienced by the domestic economy before the gains of the

international starts spilling over into the domestic export market. It does not specify the details of this time delay. Other factors include the stagnant growth rate in the EU and the significant appreciation in the exchange rate. More notably, a deficit in the current account emerged as import volumes grew and “export volumes remained essentially unchanged” (SARB. 2004a:2). As a result of the appreciation, the “rand prices of all exported goods declined by about 12 per cent” despite the volume of goods exported being 1% higher (SARB. 2004a:20). Overall domestic expenditure grew by 4%, as opposed to the previous years, 4.5% (SARB. 2004a).

The higher world growth rate was as a result of strong growth in the US, China and India; expansionary monetary and fiscal policies; strong revenues “befalling oil-exporting countries” and, “more generally, the relatively high prices received by commodity exporters” (SARB. 2004a:1).

The graph does note that the inflation rate seemingly started to moderate at the start of the fourth quarter. It is also noted that the price of oil started to trend upwards in October and by December it had reached \$32.13 a barrel, the highest it had been since the start of the second quarter. As a result, it might be argued that the increase in the price of oil moderated the decrease in the inflation rate.

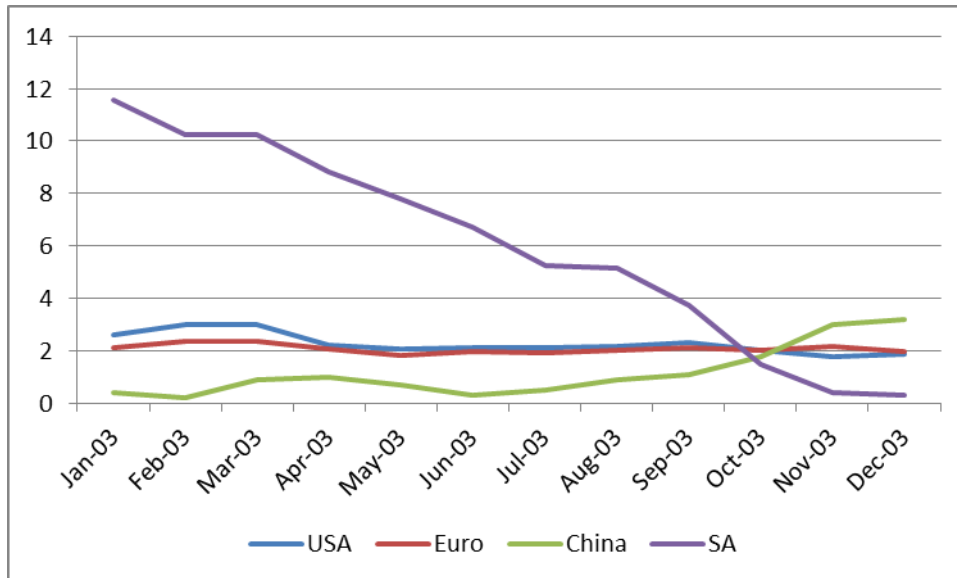


6.4.3 The Reference Areas

The SARB (2004a:1) states that international inflationary pressures were relatively low and this is demonstrated by the graph below. What the graph does into convey clearly is that the US and Euro area saw a general decline in its inflation rates. From January to December, the US inflation rates generally declined from 2.6% in January to 1.9% in December, and the Euro declined from 2.1% to 2%. China however saw a significant increase from 0.4% in January to 3.2% in December. It is interesting to note that the South African inflation rate decline started to plateau in December at the same time that the Chinese inflation rate plateaued. Furthermore, it is observed that the Chinese and South African inflation rates exhibits an inverse relationship, which might seem counterintuitive, since it is assumed that China would import its higher inflation rates into South Africa. The acceleration in the Chinese inflation rates can also be described as an interesting event which could help to

explain the behaviour of South Africa's inflation rate; hence this event will be focused on briefly in chapter 6.4.5.

Figure 12: 2003 Inflation Rates

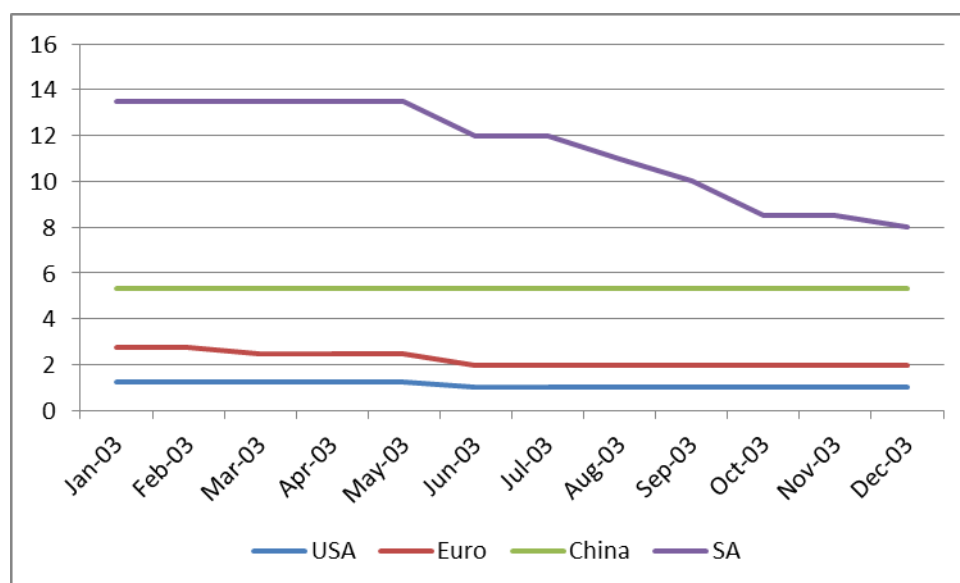


Source: IMF, 2016

6.4.4 The 2003 Interest Rates

For most of the year, South Africa's inflation rates were still significantly higher than the inflation rates of the reference countries. However, by October, the South African inflation rate was less than that of the reference countries. It was suggested that the higher interest rates were the cause of the higher inflation rates, but in October, the interest rates were still substantially higher at 8.5%. The interest rates of the US, Euro area and China were at 1%, 2% and 5.31% respectively. What was evident from the graph was that the interest rates followed the inflation rate downwards, once again suggesting a more contemporaneous relationship between the two variables with causality running from the inflation rates to the interest rates. The SARB (2004a:62) did not provide substantial detail on why it reduced the interest rates other than stating that they expected the inflation rate to remain within the target range.

Figure 13: 2003 Interest Rates



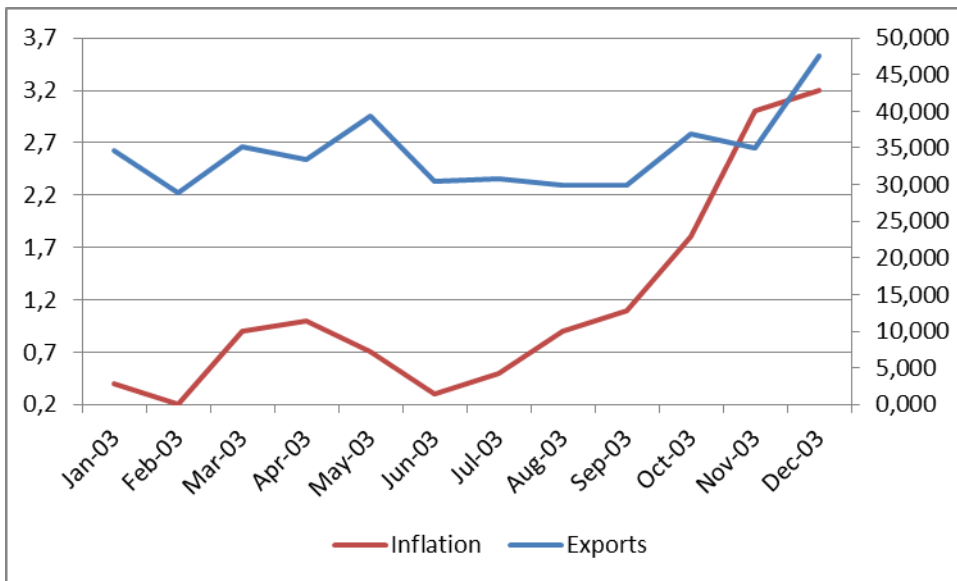
Source: IMF. 2017b

6.4.5 The relationship Between China's Inflation Rate and its Exports

Given the fact that China's economy is generally export driven (Guo & N'Diaye. 2009), intuitively it can be tentatively assumed that the export variable would be an important influence on China's output and hence, inflation rate. The export variable is also reported monthly which makes it a useful proxy for output. Extracting data from the Fred, the graph below illustrates this relationship. The Export variable is defined as the percentage growth for the same period in the previous year.

For 2003, Chinese exports growth generally fluctuated at between 30% and 35%, and generally correlated positively with the Chinese inflation rate. However, after 3 months of a constant growth rate, export growth began to accelerate from 29% in September, to 37% in October, peaking at 48% in December. With the exception of May of 2003, the October growth rate was the highest than the growth rates of the previous 38 months. Similarly, the inflation rate began to accelerate from 1.1% on September to 1.8% in October, peaking at 3.2% in December. Also similarly, the inflation rate of October was higher than the inflation rates of the last 44 months. However, it should be noted that the graph does not suggest causality. It does however suggest a strong correlation between in exports and inflation, and in effect, a strong correlation between output and inflation.

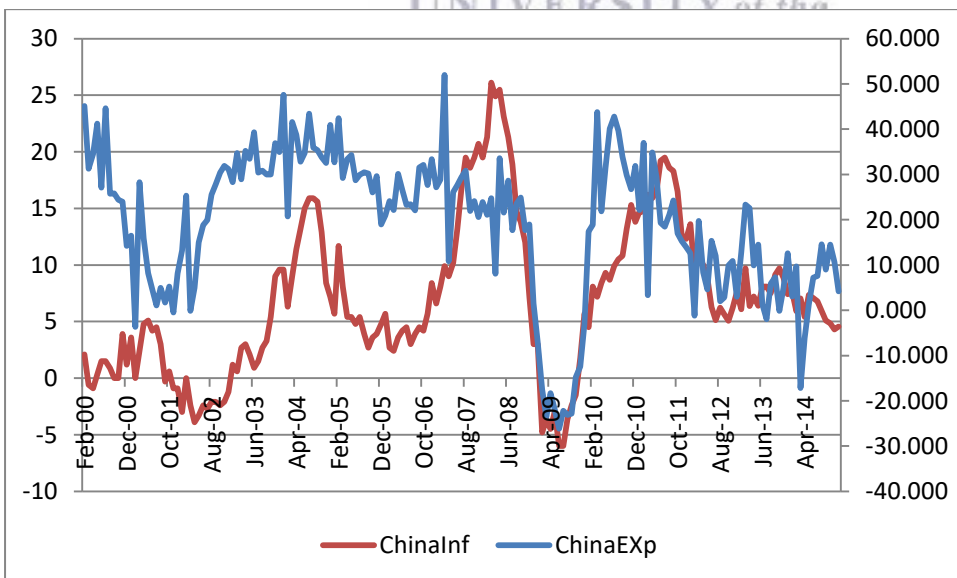
Figure 14: China's 2003 Export Growth Rate



Source 2: Fred

To confirm the validity of this relationship between China's export growth and inflation rates, the graph below illustrates this relationship during the entire research period. The inflation rates are shown on the left axis and the export growth rate on the right. It shows that the two variables generally trends in the same direction for most of the research period.

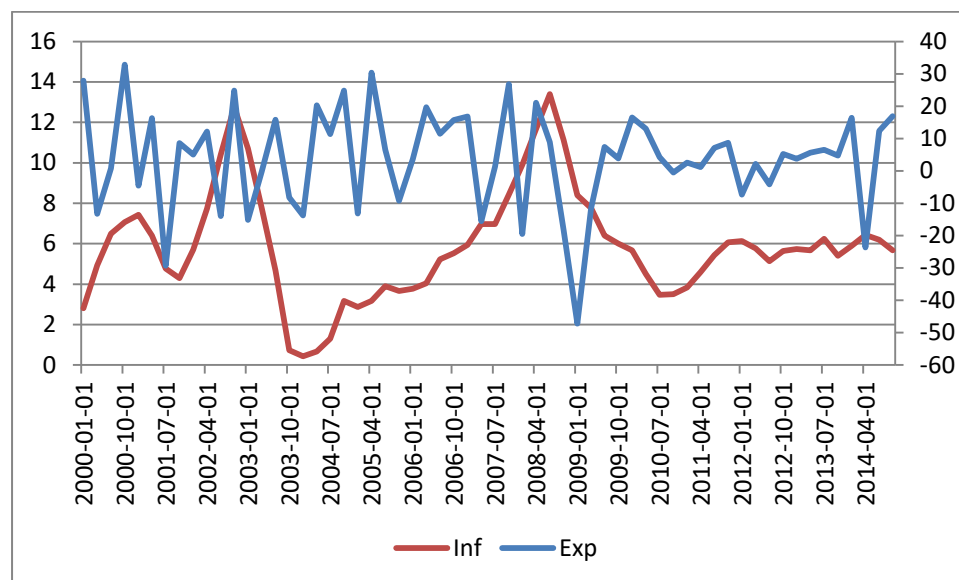
Figure 15: The Relationship between China's Inflation and Export Growth Rates



This could perhaps help to shed some more light in the South African inflation rate, and the graph below attempts to do that. The graph shows the relationship between South Africa's

inflation and exports growth rates. The inflation rates are presented as quarterly since the export data is quarterly. The graph however does very little to explain the inflationary behaviour because of the lack of correlation between the two variables.

Figure 16: Relationship Between South Africa's Inflation Rate and Export Growth Rate



Source 3: SARB. 2017

6.4.6 Preliminary Analysis for 2003

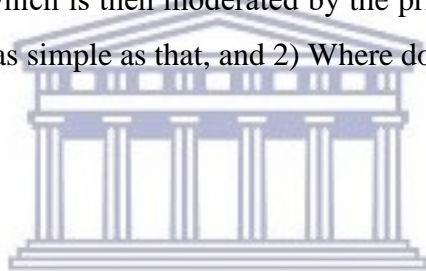
The SARB described the appreciation of the rand as “an important force in bringing down the inflation rate” (SARB. 2003a:2). However, it is important to note that the rand’s behaviour is seemingly more a function of an exogenous variable, the dollar, than it is influenced by domestic endogenous factors. Where there is some deviation away from a consistent relationship between these two currencies, it is noted that this deviation is during a period when currency manipulation was a very likely factor in encouraging this deviation. It might be surmised that it is possibly the case that any behaviour with a sudden deviation or inconsistency in the relationship between the rand and dollar, as elaborated on above, might point to the possibility of currency manipulation.

It was also once again suggested that there is a relationship between domestic output (an endogenous variable) and inflation, but only if the 3% threshold is factored in. Even if the ‘3% threshold’ hypothesis is rejected, domestic output was more a function of the exchange

rate which was likely more a function of the behaviour of the dollar. It is, for example, noted that exports volumes did not decline, but rather, the rand value of exports as a result of the depreciation rand. If we factor in interest rates, then it can once again be claimed that its impact is only transmitted to the GDP growth rate through the exchange rate. If that is the case, then it can be argued that monetary policy can only manage the inflation rate by using interest rates to influence the exchange rate.

Finally, the Chinese inflation rate's relationship with its exports was used as an attempt to shed more light on the behaviour of the inflation rate. Although it was established that there might be a very strong relationship between the two variables, it did not help in understanding the behaviour of South Africa's inflation rate. It may have been the case that the inflation rates behaviour was not as result of multiple complicated variables, but rather, the result of the dollar dictating the movement of the rand which dictates the behaviour of South Africa's inflation rate which is then moderated by the price of oil. Two questions then arises, namely, 1) Could it be as simple as that, and 2) Where does the interest rate fit in?

6.5 2004



6.5.1 The 2004 Narrative According to SARB

Although starting from a historically low base, the inflation rate for 2004 rose significantly from 0.2% in January to 3.4% in December. The SARB (2005a:16) stated however that the annual average inflation rate for 2004 was lower than the previous year and the lowest in 40 years. They assert that this was because of the “substantial appreciation” of the exchange rate, lower interest rates and “muted increases in food prices”.

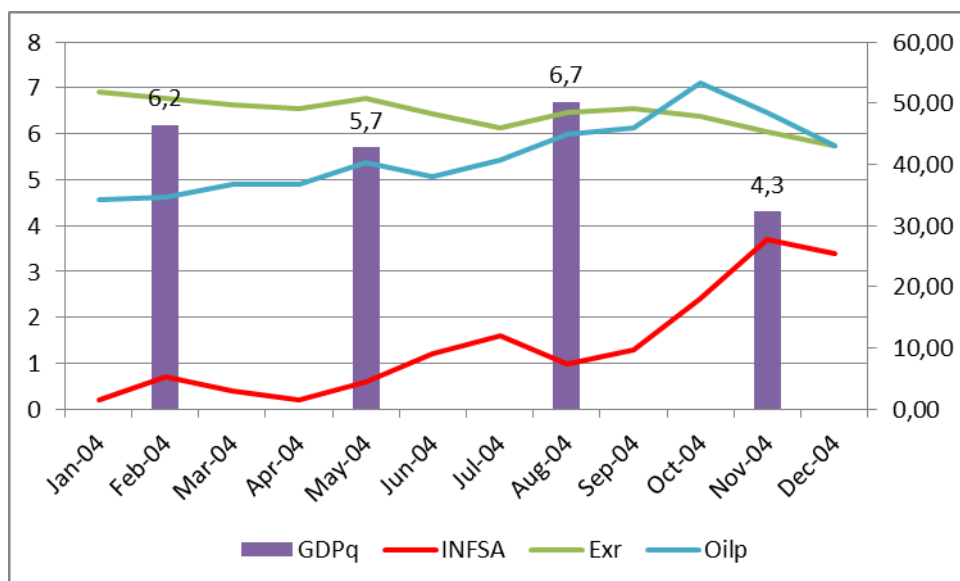
The “stronger exchange value of the rand continued to exert downward pressure” on the inflation rate but “moderated in the course of 2004 as international crude oil prices rose strongly”. The most substantial drop in the inflation rate came from energy prices and omitting these prices from the inflation rate calculation substantially diluted the drop in the inflation rate. The inflation rate had continued to remain within the target range for 17 consecutive months.

The inflation rate of “South Africa’s main trading-partner countries” moderated as a result of the price of oil and this was transmitted to the domestic economy through imported goods (SARB. 2005a:16). The “year-on-year rate of increase in the composite wholesale price index of South Africa’s main trading-partner countries accelerated steeply” from 0.9% in March 2004 to 4.2% in December.

6.5.2 The 2004 Graphic Narrative

The graph below generally confirms what the SARB stated. In addition to inflation rate increase, the price of oil escalated from \$34.31 a barrel in January to a peak of \$48.47 in November and the exchange rate appreciated from R6.92 to the dollar in January to R5.73 in December. The GDP growth rate was also considerably higher than previous periods, peaking at 6.7% in the third quarter and troughing at 4.3% in the fourth quarter. Global output growth, which reached record highs (with the international commodity prices recording “buoyant levels”), contributed to this growth through higher export revenue (SARB. 2005a:1). Internationally, the world growth rate escalated from 2,9% in 2003 to 4,5% in 2004, with the US and the EU following similar trajectories (World Bank. 2016). The South African economy followed a near identical growth path as the world economy from 2.9% in 2003 to 4.6% in 2004. There does not seem to a consistent relationship between the GDP growth rate and inflation.

Figure 17: 2004 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

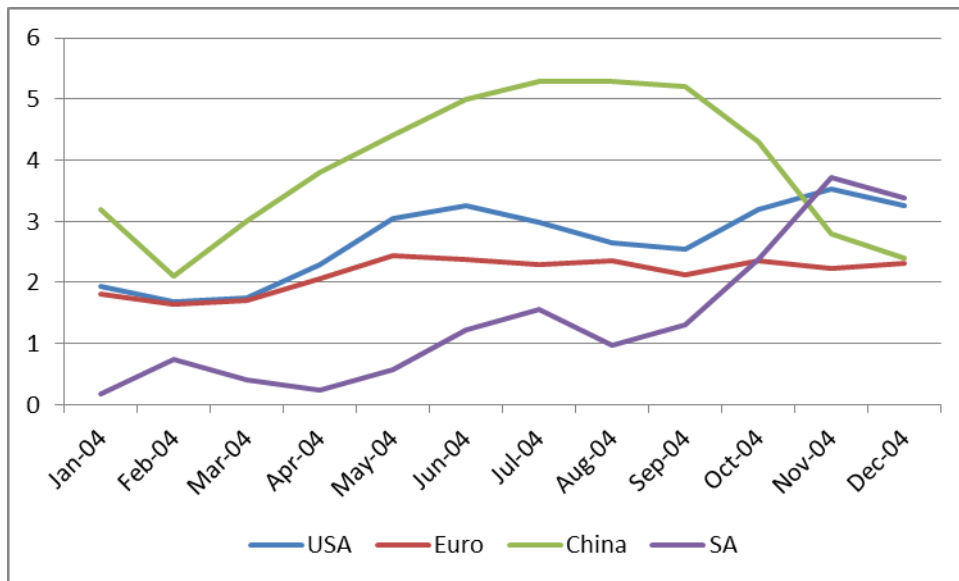
It is interesting to note that, while the inflation rate increased gradually from January (0.2%) to September (1.3%), it experienced a rapid surge in October (2.4%) and November (3.7%). It also perhaps interesting to note that despite higher growth rates, a depreciating rand, and a continuation of the increase in the price of oil, the inflation rate fell briefly but significantly in August from 1.6% in July to 1%. This August inflation rate decrease could perhaps be a lagged response to the appreciating trend in the exchange rate. It could also be argued the because of the August decrease, the inflation rate accelerated because it grew from a lower base.

6.5.3 The Reference Areas

As shown by the graph below, it is during the 2004 period that the South African inflation rate started to correlate more closely with the US inflation rate. Furthermore, as was the case in 2002 and 2003, the inflation rates of the US, Euro area, and South Africa, all followed the same trend. China once again followed a different trajectory, starting with 3.2% in January, peaking at 5.3% in July and August, and settling at 2.4% in December.

It was noted above that the inflation rate grew rapidly in October and November; and the SARB indicated that the inflation rates of South Africa's main trading partners also fed into the local economy. It is shown on the graph that the US' inflation rate experienced a downward trend from July to September, but that trend reversed when the inflation rate surged from 2.5% in September to 3.2% in October and 3.5% in November. This suggests that the inflation rate surge in the US had a significant impact on the domestic inflation rate during this time. South Africa's inflation rate drop in August could also have been a lagged and contemporaneous response to the downward inflationary trend in the US.

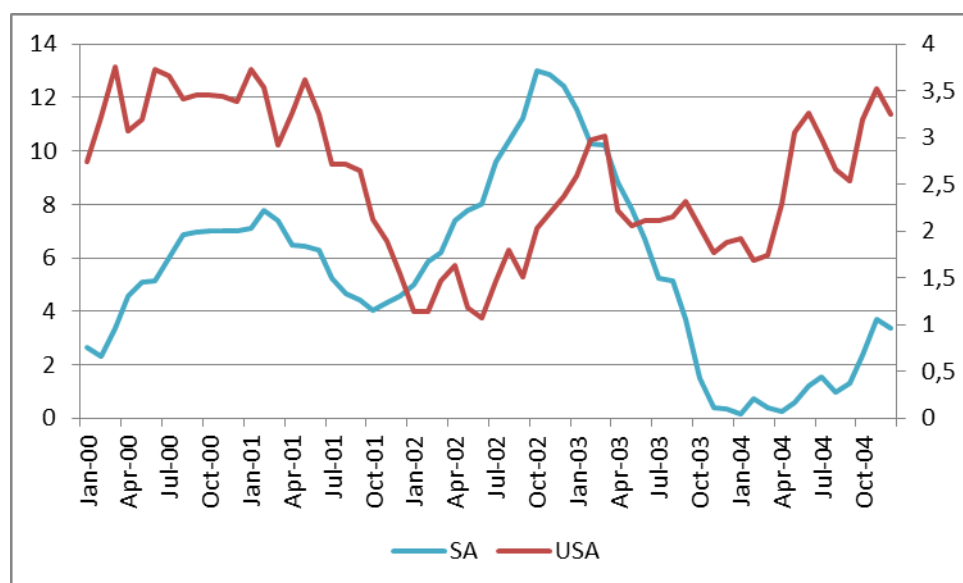
Figure 18: 2004 Inflation Rates



Source: IMF, 2016

It is observed that by November, the inflation rate in South Africa had caught up with the inflation rate of the US. A very speculative argument might be made that the two inflation rates may have shared a common trend, had it not been for non-market related interventions. For the purpose of academic curiosity, it can be further speculated that these non-market related interventions may include currency manipulation and interest rate adjustments. The graph below illustrates this academically curious speculative interest rate hypothesis by displaying the South African inflation rate on the left axis and the US inflation rate on the right axis. If it was to be the case that the inflation rates are naturally more inclined to trend with each other, then what the graph suggests is an academically imaginative scenario where a 'lagged response' South African inflation rate is constantly trying to catch up with the US inflation rate, but never quite getting there. This speculative hypothesis will be revisited later on in the thesis.

Figure 19: The Relationship Between South African and US Inflation Rates (2000-2004)



Source 4: IMF. 2016

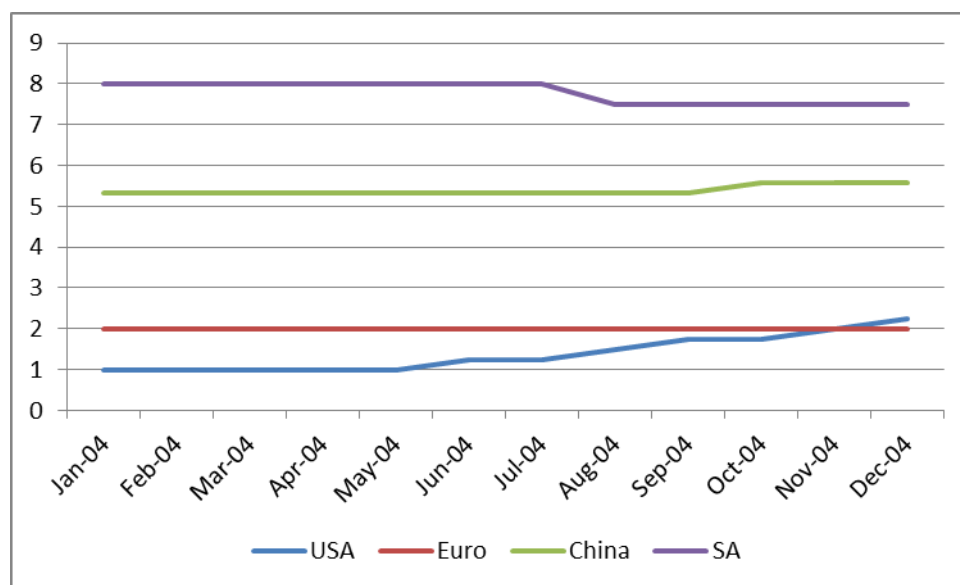
6.5.4 The 2004 Interest Rates

The graph below illustrates the interest rates, and shows that South Africa decreased its interest rates by 50 basis points in August and China increased its interest rates by 27 basis points in October. The US substantially increased its interest between June and December while the EU's interest rates remained at 2% for the year.

