CHAPTER NINE

EMPIRICAL ANALYSIS AND EVALUATION

9.0 EVALUATION PROCEDURE, SAMPLE PERIOD AND DATA SOURCES

Traditional classical regression analysis was used to evaluate the equations representing the structuralist and orthodox or neo-liberal arguments.. If the structuralist arguments are formulated as the null-hypotheses, then those of the orthodox or neo-liberal economists are the alternate hypotheses. If, for example, the orthodox arguments are rejected as null-hypotheses, then the orthodox or neo-liberal arguments are rejected. On the other hand, if the null hypotheses cannot be rejected, then the orthodox or neo-liberal arguments are confirmed. The regression analysis results are next tested for stationarity of the time-series, to avoid spurious conclusions about the established relationships. The augmented Dickey-Fuller (ADF) test is used to test the results obtained using OLS, which are presented next.

9.1 THE ESTIMATED EQUATIONS AND SAMPLE PERIOD

The two estimated and tested equations are the following:

$$M3_t = f(M3_{t-1}), \tag{69}$$

and

$$GDP = f\ (M3, CPI). \tag{70}$$

This study covers the period 1960 to 1997. Yearly data on the small and open economy of the Republic of South Africa are used, obtained mainly from the Quarterly Bulletin of the Reserve Bank of South Africa, and other economics

journals, both South African and international.

9.2 HYPOTHESES TESTING

The tested hypotheses are the following:

1.) Null hypothesis (structuralist) : $M3_t \neq f(M3_{t-1})$;
Alternative hypothesis (orthodox): $M3_t = f(M3_{t-1})$;

2.) Null hypothesis (structuralist) : $GDP \neq f(M3, CPI)$;
Alternative hypothesis (orthodox): $GDP = f(M3, CPI)$;

3.) Null hypothesis (structuralists) : Incontrollability of money supply;
Alternate hypothesis (orthodox): Money supply is controllable.

The results obtained are presented in the next section.

9.3 RESULTS OF THE TEST EQUATIONS

The following tables present the regression results after applying collected data on equation (23), to test the null hypothesis that $\beta=0$, that is the t-statistic for $M3_{t-1}$ is 0 or that $M3_{t-1}$ is not related to $M3_t$, which is informally conducted to shed some more on the controllability of monetary supply in terms of keeping it within set monetary targets. The results are obtained using the computer econometric package EVIEWS. Here only the t-statistic is uses, and not the augmented Dickey Fuller (ADF) test, since we are not measuring a long-term relationship. The results are of particular importance for this study, in explaining whether or not monetary policy can have any impact or influence on economic growth of a small and open economy, by changing money supply levels even if it cannot influence such levels.

From table 21, with 37 observations, n, and one explanatory variable, k, our degrees

of freedom, n – k – 1, become 37 – 1 – 1, becoming 35. This being over 25 degrees of freedom, and the t-statistic for M3(-1) being 139.034, which is far more than 2, the figure used for applying the rule of thumb the to determine the significance of the t-statistic, we reject the null hypothesis that β is not significantly different from zero. Thus, the structuralist argument that there is no significant relationship between the level of money supply in the current period, t, and the money supply level in the previous period, $t-1$, must be rejected and the alternate orthodox hypothesis that the monetary authorities can influence the current level of money supply, $M3_t$, by applying monetary policy on that of the previous period, $M3_{t-1}$, must be accepted.

TABLE 21: $M3 = \alpha + \beta M3_{t-1} + \mu_t$

Test Equation (21)

LS/Dependent Variable is M3

Sample (adjusted): 1961 1997

Included observations: 37 after adjusting endpoints

Variable	Co-efficient	Std. Error	t-Statistic	Prob.
α	980.6329	883.1809	1.110	0.27
M3(-1)	1.1474	0.000853	139.034	0.00

R^2	: 0.99
Adjusted R^2	: 0.99
Durbin Watson	: 1.77
Akaike's Information Criterion (AIC)	: 16.82
Schwarz Criterion	: 16.91
F-statistic	: 19330.51

