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The countercyclicality of fiscal policy in South Africa since 1994

Mmatshapo Maida

98097696

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Abstract

This study uses a simple univariate regression model to assess the cyclicity of fiscal policy, based on government expenditure, in South Africa since 1994. The model suggests that total government expenditure is highly procyclical, indicating that government spending responds positively to economic growth. The results from similar regression focusing on components of government spending suggests that only capital spending (economic classification) and general services (functional classification) are countercyclical, while other classifications are more procyclical in line with total government spending. The procyclicality of expenditure components such as compensation of employees, goods and services and all functional classification is in line with government's decisions to reduce taxes in order to boost economic activities during periods of recessions, coupled with South Africa's high public wage bill. The countercyclicality of capital spending is attributed to government's view on prioritising capital projects during periods of recession, in line with the Keynesian theory. Results of procyclicality confirm most of other empirical findings on South Africa's fiscal policy. However, this suggests that the procyclicality of South Africa's government expenditure plays only a small role in demand management and therefore stabilising aggregate demand or economic fluctuations.

Key words: Fiscal policy, cyclicity, government expenditure

Declaration

I declare that this research projects is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

M.A.M Maida

Date

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Chapter 1: Introduction to the Research Problem

1.1 Introduction

Many developing countries, South Africa included, use fiscal policy to counter the impact of economic downturns or slowdowns. According to Swanepoel and Schoeman (2003), this is mainly because fiscal policy can play a countercyclical role where external shocks may arise due to an economy's vulnerability to global economic downturns. Countercyclical fiscal policy is one of the principles (others being debt sustainability and intergenerational equity) of a sustainable fiscal policy that underpins the growth strategy in South Africa (National Treasury, 2012). South Africa has made significant fiscal reforms and adjustments since the democratic transition in 1994 in an effort to achieve macroeconomic stability, which was seen as a prerequisite for achieving developmental goals such as economic growth and poverty reduction. Since the democratic transition, South Africa's economy has been through different business cycles and fiscal policy has been at the core of these adjustments.

1.2 Fiscal policy in different economic environments

The mandate of government is to utilise resources and instruments of the state to promote development. As such, the role and objectives of fiscal policy contribute to sustainable growth and development. The history of fiscal policy in South Africa needs to be reviewed in the context of international and domestic factors in both the pre- and post-1994 era.

In 1994, South Africa had just emerged from its international exclusion and the economy of was in recession, characterised by low levels of investment and growth and plagued by high unemployment. According to Mboweni (2006), the economy was to a large extent economically isolated from the rest of the world. Mboweni

(2006) further stated that South Africa developed an unsustainable fiscal situation with high fiscal deficits and high interest payments. Emphasis was placed on the restoration of fiscal stability and the creation of a stable macroeconomic environment. Its acceptance into the international sphere created pressures and a need for fiscal policy reforms and for economic stability. As such, the new government embarked on a number of reforms and fiscal consolidation.

In 1994, the economic policy adopted by South Africa was embodied in a Reconstruction and Development Programme (RDP). This RDP proposed a massive increase in service delivery and advocated prudent fiscal policy with the aim of driving the economy to growth (Visser, 2004). This was to be achieved through borrowing or diverting resources from areas such as defence. However, by 1996 government realised that the objectives of the RDP strategy cannot be realised, mainly because the country had a low savings rate, borrowing was expensive and the possibility of a country being dependent on imports due to increased domestic demand. As such, the RDP policy framework placed emphasis on expenditure to address equity and poverty, but little emphasis on fiscal constraints (Van der Berg, 2006:203).

This led to the strategic transition to the Growth, Employment and Redistribution (GEAR) strategy, which aimed at growing the economy by 6% per annum. The GEAR therefore laid a foundation for future economic progress and achieved a 3% per annum economic growth target (Visser, 2004). During this period, fiscal consolidation allowed government to adopt an expansionary fiscal policy (Mboweni, 2006). Fiscal consolidation is defined as policies aimed at reducing government deficits and debt accumulation and it is closely linked with discretionary fiscal policy (Jooste and Marinkov, 2012). Again, Alesina and Perotti (1997) quoted in Jooste and Marinkov (2012) argued that the compositions of fiscal consolidation or adjustments are important for their likelihood of success and for their macroeconomic consequences. Sound reforms behind fiscal consolidation included the adoption of a Medium Term Expenditure Framework (MTEF), a three

year rolling budgeting system for national and provincial budgets as well as tax reform and an improved revenue collection system. In order to ensure good financial management and ensure transparency in budgeting, government also adopted the Public Finance Management Act of 1999 that calls for sound expenditure controls.

However, while GEAR was in place, government realised that a growth rate of 3% per annum was not enough to address the extensive legacy of poverty and unemployment. To this end, government implemented the Accelerated and Shared Growth Initiative of South Africa (ASGISA) in 2006 with the aim of growing the economy at 6% per annum by 2010 (Republic of South Africa, 2005:2). With ASGISA, the economy recorded positive growth and some jobs were created, as unemployment declined from 27,9% in 2004 to 20,7% at the end of 2008 but then increased to 25,7% at the end of 2009 (Statistics South Africa, 2010). The increase in unemployment in 2009 was mainly due to the negative impact of the international financial crisis and a decline in domestic economic growth. At the end of the first quarter in 2012, unemployment stood at 25.2% (Statistics South Africa, 2012). Despite this growth, the country is still faced with the challenge of scarce and critical skills and better coordination of policies to ensure provision of skills, amongst others.

Within the context of the 2008 and 2009 financial crisis that lead South Africa and the rest of the world into economic recession, the New Growth Path (NGP) succeeded ASGISA. The NGP framework is a response to the stagnation that resulted from the crisis. Thus, the NGP aims at resuscitating the economy and create five million jobs by 2020 (Economic Development Department, 2010). Like the previous ASGISA policy, the NGP framework places emphasis on massive investments in education, training, health and social development, all important measures for eradicating inequality and poverty. The NGP mentions the use of expansionary fiscal and monetary policies to achieve its objectives.

Much as it is desirable to grow the economy through stimulatory macroeconomic measures, the danger of deterioration in the real value of money or assets brought about by rising demand and inflation is something that must be guarded against (Colander, 2010). The NGP talks about the need to tame fiscal expenditure and rather depend on investment from the private sector. However, South Africa cannot avoid an expansionary fiscal policy and therefore increased government expenditure, in funding all the proposed production and equity related aspects of the NGP framework.