It is interesting to note that although the US inflation rate had moderated and started trending downwards in June, after the interest rate hike, the inflation rate once again accelerated in October. By November, it had climbed to 3.5%, its highest level since February 2001, when it was at 3.6%. Although this might assist in substantiating the argument that an increase in the interest rate only results in accelerating the inflation rate, it should be noted that by December, the inflation rate had decreased to 3.3%.

The South African interest rate decrease in August also coincided with the inflation rate decrease in the same month. If it can be argued that the interest decrease contemporaneously decreased the inflation rate, it has to also be noted that this relationship was short lived and the inflation rate once again accelerated in September. What this short-lived relationship does suggest however is that a decrease in the interest might have created a shock that pushed the inflation rate to a lower base from which to grow. Had the interest not been reduced, the inflation rate might have been higher in the following months.

Figure 20: 2004 Interest Rates



Source: IMF. 2017b

6.5.5 Preliminary Analysis for 2004

It is perhaps crucial to note that the inflation rate seemingly only managed to remain within the target range for nearly two years, because of the exchange rate which is seemingly primarily a function of the an externally determined variable, the US dollar. It is also interesting that the SARB states that low interest rates contributed towards a low inflation environment, a statement which contradicts the IT framework. There is also once again an interplay between the oil price and the exchange rate. It was suggested previously that the exchange has a more profound impact on the inflation rate than the oil price. However, in 2004, it could be argued that the oil price has a more profound impact if its change is significantly greater than that of the exchange rate. In this case, the oil price rose gradually throughout the year by 17% from January to December. During the same period, the price of oil rose by 41%. What the SARB suggests is that the exchange rate countered the inflationary impact of the oil price. In words, had the exchange rate not appreciated, the inflation rate would have been significantly higher. It is also noted that quite possibly, an acceleration in the US inflation rate plays a profound role in accelerating the inflation rate of the South African inflation rate.

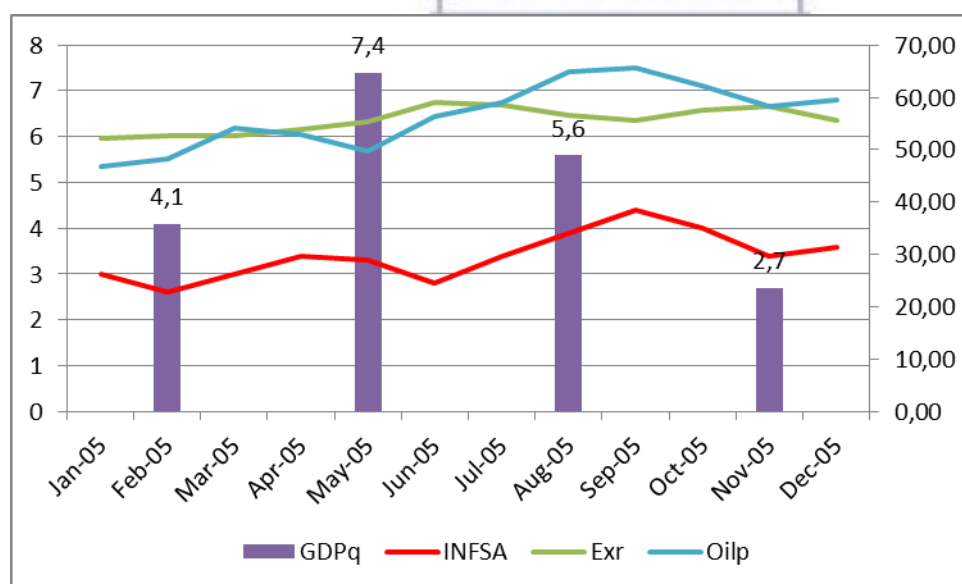
6.6 2005

6.6.1 The 2005 Narrative According to SARB

The inflation rate for 2005 remained within the target range, troughing at 2.6% in February and peaking at 4.4% in September. The SARB states that the inflation rate “accelerated significantly” due an increase in the “domestic petrol prices”. The petrol price increased by 60% “in the 21 months to October 2005”, in response to the “increase in the international price of crude oil”. In October, the price of oil (crude oil) started a downward trend which reduced the price of petrol by 9% and “decelerated” the inflation rate. The general appreciation of the exchange rate in the second half of 2005 “helped to keep a lid on consumer price inflation”.

6.6.2 The 2005 Graphic Narrative

Figure 21: 2005 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

As shown by the graph above, price of oil started at \$46.84 a barrel in January, accelerated to a peak of \$65.59 in September, before settling at \$59.41 in December. There is a fairly consistent relationship between the inflation rate and the price of oil. The exchange rate remained fairly low compared to previous periods, troughing at R5.97/\$ in January, peaking R6.75 in June, before settling at R6.36 in December. The GDP growth rate continued to remain comparatively high in the first three quarters, peaking at 7.4% in the second quarter

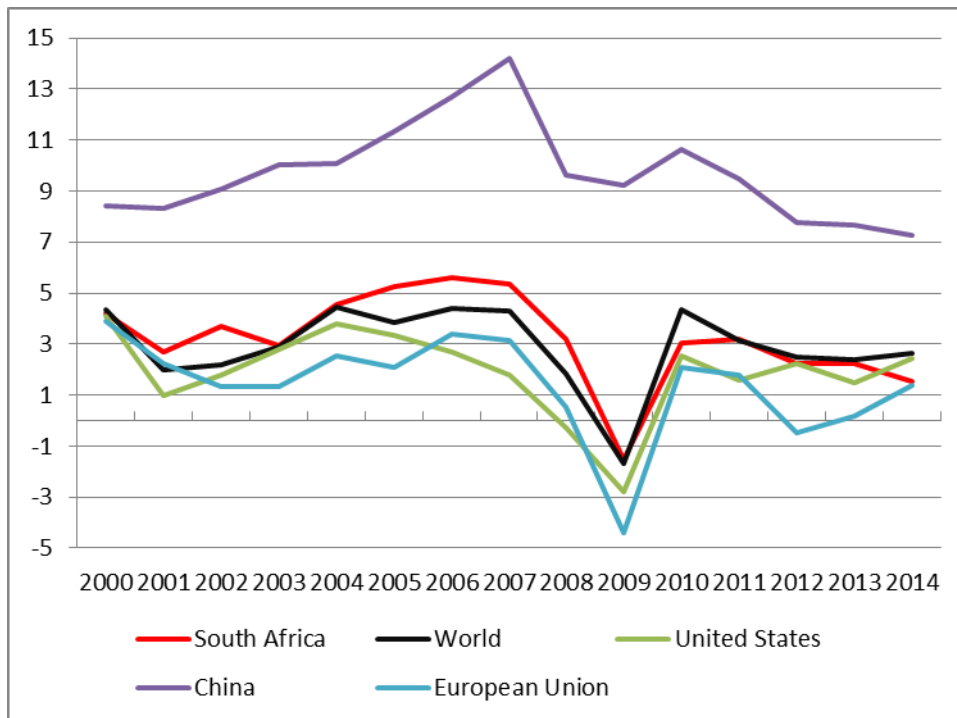
and troughing at 2.7% in the fourth quarter. What is of particular interest is the domestic GDP growth rate relative to the World GDP growth rate. This will be briefly discussed in the next section.

6.6.3 South Africa's GDP Growth Rate

The SARB (2005b:4) states that the “robust” GDP growth rate in the first half of 2005 could be attributed to a “strong increase in the real value added by the secondary sector” and “solid growth in the real output of the tertiary sector of the economy”. The slower growth in the second half “mainly reflected a decline in the real value added by the primary sector and slower growth in the real value added by the secondary sector” (SARB. 2006a:3). Supported by “rising income and the lowest nominal interest rate levels in 25 years”, growth in real household expenditure generally accelerated throughout the year, and increased to 7% in 2005 from 6.5% in 2004 (SARB. 2005b, SARB. 2006a). The annual real household expenditure growth rate, which was the highest “registered since 1981”, was primarily driven by an increase in the purchase of durable goods. However, despite the growth in real household income, rising debt financed a significant proportion of household consumption. To emphasize this point, the ratio of debt to disposable income rose from 58% in the fourth quarter of 2004 to a new record level of 65.5% in the fourth quarter of 2005 (SARB. 2006a:10). In addition, the ratio of debt service payments to disposable income rose to 7% “in the final quarter of 2005”.

As stated above, a curiosity was the World growth rate, which decelerated from 4.5% in 2004 to 3.8% in 2005 (World Bank. 2016). This deceleration did not have an impact on the annual growth of the domestic economy, which accelerated from 4.6% in 2004 to 5.3% in 2005. This was South Africa's “highest annual growth rate since 1984” (SARB. 2006a:1). Two of South Africa's main trading partners, the EU and the US, followed the same decelerating trajectory as the world growth rate. China however accelerated from 10.1% to 11.4%. The annual growth rates for South Africa, its main trading partners and the world over the entire research period are illustrated in the graph below.

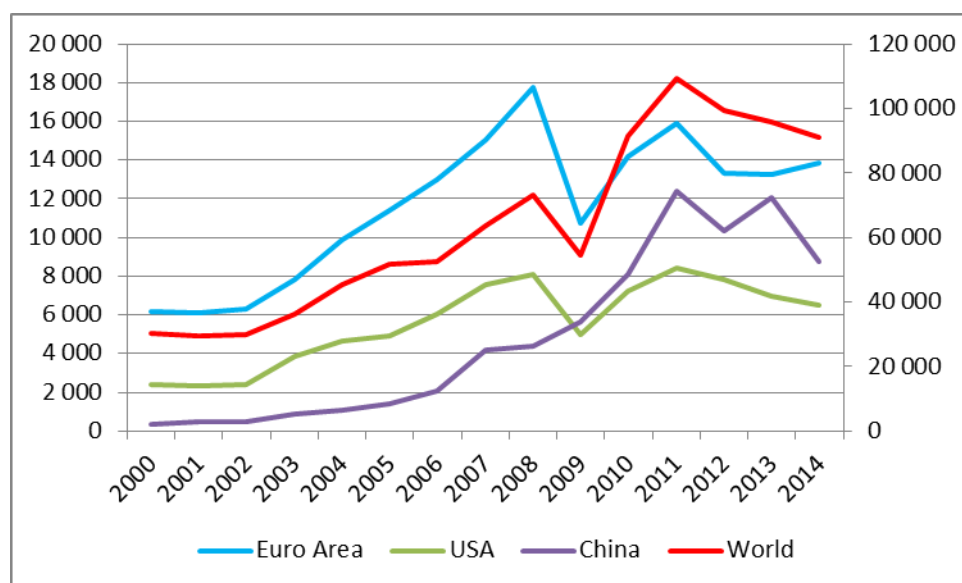
Figure 22: GDP Growth Rates: 2000-2014



Source 5: IMF. 2017a

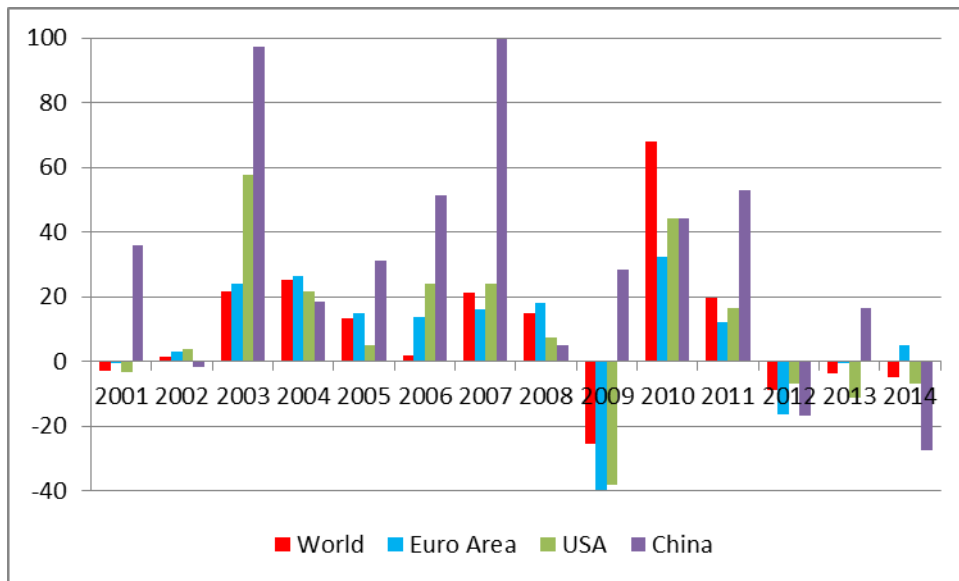
The graph shows that the South African growth rate generally trends with the rest of the world. However, the graph suggests that in 2005, instead of trending downwards with the rest of the world, it possibly trended upwards because of an acceleration in Chinese growth. Logically, if this is the case, then exports to China would have had to expand rapidly. To illustrate this point, a graph is generated using data extracted from the IMF. The graph shows the exports from South Africa to the world and its main trading partners. It is measured in millions of US dollars and the world growth rates are shown on the right vertical axis.

Figure 23: Export Growth Rates from South Africa to China, USA, Euro Area, World (2000-2014)



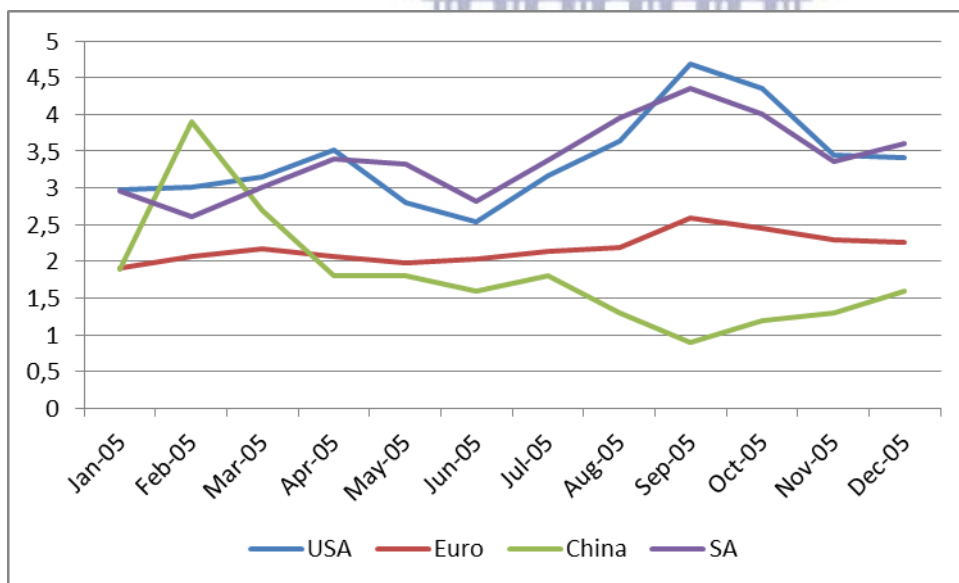
Source 6: IMF . 2017a

The graph shows that South African exports to China was initially significantly lower than that of the US and the Euro area, but gradually accelerated from 2003 to 2006. The exports to China eventually picked up speed in 2007, moderating in 2008 and surpassing the US in 2009. However, this graph only illustrates the overall contribution and does not provide any context in terms of whether it helped boost output in 2005. The graph below converts the export dollar unit growth to percentage growth. As shown in the graph, in 2005, exports to China, the Euro Area, the US and the world grew by 31%, 15%, 5% and 13% respectively. It is, at this stage, plausible that China contributed significantly to the boost in the high GDP growth rate. However, China only contributed 2% to South Africa's overall exports whereas the Euro area contributed 22% and the US 10%. Given these percentage contributions and the fact that there was a general increase in exports to the rest of the world, it is also plausible that the high GDP growth rate was given a significant boost by the exports to the world in general.



6.6.4 The Reference Areas

Figure 24: 2005 Inflation Rates

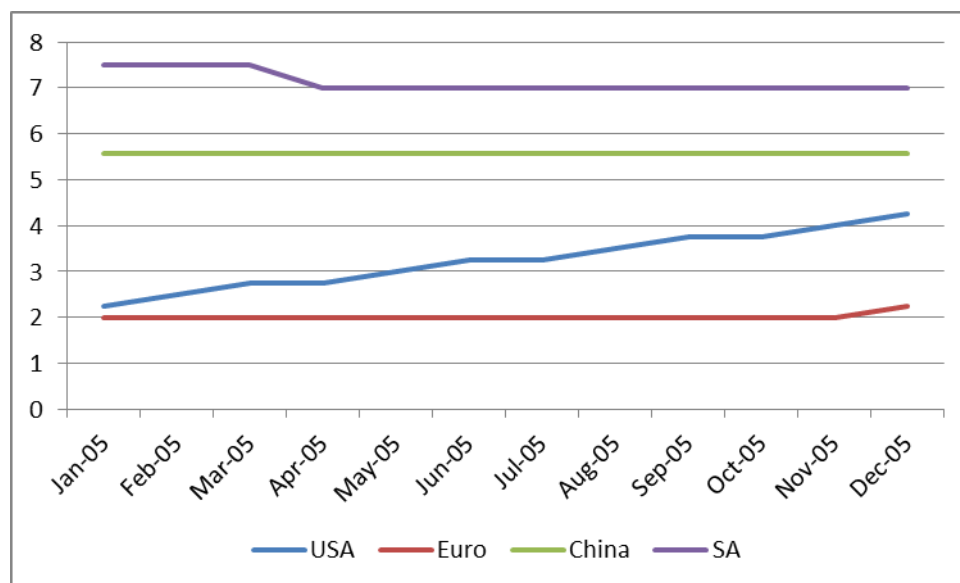


Source: IMF, 2016

For the 2005 period, it seems only pertinent to note 3 things. Firstly, the South African inflation rate was approximately equal to the US inflation, at times responding to the US inflation with a lag of one period. Secondly, although the Euro area inflation rate was generally flat, it generally correlated positively with both the South African and US inflation rates. Lastly, whereas the South African, US and Euro area inflation rates generally trended upwards, the Chinese inflation rate generally trended downwards. This trend once again correlates positively with China's export growth rate, as elaborated on in section 6.4e.

6.6.5 The 2005 Interest Rates

Figure 25: The 2005 Interest Rates



Source: IMF, 2017b

As illustrated by the graph above, on the 14th of April 2005, the MPC announced that it would reduce the repo rate by 50 basis due to the “evidence” that CPIX inflation would “remain comfortably within the target range of 3 to 6 per cent over the next two years” (SARB, 2005c:56). CPIX inflation did in fact remain within target range for 2 years before breaching the 6% upper limit in April 2007 (SARB, 2007a:17). Based on this fact, it can be argued that the IT framework from which these inflation expectations are derived produced a forecast with exceptional accuracy.

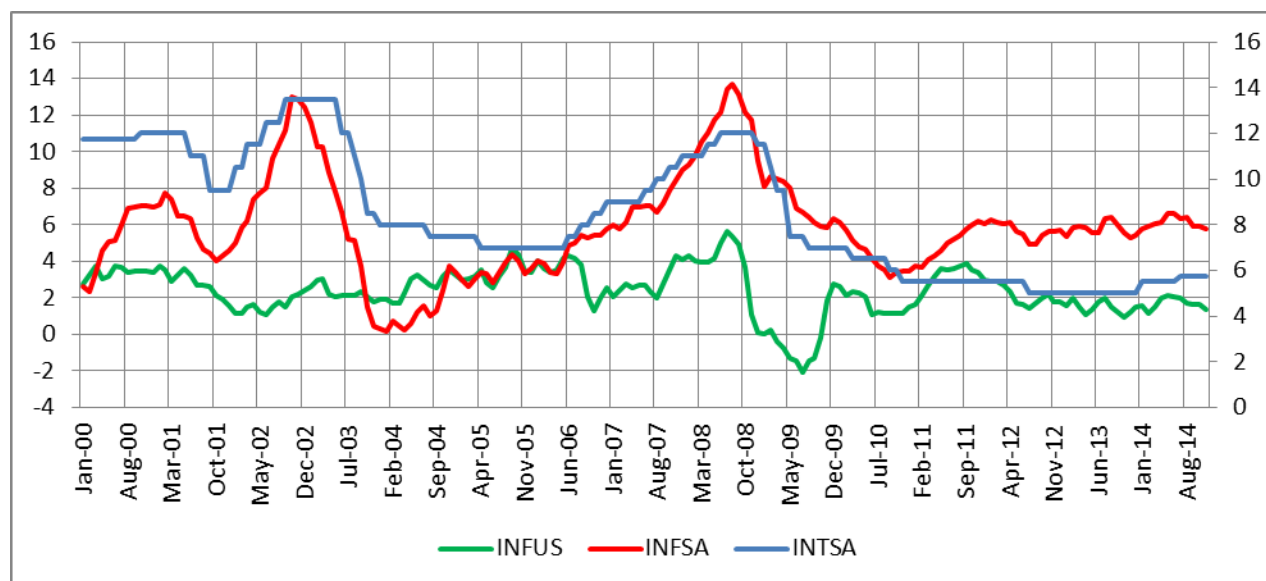
It also stated that the “CPIX inflation will begin to rise moderately over the coming months to peak at a level of around 5,25 per cent early next year before resuming a downward trajectory towards the mid-point of the inflation target range” (SARB, 2005c:54). These set of events did not happen as forecasted. According to the SARB (2007a:15), CPIX inflation troughed at 3.7% in April and “accelerated considerably during the middle quarters of 2006”, before settling at 5% “in each of the three closing months of 2006”. If it is once again assumed that the IT framework was used to derive the initial forecast, can it be concluded that the framework produces completely inaccurate forecasts? If it produces inaccurate forecasts, then it can also be assumed that the forecast that inflation would remain within the target over the next two years amounts to a ‘lucky guess’. It could however be the case that the IT

framework cannot produce reliable forecasts over the shorter term but can produce fairly accurate forecasts over the longer term.

It is also curious to note that the South African inflation rate generally correlated positively with the US inflation rate during a period when the interest rate was comparatively low and fairly constant. The graph below illustrates this relationship between the two inflation rates and includes the South African interest rates on the vertical right axis. It shows that the two inflation rates started correlating fairly closely and positively from February 2004 when the interest rates was at 8%. It had been reduced to 8% in December 2003 from 8.5% in November 2003. It was once again reduced to 7.5% in August 2004 and by November 2004, the two inflation rates were approximately equal to each other. In April 2005, the interest rate was reduced to 7% and this close relationship between the two inflation rates continued up until May 2006. On the 8th of June 2006, the SARB raised the interest rates by 50 basis points to 7.5% and the two inflation rates began to rapidly diverge away from each other. The US inflation rate dropped significantly and the South African inflation rate began a steep upward trend for the next two years with the interest rates following a similar steep upward trend.

The graph suggests that a similar positive correlation emerges from late 2010 up until the end of the research period. However, although the interest rates are fairly constant and much lower, there is a significant spread between the inflation rates. It was suggested that these differences could be explained by either interest rate adjustments or some form of currency manipulation. However, this will not be elaborated on in this section.

Figure 26: The US Inflation Rate, South African Inflation Rate and South African Interest Rate



6.6.6 The Preliminary Analysis for 2005

Once again, the SARB confirms the interplay between the price of oil and the exchange rate. The exchange rate accelerated inflation while the price of oil countered an increase in the acceleration. Output growth was seemingly supported by both domestic and international factors. The low interest rate environment helped grow domestic demand, but this also contributed to a growing debt problem. It was also posited that, despite the weaker international economy, exports from China helped boost local output. However, despite the significant increase in exports to China, it was probably the increase to the rest of the world that had a more profound impact on domestic output.

The accuracy of the IT framework in predicting inflation outcomes was also questioned, and it was suggested that the IT framework would not be able to forecast inflation rate outcomes over the short term. It may however be the case that the framework works over the longer term, most notably over a 24 month period.

Finally, it was also posited that with a relatively lower and fairly constant interest rate, and a market not characterised by manipulation, the South African inflation would simply correlate with the US inflation rate over the long term.

6.7 2006

6.7.1 The 2006 Narrative According to SARB

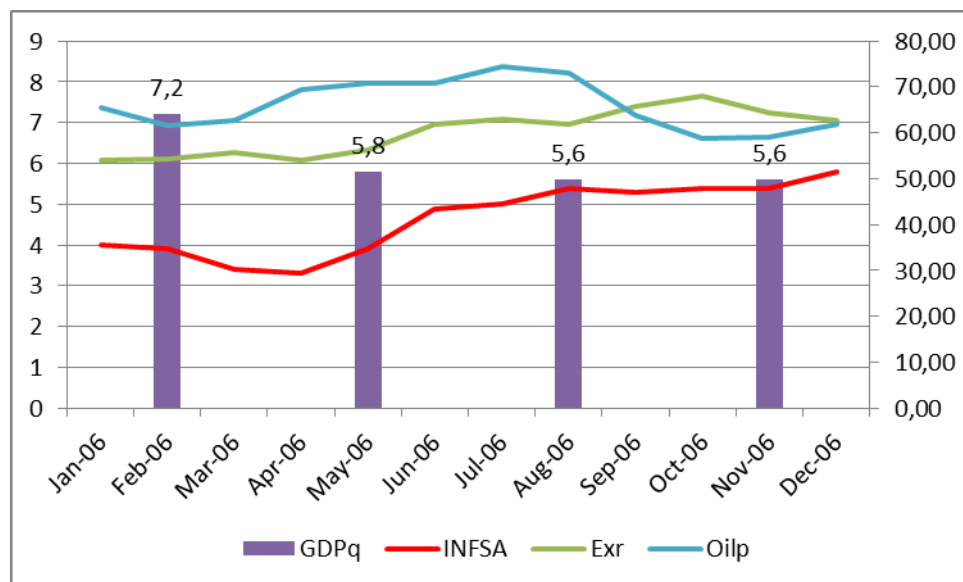
During the first few months of 2006, the inflation rate trended downwards, troughing at 3.3% in April. It escalated suddenly and rapidly to 3.9% in May and 4.9% in June. It moderated at approximately 5.4% from August to November, before once again accelerating rapidly in December to a peak of 5.8%. The SARB (2007a) states that contributors to “the inflation momentum” that started in May were the “significant depreciation” of the rand, accelerating food price inflation and “steep increases in the international price of crude oil up to August”. The inflation rate “decelerated meaningfully” after the “decline in international crude oil prices during the closing months of 2006” (SARB. 2007a:17). The SARB also states that “the curbing of inflation benefited from the action taken by the Monetary Policy Committee” (SARB. 2007a). However, as will be seen below, the inflation rate continued to escalate well into 2007.

The SARB indicates that the exchange rate in May 2006 came under pressure due to “heightened global risk aversion towards emerging-market countries” and reduction in the prices of some export commodities (SARB. 2006b:28). It came under further pressure in the third quarter due to the widening current account deficit. Although the rand value of exports had grown at a faster pace than that of imports, the deficit had widened primarily because of “larger net payments for services and income to non-residents”. These payments emanated from the “higher level of outstanding foreign debt and non-resident ownership of South African shares” as well external payments for services such as engineering (SARB. 2006b:25). It is especially pertinent to note that these payments were “buoyed by positive profit announcements”, suggesting that even a strong economy can negatively influence the exchange rate. During the 4th quarter, the exchange rate value increased by 7.7% which the SARB attributed to a weaker dollar, “strong global equity markets”, a higher gold price and the “widening of the interest rate differential”(SARB. 2006b:28).