9.4 HYPOTHESIS TESTING: IMPACT OF M3 AND CPI ON GDP

Having found that there is a relationship between $M3_{t-1}$ and $M3_t$ money supply of a small and open economy like that of the Republic of South Africa, informally

confirming the orthodox or neo-liberal argument, we still [illegible] arguments on whether or not monetary authorities can control money supply, namely, whether they have the ability to keep it within set monetary targets, as well as test whether or not there exist a significant relationship between this country's economic growth, GDP, on the one hand, and money supply, M3, and inflation, CPI on the other, as advocated. According to the structuralists, in opposition to the neo-liberal view, there is no relationship between GDP and M3, since the economic growth of a small and open economy is said to be insulated from monetary phenomena, that is changes in M3, as well as inflation, CPI, but to depend on the economic growth of the big developed western countries with which it trades. Thus, the argument can be formulated using the null hypothesis, H_o, stating no relationship between these variables, and the opposite as the alternative hypothesis, H_A, and then collected data can be applied to these hypotheses based on the test equation (70):

$$GDP = \alpha + \beta_1 M3 + \beta_2 CPI + \mu$$

as follows:

$$H_o : \beta_1 + \beta_2 = 0$$

$$H_A : H_o \text{ is not true.}$$

Applying the same analytical methods used to test the controllability of money supply by the monetary authorities of a small and open economy, that of the Republic of South Africa in this case, we arrive at the results contained in the table 22 on the next page. These results are found by applying empirical data in testing the above equation.

Again, we start with the initial visual inspection, for stationarity, after using the rule of thumb method of establishing the significance of M3 and CPI in explaining real GDP. The t-statistic values of M3 and CPI from table 22 are 12.19 and 14.78, respectively, both more than 2, thus implying significance. While M3 and CPI are individually significantly related to GDP, we must also test whether both are similarly significant or not.

To do this, we use the F-test. Here we have k, the explanatory variables, being 2, that is the numerator for the F-table, and n – k – 1 being 38 – 2 – 1 = 35. From the F-table, we get the value 5.39% at 1% significance level for the sample of 30 observations and

TABLE 22: TEST EQUATION: GDP = $\alpha + \beta_1 M3 + \beta_2 CPI + \mu$

Dependent Variable	: GDP
Sample (adjusted)	: 1960 1997
Included observations	: 38

Variable	Co-efficient	Std. Error	t-Statistic	Prob.
α	101157.1	5072.935	19.94	0.0000
M3	0.303833	0.024920	12.19	0.0000
CPI	7237.524	489.4733	14.78	0.0000

R-squared	: 0.93
Adjusted R-squared	: 0.93
Durbin Watson	: 0.89
Log likelihood	: -417.32
Akaike's Information Criterion (AIC)	: 22.12
Schwarz Criterion	: 22.25
F-statistic	: 243.84

5.18% for the sample of 40 observations. Given that the calculated F-value (F) given by table 22 is 243.84, very much greater than both the critical value (Fc) for the sample of 30 and 40, we do not need to extrapolate.

Applying the test criterion:

Reject H_o: if $F > Fc$

Don't reject H_o: if $F < Fc$

We reject the null hypothesis, representing no relationship between both M3 and CPI, and GDP, that is their correlation co-efficients, $\beta_1 . \beta_2 = 0$, and "accept" the argument that changes in the money supply, M3, and inflation, CPI, both affect economic growth, GDP, of a small and open economy. Subsequent to this informal testing a more formal ADF-test for stationarity was conducted to test for stationarity. The results are captured in the table 23, on the following page:

According to table 23, the ADF test statistics is –4.39328. We compare this to the calculation of the MacKinnon critical value, for $C(p)$. At 1% significance level, now with n = 2 and T = 36, we get:

$$C(p) = (-3.9001 - 10.534/36 - 30.03/36^2) \approx -4.22 \qquad (74)$$

We apply the criteria test that we reject the null hypothesis that there is no co-integration, when the ADF test statistic is less negative than –4.22. Since –4.39 is more negative than –4.22, we reject the null hypothesis that there is no stationarity.