Fiscal policy has seen a number of reforms in South Africa. According to Hou (2006), a countercyclical fiscal policy and multiyear budgeting promotes fiscal stability over the business cycle. As such, Hou (2006) indicates that a well-structured countercyclical fiscal policies and tools should be adopted as the core of the multiyear budgeting. According to Lledo, Yackvlev and Selassie (2009), the shift toward countercyclical or less procyclical, fiscal policies is attributed to improvements in macroeconomic performance and structural reforms in developing countries. Although South Africa is still plagued with high unemployment, poverty and inequality, fiscal policy has contributed significantly to the achievement of economic stability and also shielded the country from the negative impact of the global economic downturn.

1.3 Aim of the study

Whether fiscal policy follows an economic cycle has been the subject of several studies. The aim of this study is to examine whether South Africa's fiscal policy responds to the Keynesian postulate of countercyclical changes in government expenditure, particularly focusing on the period since 1994. Specifically, this study aims to determine whether the pursuance of a countercyclical fiscal policy is applicable to government's total expenditure or applicable to certain components of expenditure, namely, salaries and wages or certain sectors such as infrastructure, education or other social sectors. If it is found to be a countercyclical fiscal policy

as indicated by policymakers, the study will further assess whether components of government expenditure follow the same direction as total government expenditure of countercyclical.

The study is based on the principles and theory of macroeconomics relating to fiscal policy and public finance economics. Literature supports the pursuance of a countercyclical fiscal policy after an economy has been through recession and need to recover. In line with the Keynesian approach and from studies that have been previously conducted in this field in South Africa (Swanepoel, 2004, Du Plessis, Smit and Sturzenegger, 2007 and Thornton, 2007), this study aims to build on existing models by Kaminsky, Reinhart and Vegh (2004), Thornton, 2008 and Rahman, 2010. The contribution or value add of the study is mainly on disaggregated government expenditure components by economic classifications and also include intergovernmental fiscal transfers to the model. The disaggregation of government expenditure would help policymakers in reviewing the composition of government expenditure in future in an attempt to phase in a fiscal consolidation to avoid social and economic dislocation associated with more adjustments.

1.4 Research Problem

Following the recent 2008/09 global recession, the South African government has continually indicated that it will pursue a countercyclical fiscal policy, in order to assist the country in its recovery from the far-reaching impact of the global recession. National Treasury (2010) states that South Africa's pursuance of expansionary fiscal and monetary policies have helped to avert the severe impacts of the global recession, although the costs brought about the crisis would be felt in reduced economic output for many years to come (National Treasury, 2011a). The main reason for pursuance of a countercyclical fiscal (and monetary) policy is for the country to achieve its developmental objectives and economic growth, drive down high unemployment rates and alleviate poverty.

Government's medium-term fiscal policy objectives encompass three key principles: counter-cyclical fiscal stance, long-term public debt sustainability, and an inter-generational equity (National Treasury, 2011a). But, pursuance of countercyclical policy is at the fore. In fact, the South African government has adopted a countercyclical fiscal policy two years before the emergence of the global recession as it contributes to economic growth and job creation. In order to realise these and other objectives, various programmes have been implemented by government in order to steer the economy out of recession and achieve its developmental goals.

From a contraction of 1,8% in 2009, South Africa's economy grew at 2,9% in 2010 (Statistics South Africa, 2012). Much of this growth is attributed to fiscal and monetary policies that were implemented to support economic recovery. Economic growth rate projections for 2011 and 2012 are 3,1% and 3,4% respectively (National Treasury, 2012). The National Treasury (2012) further stated that its ability to respond to the global recession in a flexible manner is owed to its sound financial management and healthy public finances that boosted an increase in spending on social safety nets. As Jooste and Marinkov (2012) alluded, a package of reforms in a form of fiscal consolidation that relied mostly on spending cuts in transfers and the government wage bill could not only be expansionary but also had a better chance of success than fiscal consolidation that relies on tax increases and decreases in public investment. In spite of the recovery from the global recession and pursuance of a countercyclical fiscal policy, South Africa still faces high level of unemployment and poverty, which extend beyond the ups and downs of economic business cycles.

It is necessary to establish whether South Africa's fiscal policy has actually been countercyclical to the degree that the policymakers have alluded to, in support of economic activities. A number of empirical studies (Swanepoel, 2004, Talvi and Vegh, 2005, and Thornton, 2007) have found mixed evidence on the

countercyclicality of fiscal policy in South Africa. Also, there is a need to determine whether the counter-cyclicality has applied to total government expenditure or to only certain components of government expenditure. Specifically, there is a need to establish empirically, whether government expenditure has been countercyclical and if so, which components of expenditure contributed to counter-cyclicality. This is after policymakers have indicated that there is a need to review on the composition of expenditure in the near future as it aims to achieve an inclusive economic growth.

Overall, this study assesses the cyclicity of fiscal policy in South Africa. The research focuses on the following:

- a. Determine whether South Africa's fiscal policy has been countercyclical from 1994; and
- b. If fiscal policy is countercyclical, what components of government expenditure were countercyclical.

1.5 Outline of the study

The study consists of seven chapters. The second chapter provides the background and literature review around fiscal policy and its effectiveness as a countercyclical tool.

Chapter three provides an overview of the research hypothesis and defines the purpose of the research.

The fourth chapter provides the descriptive and analytical results around the research hypothesis. This include details of the research methodology, theory and concepts, the unit of analysis, discussion on the data collected and analysed. This chapter also presents the limitation of the research.

The fifth chapter presents the results of regression models undertaken to determine the research objectives, but more aligned to the research hypothesis.

In chapter six the results of the regression models on the cyclicalities of government expenditure, namely, the relationship between government expenditure and business cycles using output and output gap and to test which components of government expenditure follow direction of counter cyclicalities are presented.

Chapter seven summarises the main findings of the research and outlines recommendations to policy decision makers based on the results, and helps to determine gaps in the study that may be addressed by further research.

Chapter 2: Literature Review

2.1 Introduction

Fiscal policy and its effects contribute immensely on economic growth and is one of the major tools used in addressing business or economic cycles. In the wake of economic downturns, more especially during the financial and economic crisis of the 1990s and in the recent 2008/09 global financial crises (hereafter referred to as recession), most countries have adjusted their policies to use fiscal policies actively to support efforts taken by central banks (International Monetary Fund, 2008). In particular, fiscal policies have been adjusted in response to the crisis where fiscal actions were followed in support of economic growth and stability.

Since the consequences of the recession, a number of countries, including South Africa, have pursued countercyclical fiscal policy to boost economic output. National Treasury (2010) stated that South Africa's pursuance of expansionary fiscal and monetary policies have averted the impacts of a more severe global recession and more so acted as macroeconomic stabilisers. In line with the Keynesian approach, if an economy is in recession, policy would follow a countercyclical approach by increasing government expenditure, lower taxes to increase borrowings (deficit before borrowing) and boost economic activities (Akitoby, Clements, Gupta and Inchauste, 2004).