In total, the “weighted average exchange value of the rand” declined by 15.4%, “the largest annual decline since 2001” (SARB. 2007:26). The decline for 2005 was 2%.

6.7.2 The 2006 Graphic Narrative

Figure 27: 2006 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

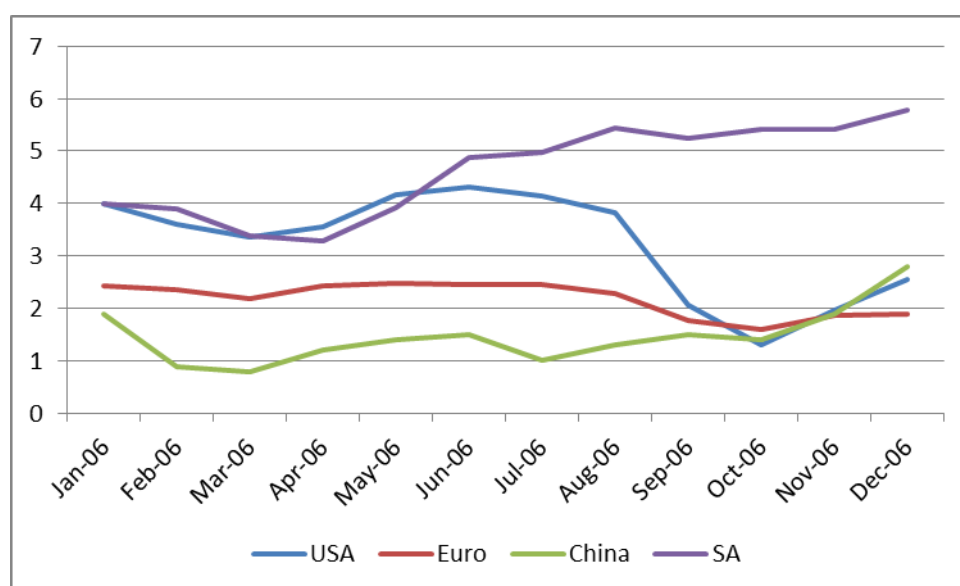
The graph does not provide any other insight other than what has been said by the SARB. The oil price started out with \$65.49 a barrel, peaking at \$74.41 in July and troughing at \$61.96 in December. The exchange rate escalated from R6.09 in January to a peak of R7.65 in October, and ended with R7.04 in December. It is however worth noting that there did not seem to any meaningful relationship between output and the inflation rate.

6.7.3 The 2006 Reference Areas

As shown by the graph below, the South African inflation rate generally correlated with the inflation rates of the reference areas up until June. By July, the inflation rates of US and the Euro area had begun a downward trend whereas South Africa's inflation rate continued to trend upwards. It may be useful to note that on the 8th of June, 2006, the MPC had announced that they would be increasing the interest to 7.5% from 7% in May. China's inflation rate generally moderated from May to October, but quickly accelerated from 1.4% in October to 1.9% November and a peak of 2.8% in December. Similarly, from October to November, the inflation rates of South Africa, the US and EU area also accelerated from 1.3% to 2.5%, 1.6% to 1.9% and 5.4% to 5.7% respectively. Given that the exchange rate had appreciated and the

price of oil was comparatively low, it could be argued that the acceleration in South Africa's inflation rate during December was as a result of the cumulative shock emanating from the rapid inflation rate increases for South Africa's main trading partners. The graph also hints at the possibility that, given its rapidly growing share of exports to South Africa, China's inflation rate had a disproportionate impact on the domestic inflation rate throughout the year. For example, the drop in the inflation rate of China in July might have moderated the inflation rate of South Africa in that same year. However, this is once again academic speculation and might be substantiated in later years.

Figure 28: 2006 Inflation Rates



Source: IMF, 2016

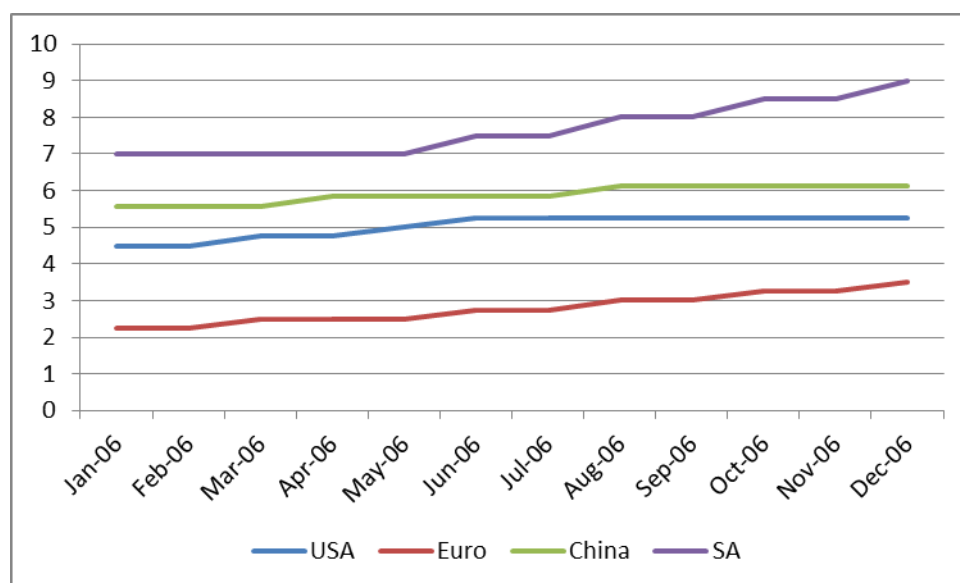
Whereas both the US and the Euro area experienced a comparatively significant decline in their inflation rates, China and South Africa experienced the complete opposite. It was only in November that the US, Euro Area and China starting to experience a significant escalation in their inflation rates. China's inflation rate had remained comparatively constant up until October. Its inflation rate started the year at 1.9% in January and was at 1.4% in October, before escalating to 2.8% in December. South Africa, which had a fairly stable inflation rate for 4 months prior, experienced a significant jump to 5.8% in December.

6.7.4 The 2006 Interest Rates

The SARB (2007b:1) pointed out that there was a general international trend towards the tightening of monetary policy which kept international inflation rates “subdued”. Similarly in South Africa, the MPC raised the rates by 50 basis points in June, August, October and December from a low of 7% to a high of 9% (SARB. 2007b:2). This was in response to the “increased inflation risks”. However, the SARB also stated that the response to the higher interest rates were ‘sluggish’, which “partly reflected the relatively low level of debt servicing costs, rising income and employment, high consumer and business confidence, and strong balance sheets”. In other words, despite the rising interest rates, this did not stop consumers from curbing their spending and the GDP growth rate was still relatively strong.

However, once again, it should be noted that not only was the rise in South Africa’s interest rate steeper, but it was also significantly higher. By the end of 2006, the interest rates for the US, EU area and China were 5.25, 3.5, and 6.12 respectively. For perspective, the South African interest rates in December were 42% higher than that of China. Whereas the South African interest rates were raised by a cumulative 200 basis points, the US, EU and China raised their interest rates by a cumulative 75, 125, and 54 basis points respectively. It would seem that it was only the inflation rates of the US and the EU area that responded accordingly to the increase in interest rates.

Figure 29: 2006 Interest Rates



Source: IMF. 2017b

6.7.5 Preliminary analysis for 2006

Throughout the narrative, there has always been a consistent story. The inflation rate generally responds to movements in the exchange rate and price of oil. However, of these two, the variable with the greatest change over a specific period of time has the most profound impact on the inflation rate.

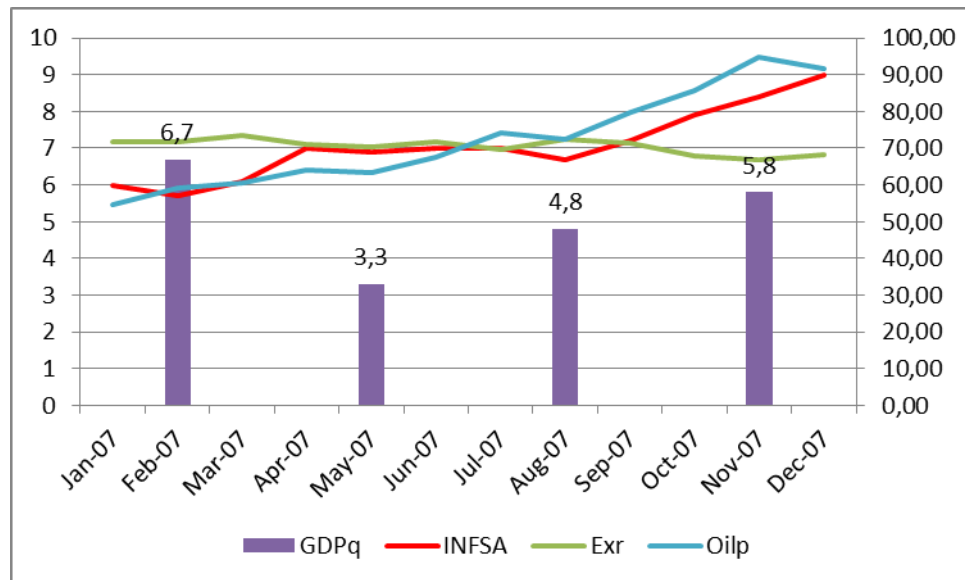
It is hard to see where the monetary policy played a meaningful role. Despite the higher interest rates, the inflation rate continued to escalate rapidly and there was no significant impact on output. Another element that emerges is that a significantly higher interest rate seems to contribute to the acceleration in the inflation rate. Furthermore, it once again appears as if the interest rates are following the inflation rates, instead of it being the other way around.

Lastly, as a matter of curiosity, It is interesting to note that higher profit margins within the domestic private sector may also contribute to weakening the rand through increased dividend payments.

6.8 2007

6.8.1 The Narrative According to SARB and the Graphic Narrative

Figure 30: 2007 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

It was noted in section 6.6a, that the MPC claimed that its actions had ‘curbed’ inflation. However, as shown by the graph above, the inflation rate continued to escalate in 2007 and once again, the interest rate was in ‘hot pursuit’. The inflation rate accelerated significantly from 6% in January to a peak of 9% in December and the interest rates had peaked at 11% by December.

According to the SARB (2008a:29), the factors that led to the inflationary pressures of 2008 was the soaring crude oil prices, commodity prices, the “extraordinary growth momentum in China and India” and food price inflation driven by demand from improving conditions in the most populous nations. The price of oil also rose significantly from \$54.51 a barrel to \$91.69 a barrel, and its trend correlated with that of the inflation rate. Despite its appreciation, there were no significant changes in the exchange rate relative to changes in the previous years.

The GDP growth rate was generally lower in 2007 at 5.4% than it was in 2006 at 5.6%. It was lower during the first 3 months of 2007 relative to the first 3 months of 2006, but higher in the fourth quarter. However, it fell back to 5% in the first quarter of 2008.

In general, real growth was impeded by the “decline in real value added by the primary sector and a moderation in growth in real value added by the tertiary sector” (SARB. 2008a:32). Production in the mining subsectors of platinum, gold and diamonds were especially affected by the “rolling electricity blackouts” as well as by “rising input costs, occasional flooding, industrial action and skills shortages”. The growth in real final consumption expenditure by households slowed down as a result of a inflation (reducing purchasing power) which was in turn “exacerbated by the steady rise in debt-service costs” (SARB. 2008a). These debt service costs reflected “the higher level of interest rates”.

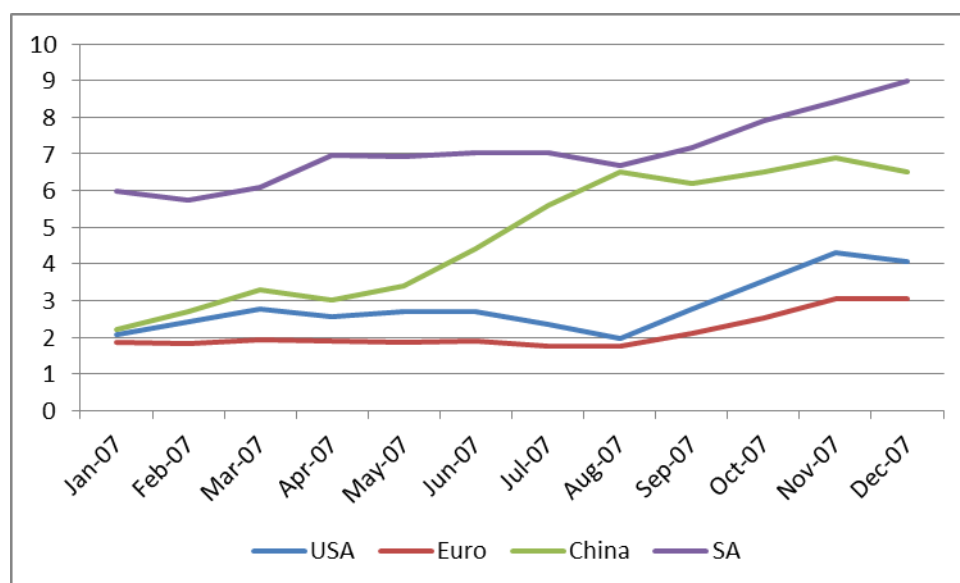
The global economy also slowed down from 4.4% to 4.3% and the US economy decelerated significantly from 2.7% to 1.8%. Growth in China however accelerated significantly from 12.7% to 14.2%.

6.8.2 The Reference Countries

The SARB (2008:43) states that the “substantial increase in international crude oil prices” had a “profound impact on price developments in the domestic economy” and “unleashed a wave of inflationary pressures across the globe”. The increase in both fuel and food prices had led to inflation targeting countries exceeding their inflation targets (SARB. 2008:42)

As shown by the graph below, the South African inflation rate generally followed the same trend as the US and Euro area. All three areas troughed in August, before accelerating rapidly. China generally trended upwards and peaked with the US and the EU in November. South Africa continued to trend upwards past November and peaked in December. The rapid rise that started in September coincided with the rapid rise in the price of oil from \$72.36 a barrel in August to \$79.91 in September, peaking at \$94.77 a barrel in November and decelerating to \$91.69 in December

Figure 31: 2007 Inflation rates



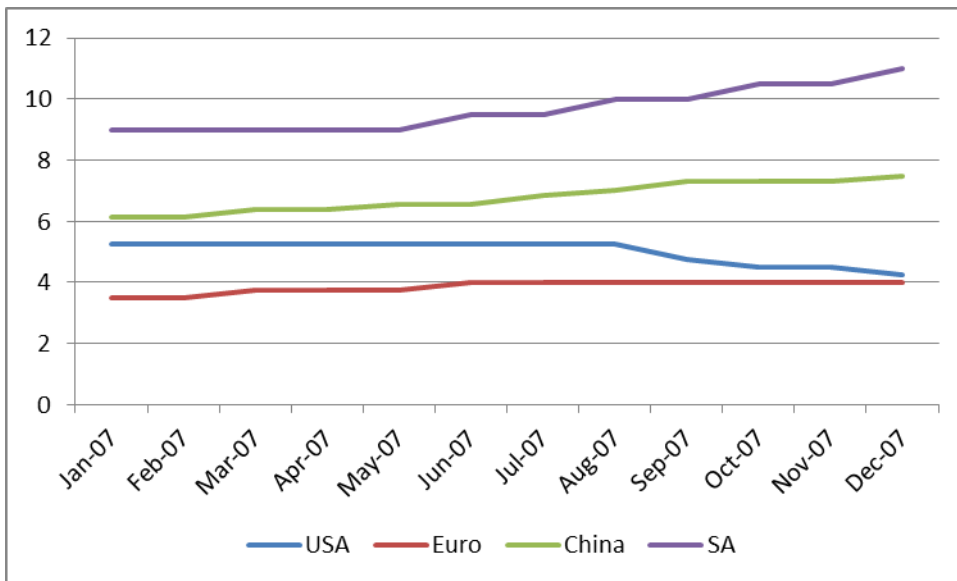
Source: IMF, 2016

6.8.3 The 2007 Interest Rates

The SARB(2008:42) stated that the rapidly rising inflation expectations had defied “the slowdown in domestic economic activity”. The SARB responded by continually increasing the interest rates in “an effort to address second-round inflationary pressures”. This response to inflationary pressures also mimicked the response of the rest of the world.

Of the G-20 nations, ten raised their interest rates (which include South Africa), 5 decreased their rates, and 2 left it unchanged (SARB. 2008a:29). In general, “the number of central banks raising policy interest rates exceeded the number reducing rates”. As shown by the graph below, of the reference countries, it was only the US that reduced its interest rates in September and December by a cumulative 100 basis points. This suggests that regardless of the monetary policy response, the inflation rate generally trended in the same direction. It was worth noting though that China’s interest rates had a fairly steep rise and this was accompanied by a steep rise in its inflation rate. It is also worth noting that the two countries with the highest interest rates also had the highest inflation rates.

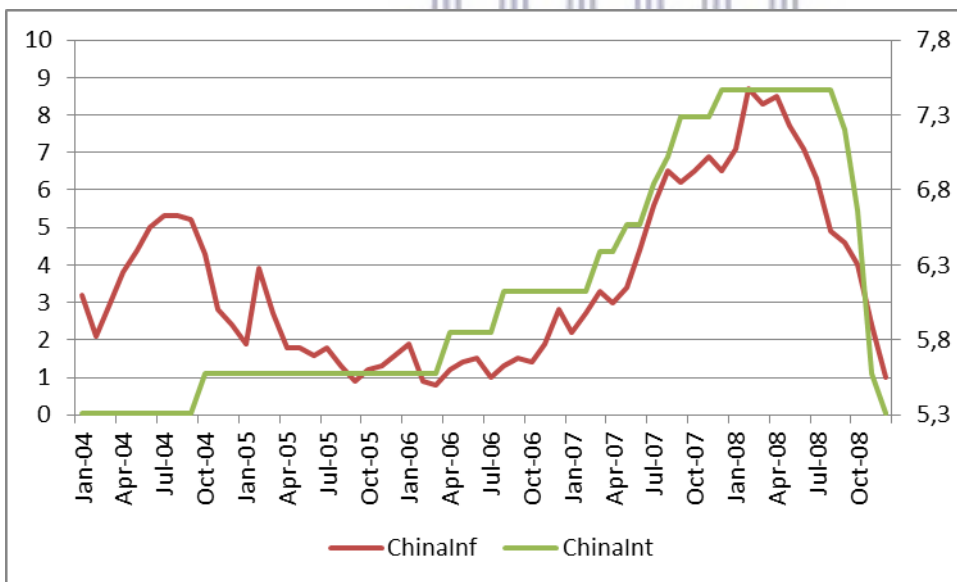
Figure 32: 2007 Interest Rates



Source: IMF. 2017b

6.8.4 China: Exports, Inflation and Interest Rates

Figure 33: Relationship Between Chinese Inflation and Interest Rates



Source 7: Fred. 2017

As shown in the graph above, China had begun increasing its interest in October 2004 but escalated this upward interest rate trend, beginning in August 2006. This interest rate trend was also accompanied by a rapidly rising inflation rate. If the inflation rate did respond to the interest rate, then this would have happened in May 2008, when the inflation rate started a

meaningful downward inflationary trend. This response would have then taken 20 months. However, the graph below shows that after an initial spike of 52% in March 2007, the export growth rate slumped to a meaningful 11% in April and remained comparatively low for most of the period under review. Given that the export growth generally fluctuated at below 30%, this growth rate was significantly lower than most of 2004 and 2005, which had generally fluctuated at above 30%. Taking all of this into account, this suggests that it took more than a year of generally lower output growth. It also noted that two years of generally higher output growth in 2004 and 2005 did not produce higher inflation rates and it was only during the upwardly interest trend that the inflation rate escalated to significant highs. It suggests that raising the interest rates only succeeds in increasing the interest rates and reducing output to longer term levels of lower output that might damage the economy. It also speaks to the South African situation where higher interest rates only seemed to succeed in reducing the purchasing power of consumers by increasing the debt burden and cost of consumer goods. Finally, it is observed the downward inflationary trend was accompanied by a downward export growth rate trend. It is thus hard to understand how increasing the interest rates stabilised the economy.

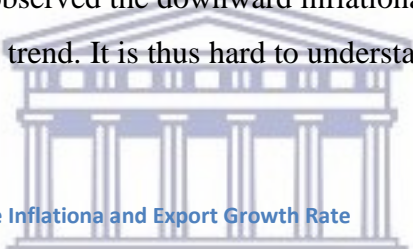
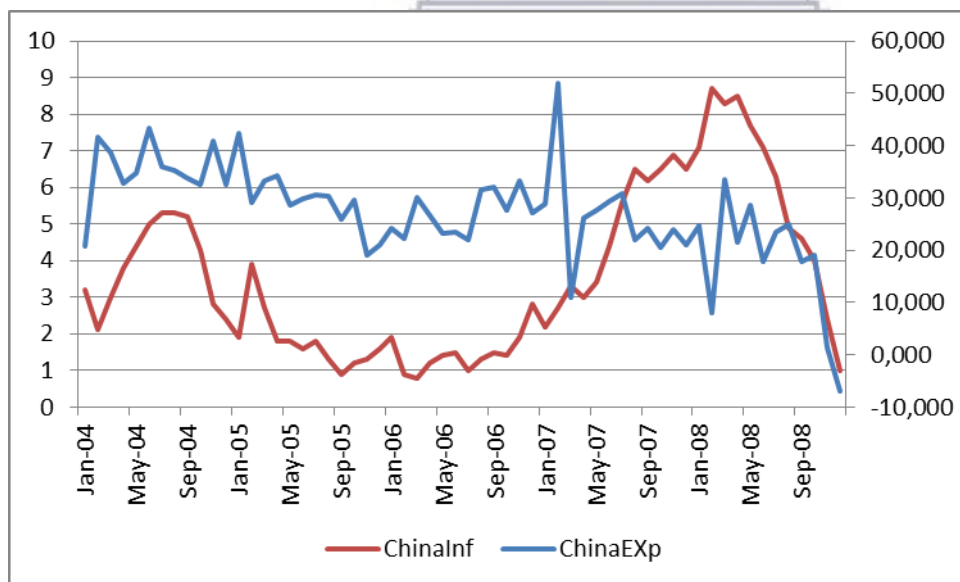


Figure 34: Relationship Between Chinese Inflation and Export Growth Rate



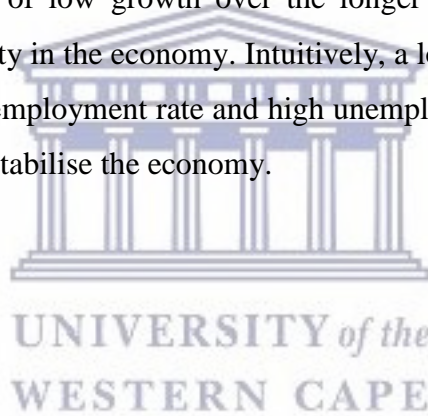
Source 8: Fred. 2017

6.8.5 The Preliminary Analysis for 2007

What stands out in 2007 is that, despite the increase in the interest rates, there was a rapid acceleration in the inflation rate and the SARB admitted that there was generally very little response to the slowdown in the GDP growth rate. This second point was elaborated on section 6.8d where China was used as example. The rapid increase in Chinese interest rates was accompanied by a rapid increase in the inflation rate and a generally lower export growth rate (and by extension, lower growth in output).

The increase in the South African interest rates only seemed to succeed in adding to the debt burden and the inflation rate was generally a function of the price of oil. The exchange rate did not play a significant role due to its fairly constant trend.

It could be argued that the interest rate only succeeded in reducing output, increasing inflation, and adding to the debt burden. It could further be argued that these set of events could risk inducing a period of low growth over the longer period, thereby negating the argument that it creates stability in the economy. Intuitively, a low growth environment is not conducive to lowering the unemployment rate and high unemployment could lead to the kind of social unrest that would destabilise the economy.



6.9 2008

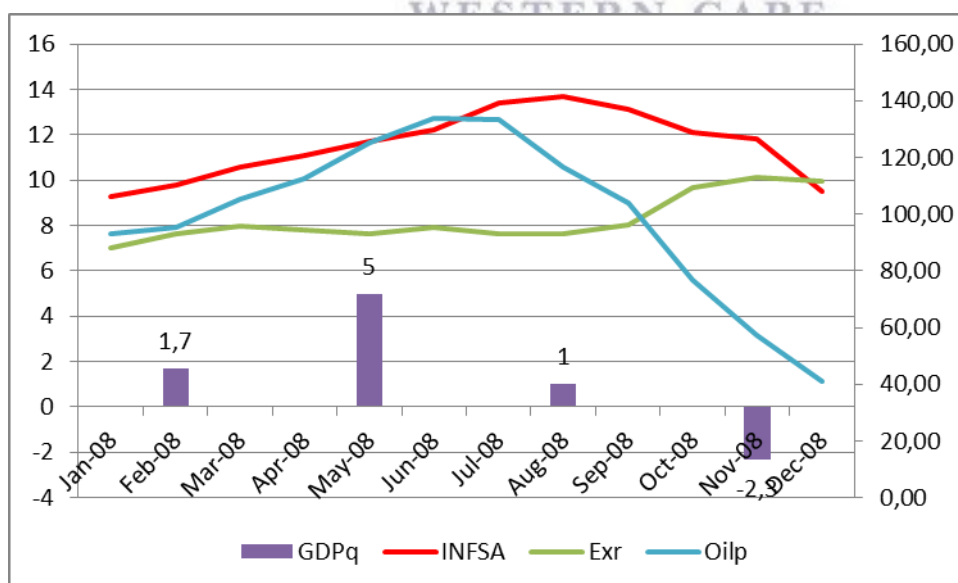
6.9.1 The Great Recession Begins

The period from the mid-1980's up to the end of 2007 is "often referred to as the Great Moderation", a period of "reduced macroeconomic volatility" (Mminele. 2012). At an annualized rate of 4% since September 1999, South Africa had experienced its longest period of recorded economic expansion (SARB, 2009a:35). After 99 months of consistent growth, this expansionary path came to an end in November 2007. During the first half of 2008, the economy was hit by electricity shortages and reduced domestic consumption. As noted in chapter 3.2, during the second half, the collapse of Lehman Brothers on the 15th of September, led to the worst global recession since the Great Depression. As a result of the global recession, the South African economy "contracted from the final quarter of 2008 to the second quarter of 2009" (SARB, 2010a:2). In the fourth quarter of 2008, there was an

outflow of portfolio capital due to risk averse investors fleeing developing countries (SARB, 2009a:36). The outflow of capital led to the depreciation of the rand but the rand managed to regain most of its value after these outflows were reversed in the first half of 2009. Consumption fell and in a bid to stimulate demand, in December 2008, the SARB started a process of reducing the repo rate (SARB, 2009a:36). The economy contracted “at an annualised rate of” 4.5% during the first half of 2009 and a further 3% during the second half (SARB, 2009a:37). All sectors, except for construction, were affected by the recession. After having increased at an annualized rate of 23.9% in the second half of 2008, the agricultural sector declined by 2.3% “in the first half of 2009” (SARB, 2009a:37). As noted above, the recession negatively affected demand for all export goods with mining being one of the sector heaviest hit. After having reached record highs in the first half of 2008 (SARB, 2009a:34), the recessions significantly reversed all gains and by the end of 2008, the sector had shrunk by 6.5% (SARB, 2009a:38). The global recession continued to wreak havoc on the sector and by the end of the first half of 2009, the decline had more than doubled to 16.8%. The resulting weak tax revenues and expansionary fiscal policy responses widened the fiscal deficits.