Accordingly, we can draw the meaningful conclusion that economic growth (GDP) of a small and open country, the Republic of South Africa in this case, is significantly affected by changes in money supply (M3) and inflation (CPI). Thus, the neo-liberal or orthodox argument that economic growth in an open and small economy is related to changes in money supply and inflation is confirmed.

The complement of the above empirically rejected structuralist argument is that the economic growth of a small and open economy depends on the economic growth of its big trading partners. For the sake of interest, and in the light of the fact that the crux of the structuralist argument concerning the relationship between economic growth of South Africa and money supply and inflation has already been rejected, an

informal test of the impact of the levels of economic growth of selected big trading partners on that of South Africa was empirically conducted. Of all the selected trading partners of South Africa, namely, the United States (USGDP), the United Kingdom (UKGDP), France (FGDP), Japan (JGDP), and Germany (GGDP), *none is significantly related* to the economic growth of South Africa (RSAGDP) and they collectively explain only 33 per cent of it, as shown in table 24.

TABLE 23: AUGMENTED DICKEY-FULLER UNIT ROOT TEST

ADF Test Statistic		-4.349328		
Augmented Dickey-Fuller Test Equation:				
Dependent Variable	: dGDP			
Method	: Least Squares			
Sample (adjusted)	: 1962 - 1997			
Included observations	: 36 after adjusting end points.			
Variable	**Co-efficient**	**Std. Error**	**t-Statistic**	**Prob.**
dGDP(-1)	-0.662753	0.152381	-4.349328	0.0001
R-squared		: 0.356991		
Adjusted R-squared		: 0.338079		
SE of regressions		: 11399.89		
SSR		: 4.42E+09		
Log likelihood		: -386.3419		
Durbin Watson Statistics		: 1.964264		
Akaike's Information Criterion (AIC)		: 21.66252		
Schwarz Criterion		: 21.66252		
F-Statistic		: 18.87638		

9.5 THE SARB AND THE CONTROLLABILITY OF MONEY SUPPLY CHANGES: 1986 – 1997

Monetary targets were introduced in 1986 in South Africa. According to the SARB, these targets were never regarded as rigid rules to be religiously adhered to. The Reserve Bank is said to have used its discretion and often allowed the growth of the money supply to move outside the set target ranges. To reflect of this position, the SARB change of the terminology to *monetary guidelines* in 1991, "...to convey the authorities' views as to what should happen to money growth rate in the prevailing economic conditions, rather than as a firm *forecast* of the rate of monetary expansion

TABLE 24: TEST EQUATION

RSAGDP = f(USGDP,UKGDP,FGDP,JGDP,GGDP)

Dependent Variable	: RSAGDP
Sample (adjusted)	: 1960 1997
Included observations	: 37

Variable	Co-efficient	Std. Error	t-Statistic	Prob.
α	-2444.289	1476.588	-1.65	0.1079
USGDP	77.17824	184.6901	0.41	0.6789
UKGDP	345.8979	234.0246	1.47	0.1495
FGDP	64.97752	230.2551	0.28	0.7797
JGDP	352.0478	255.3303	1.37	0.1778
GGDP	16.18513	85.04126	0.19	0.8503

R-squared	: 0.42
Adjusted R-squared	: 0.33
Durbin Watson	: 0.09
Log likelihood	: -331.27
Akaike's Information Criterion (AIC)	: 15.39
Schwarz Criterion	: 15.65
F-statistic	: 4.57

in the guideline year or as a binding *commitment* to the rate of monetary expansion

that was to be achieved at all costs." (SARB1991:25).

Given that South Africa is a small and open economy, even if the SARB sets the repo or market rate, monetary policy is always subject to the balance of payments constraint. This was clearly stated by the Governor of the SARB, when South Africa's gold and foreign reserves declined by over R3 billion in four months. The Governor went on to state that should the restrictive impact of such a decline on domestic liquidity continue, interest rates would not be reduced, irrespective of what is happening to the inflation rate. A warning was also given, that should the overall deficit on the balance of payments continue, that would lead to higher interest rates, which the SARB would not try to neutralise by the creation of money (Stals 1993: 30).