2.2 The role of fiscal policy

Since the topic of this research is on the cyclicity of fiscal policy, it is best to define what fiscal policy is and what fiscal policy cyclicity is. Fourie and Burger (2010) defined fiscal policy as the use of government's budget instruments such as the structure of taxation, spending and borrowing by fiscal authorities to pursue fiscal objectives. Per se, the basic instruments of fiscal policy include government

expenditure through budgets allocations, tax revenue (that is, all kinds of direct and indirect taxes) and government borrowing. Through the use of these instruments, Black, Calitz and Steenkamp (2005:239) stated that government contributes to the achievement of macro-economic goals and other objectives. These goals, *inter alia*, are economic growth, poverty alleviation, job creation, price stability and redistribution of income and low inflation.

However, in order to achieve these goals, there need to be a balance between monetary policy and fiscal policy. Keynes, quoted by Tcherneva (2008), described it as follows: fiscal policy is the steering wheel for the aggregate economy. Not only is fiscal policy more about allocation of scarce resources, but it is also for ensuring the macroeconomic stability of a country. Ocrane (2011) stated that the intent of fiscal policy is essentially to stimulate economic and social development by pursuing a policy stance that ensures a balance between taxation, expenditure and borrowing that is consistent with sustainable economic growth. On the other hand, interest rates control monetary policy in pursuit of price stability. According to Swanepoel and Schoeman (2003), monetary policy operates in a fiscal policy environment. As such, in order for monetary policy to be effective, it needs to be adjusted in accordance with the non-discretionary components of fiscal policy, hence the need for a balance between the two policies. For example, Swanepoel and Schoeman (2003) found that automatic fiscal stabilisers can play an important role as a complement to countercyclical monetary policy.

Literature does not single out which of the three fiscal policy instruments best represent fiscal policy. Different studies have used either of the three as a proxy for fiscal policy. For example, Easterly and Rebelo (1993) have used fiscal deficits as a proxy for estimating fiscal policy; Aydin (2010) used tax revenue and its components to determine the cyclicity of fiscal policy while Lane (2003); Akitoby *et al* (2004) and Gupta, Clements, Baldacci and Mulas-Granados (2005) used government expenditure and its composition when studying fiscal policy.

Fiscal policy has two broad macroeconomic objectives. According to Budnevich (2002), the objectives of fiscal policy are to promote sustainability of public accounts or government expenditure, more so the sustainability of public debt and also the regulation of aggregate demand. This sustainability is important as it is in line with the Keynesian theory that calls for a fiscal policy that runs a fiscal surplus during full employment or economic upswings, while it allows for fiscal deficits during recession (Gupta *et al*, 2005). Spilimbergo, Symansky, Blanchard and Cottarelli (2008) also concluded that a crisis calls for two sets of policy measures in line with the objectives as indicated by Budnevich (2002). For fiscal policy to address these two measures and achieve the objectives, an optimal fiscal stimulus package should address both the financial or economic crisis and the fall in aggregate demand. Furthermore, optimal fiscal stimulus packages should be timely, large enough to address objectives, ensure debt sustainability, collective and sustainable when addressing different cycles (International Monetary Fund, 2008).

Swanepoel (2004) stated that fiscal policy can be used as a stabilising instrument of economic activity and this is to be done through the effects of automatic fiscal stabilisers, discretionary fiscal policy or through a combination of both. Fatas and Mihov (2003) referred to discretionary fiscal policy as changes in fiscal policy that do not represent reactions to economic conditions or cycles. Economic theory distinguish between three components of fiscal policy, i) automatic stabilisers; ii) discretionary fiscal policy that reacts to current macroeconomic conditions, mainly changes in output or real Gross Domestic Product (GDP), and iii) discretionary fiscal policy implemented for reasons other than macroeconomic conditions (Fatas and Mihov, 2003).

Ducanes, Gagas, Quising and Razzaque (2006) defined discretionary fiscal policy as all deliberate manipulations of government purchases, transfers and taxation in pursuit of macroeconomic goals such as economic growth and full employment. They also described automatic stabilisers as cyclically induced changes in

government spending and taxes that tend to stabilise aggregate output. For example, Swanepoel and Schoeman (2003) found that unemployment insurance programmes acted as automatic stabilisers in South Africa over the period of 1970-2000. An appropriate fiscal policy response would align to any of the three components of fiscal policy. Because discretionary policy operates in an opposite direction as the monetary policy that involves changes in money supply or interest rates, it is important for policymakers to have a balance between discretionary fiscal policy and monetary policy response actions.

On the contrary, Carmignani (2010) argued that fiscal policy, rather than monetary policy, is at the core of governments' responses to cyclical downturn or crisis and the fiscal stimulus packages that are adopted by different countries adhere to the Keynesian theory. From a policy perspective, fiscal policy helps stabilises the economy. However, whether fiscal policy stabilises the economic fluctuations depend on whether fiscal policy have real effects (be it Keynesian or neoclassical effects) and also if it is being used in a countercyclical or procyclical pattern. Thus, the role of fiscal policy would depend on the business cycle at that time.

2.3 The cyclicity of fiscal policy

One of the objectives of fiscal policy is to minimise the fluctuations in the economy's aggregate demand in order to ensure that the economy performs at its target and potential level of income or output, and this is referred to as a countercyclical fiscal policy (Black *et al*, 2005). These fluctuations are associated with business cycles and according to Keynes' approach, it can be smoothed in a number of ways, mainly through discretionary fiscal policy activities (Black *et al*, 2005).

The decision to pursue one particular policy over another one largely depends on the business cycle. Akitoby *et al* (2004) stated that countries need to understand the cyclical pattern of macroeconomic aggregates for the purpose of designing

stabilisation and adjustment programmes and also to determine a relationship between economic activities and fiscal and monetary policies.

Kaminsky *et al* (2004) defined policy cyclical in terms of the instruments of fiscal policy, that is government spending and tax rates or to some extent, fiscal balance as a proportion of GDP. Carmignani (2010) stated that for fiscal policy to stabilise economic fluctuations, it must have a real impact in the economy. If fiscal shocks or responses are expansionary and conform to the Keynesian prescriptions, the fiscal policy instrument should be used in a countercyclical way in order to stabilise the economy. If fiscal response is expansionary but lead to more output contraction as attributed by neoclassical view, then intended countercyclical actions destabilise the economy and exacerbate macroeconomic volatility.