6.9.2 The 2008 Narrative According to SARB and the Graphic Narrative

Figure 35: 2008 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

The rise in the inflation rate continued unabated from 9.3% in January to a peak of 13.7% in August. This was despite the continued rise in the already high interest rates and the generally weak performance of both the world and domestic economy. The SARB (2009a:34) states that after slowing down for more than a year, “growth in the advanced economies” came to a halt at the end of 2008, impacting on developing economies and resulting in a “highly synchronised global recession”. The demand for exports from developing countries fell “resulting in declining production volumes and prices”. These developments were evident in the domestic economy with the GDP growth rate starting at 1.7% in the first quarter, peaking at 5% in the second quarter before plunging to 1% and -2.3% in the third and fourth quarter respectively.

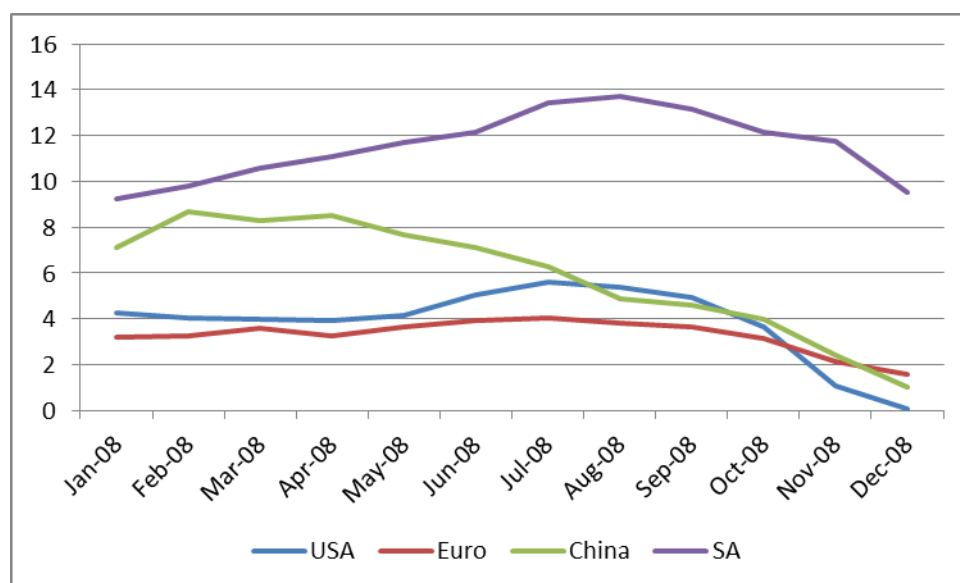
The SARB states that the “inflation-containing effect of waning demand” during the 2008 period was “offset by higher wage inflation and slowing productivity growth” (SARB. 2009a:52). The double digits increases in “nominal unit labour cost contributed materially to the elevated rates of increase” in the inflation rate.

The factors which contributed to containing the inflation rate in ‘meaningful’ way were the drop in the crude oil prices starting in July, the appreciation of the rand since October and the deceleration in food prices (SARB. 2009a:51). The oil price peaked at \$133.88 a barrel in June before plunging to a trough of \$41.12 a barrel in December. The rand weakened significantly from a trough of R6.99 to the dollar in January to a peak of R10.12 in November, before strengthening to R9.95 in December.

It is worth noting that contrary to previous suggestions that, if the growth rate falls below 3%, then the inflation rate would experience a decrease. If such a relationship between the GDP growth rate and the inflation existed in previous, such a relationship seems less evident in 2008. Where the inflation rate did decline, it was more a function of the decline in the price of oil.

6.9.3 The Reference Areas

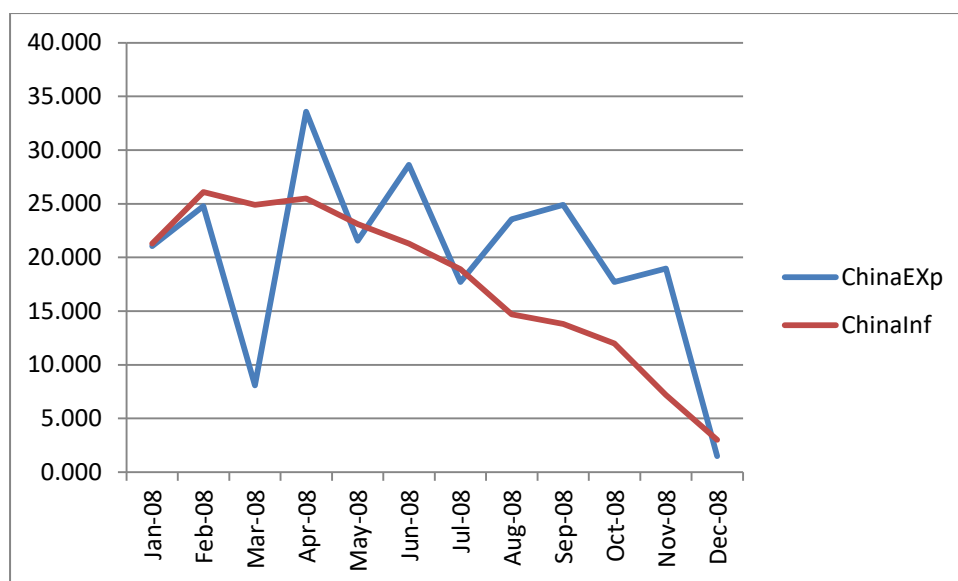
Figure 36: 2008 Inflation Rates



Source: IMF, 2016

The South African inflation rate generally correlated with the inflation rates of the US and Euro area (SARB Database). The US and Euro area inflation rates started on a downwards trend in August with the South African inflation rate starting its downwards trend the following month in September. China's downward trend had already started in March, moderated in August, and continued trending downwards in unison with the US, Euro Area and South Africa. The downward trend in the US and Euro area coincided with the drop in the price of oil whereas the South African downward trend coincided with the collapse of Lehman Brothers. As shown by the figure below, it is once again worth noting that China's inflation correlated positively with its exports, and by extension, its GDP growth rate. To add more substance to this argument, the People's Bank of China (PBC, 2009) states that the decline in inflation coincided with the decline in the value added of industrial production. During the first quarter, value added accelerated by 1.5% compared to the first quarter of 2007, but declined by 2.4% and 5.2% in the second and third quarter respectively.

Figure 37: 2008 Relationship Between Chinese Exports lagged by one month and Inflation



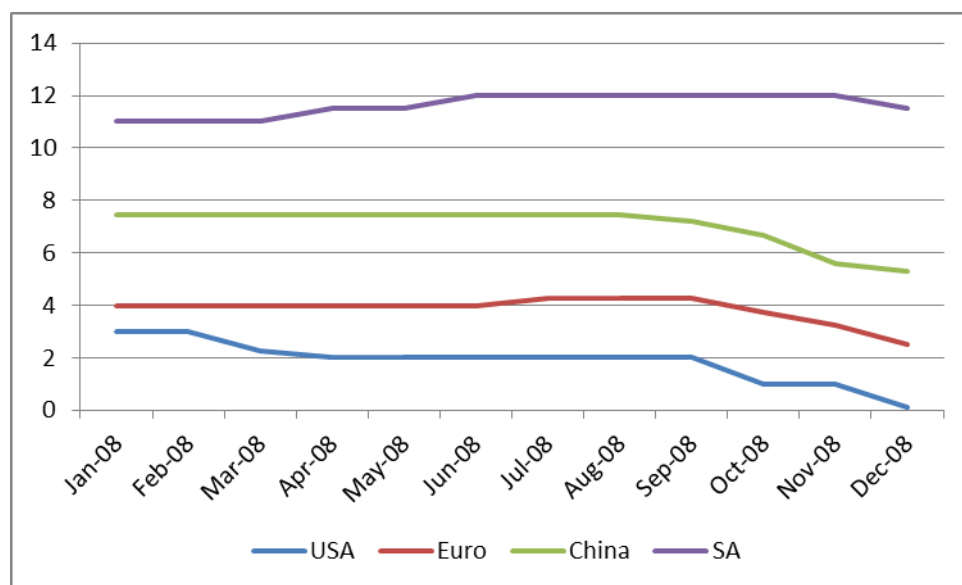
Source 9: IMF. 2006, Fred. 2017a

6.9.4 The 2008 Interest Rates

As shown by the graph below, the interest rates rose from 11% in January to 11.5% in April and 12% in June before being lowered to 11.5% in December. The interest rate cut in December was implemented despite inflation rate remaining considerably above the target (2009a:50). The SARB tried to explain this divergence from the inflation targeting framework by stating that the framework is forward looking. In other words, the interest rate is adjusted in with a view to being responsive to future inflation outcomes rather than current outcomes. The SARB however does not expand on as to how this forward looking mechanism works nor does it give any data to substantiate the use of this mechanism. The SARB did state however that the rapid decrease in the inflation rate shifted the “focus of economic policy shifted towards measures to stabilise the financial system, and to support growth and employment (SARB. 2009a:34).”

The graph also shows that the interest rate is once again considerably higher than the interest rates of the reference areas. It is also noted that once again, the inflation rates are also considerably higher, which once again raises the question as to the usefulness of excessively higher interest rates.

Figure 38: 2008 Interest Rates



Source: IMF. 2017b

6.9.5 Preliminary Analysis for 2008

2008 raises the question as to the source of the decline in the inflation rate. As was the case in previous years, the inflation rate did not respond significantly to changes in the GDP growth rate. The two variables that always feature prominently are the exchange rate and the price of oil. It was always intuitively assumed that the rapid decline in the inflation rate was a function of the collapse in output. However, could it be argued that, assuming the price of oil may be a function of output, the inflation rate is a function of the price of oil rather than output?

It also observed that the response of larger economies to the price of oil was largely contemporaneous whereas a smaller economy like South Africa seemed to respond with a lag of one month.

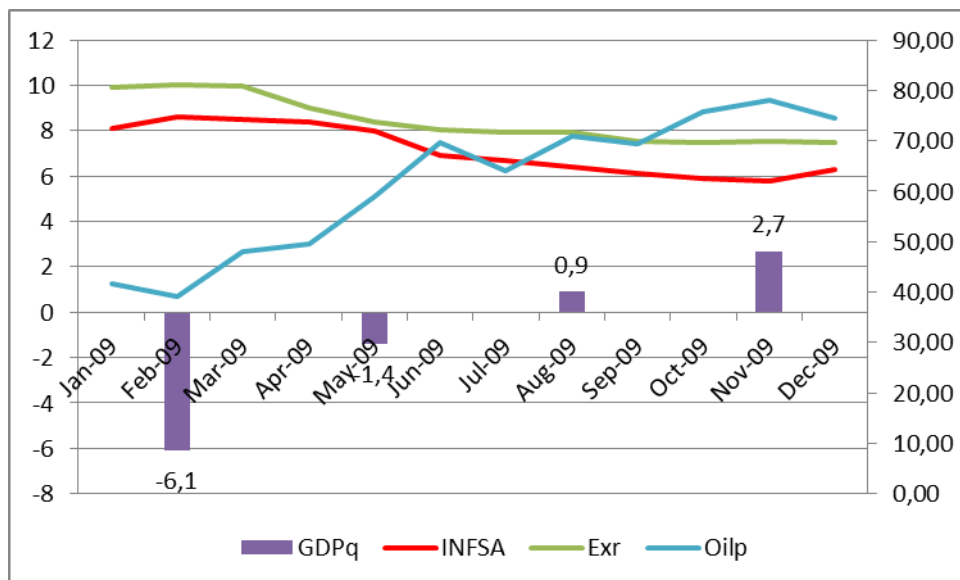
Questions are also raised as to the validity of the hypothesis presented by this thesis that the inflation responds significantly when the GDP growth falls below the suggested threshold of 3%. It could be argued that this hypothesis only holds during times of international economic stability but completely falls apart during times of extreme economic uncertainty.

Lastly, although it is not clear as to how the interest rate was changed in December within the IT framework, it is noted that the SARB's monetary policy does operate outside of this framework when necessary.

6.10 2009

Given that a basic narrative has already been built up until 2008, the narrative will 'speed up' from this point, as there is no necessity to having overly in-depth analysis, unless where needed.

Figure 39: 2009 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



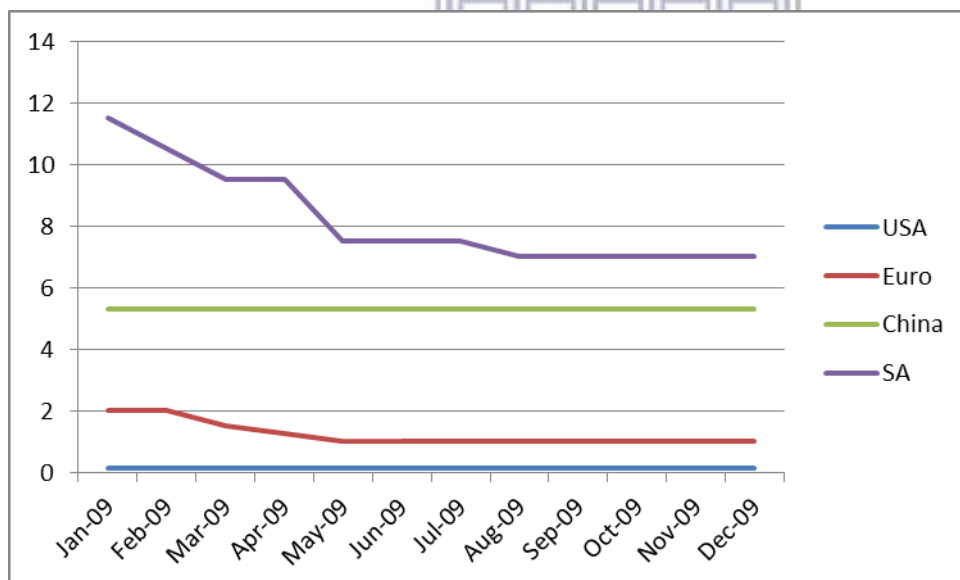
Source 10: SARB. Fred

As shown by the graph above, after depreciating considerably at the end of 2008, the rand reversed its losses and appreciated from a peak of R10 to the dollar in Feb, to R7.49 by December. The graph below shows that Interest rates were also reduced from a 11.5% in January to 7% in December and although GDP turned positive in the 3rd quarter, it was still relatively low. Despite having started the year at \$41.71 a barrel, the price of oil nearly doubled, ending the year at \$74.47 a barrel.

The inflation rate decreased significantly in from 8.4% in April, to 8% in May and 6.9%, June. This corresponded, with a one month lag, to the significant appreciation of the rand that started April and a significant reduction in the interest rate May. As shown by the graph

below, the interest rates were reduced from 9.5% in April to 7.5% in May and the rand appreciated from R9.99/\$ in March to R9.02/\$ in April. The inflation rate continued to trend downwards alongside the exchange rate up until November, when it suddenly increased from a trough of 5.8% in November to 6.3% in December. This December increase may have been lagged response to the rise in the price of oil, given that the rand remained relatively unchanged since September. It may also be a response to the increase in output. It is worth noting that the reduction in the inflation rate occurs despite the general escalation in the price of crude oil. It is also once again worth noting that the interest rates once again seemed to follow the inflation rate downwards. In 2008, by reducing the interest rate and stating that IT was forward looking, it would have been assumed that within the IT framework, it was forecasted that there is a risk of the inflation remaining relatively high. However, the inflation rate continued to fall up until the end of 2010, well below 4%, and only breached the inflation upper target of 6% in the final quarter of 2011. It is this not certain how the SARB's 'forward looking' mechanism works within the IT framework.

Figure 40: The 2009 Interest Rates

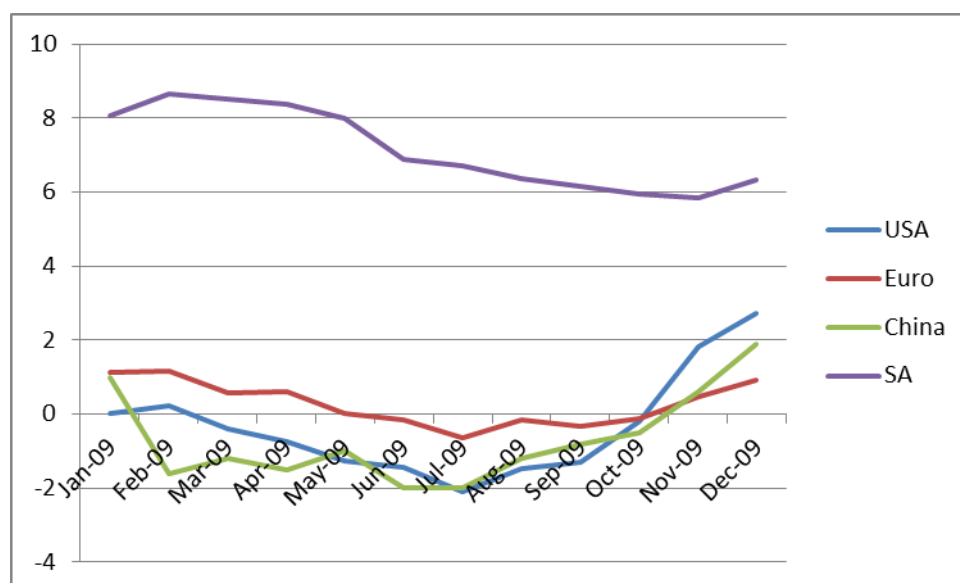


Source 11: IMF. 2017

The SARB states that the inflation rate was contained by the appreciation of the rand, the “declining producer prices in South Africa’s main trading-partner countries” and “subdued domestic demand” (SARB. 2010a:23, SARB. 2010b:19). These factors reduced imported inflation but their impact was diminished by “the pick-up in global economic activity” during the second half of 2009.

As shown by the graph below, the South African inflation rate generally followed the inflation trend of the USA, Euro area and China. However, the trend for the USA, Euro area and China started moving upwards in July whereas South Africa continued to trend downwards. South Africa only started trending upwards in December. These differences in trends may be indicative of the impact that the exchange rate has had on inflation rates. It is also noted that the inflation rate for South African is significantly higher.

Figure 41: 2009 Inflation Rates



Source 12: IMF. 2016

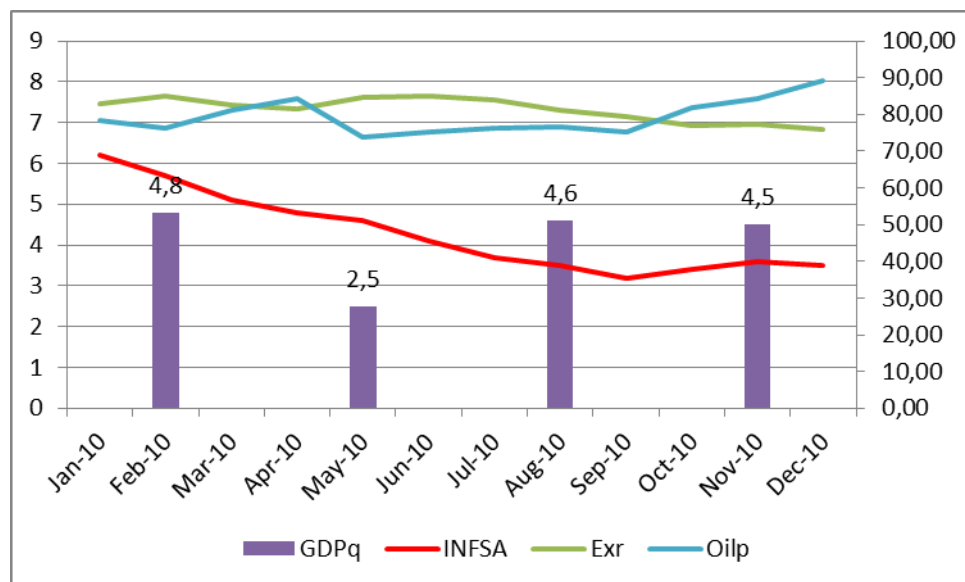
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The SARB (2010a:44) states that the rand strengthened on the back of increasing international commodity prices, net capital inflows into the country, an improvement current account deficit during the first half of 2009 and a “positive sentiment towards the country in anticipation of the hosting of the 2010 FIFA World Cup tournament”. Rand strength was further supported by positive GDP growth in the second half and “an improved inflation outlook”.

6.11 2010

6.11.1 The 2010 Narrative According to SARB, The Graphic Analysis and Interest Rates

Figure 42: 2010 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

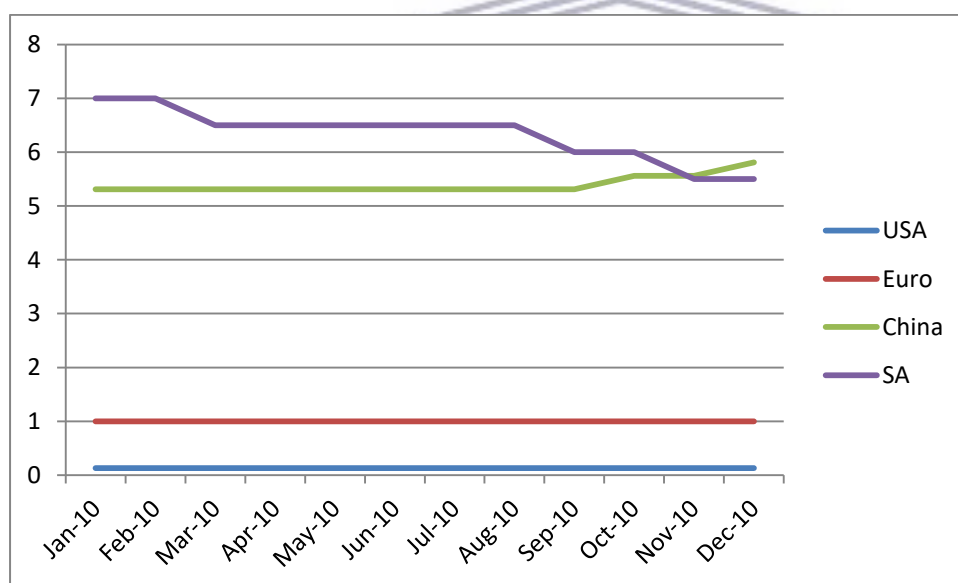
As shown by the graph above, during the course of the year, the inflation rate peaked at 6.2% in January, nearly halved to a trough of 3.2% in September, and the ended the year with 3.5% in December. The interest rate was reduced from 7% in January to 5.5% in December and the exchange appreciated from R7.45 to the dollar in January to R6.82 in December. The GDP growth rate was comparatively strong with only the second quarter recording a relatively weaker growth rate of 2.5%. GDP grew by 3% in 2010, up from -1.5% in 2009. Although the price of oil did increase by more than \$10 a barrel throughout the year, the price increase was not significant compared to previous years (Fred. 2015). It started with \$78 a barrel in January, troughed at R74\$ in May, and ended the year with a peak of \$89 in December. In 2009, the price of oil rose by approximately \$35 a barrel from January to December.

According to the SARB (2011a), inflation was contained by the continued impact of the global economic downturn, the relatively weak domestic demand conditions, excess production capacity and the appreciation in the exchange value of the rand. The SARB

considered food and oil prices to be “the biggest risk to the inflation outlook in the near future”.

The SARB (2011:1) states that the “major driving force behind the recovery has been final consumption expenditure by households” After having contracted in 2009, real expenditure by households increased by an annualised rate of approximately 5% whilst debt to disposable income has been declining on the back of reduced interest rates. This suggests that reduced interest rates reduced the debt burden, which allowed households to spend, directly impacting on the GDP growth rate. However, despite its rapid descent, the interest rate did not seem to have a particularly significant effect on inflation within an IT framework perspective. The inflation rate remained relatively well within the target range up until the first quarter of 2014 despite a continuation of lower interest rate

Figure 43: 2010 Interest Rates



Source: IMF. 2017b

As shown by the graph above, the interest rates of the US and the Euro remained at historically low levels while South Africa continued to lower its interest to a historical 30 year low (SARB. 2010:54). China increased its interest rates in October and December, overtaking the South African interest rates in December.

6.11.2 The Reference Areas

As shown by the graph below, 2010 was a volatile year for inflation rates in the US, Euro area and China. China saw its inflation rate escalate significantly from a trough of 1.5% in January to a peak of 5.1% in November, ending the year with 4.6% in December. Similarly, there was a significant rise in the EU area's inflation rate, starting the year with 1% and ending in December at a peak of 2.21%. In the US, the inflation rate generally trended downwards and experienced a significant drop from 2% in May to 1.1% in June. The inflation rates of emerging economies such as Russia, India and Brazil also rose by 8.7%, 7%, and 5.9%, which prompted a rise in interest rates (PBC. 2011:23).

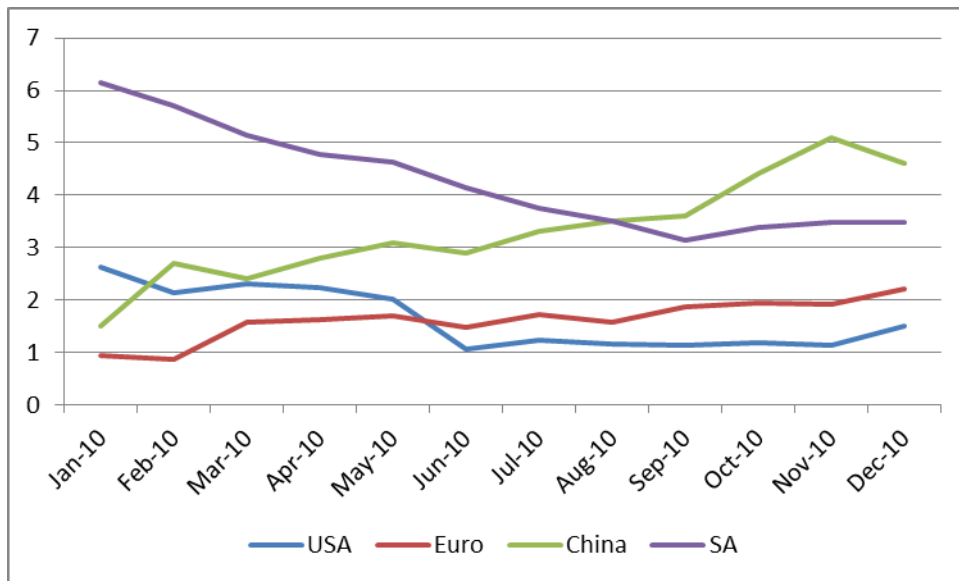
The SARB (2011:23) implies that higher food and oil prices accounted for a significant proportion of the acceleration in inflation in advanced and emerging economies. In response to the acceleration in inflation, "several central banks in emerging-market economies" increased their interest rates while the central banks in "major advanced economies maintained their policy rates at historically low levels" (SARB. 2011).