However, it is not the market that sets the interest rates, but the central bank, even if it frequently seems to be passively following market trends. In reality, it decides the monetary *targets* or *guidelines*, bases on its estimate of the strength and direction of other market forces. Table 25, on the next page, reflects *monetary targeting* experience in South Africa between 1986 and 1997. This period covers 52 quarters, of which in 31 quarters the *actual* money supply percentage changes were *overshooting* the set target or guideline ranges. These were 10 consecutive quarters, from the first quarter of 1988 to the second quarter of 1990; 5 consecutive quarters, from the first quarter of 1991 to that of 1992; and 16 consecutive quarters, from the first quarter of 1994 to 1997.

On the other hand, in 11 quarters, the actual money supply percentage changes were was *undershooting* the set target or guideline ranges. These were 7 consecutive quarters, from the first quarter in 1986 to the third in 1987; and 4 consecutive quarters of 1993. Of the 48 quarters, only 6 were *within* the set target or guideline range. These were the fourth quarter in 1987; the last 2 quarters of 1990 and the last 3 quarters of 1993.

Thus, between 1986 and 1997, for 46 out of 52 quarters, that is for 88 percent of the time, monetary policy in South Africa was *ineffective* in controlling the money supply

within the set *money supply guidelines*, as postulated by structuralists. As shown by table 26, of the 12 percent of the time when money supply changes fell within the set target or guideline ranges, it was for only 1 quarter in 1987, namely the last; for only two quarters 1990, namely the third and fourth; and for last three quarters in 1992. It should be noted that this one quarter within the target range in 1987 followed 7 consecutive quarters of undershooting the set money supply targets or guidelines in 1986 and 1987; the 2 quarters within the target range in 1990 occurred after 10 consecutive quarters of undershooting the set money supply targets in 1988, 1989 and the first two quarters in 1992; the last 3 quarters within the target range in 1992 follows 5 consecutive quarters of overshooting the set target range in 1991 and the first quarter in 1992. Accordingly, the structuralist argument that because of external foreign factors, monetary policy is ineffective in controlling money supply changes in a small and open economy, South Africa in this case, must be "accepted".

TABLE 25: SET VERSUS ACTUAL MONEY SUPPLY TARGETS

YEAR	Actual Percentage Change in M3 (Annual rate):				Set Target Range %
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
1986	11.59	10.77	9.93	9.93	**16 - 20**
1987	8.46	9.87	11.68	15.67	**14 - 18**
1988	20.63	22.20	26.17	26.40	**12 – 16**
1989	26.99	25.81	24.88	23.54	**11 - 15**
1990	21.73	19.43	14.26	12.00	**11 - 15**
1991	13.55	15.30	14.80	14.15	**8 - 12**
1992	11.26	8.37	8.95	8.37	**7 - 10**
1993	5.90	3.50	3.78	5.39	**6 – 9**
1994	10.58	14.33	15.41	15.05	**6 – 9**
1995	12.35	15.86	15.66	14.36	**6 – 10**
1996	15.29	14.55	14.87	14.94	**6 – 10**
1997	16.38	14.63	14.52	17.28	**6 – 10**

Note: Percentages are calculated by comparing quarterly averages with the corresponding figure of the previous year.

Source: SARB, *Quarterly Bulletin* (Various Issues)