According to both the neoclassical and Keynesian theories, fiscal policy should ideally be countercyclical (Akitoby *et al*, 2004). Kaminsky *et al* (2004) also argued that countercyclical fiscal policy is rationalised by resorting to a traditional Keynesian model. This means fiscal deficits should decline when an economy is growing and the opposite is true when the economy contracts. The premise for optimal fiscal policy is that taxes should be kept constant over business cycles, and therefore, assumes that government expenditure is determined exogenously (Akitoby *et al*, 2004). This would constitute a cyclical fiscal policy in that it neither reinforces nor stabilise a business cycle. This fiscal policy acyclicity is therefore rationalised by a neoclassical model.

According to the Keynesian model, the business cycle calls for the use of countercyclical expansionary fiscal policy when the economy is in a downturn or recession and a contractionary fiscal policy when the economy is experiencing growth (Woo, 2009). According to the National Treasury (2009), a countercyclical fiscal policy enables government to respond flexibly to the effects of an economic cycle which results in adjusting fiscal deficits during different business cycles, therefore creating a fiscal space. As such, if fiscal policy is shown to be procyclical,

this would suggest a negative impact of policy on long term economic growth, which hinders the achievement of macroeconomic goals and objectives in the long run. Examples of studies that found fiscal policy to be procyclical includes Kaminsky *et al* (2004), and Talvi and Vegh (2005). Their findings actually contradict both the conventional Keynesian theory that fiscal policy should be countercyclical and the neoclassical theory of tax smoothing. According to Barro (1979) quoted in Lane (2003), the tax smoothing hypothesis suggests that for any government spending decision, tax rates should be held constant over the business cycle and that a budget surplus should move in a procyclical direction.

In addition, the degree of cyclical direction of fiscal policy depends on which instruments are used when determining its cyclicity, that is, government spending, tax rates and public debt. Del Granado *et al* (2010) compared the developing and developed countries' cyclical direction of fiscal policy and found that factors that determine directions of fiscal policy were the lack of access to international credit markets by developing countries and political considerations in those countries. These factors constrain the ability of developing countries to increase government spending in response to cyclical fluctuations. These developing countries are prone to what Del Granado *et al* (2010), termed a "voracity" effect, whereby the "competition for government's limited resources lead to a more than proportional increase in public spending" when responding to a positive shock (Del Granado *et al*, 2010:3). Lane (2003) also found evidence that a country's political powers constitute an additional factor determining the degree of cyclicity, tending to generate a procyclical bias in government spending. Accordingly, for policymakers to achieve the desired results on addressing economic fluctuations, factors that have been identified above as having an influence on how fiscal policy should impact the economy, should be well understood in order for the identification of appropriate response measures or the type of fiscal policy to be put in place and to achieve the intended result.

2.4 Fiscal policy transmission mechanism

The transmission mechanism could be defined as the channels through which a change in the demand or supply of money affects aggregate demand for goods and services. For any policy decision, be it monetary or fiscal, to have an impact on the economy, an effective transmission mechanism into the economy is needed. In terms of Keynesian economics, Basic (2007) argued that an increase in public spending would stimulate demand through increased economic activities, which in turn lead to an expansion in output or Gross Domestic Product (GDP). Similarly, Keynesian's view suggests that government consumption spending has a positive impact on the economy (Ocrane, 2011).

Fiscal policy transmission in a standard Keynesian model fosters private sector investment by sustaining domestic spending. In the same token, Black *et al* (2005) stated that income taxes and increases government spending on unemployment benefits strengthen the demand stabilising impact of fiscal policy because they act as automatic stabilisers. This is achieved precisely because changes in income would automatically trigger changes in tax revenue that would stabilise aggregate demand, income and ultimately output. Swanepoel and Schoeman (2003) indicated the payment of unemployment insurance by government qualifies as an automatic stabiliser because unemployment tends to follow a business cycle. Thus, when the business cycle enters recession, total unemployment insurance payments increase while the numbers of employed people decrease, which lead to reduced contributions to unemployment insurance premiums. This increase or decrease in government expenditure or a change in taxes to affect aggregate demand is referred to as the Keynesian fiscal transmission mechanism (Black *et al*, 2005).

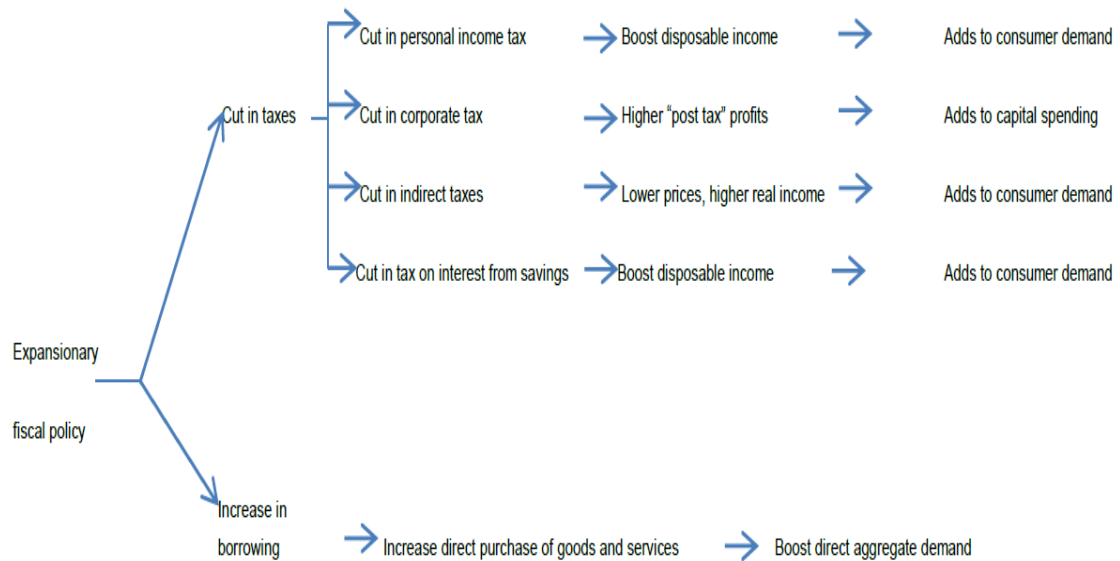
On the contrary, Basic (2007) argued that in terms of the neoclassical theory, an expansionary fiscal policy decreases economic activity and therefore leads to a decline in output and inflation. As such, every dollar increase in government

spending is offset by a dollar reduction in private investment spending. A number of studies (such as Baldacci, Hillman and Kojo, 2004 and Dornbusch et al, 1998 quoted in Ocrane, 2011) referred to the decline in private investment as a result of fiscal expansion as crowding out. Black *et al* (2007) also defined crowding out as the dampening of private investment on account of increases in interest rates associated with an increase in debt-financed public expenditure. Black *et al* (2007) quoting Dornbusch *et al* (1994), further explained that crowding out may occur whenever there is fiscal expansion that increases interest rates, implying tax financing in future. Baldacci *et al* (2004) argued that increase in interest rates that lead to crowding out occurs because increased interest rates affect perceptions of fiscal sustainability in high-income countries.