The ECB (2010.) states that "significant increases in energy prices in the first four months" of 2010, "triggered by a notable rise in oil prices over that period, contributed" to its higher inflation rates. It also states that food prices contributed "slightly" and "base effects stemming from the energy and food components" contributed "partly". Base effects are defined as "some atypical influence" that occurs at time, $t-12$, that affects the growth rate of a variable at time, t , where t equals a month and $t-12$ equals 12 months prior to time t (ECB. 2010a). What base effects suggest is that instead of, for example, inflation variation being caused by events in the previous month, they are caused by events that occurred 12 months ago.

China's PBC (2011) states that its rapid rise in inflation is attributed to the strong economic recovery, imported inflation, and rising cost of labour and land.

What is of particular interest is the behaviour of the US inflation rate, which will be elaborated on below.

Figure 44: 2010 Inflation Rates

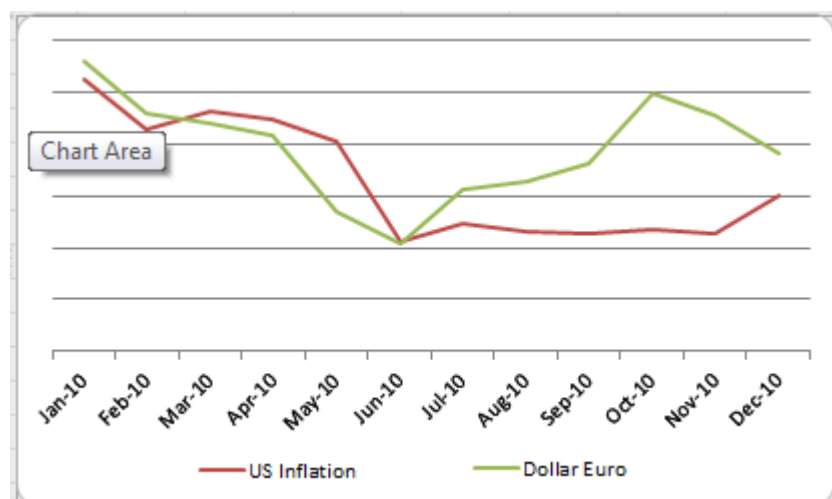


Source: IMF, 2016

6.11.3 The US Inflation Rate

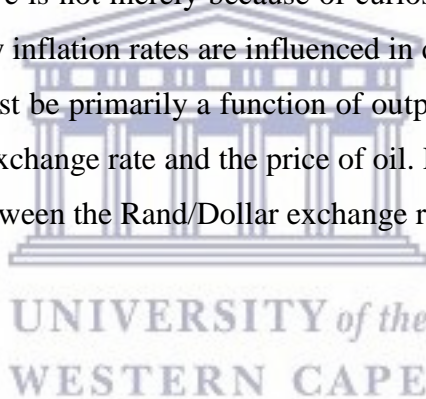
The Fed was not particularly clear on the reasons for the behaviour of the US inflation rates. However, in an academically curious attempt to understand these set events as stated above, various sources was explored, and it was found that there was a close correlation between the Dollar/Euro exchange rate, and the US inflation rate. The graph above illustrates this relationship. For the first half of the year, this relationship seems positive and strong. This positive relationship becomes less evident during the second half and turns negative in November and December. However, the Dollar/Euro exchange rate troughed in June, and accelerated upwards at a faster pace than the US inflation rate from July. It was in June that the Euro area inflation overtook the US inflation rate and by July, the US inflation rate's downward trend had halted and moderated.

Figure 45: Comparing US Inflation and Dollar/Euro Exchange ratetrends



Source 13: Fred. 2017

The point of the exercise above is not merely because of curiosity, but to determine whether there is a difference in the way inflation rates are influenced in different countries. For China, their inflation rate might be just be primarily a function of output and for the US, it might be a function of its Dollar/Euro exchange rate and the price of oil. For South Africa, it might just be because of the interplay between the Rand/Dollar exchange rate and the price of oil.

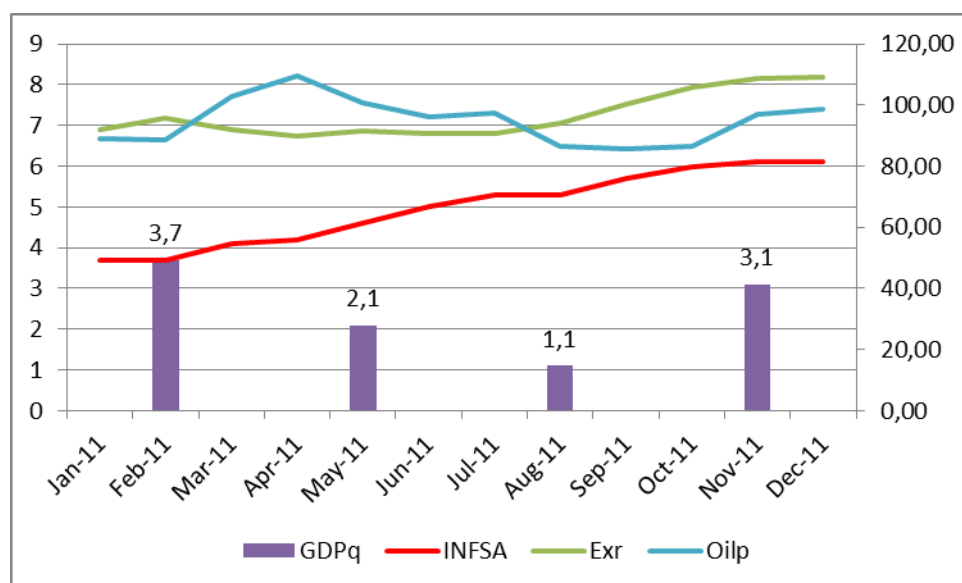


6.12 2011

6.12.1 The 2011 Narrative According to SARB and the Graphical Analysis

The SARB (2012b:18) states that “despite an environment of lacklustre growth and subdued levels of demand”, the inflation rate “accelerated markedly” “due to exogenous supply-side factors”. The immediate conclusion being drawn is the inflation rate’s growth was stronger than would have been the predicted by the IT framework and was a function of factors beyond the control of the SARB.

Figure 46: 2011 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

As shown by the graph above, after its general decline in 2010, the inflation rate reversed its trend in 2011, troughing at 3.7% in January, and peaking at 6.1% in December. The SARB (2012a:27) states that the rise in domestic inflation can mainly be attributed to the increase in the prices of non-durable goods, which in turn was “primarily driven by notable increases in the prices of food and petrol”.

In addition, international inflationary pressures “spilled over” into South Africa’s economy, which placed upward pressure on the domestic inflation rate (SARB. 2012a:25). These pressures started to intensify “towards the end of 2010”, despite the “fairly hesitant global economic recovery and persistently large output gaps”. The components that were identified as contributing to these pressures were the increasing “international food and crude oil prices”. However, “the moderation in global economic activity, particularly in Europe” during the second half of 2011, reduced these inflationary pressures. It is noted again that despite weaker growth (large output gaps), the international inflation rates also grew at rates that is inconsistent with the outcomes as would be predicted by an IT framework.

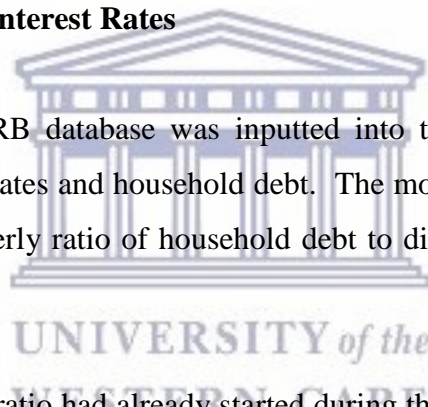
Despite the weak growth rate, the domestic GDP growth rate did in fact increase from 3% in 2010 to 3.2%. The SARB (2012a) however described this increase in the growth rate as “pedestrian”, “significantly below potential” and “well below the average rate of 4.4 per cent recorded during the previous upward phase which lasted from September 1999 to November 2007”. Furthermore, it attributes this weak recovery to the weakness of the recovery of the

global economy, the reduction in debt-to-GDP ratio, and the “destruction of some domestic productive resources”.

The increase in the growth rate was assisted by an increase in the real final consumption expenditure by households from 3.7% in 2010 to 5% in 2011. Furthermore, this increase was also supported by increased employment, salary and wages increases at “rates in excess of the upper limit of the inflation target range”, and the “stable 30-year low interest rate environment”. In addition, the increase in household spending was largely financed by an increase in income rather than an increase in debt. Household debt increasing on average by 7.2%, significantly lower than the 20% average increase between 2003 and 2008. The reduction in the growth of debt suggests that consumers began to manage their finances more prudently, or it may simply be the case that they had too much debt. This will be explored briefly below.

6.12.2 Household Debt and Interest Rates

Data extracted from the SARB database was inputted into the graph below to show the relationship between interest rates and household debt. The monthly interest rates are shown on the left axis and the quarterly ratio of household debt to disposable income is shown on the right.



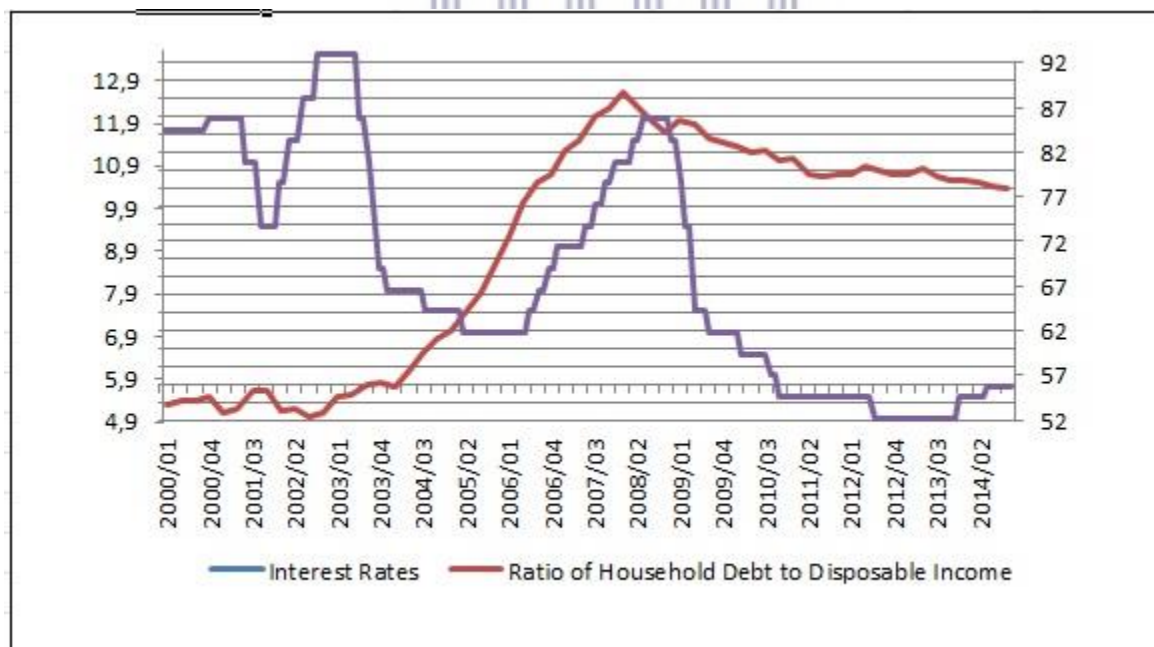
The upward trend in the debt ratio had already started during the lower interest rate period of 2003 and had escalated, even as interest rates began its sharp upward trend during the second quarter of 2006. The escalation in the debt ratio came to a halt in the first quarter of 2008, where it had peaked at 89%. By the first quarter of 2012, the debt ratio had declined to 79% and for the rest of 2012, there was very little change in the ratio. The ratio had already declined to 79% from the second quarter of 2011 and remained generally unchanged until the third quarter of 2013. By the final quarter of 2014, it had declined marginally to 78%.

As noted above, the SARB indicated that the drop in the debt ratio had contributed to the weak growth. This assertion may be debatable given the fact that the ratio remained relatively unchanged since 2013. The SARB also notes that the growth in household debt was significantly lower than in previous years and increased consumption was ‘largely financed by an increase in income rather than an increase in debt’.

Throughout the thesis, it was also suggested that increasing the interest rates adds to the debt burden and this assertion was validated by the SARB in their quarterly reports. It could be argued that lower interest rates had encouraged consumers to take out more debt, but the increase in the interest rate had added to debt burden and significantly eroded consumers ability to purchase goods and services. By the time the financial crisis had arrived, the debt burden had reached levels where growth in consumption had been impeded which suppressed the GDP growth rate over the longer term. As will be shown below, the GDP growth rate had continued to trend downwards up until 2014 and beyond.

The hypothesis above presents another interesting question. From June 2004 to August 2007, the US Federal Reserve had increased its interest rates by a comparatively significant 425 basis points. The 2008 crisis was the result of US home buyers no longer being able to afford the payments on their homes. Could it have been that the interest increases added to the debt burden of the US consumer and had interest rates not been increased, would there have been less mortgage defaults? If there had been less defaults, could the crisis have been avoided?

Figure 47: Relationship Between the Interest Rates and Ratio of Household Debt to Disposable Income

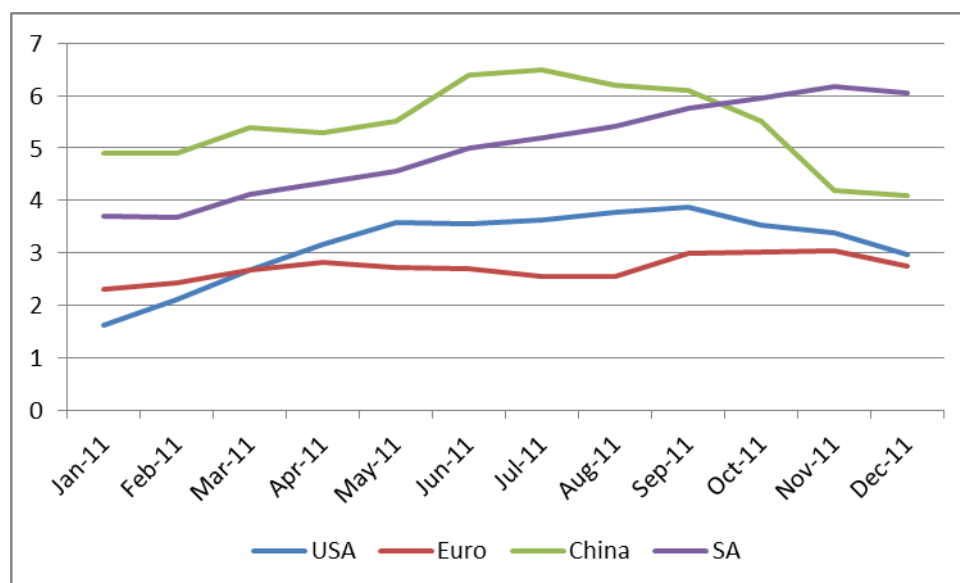


Source 14: SARB. 2017

6.12.3 The References Areas

As noted above, international inflation pressures spilled over into the domestic economy during the first half of 2011 and moderated in the second. This is illustrated in the graph below, which shows that the US and China experienced significant shifts in their trends. This is especially true for China which experienced significant volatility in their inflation rates.

Figure 48: The 2011 Inflation Rates



Source 15: IMF. 2016

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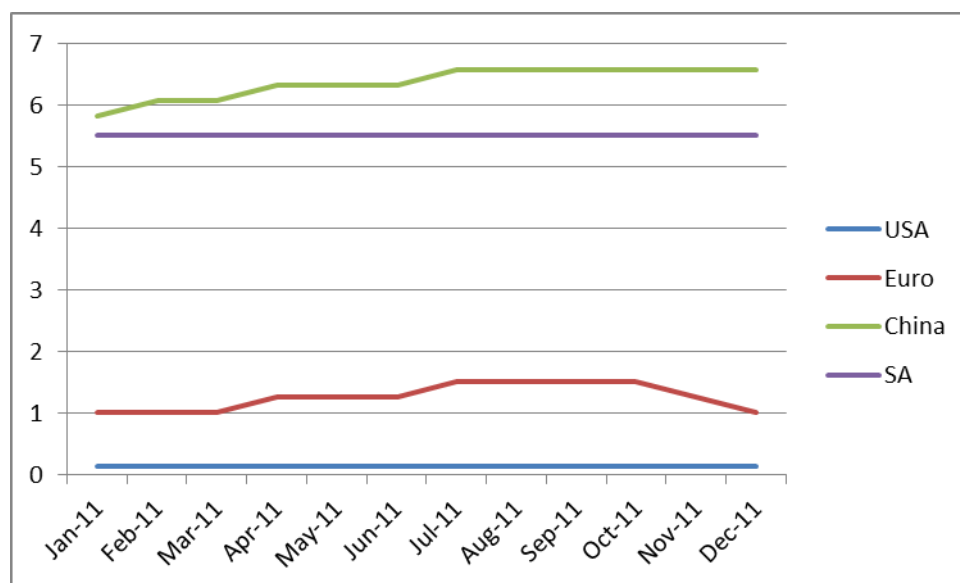
The PBC (2012) states that the generally rapid reversal in the inflation rate was as a result of a slowdown in GDP. They state that the slowdown was as a result of “prudent monetary policy”. The Chinese economy grew by 9.7%, 9.5%, 9.1% and 8.9% in the first, second, third and fourth quarter respectively. However, it should also be noted that there was a remarkable decline in the growth rate of exports that started in September and continued unabated up to the end of observation period.

The ECB (2012a) stated that energy prices contributed 80% to the increase in inflation, with a larger impact in the US. It also confirms that “inflation in the euro area and in the United States has followed similar patterns since 2008”.

It is also worth noting that Chinese inflation rates continued to overtake the South African inflation rates up until December, and this could be attributed to the interest rates as shown in

the graph below. However, despite the Chinese interest rates being higher than South African's, this did not deter the Chinese inflation rate from decelerating to below the South African inflation rates. This could suggest that the IT framework might be applicable to the Chinese economy. It might also just confirm the strong relationship between Chinese output and its inflation rates.

Figure 49: The 2011 Interest Rates



Source: IMF, 2017b

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In September, the inflation rate of the Euro area experienced a significant jump which coincides with a jump in the Euro/Dollar exchange rate (Fred, 2017a).

Starting at €1.3371 to the dollar at the beginning of January, the Euro continued to appreciate up until April. Starting in May, it generally fluctuated between €1.45 and €1.40 and on the 6th of September, it dropped to below €1.40 and continued to depreciate significantly during the September, ending the month at €1.35. The exchange rate continued to generally fluctuate between €1.40 and €1.35 before experience another significant drop in December.

It could be argued that the Euro appreciation, the rapidly rising price of oil had a more pronounced shock effect on the inflation rate increase from January to April. The same argument could be made for the rest of the year, except for September. During September, the oil price continued to decline, but the significant weakening in the Euro once again had a

pronounced shock effect, which positioned inflation at a higher rate in the following months. Although the depreciating Euro only pushed up the inflation rate during this month, the effect it had over the longer term was to have inflation increase at a more elevated base than before September.

It is significant to note that during this period, the strengthening Euro aligned more closely with the behaviour of the US inflation rate. The US inflation rate increased up until May, moderated up until September, started a decreasing trend in October and had a more pronounced decrease in December. However, this trend also closely aligned with the price of oil, which makes it difficult to determine which variable had the largest impact on inflation. What can quite reasonably assumed is that, when, for example, the oil price increases and the exchange rate appreciates, these variables acts as opposing forces, with the oil price increasing inflation and the exchange rate decreasing inflation. Similarly, if the oil price rises and the exchange rate depreciates, they reinforce each other's influence on the inflation rate in that they accelerate the inflation rate an exponential rate.

6.12.4 The 2011 Preliminary analysis

By suggesting that the inflation rate was beyond its control, the SARB also asserted that it could not use interest rates as a monetary policy tool. The most important implication is that the IT framework was 'unusable' during the 2011 period. Furthermore, the relationship between output and inflation was weak at best, both domestically and internationally. The general consensus among the various monetary bodies that included the ECB and the PBC is that the price of oil was a significant factor as well as the price of food. It had been established earlier on in the thesis that domestic price of food was generally a function of international factors. The only country that seemed to respond to output seems to be China, hence the IT framework might be more applicable to a country that is structurally similar to China. Lastly, it is noted that despite the interest rates in China being higher than in South Africa, by the end of 2011, the Chinese inflation rate had been lower than the South African inflation rate. This might help to negate the hypothesis that a higher interest rate leads to a higher inflation rate.

2.12.5 One Last Look at the Inflation Rate of 2011

During the 2011 period, it was relatively difficult to identify which variables had a more profound impact on the inflation rate. Given that the interest rate remained unchanged, it might be a good idea to use this lack of clarity to interpret the behaviour of the inflation within a possible framework, as had been observed in previous years.

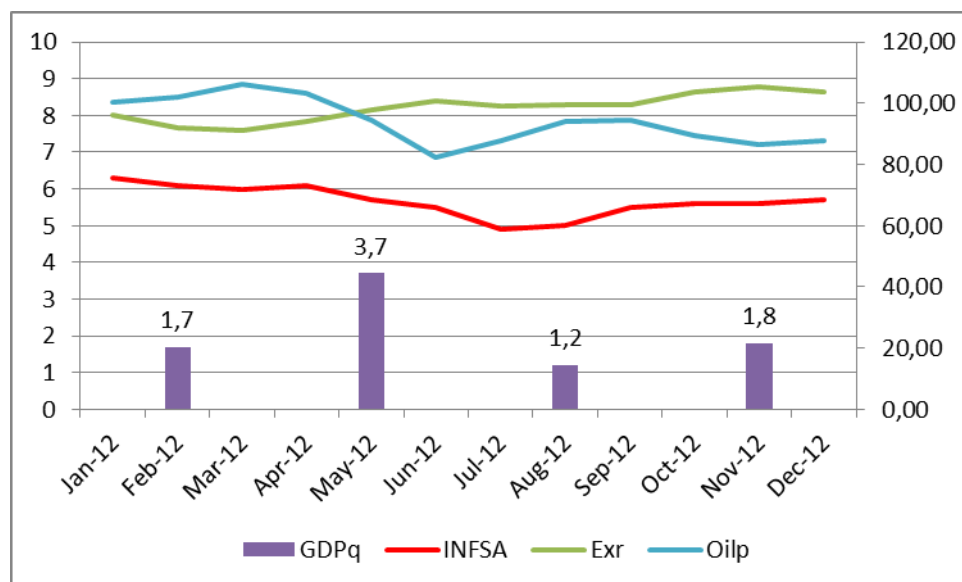
The inflation rate for South Africa had started to increase in October 2010, the same month that the price of oil started to increase. A significant jump in inflation from 3.7% to 4.1% was experienced in March 2011, the same month in which the price of oil jumped from \$89 a barrel to \$103 a barrel. For both the inflation rate and the price of oil, these were the largest unit increases since October. This may be indicative of the profound contemporaneous effect that the price of oil has on the inflation rate. However, the inflation rate continued to increase significantly from May to July, despite the significant drop in the price of oil, lower GDP growth rates, lower interest rates, and a relatively constant exchange rate. The inflation rate for the US also moderated and the EU's inflation rate declined. The continued escalation in the inflation rate could have been a lagged response to the significant increases in the price of oil or it could have been a response to the jump in the China's inflation rate. During the first half of 2011, China's inflation rate trended upwards and significantly jumped from 5.5% in May to 6.5% in July.

While South Africa's inflation rate seemingly started to moderate in August, the exchange rate accelerated significantly from R6.79/\$ in July to R7.06/\$ in August and R7.52/\$ in September. It peaked at R8.17/\$ in December. In what is assumed to be a lagged response to the exchange rate, the inflation once again escalated rapidly from 5.3% in August to 5.7% in September, peaking at 6.1% November and December. The inflation rate generally moderated in the fourth quarter. This quarter was characterised by a higher GDP growth rate, an increasing price of oil, and a depreciating rand. All of these fourth quarter characteristics should have translated into an increase in the inflation rate. The moderation in the inflation rate could quite possibly be explained as a lagged response to the decrease in the price of oil (\$110 a barrel in April to \$86 in September), a lagged response to the decrease in the inflation rates of the US and China, and/or a more contemporaneous response to the moderation and eventual decrease in the inflation rate of the EU area.

6.13 2012

6.13.1 The 2012 Narrative According to SARB and the Graphic Narrative

Figure 50: 2012 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

The SARB (2013a:30) states that the general downward trend in the inflation rate during the first half of 2012 was largely because “of a moderation in food and non-alcoholic beverages price inflation, and in petrol price inflation”.

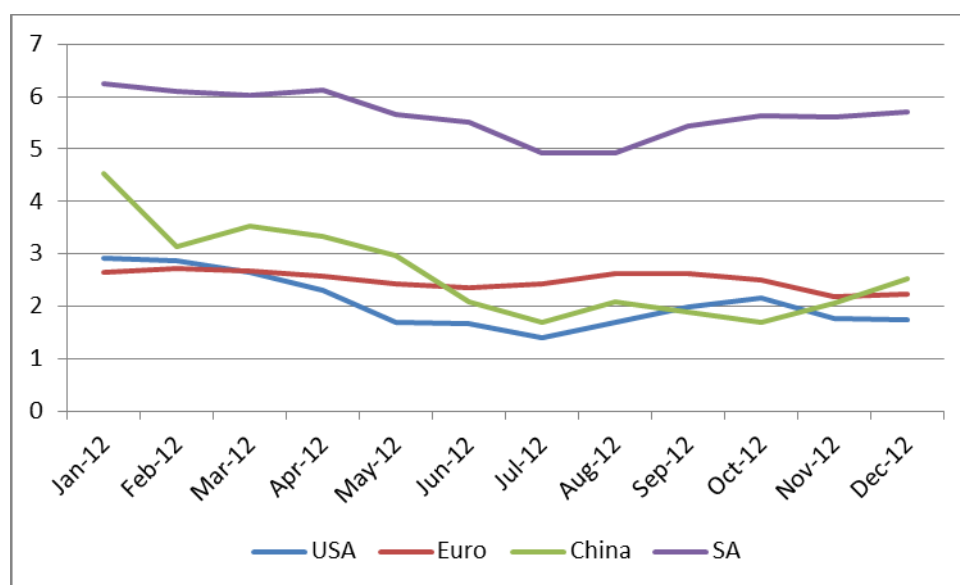
Starting in August, there was a gradual increase in the domestic inflation rate, despite the “benign international inflation environment”. The SARB states that the possible reasons for this acceleration in inflation could have been the depreciation of the rand, “high administered price inflation and wage increases in excess of inflation”. The fluctuations in administered prices were largely as a result of “fluctuations in petrol price inflation” (SARB. 2013a:30). The rand’s exchange rate generally “tracked that of the euro, especially after the global financial crisis”, but this relationships weakened in the second half of 2012 due to domestic factors (SARB. 2013:51).

The international inflationary pressures “remained modest” as a result of the “subdued global economic growth” that occurred in the second half of 2012 (SARB. 2013a:27). This slowdown also reduced “international commodity prices in especially the second half of 2012”.

6.13.2 The Reference Areas

By looking at the graph above, it becomes apparent that SA's inflation rate followed a generally similar trajectory as that of the 3 reference areas. However, it seems to have been more aligned to the trajectory of the US, up until October, where it became more aligned to China.