Given that the results obtained are not conclusive in confirming or rejecting all the arguments of either of the contending economics schools of thought, that is the orthodox or neo-liberal and structuralist, it was decided that further, though non-rigorous, empirical evaluation should be conducted. Also given that the there is a significant relationship between $M3_{t-1}$ and $M3_t$, suggesting that the monetary authorities can *influence* the *levels* of the money supply, although they are *unable to control* them *within* the *set guidelines*, it became obvious that monetary policy application was constrained. This necessitated further examination, namely, of the impact of external factors on the potency of domestic monetary policy. The United States $/South African Rand foreign exchange, FOREX, was used as a proxy for external factors. The other domestic explanatory variables of M3 are the repo rate, REPO, BA, R150 and GDE. However, only two of the five explanatory variables, namely, the REPO and FOREX, were found to be significant, giving the following equation:

$$M3 = f(REPO, FOREX), \qquad (75)$$

After testing down from the following *general* equation:

$$M3 = f(REPO, FOREX, GDE, BA, R150), \qquad (76)$$

where GDE is the real Gross Domestic Expenditure (GDE); BA is the 3 months bankers' acceptance rate (BA); and (R150) is the market rate on long-term government bonds.

Equation (76) was run mainly in order to start from the general and move to the specific, retaining significant variables and dropping those that are not. GDE R150 and BA were found to be insignificant in explaining changes in M3. As a result only the REPO, as a domestic explanatory variable, and FOREX, as a proxy for external factors or influences were used to further explain M3. This is covered in the next section.

Furthermore, the regression results of equation (75) indicate that the REPO and FOREX are significant as explanatory variables, both individually and collectively, as well as in explaining changes in M3. With the individual t-statistic below 2 and the calculated F-statistic of 167 for 37 included observations and 2 explanatory variables above, the F_c of 3.28 (5 per cent level) and 5.29 (1 per cent level) for 2 and 34 degrees of freedom for the numerator and denominator respectively, we *reject* the null hypothesis that the REPO and FOREX are *insignificant* in explaining changes in M3. The following tables present the results after applying collected data on equation (75), to test the null hypothesis that the t-statistic for REPO and FOREX are 0, or that the two variables are not related to M3. Although for this study, as stated above, only the t-statistic and the Augmented Dickey Fuller (ADF) test results are of importance for this study, in explaining why M3 is related to $M3_{t-1}$, while monetary authorities fail to meet *set* monetary targets, other standard regression analysis results will be given for the sake of completeness.

It is apparent from table 26, on the next page, with 37 observations (n), and two explanatory variables (k), that the degrees of freedom, n-k-1, becomes 37-2-1, which equals 34. This being over 25 degrees of freedom, with the t-statistic for REPO and FOREX being above absolute 2, used as the rule of thumb to determine the significance of the t-statistic, we reject the hypothesis that REPO and FOREX are not significantly different from 0. Thus, we conclude that while the monetary authorities in South Africa can influence M3 by applying the REPO to $M3_{t-1}$, external forces represented by FOREX as a proxy, also impact on M3. Accordingly, on the issue of the *controllability of money supply*, both structuralists and neo-liberals are correct. The results obtained confirm the neo-liberal argument that money authorities of a small and open economy can control the money-supply, in this case using the REPO. Simultaneously, the structuralists argument that external forces, with FOREX as a proxy, render monetary policy impotent is confirmed.

The next step is to determine the stationarity of the time series used in arriving at the above conclusion. The stationarity test will tell whether the conclusion is meaningful

or nonsensical. To determine the stationarity of the time s[illegible], [illegible] augmented Dickey Fuller (ADF) test on the residuals.

Before the formal ADF test has used to test for the presence of unit roots, an initial and informal visual inspection of the first and second-order moments was conducted. During this initial stage, correlograms were used in addition to time plots, to determine how long it takes the auto correlations to die down. If they die down rapidly the time series are stationary, and, in the case of non-stationarity, they fade away slowly with a positive value. After establishing that the equation (76) is co-integrated by this initial visual inspection, the formal test on the results was conducted.