The analysis of the fiscal policy transmission mechanism is best explained through applying either the Aggregate Supply/Aggregate Demand (AS/AD) model, which is useful when evaluating factors and conditions that affect a country's GDP and inflation, or an analysis of fiscal policy multipliers (Colander, 2008). Parkin *et al* (2003) state that to study a broader business or economic cycle mechanism, a broader framework such as the AS/AD model is required. Fiscal policy has been seen as an instrument of demand management and affects aggregate demand and supply, and variables such as output, prices and employment. As such, a change in any of the fiscal policy instruments can be used by policymakers to influence economic output, especially during a time of economic recession (Black *et al*, 2005). However, an analysis of the transmission of fiscal policy decisions or any fiscal response measures require a good understanding of the characteristics of a country's environment and the nature of the economic or business cycle a country is dealing with. A pre-requisite for successful fiscal policy should take into account the characteristics of the transmission mechanisms (both the fiscal and monetary policy mechanism) in order to achieve the expected results or impact. The fiscal policy transmission is affected by what both the aggregate demand and supply factors of a country are at any given time (Colander, 2008).

Figure 2.1 provides a schematic representation of fiscal policy transmission mechanism. Government decisions to cut personal income tax cause disposable income to rise. The change in disposable income changes consumer demand and ultimately aggregate demand increases. Likewise, decisions to cut corporate tax causes companies profit to increase and therefore add to business capital spending.

Figure 2-1: Fiscal policy transmission mechanism



Source: Adapted from <http://tutor2u.net/economics/revision-notes/as-macro-fiscal-policy.html>, author's adaptations

Another form of expansionary fiscal policy arises when government increases its level of borrowing when the government is running a budget deficit and therefore benefit economic growth. Increased borrowing boosts government spending and impacts output since it has a more direct impact on aggregate demand (Jha, Mallick, Park and Quising, 2010). However, the positive effect have a positive macroeconomic effects in the long run if the borrowed funds are used to fund capital projects and therefore improving the supply-side capacity of the economy promoting long-run growth (Baldacci *et al*, 2004).

Like the transmission on monetary policy, fiscal policy largely influences domestic aggregate demand in order to influence real economy. However, the expected transmission is influenced largely by the use of either a standard Keynesian or neoclassical model, implying that actual impact cannot always be estimated *ex ante*. According to Baldacci *et al* (2004), the positive effects of fiscal expansion from a Keynesian view can be offset by adverse effects of financing investment through deficits that result in higher interest rates and the impact differ between high- and low-income countries. The proponents of the neoclassical theory emphasised that the effect of increased government spending are temporary and ineffective because when prices adjust in the long run, output and employment will not change (Ocrane 2011).

On the supply side, the factors include the degree of price flexibility whereas on the demand side the factors are affected by structural constraints that lead to inelastic aggregate demand (Kandil, 2006). According to Baldacci *et al* (2004), a supply side link between fiscal policy and investment is suggested through wage levels because higher labour taxes result in higher post tax equilibrium wages that lead to lower expected profits and therefore lower investments.

While considerable literature has been published on the transmission mechanism of monetary policy, there are little studies on the transmission mechanism for fiscal policy. For example, Perotti (2008) and Fontana (2009) reviewed current theoretical effects, and their interpretation of empirical literature on the transmission mechanism of fiscal policy found the results to be mixed. As opposed to the monetary policy transmission mechanism, there is no agreement on the effects of fiscal policy. However, it is important for the two macroeconomic policies to support each other. According to Spilimbergo *et al* (2008), the role of monetary policy is to support any fiscal stimulation by avoiding any increase in interest rates when the country is in recession or up until economic output shows signs of recovery.

In terms of theory, Perotti (2008) found that the neoclassical approach predicted that a positive shock of increasing government spending should lead to a decline in private consumption and real wages due to a negative wealth effect and future expectation to pay higher taxes. However, the neo-Keynesian approach predicted contrasting results, namely that an increase in government spending causes a shift in labour supply that leads to increased wages, which in turn induce private consumption expenditure because of a substitution effect. Fontana (2009) stated that the conflicting results of the fiscal policy transmission mechanism are a result of different reactions of private consumption expenditure and/or real wages on government expenditure, depending on underlying economic conditions.

In their study on growth and fiscal policy transmission channels in low-income countries, Baldacci *et al* (2004) identified private investment as a principal transmission channel through which fiscal policy affects economic output (with governance and factor productivity as other transmission channels). Economic growth in high-income countries was found to be transmitted mainly through private investment, while the transmission channel in low-income countries was through improved factor productivity (Baldacci *et al*, 2004). According to them, increased private investment would lead to expansionary fiscal contractions if government reduces its budget deficits or reduces its level of spending. This shows that there would be a trade-off between private investment and government spending.

Conversely, the same investment transmission would yield different results if it were to be implemented in low-income countries because in low-income countries, private investments are insensitive to interest rate changes and as such interest rates do not respond to any reduction of fiscal deficits (Baldacci *et al*, 2004). Overall, fiscal transmission is effected through different mechanisms with a view of responding to economic fluctuation. However, results from such a transmission would depend on a coordination of factors governing the fiscal response and as such, could conform to either the Keynesian or the neoclassical theory. Fontana (2009) also included factors such as decisions by monetary policymakers and the

cyclical conditions as factors that might determine the way in which fiscal policy responses are transmitted to the economy.

2.5 Fiscal policy multipliers

Literature examining whether fiscal policy stimulates economic activities during recession has long been analysed through the determination of multiplier effects from expansionary government expenditure, tax cuts or increased borrowing. Parkin, Powell and Matthews (2003) defined a multiplier as the magnified effect of a change in autonomous expenditure on aggregate income or real GDP. Jha *et al* (2010) defined a fiscal multiplier in a quantitative way (in the context of developing Asia) as an increase in economic output due to a one dollar increase in government expenditure or a one dollar reduction in taxes. This measures how effective tax cuts or government expenditure stimulate output. There are three types of fiscal multipliers, that is i) the government expenditure multiplier, which considers the percentage of income that is saved and recirculated into the economy; ii) tax multiplier which determines the extent to which aggregate income changes when tax rates change; and iii) balanced budget multiplier, which postulates that changes in income is brought about by changes in government spending and taxation (Parkin, Powell, and Matthews, 2003).