Figure 51: 2012 Inflation Rates



Source: IMF, 2016

The PBC (2013:13) states that GDP growth was 8.1%, 7.6%, 7.4% and 7.9% for the 1st, 2nd, 3rd and 4th quarter respectively. It attributed China's inflation behaviour to "prudent monetary policy" and implied that the fourth quarter rise in inflation was as a result of the increase in GDP growth (PBC. 2013:16). As shown in the graph above, China's inflation rate generally trended downwards up until the fourth quarter when it trended upwards.

Inflation in "most emerging Asian economies remained well contained" due to "moderate output growth", with India being the exception (Fed. 2013a:35). India's inflation rate stood at 10% for the year, and it is interesting to note that India's interest rates had been the highest it has been at 8.5%, for the entire period under review

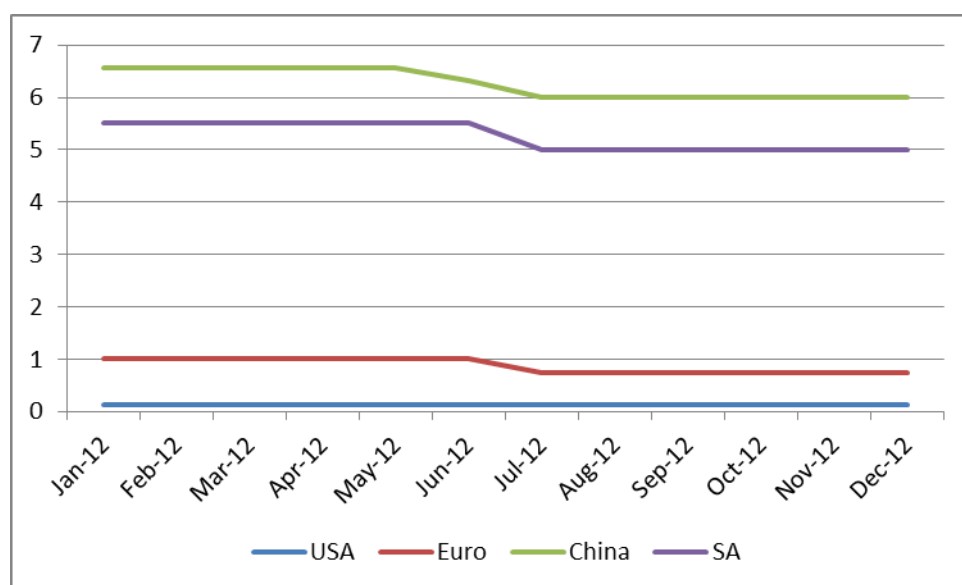
The Fed (2013a:10) states that the likely contributors to the low inflation rates of the US was the "considerable slack in labor markets and limited increases in labor costs, relatively stable

prices for commodities and imports, and well-anchored longer-term inflation expectations”. Growth in output was also generally lower than in the previous year.

The SARB (2013a:34) asserts that weakness in the economies of the Euro area led to lower inflation with Greece in particular experiencing deflation. GDP growth in the EU area continued to plummet, falling further into recession (Fed. 2013a:34).

6.13.3 The 2012 Interest Rates

Figure 52: The 2012 Interest Rates



Source: IMF. 2017b

It is once again noted that despite China’s interest rates being higher, its inflation rate continued to be significantly lower than that of South Africa. Once again, there may be some credence to the PBC’s assertion that it has applied its monetary policy prudently. For example, China lowered its interest rate from 6.31% in June to 6% in July, which may have assisted in boosting output and inflation during the second half of 2012. However, if it is assumed that the IT framework starts to deliver results by the 24 month, then the result contradicts the IT framework.

China began to increase its interest rates in October 2010, with another increase in December 2010, February 2011, April 2011 and July 2011. Given the IT framework, within a 24 month period, the increase would have reduced output, reduced inflation, and placed the economy on a more stable, stronger trajectory. The inflation rate had indeed been reduced from 4.4% in

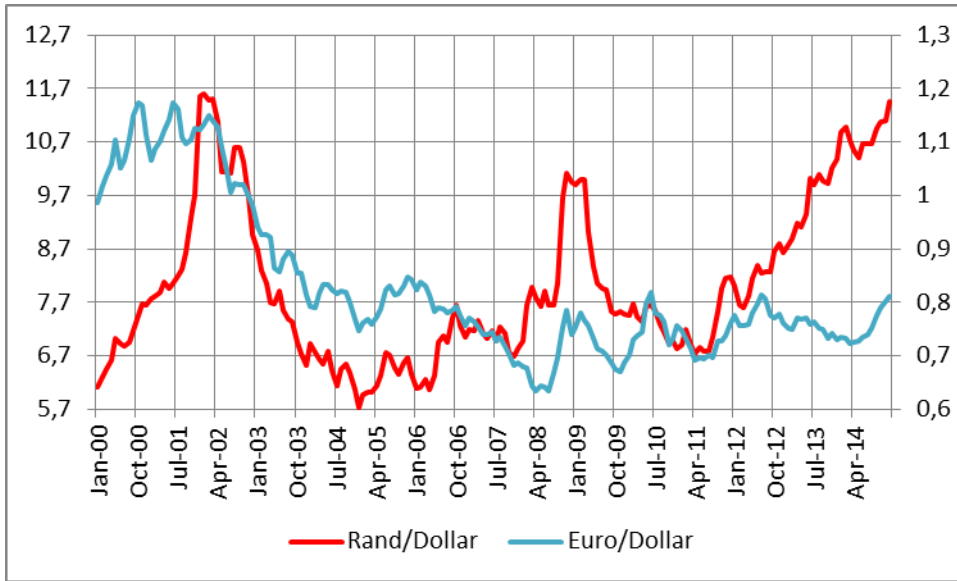
October 2010 to 2.6% in September 2012 and 1.6% in June 2013. Output had also been reduced, but the size of the declines does not suggest that increasing the interest rate had placed China on a more stable trajectory. The GDP growth rate for China had plummeted from 10.6% in 2010, to 7.8% in 2012 and 7.7% in 2013. By 2014, the GDP growth rate had fallen again to 7.3%. It might have been assumed that in the very least, output would have trended upwards by 2014.

Similarly for South Africa, it could be argued that the interest rate decreases that occurred in November 2010, gradually increased inflation more or less within a 24 month period. In November 2010, the interest rate was decreased by 50 basis points to 5.5%. At the time, the inflation rate stood at 3.5% and by October 2012, the inflation rate stood at 5.6%. However, for this claim to be valid, there would have to be an increase in output, which was not the case. Output had in fact plummeted from 4.3% in 2010 to 2.5% in 2012 and 2.4% in 2013. It had only slightly increased to 2.6% in 2014, which was still considerably weak. Even taking into account the interest increase of March 2010 and September 2010, this relationship between inflation and output does not hold. The GDP growth rate had been in general decline since 2010 and continued this trend into 2013 with a slight increase in 2014. Inconclusive outcomes are also evident in the US and EU area, hence, once again, a more plausible monetary policy tool might be needed to control the behaviour of the inflation rate.

6.13.4 The Relationship Between the Rand and the Euro

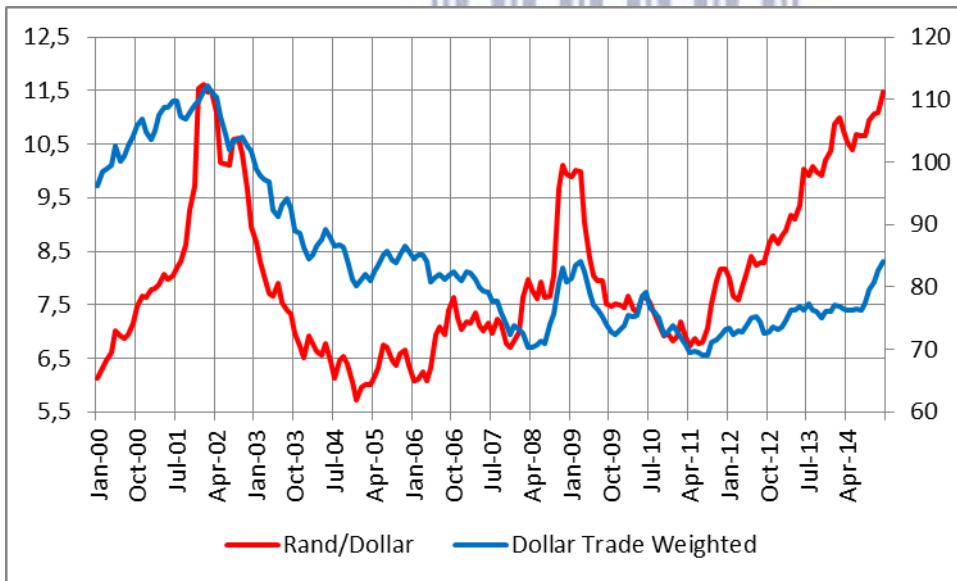
In section 6.4.1, it was asserted that there was a clear correlation between the rand and the dollar. It was also suggested that any breakdown in this relationship might be as a result of currency manipulation. However, in section 6.13.1, it was asserted that the SARB had confirmed that the Rand generally correlated with the Euro. However, the two graphs below illustrate these relationships and shows that the rand correlates strongly with both the Euro and the Dollar. Furthermore, it is observed that in both cases, there is a 'deviation' in these relationships at approximately the same time.

Figure 53: The Relationship between the Rand and Euro



Source 16: Fred 2017

Figure 54: The Relationship between the Rand and Dollar

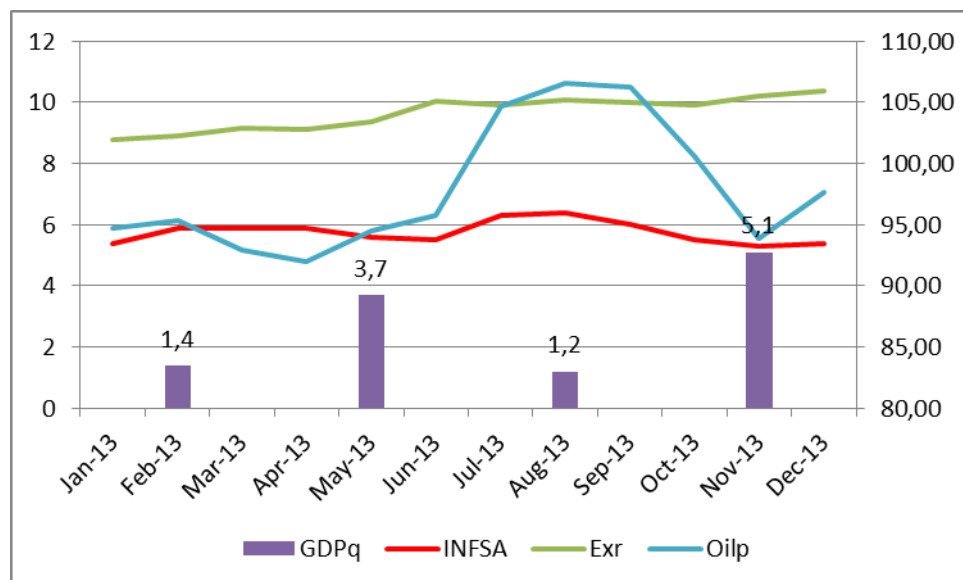


Source 17: Fred 2017

6.14 2013

6.14.1 The 2013 Narrative According to SARB and the Graphic Narrative

Figure 55: 2013 Relationship Between SA Inflation, SA GDP growth rate, R/\$ Exchange Rate, Oil Price



Source: SARB. 2015a, IMF. 2016, Fred. 2017a, Fred. 2015

The SARB (2014a:23) states that the inflation rate remained within the target range for most of the year, accelerating only marginally compared with the previous year and only breaching the upper limits in July and August. Furthermore, it ascribes fluctuations in the inflation rate to “food and petrol prices, with underlying inflationary pressures remaining fairly stable”. More specifically, inflationary changes “resulted largely” from the changes in the prices of non-durable goods, with petrol prices being a significant contributing factor. The acceleration in inflation during July and August “could mainly be attributed to higher petrol prices and, to a lesser extent, higher food prices” (SARB. 2013b:24).

It is observed that, once again, output and inflation did not correlate. The inflation rate increased during quarters where output was increased significantly and decreased where output decreased significantly. It is also once again noted that the ‘3% threshold’ hypothesis does not hold.

It could be argued that during each quarter, the inflation had a lagged response to the output of the previous quarter. It could also be argued that other factors such as the gradually

depreciating exchange rate distorted the impact of output. This possibility will be explored below.

As noted above, the exchange rate depreciated gradually, but the the SARB (2014a:2) asserted that this depreciation saw “little pass-through to consumer goods price inflation”.

The possible reasons for the limited pass-through given by the SARB include:

- Greater competition among producers due to surplus capacity
- “tight consumer budgets and conservatism among lenders and borrowers alike about the use and extension of credit”
- “the length of the supply chain, inventory buffers and the use of instruments to hedge against exchange rate movements”;
- Cheaper imports from “lowest-cost countries”;
- “technological advances lowering the real prices of a range of products such as telecommunication equipment and computers”; and
- “benign inflation expectations shaped by the generally successful inflation outcomes under inflation targeting”

However, the SARB does not state whether these factors definitively played a role but merely states that these factors “probably” contributed to the limited pass-through. The exchange rate did however depreciate significantly from a trough of R8.79/\$ in January to a peak of R10.37/\$ in December. It was noted that the rand weakened due to weaker-than-expected growth in output, a “decline in the international prices of gold and platinum”, and labour disputes (SARB. 2013a:51).

The SARB (2014a:4) attributed the weaker growth in output to labour disputes, “subdued business and consumer confidence levels”, hampered production due to “structural impediments”, and lethargic conditions in the global economy. The growth rate for 2013 was the lowest in 15 years, with the exception of 2009. It also stated above that the rand weakened because of ‘weaker-than-expected growth’, implying that the growth rate forecasted by the SARB had been incorrect. This incorrect forecast will be briefly explored below.

6.14.2 Forecasting Output and inflation: Another Brief Look at the IT Framework

After having grown by 2.5% in 2012, the SARB (2013d:73) had forecasted that the 2013 aggregate real GDP would grow at a rate of 2.6%. This forecast was made in the first quarter of 2013. However, by the end of 2013, aggregate real GDP had declined to a “disappointing 1.9%”. Not only was the growth rate significantly different to the actual growth rate, but the direction of the growth rate was also incorrect. If taking a look at how the IT framework is applied, then it would be logical to assume that the SARB weren’t able to forecast the inflation rate either.

As noted in section 6.14.1, the SARB implied that the “generally successful inflation outcomes” had been as a result of the application of the IT framework. Once again, the IT framework suggests that after forecasting future output, the SARB would be able to know the approximate magnitude and direction of the inflation rate. However, if the SARB aren’t able to forecast output, then by implication, it would not be able to forecast inflation. As noted above, the SARB admitted that it had been unable to give a correct approximation of the GDP growth rate hence it would be logical to assume that it been unable to forecast inflation. However, just because this particular forecast is wrong, it cannot be automatically assumed that SARB is wrong ‘all of the time’.

During the first quarter of 2012, the SARB (2012b:69) stated that after an estimated real growth rate of 3.1% in 2011, the growth rate was forecasted to decline to 2.8% for 2012. Despite this growth rate being incorrect, it can be argued that the estimation was approximately correct, depending on the margin of error. The growth rate for 2012 was 2.5%. If it is to be assumed that this was an acceptable approximation, then in the very least, the SARB’s ability to forecast growth can be argued to be correct ‘some of the time’. However, the forecast of 2.8% had to be changed from a previous forecast of 3.2%. In addition, prior to the forecast of 3.2%, in September of 2011, the SARB (2011b:63) had forecasted a 2012 growth rate of 3.6%. This forecast of 3.6% was changed from a previous forecast of 3.9% which was significantly different from the actual growth rate of 2.5%. These significant downward revisions suggest that the SARB struggles with developing accurate forecasts over the longer term hence it may also struggle to accurately forecast the inflation rate over the longer term. Also in September of 2011, the SARB had forecasted that the growth rate for

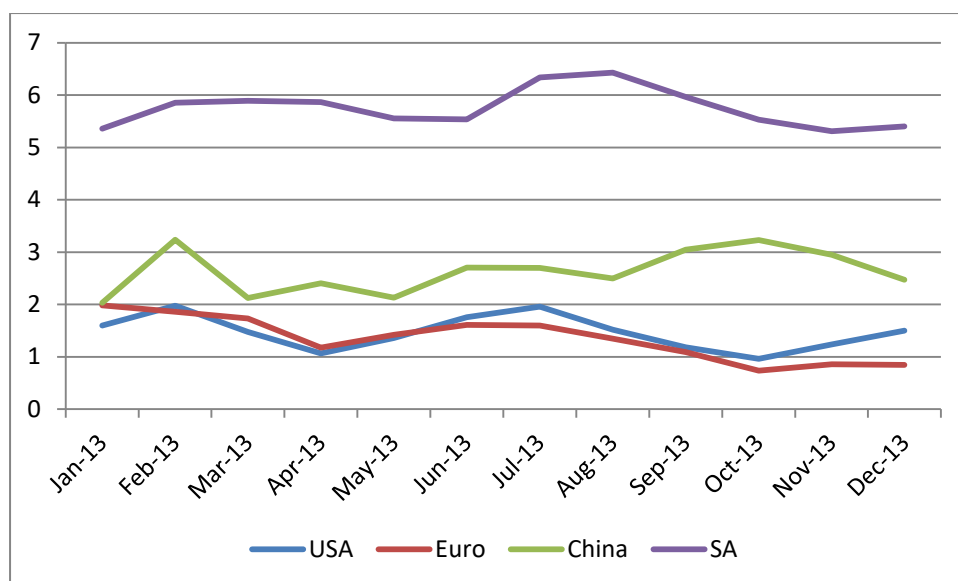
2013 would be 4.4% but as noted above, the actual growth rate of 1.9% was significantly different to the actual growth rate.

As noted above, the SARB may have difficulties in forecasting the GDP growth rate over the longer term but it does seem to have more accurate estimations over the shorter term. In the first quarter of 2010, real GDP was forecasted to grow at a rate of 2% (SARB. 2010b:66) and in the final quarter it was forecasted to grow at 2.8% (SARB. 2010c:67). The real GDP growth rate for 2010 was 2.9%, which is approximately equal to the forecast in the last quarter and once suggests that the SARB's forecasts are much more accurate over the shorter term. However, on the 12th of October 2006 (the last quarter), the MPC released a statement in which they wrote that the real GDP growth rate for 2006 is "expected to be lower" than the estimated 4.9% growth rate for 2005 (SARB. 2006b:60). In 2006 the actual growth rate had accelerated to 5.5% (SARB. 2007b:4). Despite this forecast for 2006 being made in the last quarter of 2006, the SARB had once again incorrectly forecasted both the magnitude and direction of the growth rate. This could mean that the SARB does not have the correct tools to forecast growth over both the long and short term. It could also mean that the SARB managed to improve its forecasting tools in the last few years to, in the very least, be able to forecast growth in the shorter term but still unable to give accurate longer term forecasts.

Regardless of which year is studied, it is observed that there are significant inconsistencies in what is forecasted by the SARB and the actual growth rates. Once again, output is fundamental part of the IT framework and being unable to predict output suggests an inability to predict the inflation rate.

6.14.3 The Reference Areas

Figure 56: 2013 Inflation Rates



Source: IMF, 2016

As shown in the graph above, the South African inflation rate generally correlated with the inflation rates of the US and Euro area. South Africa however had approximately the same inflation rate (5.4%) in December as it had in January. The US and EU's inflation rates experienced a significant downward trend from 1.6% in January to 1.5% in December and 2% in January to 0.8% in December respectively.

The ECB (2013a:68) states that the inflation rate in the first half of 2013 was largely influenced by “a strong decline in energy price inflation from the elevated levels seen in 2012”. It also stated that the sharp decline in the inflation rate that was experienced in August was largely as a result of “a decline in the annual rates of change of the energy, food and non-energy industrial goods components”, as well as “the appreciation of the euro over the past year”. More specifically, it states that the “fading away of the impact of past increases in oil prices” led to “negative base effects”. In other words, the annual oil inflation rates leading up to August had a significant impact on a negative energy price inflation rate of 0.4%.

It is noted that the inflation rates for South Africa were once again persistently and significantly higher than that of the reference countries. However, the Fed considered its significantly lower inflation rate to be problematic.

6.14.4 A Brief Look at the Fed's Monetary Policy Outcomes

The Fed's monetary policy report states that "the inflation rate over the longer run is primarily determined by monetary policy" (Fed. 2014a). The behaviour of the inflation rate since 2013 contradicts this statement and suggests that factors beyond the control of the Fed determine the inflation rate.

In its monetary policy report for 2013, the Fed's monetary policy committee stated that inflation was "persistently below its 2 percent objective", posing a risk to the economy (Fed. 2014a). It however assured the markets that the persistently lower inflation rate was "transitory"; and that "survey and market based measures of longer-term inflation expectations have remained in the ranges seen over the past several years". In other words, inflation forecast had shown that the inflation rate would eventually reach its 2% objective. This was not the case and IMF data shows that the inflation rate continued to be persistently and significantly below the stated inflation objective up until the November 2016 when it has reached 1.7%. During the month of December 2016, the objective was finally reached when the inflation rate was 2.1% However, since then, the inflation had fluctuated significantly and was either significantly above or below the 2% objective.

In a July 2017 article written for the New York Times, it was claimed that the Fed was "on track to fail for the sixth straight year" (Applebaum. 2017). At the time, the Fed's chairwoman, Janet Yellen is quoted as saying that "it's premature to reach the judgment that we're not on the path to 2 percent inflation over the next couple of years" (Applebaum. 2017). This quote verifies that the Fed had not reached its objective well into 2017. It also suggests that the Fed is not certain of how long it will take to get inflation under control.

6.15 2014

6.15.1 The 2014 Narrative According to SARB

The SARB (2014b:23) stated that "despite lacklustre output growth" during the first half of 2014, the inflation rate accelerated due to "an acceleration in petrol and food price inflation

and broader exchange rate pass-through”. By May 2014, the inflation rate had accelerated to 6.6%, “its highest level” since July 2009 when it was at 6.7%.

The considerable decline in the price of oil during the second half of 2014 “contributed largely to significantly lower domestic inflation” and helped contain global price inflation (SARB. 2015a:29). The declining oil price, which raised the “spectre of deflation in some economies”, was ‘reinforced’ by a stronger dollar, “weak demand and the decision by oil producers to refrain from cutting back on production” (SARB. 2015a:1). By the January 2015, the price of oil had “sank to a six-year low of US\$45 per barrel”.

It is perhaps important to point out that the declining oil price was influenced by factors external to the economy. If this was the case, then once again, the inflation rate was largely a function of factors external to the economy.

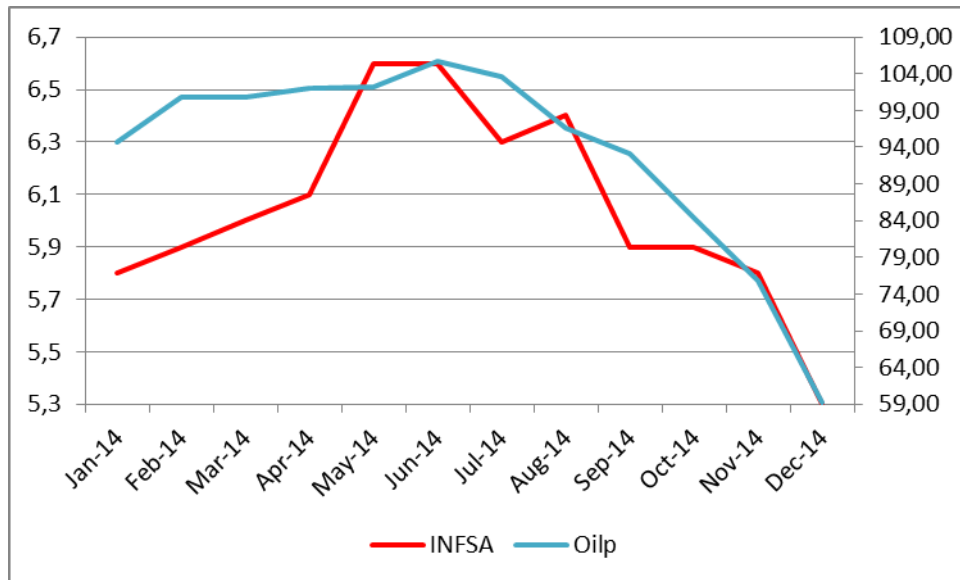
6.15.2 The Graphic Analysis and Reference Countries

As noted in section 1.2, the question for this thesis was formulated by causal observations made about the inflation behaviour in 2014. Thus far, the graphic analysis combined the selected variables into a single figure to establish a consistent narrative about the relationship between these variables. To understand the importance of 2014 in formulating the question, the independent variables will separated and illustrated to show its exact relationship with the inflation rate in the same context as a bivariate regression. The reference countries will also be included to provide context to the narrative.

The first variable that will be graphically analysed is the price of oil which is shown in the graph below. If it is assumed that the price of oil is the only variable that influences the inflation rate, then it can be argued that within the first half of 2014, the elevated and rapidly accelerating price of oil had also accelerated the inflation rate. The price oil had jumped from \$95 a barrel in January to \$101 in February, peaking at \$106 in June. The inflation rate had also trended upward troughing at 5.8% in January and moderating to a peak of 6.6% in May and June. During the second half, both the inflation rate and the price of oil fell relatively sharply. During December, the price of oil plummeted to a trough of \$59 a barrel and the inflation rate plummeted to a trough of 5.3%. There was however a momentary increase in the inflation rate from 6.3% in July to 6.4% in August. In addition, despite sharp monthly

declines in the price of oil throughout the second half, the inflation rate moderated from September (5.9%) to November (5.8%).

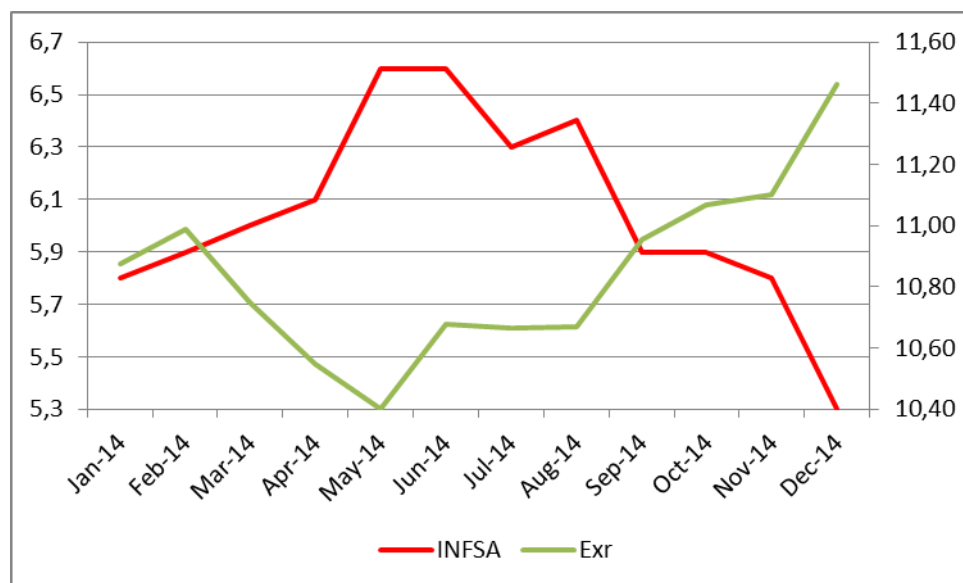
Figure 57: The 2014 Relationship Between the South African Inflation Rate and Price of Oil



The second figure below shows the relationship between the inflation rate and the rand/dollar exchange rate. Graphically, there was a counterintuitive negative correlation between the inflation rate and the exchange rate. Given this counterintuitive relationship, it could be argued that there was no relationship between these two variables and any indication of a relationship is spurious. However, even if this relationship is not visually evident, it does not mean that there was no pass-through. Calculated from data obtained from the SARB, it shown that during the 180 months from 2000 to 2014, the exchange rate had only been greater than R10/\$ for 29 months. These 29 months makes up 16% of the 180 months under review. Given this data it can be argued that the exchange rate had been unusually elevated since November 2013. It can be further argued that this unusual elevation contributed to the inflation rate remaining elevated regardless of other factors. For example, during the second half of 2014, had it not been for these unusually elevated exchange rate levels, the inflation rates might have seen a steeper drop in response to the steep fall in the price of oil. Furthermore, the moderation in the inflation rate from September to November could have been as a result of these elevated exchange rate levels. It was also during this time that the exchange rate depreciated sharply from R10.67/\$ in August to R10.95 in September and R11.