TABLE 26: TEST EQUATION M3 = f (REPO, FOREX)

Dependent Variable	: M3
Sample (adjusted)	: 1960 1997
Included observations	: 37

Variable	Co-efficient	Std. Error	t-Statistic	Prob.
α	293031.9	24135.42	12.14	0.0000
REPO	-4203.034	659.6000	-6.37	0.0000
FOREX	33943.76	2817.209	12.04	0.0000

R-squared	: 0.91
Adjusted R-squared	: 0.90
Durbin Watson	: 1.18
Log likelihood	: -396.41
Akaike's Information Criterion (AIC)	: 18.75
Schwarz Criterion	: 18.88
F-statistic	: 167.61

The formal test for cointegration involved taking the ADF statistics, -12.46415 in table 27, and measure it against a MacKinnon (1991) set of parameters of an equation of the response surfaces. The following relation of response surfaces:

$$C(\rho) = \quad 0\alpha + 0_1 T^{-1} + 0_2 T^{-2}, \qquad (77)$$

where $C(\rho)$ is ρ percent critical value and T is the number of observations making it possible to get the appropriate critical t-Test residuals from an Ordinary Least Squares (OLS) equation where the number of regressors (excluding the constant and trend) lies between: $1 \leq n \geq 6$. For instance, with 105 observations and n = 3, by looking at MacKinnon table for a constant, 0α, and no trend, at the 5% significance level we get 0α = -3.7429; 0_1 = -8352 and 0_2 = -13.41 and substituting into these figures in equation (77), we get:

$$C(\rho) = (-3.7429 - 8.352/105 - 13.41/105^2) \approx -3.82 \qquad (78)$$

The test criterion for testing the null hypothesis that there is no integration, is to compare the ADF test statistic with the MacKinnon calculated value. We reject the null hypothesis of no co-integration at 5% significance level if the ADF test statistic, that is the t-value, is more negative than –3.82 (Harris 1995: 54 – 550).

The calculated critical value, based on the MacKinnon table (Harris 1995:158), where constant is –3.4336, 01 = 5.999, 02 = 29.25, with n = 2 and observations, T is 31, we get:

$$C(\rho) = (-3.9001 - 10.534/31 - 30.03/31^2) \approx -4.37 \qquad (79)$$

Since the ADF test statistic, according to Table 27, is -12.46415 and it is less negative than –4.37, we reject the null hypothesis that there is no cointegration. Therefore, we can conclude, at 99% confidence level, that money supply, M3, is significantly related to the repo rate, REPO, and the foreign exchange rate between the United States dollar and the South African Rand, FOREX, as a proxy for external influences on money supply, without fear that this conclusion might be spurious or non-sensical.

TABLE 27: AUGMENTED DICKEY-FULLER UNIT ROOT TEST

ADF Test Statistic		-12.46415		
Augmented Dickey-Fuller Test Equation:				
Dependent Variable	: dM3			
Method	: Least Squares			
Sample (adjusted)	: 1998:09 – 2001:03			
Included observations	: 31 after adjusting end points.			
Variable	**Co-efficient**	**Std. Error**	**t-Statistic**	**Prob.**
dM3(-1)	-2.721861	0.218375	-12.46415	0.0000
R-squared		: 0.90		
Adjusted R-squared		: 0.89		
SE of regressions		: 9647.389		
SSR		: 270E+09		
Log likelihood		: -327.3611		
Durbin Watson Statistics		: 2.557310		
Akaike's Information Criterion (AIC)		: 18.41123		
Schwarz Criterion		: 18.50374		
F-Statistic		: 266.3744		

9.6 CONCLUSION

In this chapter we presented a brief statement of the problem addressed, the opposing views of structuralist economic theory and orthodox or neo-liberal theory, on whether monetary authorities of a small and open economy, in this case the Republic of South Africa, can or cannot control money supply. Control should be understood to mean the ability of monetary policy to influence changes in money supply, in line with the *monetary targets* or *guidelines*. As shown in table 29, monetary policy failed dismally to control money supply changes. Also covered in the chapter is the result on testing the relationship between $M3_t$ and $M3_{t-1}$, that is whether or not there exists significant relationship between $M3_t$ and $M3_{t-1}$. A significant relationship of this kind between the these two variables is found to exist, contrary to the structuralist