In cases where there are fluctuations in the economy, a decision to adopt a certain type of discretionary fiscal policy would result in a particular multiplying effect. Jha *et al* (2010) defined a multiplier concept as a measure of how effective tax cuts or government expenditure stimulate output. Similarly, Black *et al* (2005), defined a government spending multiplier, or balanced budget multiplier, as any given increase in government spending that is financed by an equivalent tax increase, which results in an increase in a country's GDP.

As an alternative way of determining how fiscal policy is transmitted and how it impacts the economy, Romer (2009) distinguished between two fiscal policy

multipliers, the tax and spending multipliers, which require some form of calculation. Both approaches to determining how fiscal policy is transmitted to economic activity are influenced by a number of factors, such as the method of calculating multipliers or the extent of the economic fluctuations. Fiscal multipliers are influenced by the choice of calculation method, and the nature or composition of the environment in which change is to be effected. Colander (2010) explained a multiplier model to emphasise the effect of fluctuations in aggregate demand, rather than the price level, on output.

The Keynesian income/expenditure economic model, which is widely used in literature, comprises household consumption expenditure, government consumption and investment expenditure and net exports, can be presented as follows (adapted from Parkin *et al*, 2003):

$$AE = C + I + G + (X - M) \dots\dots\dots (1)$$

Where AE is aggregate expenditure, C represents household consumption expenditure, I is gross capital formation or investment, G is government consumption expenditure and $(X - M)$ represents net exports (that is, exports less imports) which may be negative where the economy cannot meet domestic demand. Further disaggregation of equation 1 yields the following equations:

$$C = a + b(Y - NT) \dots\dots\dots (2)$$

a is defined as autonomous consumption expenditure, Y represents real GDP or income; NT equals net taxes (that is autonomous taxes less autonomous transfer payments); autonomous taxes are determined as tY where t is a marginal tax rate and $Y - T$ is disposable income. Therefore,

$$NT = Ta - Tr + tY \dots\dots\dots (3)$$

Ta is defined as autonomous taxes and Tr represents autonomous transfer payments. Rearranging equation 3 back in equation 1 gives consumption expenditure as a function of GDP or Y :

$$C = a - bTa + bTr + b(1 - t)Y \dots\dots\dots (4)$$

Imports (M) are a function of income: $M = mY \dots\dots\dots$
 (5)

Adding equations 4 and 5 back to equation 1 shows that AE is dependent on the following variables:

$$AE = a + b(1 - t)Y + I + G + X - mY \dots\dots\dots (6)$$

In order to determine a fiscal multiplier, rearrange equation 6:

$$AE = [a + I + G + X] + [b(1 - t) - m]Y \dots\dots\dots$$

(7)

Where $[a + I + G + X = A]$ represent components of expenditure that are autonomous (expenditure changed independently from Y). Therefore equation 7 can be simplified as follows:

$$AE = A + [b(1 - t) - m]Y \dots\dots\dots (8)$$

Given that in any equilibrium in the economy, aggregate expenditure equals real GDP or income (Y), $AE = A + [b(1 - t) - m]Y = Y$;

$$\therefore Y = \frac{1}{1 - [b(1 - t) - m]} A \dots\dots\dots (9)$$

A multiplier is defined as a change in equilibrium income as a result of change in one of autonomous variables. The following multipliers can be determined from equation 9:

- i) Government expenditure multiplier, which is a change in Y as a result of change in A :

$$\Delta Y = \frac{1}{1 - [b(1 - t) - m]} \Delta G$$

∴ multiplier equals:

$$= \frac{1}{1 - [b(1 - t) + m]}$$

- ii) Autonomous tax multiplier, which is a change in equilibrium expenditure (Y) that results from a change in autonomous taxes (t). Autonomous tax multiplier equals

$$= \frac{-b}{1 - [b(1 - t) + m]}$$

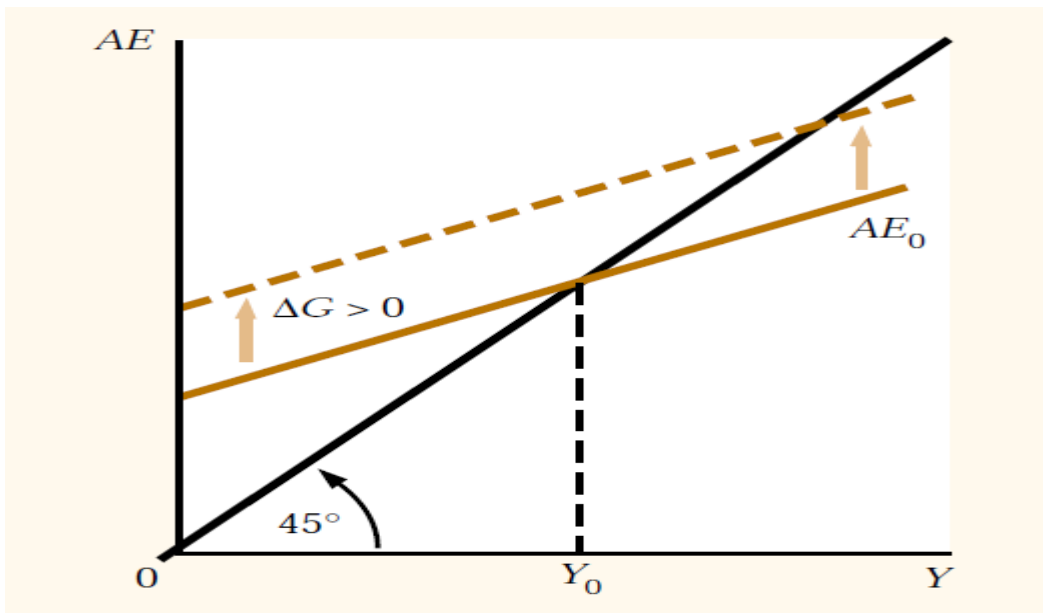
- iii) autonomous transfer multipliers is that change in equilibrium expenditure that results from a change in autonomous transfer payments, multiplier equals

$$= \frac{b}{1 - [b(1 - t) + m]}$$

These multipliers clearly show that the multiplying effects (the impact on AE) differ, depending on the policy approach chosen. If the cost of the chosen instrument is the same for government, the impact on AE differs. Figure 2.2 shows the effect of an increase in autonomous government expenditure as represented by ΔG . This will increase the level of autonomous desired aggregate spending and then causes an increase in AE as shown by an upward shift in the AE function, ultimately leading to an increase in equilibrium GDP. Assuming that in an economy, $t = 0$ and $m = 0$, then government multiplier is equal to $\frac{1}{(1-b)}$. If government autonomous

spending (for example on infrastructure) expands by R1 billion during recession and $b = 0.75$, then the multiplier is 4. Therefore, $\Delta Y = \frac{1}{1-[b(1-t)-m]} \Delta G = 4 * \Delta G$. Important in the formula is to note that b , m and t influence all the multipliers. This implies that the total impact on the economy (as measured in terms of GDP) will increase by R4 billion. As such, where government aims to grow the economy by a particular growth rate, a multiplier can be used to determine the level of spending required, assuming other constant factors.