09 in November. However, the rand also depreciated sharply in from May to June at a time when the inflation rate moderated despite the sharp increase in the price of oil.

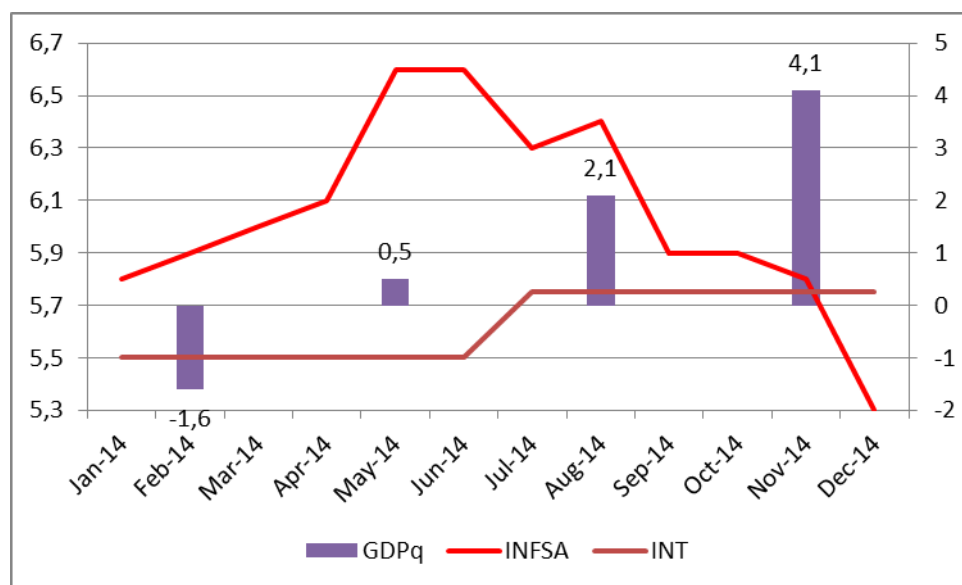
Figure 58: The Relationship Between the South African Inflation Rate and Rand/Dollar Exchange Rate



The third graph shows a relationship between the inflation rate and the GDP growth rate. Once again, the relationship between the GDP growth rate and the inflation rate does not reflect behaviour as would be forecasted within an IT framework. However, the significant increase in the GDP growth rate from 0.5% in the second quarter to 2.1% in the third quarter could help explain the momentary increase in the inflation rate in August. The fourth quarter increase in the GDP growth rate to 4.1% could also help to explain the moderation from September to November. It does not however explain the sharp fall in the inflation rate in December. The only viable explanation up to this point is the sharp drop in the price of oil. It should be noted that the GDP growth rate had decreased significantly from 2.2% in 2013 to 1.5% in 2014, the weakest it had been since 2009 and the second weakest growth rate for the entire observation period. The third weakest growth rate during the observation period was 2% in 2001.

The interest rate was added to the graph to perhaps help explain the increase in the August inflation rate increase. If it is the case that interest rates have a positive relationship with the inflation over a shorter term, then once again, the August inflation rate increase could be a lagged response to the increase in the interest rate. The interest rate was increased by a marginal 25 basis points from 5.5% in June to 5.75% in July.

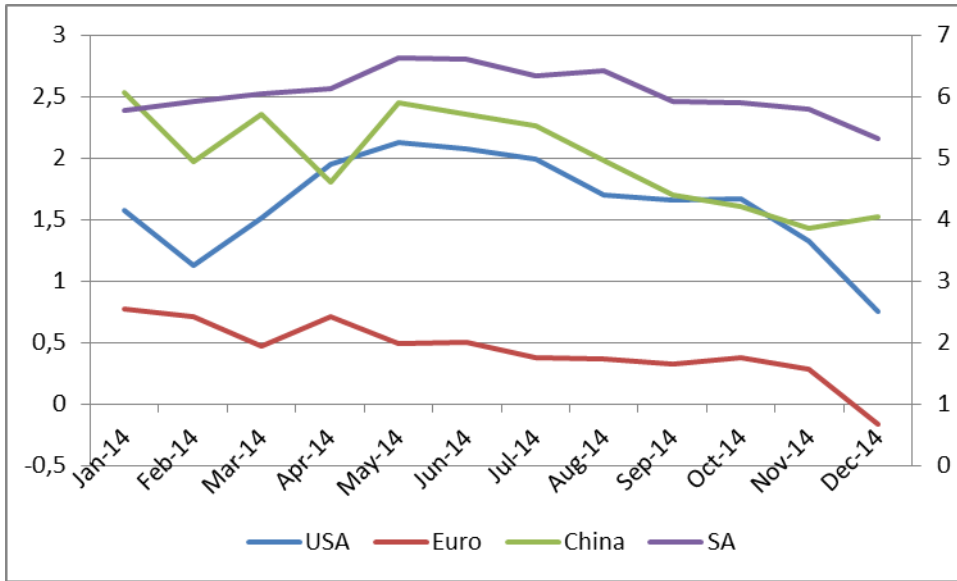
Figure 59: The Relationship Between the Inflation Rate, GDP Growth Rate and Interest Rate



The last graph is to show the relationship between the South African inflation rate and the inflation rates of the reference countries. Unlike the other graphs, the South African inflation is shown on the right vertical axis. This provides a more detailed illustration of the relationship between the respective variables.

The South African and US inflation rates generally exhibited similar trends during the first and second halves of the year whereas the inflation rates of the Euro area and China generally trended downwards. However, both China and the Euro area displayed a more moderating trend in the first half and similar to South Africa and the US, a sharp downward trend in the second half. What is of significance is that, during the second half, the South African inflation mimicked the behaviour of the US inflation rate, but with a one month lagged response. This could also help explain the moderation in the South African inflation rate from September to November. After having dropped sharply from 2% in July to 1.7% in August, the US inflation rate moderated at 1.7% in September and October. The inflation rates for all reference countries moderated in June and could help explain why the inflation rate in South Africa also moderated in June.

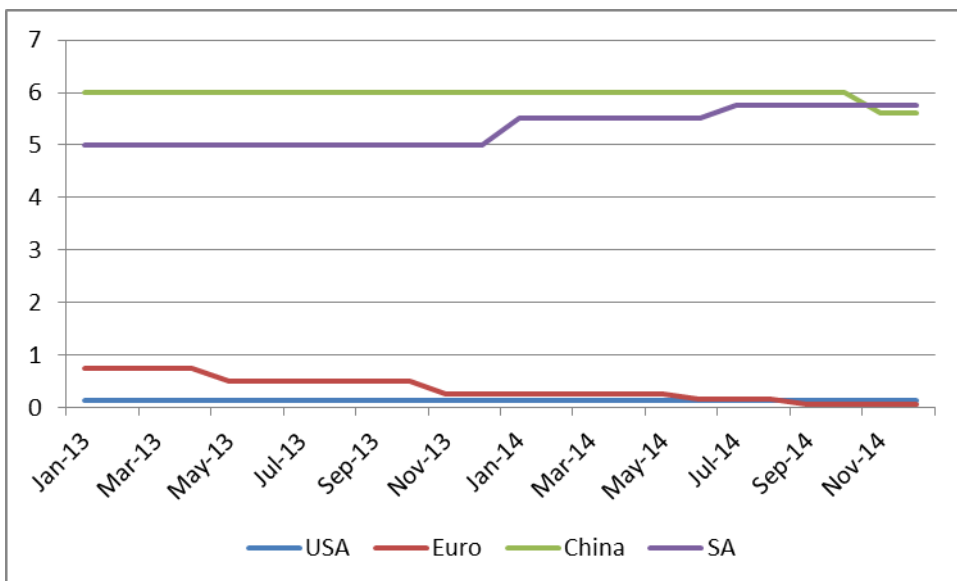
Figure 60: The 2016 Inflation Rates



6.15.3 The 2013 and 2014 Interest Rates

During the 2013 narrative, the interest rates were not included. The reason for this exclusion was the fact that the South African interest rates were changed in the first month of 2014, hence the narrative about the interest rates might have been disjointed. It also allows for a much more expansive narrative to be built to over a period of two years and conclude this part of the narrative on a more in-depth note.

Figure 61: The 2013, 2014 Interest Rates



During the 2013 period, South Africa, the US and China had kept their interest rates unchanged. All three countries experienced significant inflation rate volatility but the inflation rates of South Africa and the US remained approximately unchanged in the first and last month of 2013.

The US started the year with 1.6% in January, peaked at 2% in February and July 2013, troughed at 1% in October 2013, and ended the year with 1.5% in December. South Africa started the year at 5.4% in January, peaked at 6.4% in August, troughed at 5.3% in November and ended the year with 5.4% in December. China had started the year with a trough of 2% in January, peaked at 3.2% in February, and ended the year with 2.5% in December.

The Euro area however trended downwards, starting the year with a peak of 2% in January, troughed at 0.7% in October and ended the year with 0.8% in December. During the same period, it had reduced its interest rates by a cumulative 50 basis points from 0.75% in April, to 0.5% in May and 0.25% in November.

During the 2014 period, it was only the US that kept its interest rates unchanged. It should be once again noted that since 2008, these interest rates were at historically low levels, and yet, by December 2014, the inflation rate (0.8%) had reached its lowest level since October 2009. Prior to the financial crisis in late 2008, the inflation rate had never decreased to below 1% during the period under review. December 2008 was the first time it had decreased to below 1% during the entire period under review.

The Euro area had continued to decrease its interest rates from 0.25% in May 2014 to 0.15% in June and 0.05% in September. Its interest rates had also been at historically low levels since 2009. By December 2014 however, its inflation rate had turned negative for the first time since October 2009.

China's inflation rate of 1.4% in November 2014 was its lowest since November 2009. China however started decreasing its interest in June 2012, from a relatively high 6.56% in May 2012 to 6.31%. In November 2014, it decreased its interest rates from 6% in October to 5.6%. It should be noted that given its volatile behaviour since June 2012, it is unclear how the inflation rate was influenced by the lower interest rates. Unlike South Africa, the US and the EU area, its inflation rate increased in December 2014 which could mean that China is very responsive to a change in the interest rate.

South Africa maintained an interest rate of 5% for the whole of 2013 and only increased it by 50 basis points in January 2014. In July 2014, it increased the interest rate once again by 25 basis points. In January 2014, the inflation rate accelerated to 5.8% from 5.4% in December

2013, peaking at 6.6% in May and June. The inflation rate only reversed its sharply upward trend in July, when the trend in the price oil started to trend downwards.

6.15.4 The Preliminary Analysis for 2014

During the first half of 2014, the elevated and increasing price of oil might have accelerated the inflation rate. Had it not been for the unusually elevated levels of the exchange rate, the inflation rate might not have been as high as it had been; especially given the weak GDP growth rates and lower interest rates. However, the inflation rate had moderated in June, possibly due to a moderation in the inflation rates of South Africa's largest trading partners. In other words, during June, less inflation was being imported into the country.

During the second half, the inflation rate trended downwards as a result of the sharp drop in the price of oil. The inflation rate moderated from September to November quite possibly due to a sharp increase in the GDP growth rate, a one month lagged response to the moderation in the inflation rate of the US, and the continued elevated and depreciating exchange rates. The increase in the inflation rate in August might have primarily been a response to the sharp third quarter increase in the GDP growth rate and perhaps a lagged response to the increase in the interest rate

It is noted that the increase in the interest rate in January 2014 might have contributed to the acceleration in the inflation rate during the first half of 2014. As possible proof, the historically low inflation rates in the US and EU had only led to historically low inflation rates.

6.16 THE FINAL ANALYSIS OF THE NARRATIVE

As noted in chapter 1.3, the specific question is primarily aimed at looking at the rationale of increasing the interest rates during a low economic growth period. However, as elaborated on in chapter 4, given the conflicting empirical results and lack of consensus on inflation rate outcomes; it became necessary to understand the behaviour of the inflation rate in South Africa.

In chapter 5 it is noted that in order to begin with the process of explaining the behaviour of the inflation rate, the events surrounding the 29 February was used as an anchor by which to identify the principle dependent variables. These included the interest rates, the exchange rates and the price of oil. Not only was the narrative aimed at determining whether the selections of these variables were valid, but they also aimed to identify additional explanatory variables. Given that the SARB is the main authority on the inflation rate, the narrative always generally started with what the SARB identified as the main explanatory variables. The additional subsections, namely the graphic narrative, reference countries and interests were added to either support or dispute the SARB's narrative as well as find answers that are not provided by the SARB.

6.16.1 The Main Explanatory Variables According to the SARB

The table below lists what the SARB's narrative suggested was the main explanatory variables. The main explanatory variables mentioned by the SARB are divided into the primary and secondary explanatory variables. The primary variables are what the SARB considered to be the primary drivers of the inflation rate and the secondary variables are the variables that moderated or accelerated the effects of the primary variables.

It should be noted that to classify the variables, careful consideration was given to the wording of the SARB's reports. For example, in 2009 there are no primary explanatory variables because the SARB did not indicate which variables it considered to be the primary drivers of inflation. It just stated that the variables listed 'contained' the inflation rate.

Table 2: Primary and Secondary Explanatory Variables According to the SARB

Year	Primary Explanatory Variables	Secondary Explanatory Variables
2000	Price of Oil, Food Prices	Exchange rate
2001	Transport Costs, Exchange Rate	Imported Inflation*
2002	Exchange Rate, Price of Oil, Food Prices	Imported Inflation
2003	Exchange Rate	Imported Inflation
2004	Exchange Rate, Interest Rates, Food Prices, Price of Oil***	Imported Inflation**, Price of Oil***
2005	Price of Oil	Exchange Rate

2006	Exchange Rate, Price of Oil, Food Prices	
2007	Price of Oil, Commodity Prices, Growth in China and India, Food Prices****	
2008	Wages, Productivity Growth	Price of Oil, Exchange Rate
2009		Exchange Rate, Imported Inflation, GDP Growth Rate
2010		GDP Growth Rate (Global and Domestic), Exchange Rate
2011	Non-durable Goods, Imported Inflation	Price of Oil, Food Prices, Global GDP Growth Rates
2012	Food and Non-Alcoholic beverages prices, Petrol Prices	
2013	Petrol Prices	
2014	Price of Oil, Food Prices, Exchange Rate	

* Trading partner countries had lower inflation rates

** Trading Partners inflation rates were lower because of the lower oil price

*** It was not clear whether the SARB viewed the price of oil as a mere secondary moderating influence or a primary influence. The price of oil did however trend upwards with the inflation rate.

****The food prices accelerated because of the growth in demand in the world's largest countries

6.16.2 The 2000 Narrative vs the 2014 Narrative

The first thing that stands out is that the SARB's narrative during the observation period generally ended the way it had started. Both 2000 and 2014 had the same structural narrative where the price of oil and food prices was the primary explanatory variables and the exchange rate was the secondary explanatory variable. In other words, the inflation rate was primarily influenced by the price of oil and food price; and the exchange rate had the secondary effect of either moderating or accelerating the effects of the price of oil and food prices on the inflation rate. However, it is not necessarily the case that this structural narrative was evident in all years.

6.16.3 The Price of Oil

As shown in the table, the price of oil was listed as the primary explanatory variable in 7 of the 15 years under review. It was also listed as a secondary explanatory variable in 3 of those years but it should be noted that it was listed as both a primary and secondary explanatory variable in 2004. In total, the price of oil was listed as a main variable in 9 of the 15 years under review. However, in the years where it was not listed, the price of oil still played a role worth mentioning. These are elaborated on below.

In 2001, transport costs were listed as a primary explanatory variable and the SARB stated that diesel and fuel were the main factors influencing transport costs (using data extracted from the Department of Energy, it is shown that the price of diesel and petrol generally correlates at 90% with the price of oil). In addition, the SARB stated that price of oil minimised the impact that the depreciating rand had on the secondary explanatory variable, imported inflation. Figure 7 in chapter 6.2.2 also shows that the price of oil generally trended with the inflation rate for most of the year thus suggesting that the price of oil had a more profound impact than was suggested by the SARB.

In 2003, the price of oil generally did not trend with inflation rate, but in chapter 6.4.2, it was suggested that by observing figure 14, the steep rise in the price of oil in the fourth quarter moderated the fall of the inflation rate in that same quarter.

In 2009 and 2010, the SARB did not indicate that the Price of Oil was either a primary or secondary explanatory variable, but in its assessment of 2010, it did mention the Price of Oil to be “the biggest risk to the inflation outlook in the near future”. Figure 42 shows that there was generally no correlation between the inflation rate and the price of oil in 2009. In 2010 however, the inflation rate did trend weakly with the price of oil in the first three quarters of 2010 and more strongly in the fourth quarter which validated the SARB’s inflation outlook concerns

In 2012 and 2013, the petrol price was listed as a primary variable and the petrol price is of course directly influenced by the price of oil. However, as shown by figure 53 in chapter 6.13.1 and figure 58 in chapter 6.14.1, it is difficult to determine the exact relationship between the inflation rate and the indirect influence of the price of oil.

6.16.4 The Exchange Rate

The exchange rate was listed as a main explanatory variable in 11 of the 15 years under review, 6 of which was primary variable and 5 of which was the secondary variable. However, the exchange rate featured prominently in 2011 despite not being listed. It is observed in figure 49 under chapter 6.12.1 and elaborated on in chapter 6.12.5, that the exchange rate trended upwards with the inflation rate during the second half of 2011. It is also suggested that the acceleration in the inflation rate during this half was likely a lagged response to a generally significant depreciation of the rand. If this observation is accepted as valid, the exchange rate featured in 12 of the 15 years under review.

It was only in 2007, 2012 and 2013 that relationship between the inflation rate and the exchange rate could not be established with a certain degree of confidence.

In 2007, the inflation rate did not correlate with the exchange rate but it was also during this year that the inflation rate trended very strongly with the price of oil.

In 2012, it was generally difficult to ascertain the exact cause of the inflation rate using the graphic analysis. The relationship between the inflation rate and the exchange rate was also unclear in 2013. In chapter 6.14.1, it is noted that the SARB asserted that despite the depreciating rand, the pass-through in 2013 was limited.

6.16.5 The Relationship Between the Exchange Rate and the Dollar

It was observed on chapter 6.4.6 that there is a strong correlation between the rand and the dollar. Given the size of the South African economy to the US economy (as noted in chapter 4.2), it is more likely that the rand is a function of the dollar. If this is the case and one of the primary explanatory variables is the exchange rate, then it suggests that the inflation rate is generally a function of influences external to the economy and not as a consequence of monetary policy. Chapters 6.4.1 and 6.7.1 also notes the SARB's characterisation of the rand as being influenced by the dollar. This point is elaborated on in chapter 6.13.4.

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6.16.6 The Interest Rates

Despite the interest rate being touted as the primary tool through which it implements its monetary policy, the SARB only identified the interest rate as a main explanatory variable in 2004. However, as noted in chapter 6.5.1, the SARB contradicted the IT framework by stating that the lower interest rate in 2004 contributed towards keeping the inflation rate low. Given the mechanisation behind the IT framework, it would have been assumed that a lower inflation rate would have helped keep the inflation rate at an elevated level.

Similarly, in 2001 and outlined in chapter 6.2.1, the SARB also asserted that a decline in mortgage bond rates had contributed to reducing the inflation rate from a peak of 7.8% to a trough of 4%. In that year, interest rates had been decreased by 250 basis points. Since mortgage bond rates and interest rates are linked, the logical assumption is that a reduction in the interest rates reduced the inflation rates. This sequence of events and the SARB's statement once again contradicts the IT framework.

Also in 2001, the SARB indirectly credited the interest rates for ensuring price stability. More specifically, it credited monetary policy as a factor in ensuring price stability (although it should be noted that the SARB did not identify monetary policy as a main explanatory variable). If IT is the core framework of monetary policy, then it must be assumed that the SARB is saying that the interest rates had an impact on the inflation rate within the IT framework. In 2002 however, the inflation rate escalated rapidly to a relatively unstable November 2002 peak of 12.9%. In addition, in explaining its interest rate reduction, it incorrectly asserted that “the risk of missing the inflation target in 2002 was small” (chapter 6.2.5). This forecast was of course, profoundly incorrect.

Similarly in 2006, the SARB again cited monetary policy as a significant factor in curbing the inflation rate but in 2007, the inflation rate accelerated to a December 2007 peak of 9%. This acceleration continued into 2008 where it peaked at 13.7% in August. The SARB attributed the acceleration in August to “higher wage inflation and slowing productivity growth”, but it is not clear how significantly these two factors contributed to the inflation rate. What is clear though is that the SARB identified the price of oil and the exchange rate as two of the primary explanatory variables and figure 30 shows that the inflation rate ‘interacted’ strongly with both variables. Given that both of these variables (price of oil and exchange rate) are

more likely a function of influences external to the domestic economy, it is more likely that the inflation rate was influenced by events external to the economy and not by monetary policy.

Lastly, the SARB provides no details to defend its crediting of monetary policy in 2001 and 2006 nor does it provide substantial explanations as to why monetary policy failed in the years that followed. It can be verified though that by looking at Figure 7; figure 10; figure 33 and figure 38, in 2001; 2002; 2007 and 2008, the inflation rate trended strongly with the price of oil.

6.16.7 The Relationship Between the Interest Rates and the Exchange Rate

Other than what has been mentioned above, where the SARB suggested that the interest rate impacted the inflation rate, it was usually through its interaction with the exchange rate. For example, In 2001 (chapter 6.2.1), the interest rates were raised due to what can only be interpreted as an attempt to protect the value of the rand. As noted in section 6.2.1, the interest rates were raised as a direct response to the increase in bond yields resulting from the depreciating rand. In 2002 and 2003, the SARB also attributed the improvement in the performance of the rand to the higher interest rates.

6.16.8 The relationship Between the Interest Rate and Debt

As noted in chapter 6.1.2, 2000's household debt had already begun to grow faster than household income. By the fourth quarter of 2005, the ratio of debt to disposable income reached a 'new record level of 65.5%' (chapter 6.6.3). It was this acceleration in debt levels that contributed significantly to the record real household expenditure growth rate which in turn, contributed significantly to the strong GDP growth rate in that year. The acceleration in the debt ratio of 2005 was partly as a result of the record low interest rates at the time. It is noted that despite these record low interest rates, significantly high GDP growth rates and strong domestic consumption, the inflation rate remained comparatively low.

The inflation rate started to accelerate in 2006 which prompted the reserve bank to increase the interest rates. As noted in chapter 6.7.4, the increased interest rates did not curb spending

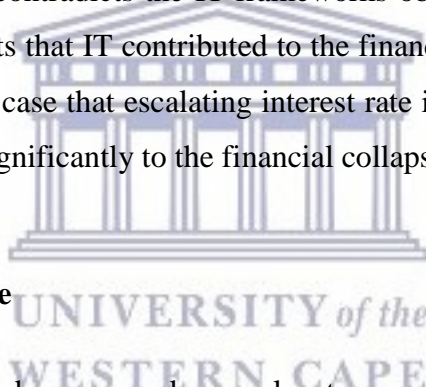
which the SARB partly attributed to the “low level of debt servicing costs”. In chapter 6.8.1, it is noted that the real household expenditure growth rate began to slow down in 2007 due to the higher inflation rate. Furthermore, the SARB asserted this slowdown was “exacerbated” by rise in the debt servicing costs. In other words, not only was inflation eating away at the purchasing power of consumers, so was the rising interest rates. It should also be noted that during this time (2007), the inflation rate had continued rise rapidly from ‘6% in January to a peak of 9% in December and the interest rates had peaked at 11% by December’.

In chapter 6.12.2, it was concluded that although decreasing the interest rates had encouraged consumers to take out more debt, an increase in the interest rate did not discourage them from acquiring more debt. It was more likely that the increased interest rates only accelerated both the debt burden and the inflation rate to unsustainable levels. Although the debt ratio declined since its peak of 89% in the first quarter of 2008, it only managed to trough at 78% by the end of 2014. This seemingly contradicts the IT frameworks objective of ensuring long term economic stability and suggests that IT contributed to the financial collapse of 2008. In other words, it might have been the case that escalating interest rate in the US accelerated the debt burden and thus contributed significantly to the financial collapse.

6.16.9 The GDP Growth Rate

The GDP growth rate was listed as a secondary explanatory variable in 2009, 2010 and 2011. This would suggest that within the IT framework, monetary policy had succeeded in getting the desired inflationary results. During this time, the inflation rate began at 8.1% in January 2009, trended downwards to a trough of 3.2% in September 2010, started trending upward and ended the period with 6.1% in December 2011.

24 months prior to January 2009, the interest rate was at 9% and had been part of an increasing interest rate cycle since June 2006. By the end of this upward cycle, the interest rate was at a peak of 12% in November 2008 after which it was decreased to 11.5% in December 2008. Given this information, it could be assumed that after just over 24 months of interest rate increases, GDP growth finally responded and fell from 3.2% in 2008 to -1.5% in 2009. However, the world’s GDP growth rate had also fallen from 1.8% in 2008 to -1.7% in 2009.



Given the size of South Africa's economy relative to the world economy, it is more likely the case that the drop in output was more a function of the world economy than a function of monetary policy. It is shown in chapter 6.9.2 that the SARB confirmed this assertion when it said that the financial crisis of 2008 led to a "highly synchronised global recession".

6.16.10 The GDP Growth Rate and its Role within the IT Framework

The IT framework generally suggests that it is able to forecast a fairly reliable approximation of the inflation rate. However, since output precedes the inflation rate, it would first have to forecast a fairly reliable approximation of the GDP growth rate. In addition, for the IT framework to hold, the GDP growth rate would have to correlate with the inflation rate (either contemporaneously or with an acceptable lag) and respond to interest rate changes.

In chapter 6.14.2, it was noted that there were multiple instances of incorrect GDP growth rate forecasts with approximations that were vastly different to the actual GDP growth rates in both magnitude and direction. It was suggested that the SARB does not have the necessary tools to forecast growth rates with any degree of certainty over the long term. Its tools may only be able to forecast growth rates over a period of less than one year.