argument. Given the empirical results obtained that the mo[illegible] influence the current period M3 level, by manipulating that of the previous period, despite their failure to control money supply changes within set money supply targets, it was necessary to probe these results further. The impact of external factors on the efficacy of domestic monetary policy was also probed. A single-equation model was used to determine the impact of domestic monetary policy on M3, in the light of external factors. Domestic explanatory variables that directly influence M3, namely GDE, R150, BA, and the REPO, were used. The United States dollar/South African Rand *exchange rate* (FOREX), was used as a proxy for foreign influences or external factors. The purpose was to determine whether or not the controllability of money supply has rendered ineffective by external or exogenous factors. Only the REPO and FOREX were found to be individually and collectively significant in explaining M3, thus explaining the ability of monetary authorities in South Africa, to influence the current money supply level, while being unable to keep it within the set monetary targets.

Also evaluated in this chapter was whether or not changes in GDP can be explained by changes in M3 and CPI, said not to be mainly a monetary phenomenon by structuralists. According to structuralists, the monetary authorities cannot change money supply, M3, as they desire, for each time they try, they get the opposite result, that is when they desire expansionary results, they end up with contraction of money supply and when contractionary policy is pursued they end up instead with increase in money supply, and this was empirically examined. Thus, structuralists hypothesise that there is no significant relationship between economic growth, GDP, as the dependent variable, and M3 and CPI, as explanatory variables. Instead economic growth of a small and open economy is said to be influenced by that of big trading partners. Then, the alternative hypothesis to this structuralist null hypothesis, becomes: GDP is explained by M3 and CPI. From the obtained results above, it is found that both M3 and CPI significantly determine or influence GDP. An informal and non-rigorous empirical test was also used to establish the relationship between the economic growth of South Africa and the levels of economic growth of its big trading partners. .

The approach used by the study to empirically test the hypotheses was the OLS regression analysis. To first determine the significance of the relationships between variables, the t-test and F-test were used. Then tests for stationarity were applied, to determine whether or not the tested equations were co-integrated, to avoid drawing spurious or non-sensical conclusions. The initial step for testing was to use the less formal visual inspection approach. Then the augmented Dickey-Fuller (ADF) test was used. The time series used were found to be stationary, thus rendering the conclusions drawn meaningful and not nonsensical. Accordingly, from this empirical study, the following conclusions were drawn:

(1) The structuralist argument that monetary authorities cannot control the money supply (M3) changes, namely, keeping them within set monetary targets, is "*accepted*". However, this result must be read with (3).

(2) The neo-liberal or orthodox theory argument that economic growth (GDP) of a small and open economy; South Africa in this case, is influenced or determined by M3 and CPI is "*accepted*"; and in addition, the economic growth of South Africa is not significantly related to the levels of economic growth of her big trading partners.

(3) The neo-liberal or orthodox theory argument that money supply in the current period ($M3_{t}$) is related to money supply in the previous period $M3_{t-i}$), in an open and small economy, that of Republic of South Africa in this case, is "*accepted*"; meaning, in the light of (1), monetary authorities can *influence* changes in money supply, but *cannot control it*, because of external influences.

(4) While the repo rate explains *changes* in the money supply in South Africa, its impact is diluted by external forces. This explains why monetary authorities are able to influence the current period money supply but are unable to control it within set target levels.

Accordingly, the seven problem areas as well as associated questions, set out in section 1.6. are answered by the above conclusions as follows:

- Problems (1), (3), (4) and (5) are answered by conclusion (2), namely, that economic growth of South Africa , as a small and open economy, is influenced by monetary policy through both money supply changes and the levels of inflation, as postulated by orthodox or neo-liberal economists;

- Problems (2) and (5) are also answered by conclusion (2). Because monetary policy influences economic growth, and economic growth is positively correlated with the rate of employment, therefore monetary policy also stimulate employment growth;

- Problem (7) is answered by conclusion (3), namely, that monetary authorities in South Africa can influence the current period level of money supply by manipulating that of the previous period. However, conclusion (1) clearly modifies this conclusion, by showing that the monetary authorities, even though they influence the current money supply, cannot control it according to the desired set monetary targets. The explanation for this is given by conclusion (4), namely that external factors influence domestic monetary policy.