Figure 2-2: Impact of an increase in government expenditure



Source: Adapted from Parkin *et al*, 2003

In contrast to the Keynesian theory on whether fiscal policy enhances output during depressed economic cycles or recession, the neoclassical theory suggests that a fiscal multiplier, either as a result of a decrease in taxes or increased government debt to fund expenditure, would be zero (Jha *et al*, 2010). In terms of the neoclassical theory, consumers are forward-looking and are knowledgeable of government's intertemporal budget constraints. They are aware that any tax cuts or increase in government spending due to borrowing will result in an increased tax burden in the future, resulting in rational consumers not changing their consumption patterns. Such decisions by consumers would offset expansion in

government spending and therefore lead to $\frac{1}{1-[b(1-t)-m]} \Delta G=0$. Furthermore, Jha *et al* (2010) indicated that consumers' knowledge that an increase in government spending from its borrowing today will be offset by future spending cuts or increased taxes will leave output unaffected. Such a decision by consumers to offset current spending while considering sustainability in future payment of the debt would render a countercyclical fiscal policy ineffective.

Should a fiscal multiplier be negative, it would mean that fiscal expansion is contractionary, especially where it concerns issues of fiscal sustainability (Spilimbergo, Symansky and Schindler, 2009). However, International Monetary Fund (2008) simulations showed that fiscal multipliers can vary from a positive in line with Keynesian theory to a negative in line with non-Keynesian views, depending on the choice of fiscal policy instrument and the type or characteristics of the economy. Chen, Shieh, Lai and Chang (2005) also found that short run fiscal multipliers may be positive or negative, depending upon whether the public infrastructure and private investments are substitutes or complements for each other.

2.6 The effectiveness of fiscal policy

After the emergence of the global crisis, there was an increase in the role of fiscal policy as an expansionary and stabilisation tool of government with the objective of smoothing cyclical fluctuations in a country. In order for one to understand the role of fiscal policy as a stabiliser, it is important to understand the nature of its effects. Ducanes *et al* (2006) argued that the effectiveness of fiscal policy can best be explained by distinguishing between discretionary fiscal policy and automatic stabilisers. The disadvantage for most countries that respond to fluctuations or crisis using discretionary policy is that this type of policy change tends to take long to implement because of the long processes taken for policy makers to approve such a policy. As a result, automatic stabilisers are preferred as a tool to smooth the business cycles (Swanepoel, 2004 and Ducanes *et al*, 2006). The impact of

fiscal policy is also affected by country-specific fiscal characteristics. According to Ducanes *et al* (2006), the effectiveness of increased government spending as an expansionary and stabilising tool might work in some countries, while only one tool would be effective in other countries.

The effectiveness of fiscal policy is mainly assessed by how it influences the achievement of macroeconomic goals. But as alluded to earlier, Romer (2009) indicated that the impact of any government activity on the economy depends, in part, on the size of a spending multiplier. However, as indicated in the transmission mechanism of fiscal policy, the overall effectiveness of fiscal policy will depend on not only the size, but also on composition of fiscal policy in terms of tax cuts as opposed to government spending. In their empirical study to determine whether countercyclical fiscal policy can be used to stimulate growth, Jha *et al* (2010) indicated that while a deficit-financed tax cut stimulates economic activity, the impact of deficit spending is ambiguous. Overall, they indicated that tax cuts may be a more effective countercyclical policy instrument than government spending. However, there is no clear-cut evidence that explains the usefulness of countercyclical fiscal policy as a tool for fighting recession. Different literature sources have shown differing results.

The effectiveness of fiscal policy also depends on a number of other factors at play in a country as stated in different literature, for example, by Lane (2003), Swanepoel (2004), Magud (2008) and Del Granado *et al* (2010). All of these factors arise from a decision to use either discretionary policy or the automatic stabilisation mechanism to adjust fluctuations in the economy. For example, Magud (2008) attributed the effectiveness of expansionary fiscal policy to the degree of fiscal fragility of variables such as the level of government debt as a ratio of GDP. Furthermore, Magud (2008) stated that countries with low debt to GDP ratios can borrow to finance increases in government expenditure, therefore boosting aggregate demand in the economy. The opposite is true for those countries with high debt to GDP ratios: borrowing tends to be impossible and end up reducing

government expenditure. Magud (2008) showed that for highly indebted countries, an expansionary fiscal policy will lead to a contraction in output, indicating that Keynesian countercyclical policies are effective and credible for solvent countries only.

The resultant decline in government expenditure negatively impacts on a country's output in both the short and the long run. In light of this, Magud (2008) stated that a reduction in government expenditure is actually expansionary because it releases resources to the private sector in the credit market. As alluded in the transmission mechanism of fiscal policy, this could result in a "crowding in" effect (the opposite of "crowding out"), as market interest rate declines, allowing the private sector to increase its borrowing for investment. Such a reaction by the private investor would result in a trade-off between fiscal policy and private sector spending and might leave the economy in a neutral or even a worse-off position, rendering fiscal policy ineffective.

Since the early 1990s, there has been an increase by different countries (in particular South Africa) to use fiscal policy as an expansionary and stabilisation tool. Through the transmission mechanism, fiscal policy can impact the economy through either the demand side or the supply side of the economy. Black *et al* (2005) developed a policy-oriented model of the national economy and focused on the role played by fiscal policy instruments in bringing about desired changes in real GDP and employment. Subsequently, the type of fiscal policy instrument determines how fiscal policy impact aggregate demand or supply.