It was also shown on several occasions that the inflation rate did not respond to the GDP growth rate and the GDP growth rate did not respond to interest rates changes. For example, in 2006 (chapter 6.7.4), the SARB acknowledged that the GDP growth rate did not respond strongly to the increase in the interest rate. During this year, the SARB increased the interest rate 4 times for a cumulative total of 200 basis points but the GDP growth rate had still finished stronger in 2006 than in 2005 while the inflation rate continued to escalate. In 2007, the GDP growth rate was lower than in 2006 but the inflation rate still escalated rapidly and the interest rate also continued to trend upwards with the inflation rate. As noted in chapter 6.8.3, the SARB acknowledged that in 2007, the inflation rate did not respond to the lower GDP growth rate.

Similarly in 2008, the inflation rate did not respond to the relatively lower GDP growth rates and the SARB attributed this inconsistency to higher wages and slower productivity growth. It states these two explanatory variables offset the “inflation-containing effect of waning demand”. However, once again, it is not clear how this was the case.

In 2010, it is shown that the interest rate decreases that occurred in 2010 was eventually followed by an increase in the inflation rate, but failed to produce any subsequent increase in the GDP growth rate.

The inconsistent relationship between the GDP growth rate and the inflation rate was even more pronounced in 2014. During the first half of 2014, when the growth rates were at -1.6% and 0.5% for the first and second quarter respectively, the inflation rate had a sharp upward trend. During the second half, when the GDP growth rates rebounded strongly to 2.1% in the third quarter and 4.1% in the fourth quarter, the inflation rate reversed its trend and declined significantly.

Lastly, it was noted in chapter 6.12.4 that in 2011, the SARB had implied that the factors influencing the domestic inflation rate was external to the economy and beyond its control. It is noted in chapter 6.12.1 that the international inflation rates accelerated despite the weak global GDP growth rate. In other words, the behaviour of the global inflation rate was also inconsistent with what would be forecasted within an IT framework.

6.16.11 The Observed Relationship Between the GDP Growth Rate and the Inflation Rate

Despite the generally poor understanding of the relationship between output and inflation (Blanchard, et al. 2010:7), the narrative made an attempt to see whether this relationship exists. For example, at the beginning of the narrative in 2000 and noted in chapter 6.1.1, the SARB stated that there was “little indication of endogenously generated inflation”. However, by observing figure 4, it was suggested that the GDP growth rate (an endogenous variable) played a moderating role, as would be the case with a secondary explanatory variable. The SARB also noted that the global downturn at the time was less evident in South Africa, which suggests that the growth rate was a more a function of domestic rather than global influences. Given these observations, it could be argued that the inflation rate was also partly a function

of endogenous influences. However, this was a tentative observation and this sort of behaviour was generally not observed in the years that followed.

The table below demonstrates what was observed via the graphical analysis. The categorizations and their meaning are as follows:

- Trending Strongly (TS): The GDP growth rate and inflation rate correlated strongly and positively
- No Trend (NT): There was no observed correlation
- Tentatively Observed Correlation (TOC): It was observed that there might be some correlation but this correlation cannot be established with certainty
- Threshold: The inflation rate responds to the 3% threshold, as hypothesised in section 5.1a
- Above 3% GDP Growth Rate (>3%): The GDP grew at rates above 3% in all 4 quarters
- Not Responding to Threshold: The GDP growth rate does not respond to the 3% threshold



Date	TS	NT	TOC	Threshold	>3%	NRT
2000			X		X	
2001	X			X		
2002		X		X		
2003		X		X		
2004		X			X	
2005		X		X		
2006		X			X	
2007		X			X	
2008			X			X
2009			X			X
2010			X			X
2011		X				X
2012			X			X
2013		X				X
2014		X				X
Total	1	9	5	4	4	7

As shown in the table, there was no trend observed in 9 of the 15 years under review. There was also a tentatively observed correlation in 5 of those 15 years. As noted above, in the

years where a relationship was tentatively observed, it cannot be claimed with certainty whether there was any correlation. It could thus be argued that at best, the relationship between the inflation rate and the GDP growth rate was relatively weak in 14 of the 15 years under review.

It also noted that the relationship with the hypothesised 3% threshold could only be observed in 4 of the 15 years and only where GDP did not grow at a rate of above 3% in all 4 quarters. This observed relationship with the threshold was only observed in years prior to 2008. Starting in 2008, there seems to be a complete breakdown in the hypothesised relationship. It should once again be clarified that is only a hypothesis derived from an attempt to find a suitable proxy for the GDP growth rate. Whether it is valid will not be elaborated on any further but it does emphasise the need for a more imaginative approach to understanding the relationship between the GDP growth rate and the inflation rate.

6.16.12 Imported Inflation

Although the SARB had identified imported inflation as secondary explanatory variables from 2001 to 2004, it was usually also identified as a function of some other main explanatory variables. From 2001 to 2003, imported inflation was identified as function of the exchange rate. In 2004 however, the SARB identified imported inflation as a function of the inflation rates of South Africa's trading partners.

Although imported inflation was not listed as a main variable in 2000, the SARB did note once again suggest that it is a function of the exchange rate and not a function of the inflation rates of trading partners. Figure 5 demonstrates why this is the case.

6.16.13 The Inflation Rate Relationship Between South Africa and the Reference Areas

It was observed throughout the narrative that South Africa's inflation rate generally trended in the same direction as the US inflation rate. These observations were made for 13 of the 15 years under review.

The relationship between these two inflation rates was unclear in 2010 and 2011. In 2011, the SARB did however note that the inflation rates of South Africa's trading partners were placing upward pressure on the domestic inflation rate.

Lastly, South Africa's inflation rate was generally higher and although all inflation rates generally trended upwards, South Africa's inflation rate accelerated faster. It was suggested that this was because of the fact that South Africa's interest rates were considerably higher than that of the reference areas.

6.16.14 The Food Price

Throughout the narrative, not a lot of emphasis has been placed on the food price because it was never clear as to how significantly the food price influenced the inflation rate. As noted in chapter 6.1.1, during 2000, the food price never generated any endogenous (or domestic) inflationary pressures and the ECB (2013a:68) also pointed out that the food prices generally "have had relatively little effect" on the inflation rate. In addition, the domestic price of food had generally been a function of international food prices and thus was not particularly susceptible to domestic monetary policy. Even in 2001 where the international food prices are less visible in domestic prices, the SARB indicated that the domestic food price was a more a function of the exchange rate which in turn, is more likely a function of the dollar.

Any further research on this area might need to definitively clarify the role of food prices in influencing the inflation rate.

6.16.15 Does Inflation Targeting Work?

In chapter 3.2, it was noted that Brito and Bystedt lists 3 strands of thought on the impact of IT in developing countries. These are:

1. Developing economies' "lack of institutional maturity and consistency of macroeconomic fundamentals could undermine credibility and give worse results"
2. The implementation of IT should improve the credibility of the central bank and "lead to better macroeconomic outcomes".
3. IT contributes "very little to lower inflation" and only succeeds in acting as "conservative window-dressing".

The first strand is negated by the fact that South Africa has a sound macroeconomic framework (chapter 4.1) and the second strand cannot be verified because of the tenuous relationship between output and inflation. In addition, the reports and data provide no concrete indication that increasing the interest rate lowers inflation and vice versa. The observed behaviour of the relationship between the inflation rate and the interest rate suggests that it is more likely that 1) the interest rate responds to the inflation rate and 2) the relationship between the two variables are positive. Given the information presented in the narrative, the only strand that seemingly applies to South Africa's monetary policy is the third, which is that IT does not lower inflation and as such, can be termed, "conservative window-dressing".

In addition, the narrative suggests that:

- The two variables that features most prominently in explaining the behaviour of the inflation rate are the price of oil and the exchange rate
- The price of oil and exchange rate are more likely a function of factors external to the economy
- The SARB had on several occasions failed to correctly forecast the inflation rate
- The SARB selectively credits monetary policy for inflation stability without providing any credible explanation for this assertion and fails to account for when the inflation rate becomes unstable
- Where the SARB credits monetary policy for inflation stability, factors external to the economy influences the inflation rate.
- An increase in the interest rate can only reduce inflation through its influence on the exchange rate
- The increase in the interest rate more likely increases debt to unsustainable levels and does not succeed in reducing output
- The increase in debt more likely adds additional cost of consumer goods and services which accelerates the inflation rate
- Unsustainable debt creates long term debt problems which leads to a structurally damaging economic collapse rather than some gradual, sustainable decrease in output
- The GDP growth rate is more a function of the World GDP growth rate than a function of domestic monetary policy

- The relationship between the GDP growth rate and the inflation rate is weak and the SARB seems unable to provide a reliable forecast of the GDP growth rate beyond a year.

It is this last suggestion that is pivotal to answering the question of whether IT works. According to the IT framework, causality should run from interest rates to output and from output to inflation. By that logic, the validity of the IT framework should not be analysed in terms of the relationship between interest rates and output but rather, the relationship between output and inflation. If it can be established that there is a clear relationship between output and inflation, then it can be concluded that, for example, an increase in the interest rates does indeed lead to a decrease in the inflation rate. If a relationship between output and inflation cannot be established, then from a purely mathematical standpoint, any model based on the IT framework will inevitably fall apart. Any further analysis to determine the relationship between the interest rate and the inflation rate would be irrational unless a point is reached where a clear relationship between output and inflation can be established. For the most part however, the relationship between output and inflation seems to be tenuous at best and can only be observed in 2001. In addition, IT would not be able to function as a predictive framework if it cannot forecast the outcomes of its explanatory variables. As noted above, the SARB's ability to forecast GDP growth rates is generally weak which, from a purely mathematical standpoint, negates IT as a reliable framework to forecast future inflation.

CHAPTER SEVEN: EMPIRICAL ANALYSIS OF QUANTITATIVE OUTPUTS

It was noted in chapter 5.3 that the quantitative outputs interrogate the validity of the quantitative conclusions. It was also noted that there are two parts to developing the model, the second of which will be derived from the Qualitative Narrative. Chapter 7 will start by justifying the choice of model and explanatory variables based on the qualitative conclusions in chapter 6. The outputs from the OLS regression will be presented and it will be determined if the outputs substantiates the conclusions in the qualitative historical narrative.

7.1 THE MODEL

Based on the observations made throughout the narrative, it was generally suggested that the explanatory variables have a ‘more contemporaneous’ relationship with the inflation rate. What this means is that, where an explanatory variable has a lagged month response to the inflation rate, these lags are generally either zero or one. Based on these observations, it was decided that a simple OLS model would be needed to confirm whether these observations are justified.

Other models that were considered included the Vector Autoregressive models where each variable is explained by “its own lagged variables” (Stock & Watson. 2001:101). However, given the information in the narrative, this would require a greater understanding of how debt produces a multiplier effect in the inflation rate. Another model that was considered falls within the Autoregressive Conditional Heteroscedasticity(ARCH) set of models and takes into consideration that financial variables often suffer from “autocorrelated heteroscedasticity” (Gujarati. 2011:239). More specifically, a variant of the ARCH models (GARCH), the Generalised ARCH model was to be applied. The GARCH model is more widely applied and remedies some of the shortcomings of the ARCH, particularly with regard to producing a more parsimonious model (Gujarati. 2011:246). However, several sources have indicated that the number of observations were not sufficient to produce reliable results.

7.2 THE EXPLANATORY VARIABLES

As was noted in chapter 5.3.2, the variables were chosen to simplify the model and to avoid any multicollinearity problems. For example, although the narrative spoke at length about the inflation rates of South Africa's largest trading partners, these inflation rates won't be introduced into the model since it would inevitably correlate with the price of oil. The variables that will be included are the interest rates, the price of oil, the exchange rate, and the '3% threshold'. The inclusion of these variables was justified by the conclusions derived from the narrative.

In chapter 6.9.5 of the narrative, it was noted that the two variables that always featured prominently was the price of oil and the exchange rate. It was even proposed that the collapse in the inflation rate at the end of 2008 was not a function of output, but rather, a function of the price of oil. It was also suggested that whereas the price of oil seemed "largely contemporaneous" in larger economies, it responded with a lag of one month in South Africa. It was suggested in chapters 6.5.2, 6.10 and 6.12.5 that the exchange rate also responded with a one month lag.

Although the interest rate generally seems to follow the inflation rate rather than determine it, it was also suggested that there is a positive relationship running from the interest rate to the inflation rate. For example, it might be the case that whereas the interest rates are increased in response to an increase in the inflation rate, the increase in the inflation rate results in an increase in the inflation rate. The relationship between these variables was elaborated on in chapters 6.3.5, 6.4.4, 6.5.4, 6.10.4, and 6.15.4. As was the case with the price of oil and the exchange rate, it was also suggested that interest responds with a one month lag.

It also seemed to be the case that 3% threshold featured as a viable indicator of inflation behaviour prior to 2008. However, it could be argued that since this hypothesis fell apart in 2008, it should not be included. However, another argument could be made that the 3% threshold did not necessarily fall apart, but rather, was distorted by multiple events during a time when the world economy was experiencing significant volatility.

7.3 ESTIMATING THE DETERMINANTS OF THE INFLATION RATE

The model will be implemented by running a simple regression via the Stata statistical package. As was noted above, each variable, excluding the GDP dummy, will be differenced for the purpose of looking at the effect that a change in an explanatory has on the change in the inflation rate. It was also noted that the thesis is specifically interested in the direction and relative magnitude of the coefficients. The variables be denoted as follows:

- IntR1 – The interest rate lagged by one month
- Exr1 – The exchange rate lagged by one month
- OilP1 – The price of oil lagged by one month
- GDPdum – The dummy variable for the ‘3% threshold’, where
 - 1 is the GDP growth rate of equal to or less than 3%
 - 0 is the GDP Growth rate of greater than 3%

Source	SS	df	MS			
Model	28.604054	4	7.15101351	Number of obs =	178	
Residual	37.3386992	173	.215830631	F(4, 173) =	33.13	
Total	65.9427533	177	.372557928	Prob > F =	0.0000	
				R-squared =	0.4338	
				Adj R-squared =	0.4207	
				Root MSE =	.46458	

Infr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
IntR1	.7511828	.0960305	7.82	0.000	.5616405	.9407252
ExR1	.4140491	.1136891	3.64	0.000	.1896529	.6384453
OilP1	.0453982	.0067325	6.74	0.000	.0321097	.0586867
GDPdum	-.1540165	.0729707	-2.11	0.036	-.298044	-.0099891
_cons	.0851437	.0475786	1.79	0.075	-.0087655	.1790529

The table above shows the output and generally suggests that the narrative produced reliable conclusions. All the variables, excluding the GDP dummy, have a positive relationship with the inflation rate. For robustness, lags of zero and two were also inputted into the regression. The results showed that the magnitude for each coefficient, excluding the GDP dummy, was less than when the variables were given a lag of one. This decrease in the magnitude was most pronounced in the coefficient of the interest rate, which suggests that an increase in the interest rate correlates most intensely with the inflation rate, a month after its change. Although this particular point won't be elaborated on, an interesting observation is that, where the 'one month lagged' rule was applied, the magnitude of the negative coefficient of

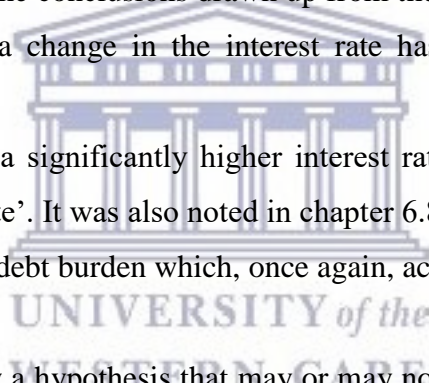
the GDP dummy increased. In addition, the adjusted R-Squared decreased significantly which implies that the 'one month lagged' rule gives a more accurate explanation of the variation in the inflation rate.

It is also observed that a change in the exchange rate has a significantly more profound impact in the inflation rate than the price of oil. This was explored in chapter 6.2.2 where it was suggested that the exchange rate has a greater impact. It was also suggested in chapter 6.5.5 that for the price of oil to have a more profound impact, its change would have to be significantly greater than the change in the exchange rate. The OLS seems to confirm that this is indeed the case. However, what is surprising is that the price of oil does not seem to exhibit significant pass-through to the inflation rate. This seems at odds with the narrative and requires further discussion. It is however in line with existing literature.

What is not surprising, given the conclusions drawn up from the narrative, especially through the graphic analysis, is that a change in the interest rate has the greatest impact on the inflation rate.

It was noted in 6.7.5 that a 'a significantly higher interest rate seems to contribute to the acceleration in the inflation rate'. It was also noted in chapter 6.8.5 that increasing the interest rates only seems to add to the debt burden which, once again, accelerates the inflation rate.

Lastly, although it is generally a hypothesis that may or may not be valid in the long run, the GDP dummy does suggest that a GDP growth rate of below 3% leads to a negative change in the inflation rate. It might confirm that there is indeed a relationship between the inflation rate and output, but what it does not confirm is that this relationship operates within an IT framework.



CHAPTER EIGHT: THE CONCLUSION

8.1 INTRODUCTION

The thesis was composed of 8 chapters. Chapter one provided an introduction to the thesis as well as the question that needed to be answered and the justification for asking this question. Chapter two and three summarised the relevant theoretical literature and empirical literature whereas chapter 4 provided a summary of the South African economy and the 2008 financial crises. Chapter five will introduce the methodology and quantitative outputs. Chapter 8 will conclude the thesis with the main findings and the policy recommendations.

8.2 MAIN FINDINGS: INCREASING INTEREST RATES IN A LOW GROWTH ENVIRONMENT

The specific objective of the thesis was to investigate the feasibility of increasing the interest rates in a low growth environment. It was suggested that, contrary to what is suggested by the IT framework, an increase in the interest rate increases the inflation rate. It was also suggested that if an increase in the interest rate decreases output, then it might not be prudent to increase the interest rate in a low growth environment. Three steps were taken to verify whether these two suggestions might hold merit.

8.2.1 The Empirical Consensus on IT

The first step was to investigate the existing empirical literature on the general performance of IT and more specifically, the performance of IT after the 2008 financial crisis. It was found that the research suggests that there is a general lack of consensus on the performance of IT, before and after the economic crisis. Various modelling techniques had been used which necessitated the use of a different approach to gain a more in-depth understanding of the behaviour of the inflation and the performance of IT.

8.2.2 The Conclusions of the Historical Narrative

To gain an in-depth understanding, a qualitative historical narrative was utilised which simply aims to tell the story of the inflation rate. The narrative was derived from the data and reports of the main authority on South Africa's IT, the SARB. The narrative also utilised the data and reports of the USA's Fed, the EU's ECB, and China's PBC as well as data from the World Bank and IMF.

The narrative suggested that the inflation rate is mainly a function of the price of oil and the exchange rate. More importantly, these two variables are more likely determined by factors external economy which implies that domestic monetary policy aren't able to substantially influence the inflation rate.

It was also noted that the SARB had generally failed to give a reliable forecast of the GDP growth rate. By failing to forecast a reliable approximation of the GDP growth rate, the SARB would not be able to forecast a reliable approximation of the inflation rate within an IT framework. It would be reasonable to assume that this assessment is correct, given the fact that the SARB had generally failed to give a reliable approximate forecast of the inflation rate. Given the mathematically logical conclusion that the IT framework does not hold, it is once again reasonable to assume that monetary policy does not substantially influence the inflation rate. The narrative did in fact find that there is very little information to contradict the conclusion that the relationship between output and inflation is tenuous. The thesis suggested that a 3% threshold could be used to identify whether this relationship exists. It was however emphasized that this threshold is hypothetical and does not provide conclusive evidence of the relationship between the inflation rate and the GDP growth rate.

If it is the case that the narrative is correct in its conclusions and the SARB is generally unable to manage the inflation rate, from a purely mathematical perspective, it would be irrational to evaluate the relationship between interest rates and inflation rates within an IT framework. To put it more bluntly, the logic of mathematics makes it unnecessary to include the IT framework as an assessment tool when answering the question of whether an increase in the interest rate increases inflation.

In answering the specific question, it is noted that the graphic narratives suggest that the interest rate has a more contemporaneous positive relationship with the inflation rate. The SARB had also implied that this positive relationship exists. This would further suggest that

IT does not produce the outcomes as suggested by its framework. In addition, increasing the interest rates did not necessarily reduce consumption and hence, did not reduce output. The only observable outcome was an increase in the debt burden to seemingly unsustainable levels which could have contributed to a long term low growth environment. In fact, it seems to be the case that the only variable that seemingly connects inflation rates, GDP growth rates and interest rates are debt. The narrative suggested that debt leads to an increase in the cost of goods and services which helps to accelerate the inflation rate. Furthermore, the SARB concluded that increased interest rates ‘exacerbates’ the impact of inflation. The narrative further suggested that this leads to unsustainable debt levels which collapse output instead of producing macroeconomic stability.

8.2.3 The Outputs of the Quantitative Model

As noted previously, the thesis was primarily focused on a qualitative centred narrative and the outputs of the quantitative model were used to determine whether the conclusions from this narrative are valid. The model and the explanatory variables were also chosen based on these qualitative conclusions. The thesis was primarily interested in the direction and relative magnitude of the coefficients.

The model generally gave substance to what was suggested by the narrative. The model suggested that the price of oil and the exchange rate increases the inflation rate and that the exchange rate has a more substantive impact on the inflation rate than the price of oil. What was confusing however is that the model also suggested that the price of oil has a fairly marginal impact on the inflation rate, contrary to what the narrative suggested. The model also suggested that the inflation rate decreases when GDP grows at or below a rate of 3%. However, once again, this is hypothetical and should be subjected to further analysis.

Most importantly, the model generally suggested that the narrative may be correct in its assertion that there is positive relationship between the interest rate and the inflation rate. It may also be the case that this relationship is most pronounced one month after the change in the interest rate. The model cannot claim to have detected causality, but given the SARB’s own admissions and the general observations in the narrative, it may be the case that inflation does indeed lead to an increase in the interest rate. It should however be noted that the model’s design is not particularly sophisticated and further research should be conducted to

definitively conclude on the relationship between the inflation rate and the interest rate. In building this sophisticated model, it would seem to be the case that debt plays a pivotal role.

8.2.4 A Simple Scenario

Correlation does not imply causation hence the thesis cannot claim to have found the answer to the relationship between interest rates and inflation. It also cannot claim to have found definitive proof of the negative impact of increasing the interest rate in a low growth environment. However, given the qualitative conclusions and quantitative outputs, it seems more probable that interest rates does have a positive relationship with the inflation rate and that increasing the interest rate within a low growth and high debt environment would have consequences that is less than desirable. To conclude this section and provide some substantive reasoning to this probability, a simple scenario was constructed to highlight the possible interactions between the relevant variables as suggested by the narrative and the model. This scenario is as follows.

In 2000, person X has a real income of R10000 a month, a debt burden of R10000 and a debt repayment obligation of R400 a month. Assume that the inflation rate and the rate of wage increases remains at 0% for the entire period under review. Also assume that person X does not save. Due to the low interest rates, Person X continues to accumulate debt and by 2014, that Person X has a debt burden of R80000 and a debt repayment obligation of R4500 a month. In 2000, Person X could contribute towards growing the economy by spending R9600 a month. In 2014, person X could only spend R5500 a month which is reflected in the declining GDP growth rate. This significant reduction in spending is also reflected in the increasing unemployment rate.

Let us assume that in 2000, Person X's spending helped employ Person Y. In 2014 however, Person Y had to be retrenched because Person X did not spend enough money. Whereas Person Y had a real income of R5000 in 2000, s/he has an income R0 in 2014. At this point, not only is person X's reduced spending power reducing the GDP growth, but person Y's lack of income is accelerating the reduction in the GDP growth rate.

Let us now assume that in 2000, the inflation rate and the rate of wage increases are greater than zero but equal to each other (it is still assumed that the real income is R10000). However, halfway through the period under review, the interest rates are increased which

increases the cost of production. This increased cost of production leads to an increase in the cost of consumer goods and services, effectively accelerating the inflation rate to levels that are greater than the rate of wage increases. By 2014, the inflation rate had reduced Person X's real income by R500 and s/he only has R5000 to contribute to the economy. However, the increase in interest rates also increased person X's monthly debt obligations which reduces his/her spending power by another R1000, effectively leaving person X with only R4000 a month to contribute towards growing the economy. At this point, Person X is contributing too little and the factory at which Person Y had worked previously has to shut down. The factory owner has to sell all the assets which include all moveable and immovable assets. Several people become unemployed and given the cost of the assets (especially the sunk costs), it would take years for another factory to be built. Due to these lost jobs and Person X's own reduced spending power, the economy enters into a recession and the factory that employs Person X, shuts down. Person X now has a real income of R0 and a debt burden of R80000 while the economy will take years to recover from the structural damage caused by the factory closures. The economy effectively enters into a period of long term low growth and high unemployment. However, the scenario does not take into consideration a period in which the economy is already within a period of low growth.

If in 2014, the economy had already been a period of low growth, how would an increase in the interest rate affect Person X? Let us assume that Person X has a certain skill that would allow him/her to find employment within a year. However, let us now assume that Person X did in fact save money and s/he has enough money to service the debt obligations. In 2014, the Central Bank decides to increase the interest rate which increases production costs, accelerates inflation and reduces the real value of Person X's savings (we assume that the interest rates on savings is less than the inflation rate). Person X has already reduced his/her consumption spending and this is reflected in the low GDP growth rate. However, after the interest rate increase, Person X has to implement further reductions in spending which is once again reflected in an even lower GDP growth rate. This reduced spending leads to additional factory closures and job losses which pushes the economy into a period of recession. A point is reached where the factory closures and increased unemployment leads to an oversupply of persons with the same skills as Person X, hence making it improbable that s/he would find employment within a year. Before the interest rate increase, Person X would have found employment within a year and would have contributed towards the economy through increased spending. The economy would have begun a process of recovering. However, the

oversupply of labour results in Person X finding employment after a year which extends the period of low growth and high unemployment.

8.3 POLICY RECOMMENDATIONS

Both the quantitative historical narrative and the qualitative model suggest that the IT does not produce the results as intended by its framework. In addition, the SARB had conceded that this statement holds true. Mathematically, it would seem irrational to implement a model that produces substantially incorrect approximations in both direction and magnitude. It would seem more rational and logical that after approximately 17 years of applying a framework that produces unreliable results, the SARB would have rethink its implementation and either 1) interrogate and improve on the current model or 2) discard IT in its entirety in favour of a more reliable framework. The thesis cannot claim to have an answer to the IT conundrum and hence, cannot make any policy recommendations with a substantive amount of evidence and reasoning to validate these recommendations. However, what the thesis can state with a certain degree of confidence is that further research on the effectiveness of IT and the relationship between the inflation rate and the interest rate would need to be prioritised and the recommendations implemented.



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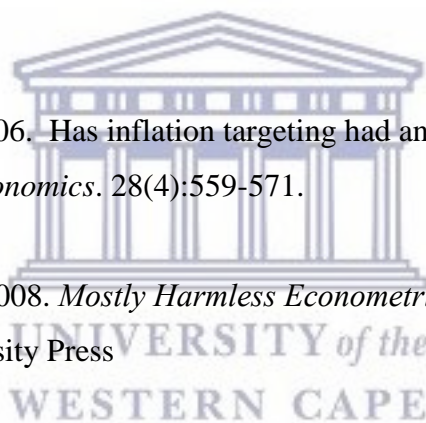
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