Other factors that affect the effectiveness of fiscal policy are highlighted by Swanepoel (2004), who in his study on the mix of monetary and fiscal policies, stated that the extent to which fiscal policy is effective depends on factors such as instruments used and the economic and policy environment in which the instrument is used. Intrinsically, depending on the economy cycle, fiscal policy initiatives could impact economic activities either way and policymakers need to

establish with certainty, the state of the business cycle. Fatas and Mihov (2003) stated that while fiscal policy has a potential to destabilise macroeconomic stability, it has the ability to smooth out business cycle fluctuations by expansionary public spending or tax cuts in recession or through contractionary policy in periods of expansions.

The effectiveness of fiscal policy also depends on the time lags involved when policymakers recognise the change in economic activity or business cycle and the implementation of a policy change. This was alluded to as a disadvantage of using discretionary policy. Time lags (from recognition of a change to implementation of decisions) can render fiscal policy ineffective and even cause the results of fiscal policy decisions to be procyclical as opposed to countercyclical (Black *et al*, 2005). In the short time after a change is recognised, the use of monetary policy is preferred over fiscal policy because the decision making time and implementation are shorter.

Swanepoel (2004) compared the monetary and fiscal policy mix and attributes some of the reasons for mixed results to uncoordinated policies, the lack of common measures of automatic stabilisers and inadequate adjustment of the budget balance to business cycles, in particular in South Africa. In order to avoid this, Swanepoel (2004) cautioned on the importance of knowing when to use discretionary policy that takes into account economic cycles in order to have a positive impact on the economy.

In South Africa fiscal policy has shown success since the country's political transition in 1994. According to Du Plessis *et al* (2007), the use of fiscal policy since 1994 has been an extraordinary success, owing to its achievement of stabilisation after the democratic transition. This includes the reduction in public debt to GDP ratios, budget deficits, continued efforts to increase social safety net and improved tax collection. In the aftermath of the global crisis, the coordination of both fiscal and monetary policy has seen South Africa's speed of transmission

increasing (National Treasury, 2011b). This was in line with Fofack (2010), who indicated that the scale of the crisis and the speed of international transmissions called for coordinated responses in both the domestic economy and at a global level. Because there needs to be a coordinated effort between fiscal and monetary policies in South Africa, the South African Reserve Bank supported the economy by reducing interest rates, thereby boosting domestic demand. Moreover, Fofack (2010) cautioned that for fiscal policy to be effective, it should be guided by productivity of investments and efficiency. For South Africa, fiscal policy trajectory was mainly as a result of increased investment expenditure. For a country to maximise the effectiveness of fiscal policy, Kandil (2006:118) stated some necessary conditions. These include a country to have a large marginal propensity to spend on domestic products and a small marginal propensity to import.

Because different factors could drive the effectiveness of fiscal policy, it is important for policy makers to be cautious when making decisions on how to best respond to a business cycle fluctuation, mainly to avoid conflicting forces at play that might force government spending to have unintended effects on the economy. Because there needs to be a balance between fiscal and monetary policies, Kandil (2006) further stated that the effectiveness of monetary policy could be maximised if in a country the interest rate sensitivity of money demand is small; income elasticity of money demand is smaller; interest sensitivity of investment demand is large; and there is some kind of a multiplier effect.

Therefore, the alignment of factors affecting the transmission mechanism is important and should be well informed to avoid negative results that would make the economy worse off. For example, the impact of government spending on interest rate and the sensitivity of investment demand to changes in interest rates could lead to the “crowding out” effect (Kandil, 2006 and Black *et al*, 2007), something that would deter fiscal policy actions to achieving their intended goals.

2.7 Government expenditure and the importance of macroeconomic stability

One of the tools that fiscal policymakers use to achieve macroeconomic goals is through government expenditure. As such, government spending is an important factor in the achievement of macroeconomic stability because of its ability to act as an automatic stabiliser or through discretionary actions. Government expenditure is seen as a tool to achieve developmental goals and it is driven from the demand side, as opposed to the supply side (Black *et al*, 2005), as it reflects the demand for government services or programmes by the society as a whole. According to

According to Tanzi and Schuknecht (2000), government spending is either demand driven or supply driven. Demand driven government expenditure is also known as a backward linkage, which occurs when the government acknowledges a need to create an environment of inclusive growth and eradication of challenges such as poverty. In response, government may decide to increase spending in a form of social safety nets. Swanepoel and Schoeman (2003) found that payment of unemployment insurance benefits acted in tandem to serve as counterbalances to the direction of the economy and acted in a countercyclical manner to moderate economic recession. However, they also concluded that the payments of unemployment insurance benefits demonstrated a weak automatic stabilising response to the direction of the economy.

Supply-driven expenditure, also known as a forward linkage, tends to influence production. Furthermore, Tanzi and Schuknecht (2000) defined supply-driven expenditure to involve spending on investment to influence production, which records impact in the long term. Similarly, Aydin (2010) compared changes in output and tax revenue to indicate that tax revenues increase during economic upturns, owing to improvements on the supply side while government expenditure would be lower on cyclical accounts such as unemployment benefits. Darby and Melitz (2008) examined the cyclical responsiveness of government social

expenditure on health, retirement benefits incapacity and unemployment benefits in the OECD countries and found unemployment benefits to be only element that responded to cycles.

In responding to negative shocks such as recession, government expenditure might increase or decrease depending on whether policymakers allow automatic stabilisers or discretionary fiscal policy to operate. After the global recession in 2008, a number of countries increased government spending by increasing budget deficits and some decreased fiscal surpluses (International Monetary Fund, 2009). Responses to such fluctuations could be in line with policymakers' decisions to stabilise economies, either by pursuing countercyclical or stabilisation policies. However, the debate on the appropriate role of fiscal policy and government spending as a tool of discretionary fiscal policy in managing the business cycle has persisted for many years and there is no single right way to respond to fluctuations.

The International Monetary Fund (2009) further indicated that such responses were not the ones pursued with past economic downturns as experience should have required different factors to be considered and different decisions to be pursued. This shows that the decision to expand or contract government spending in order to pursue either a procyclical or countercyclical policy should be informed by a balance in factors that impact on fiscal policy's transmission mechanism, including the nature and extent of the business cycle facing the policy makers, and the effectiveness of fiscal policy if it is to meet its objective of stabilising the economy. As a tool of fiscal policy, government expenditure contributes to economic growth and job creation, and therefore, economic stability. However, achievement of such stability depends on the composition of what government spend on.

Since 1994, South Africa has prioritised macroeconomic stability and government has prioritised sustaining infrastructure spending and using countercyclical fiscal policy in order to boost falling demand and to sustain output and employment (National Treasury, 2010). In developing countries, the impact of the global crises

has seen policy makers focusing on their budget spending. In South Africa, the 2011 spending framework aimed at shifting the composition of spending towards infrastructure investment, therefore supporting a supply-driven expenditure (National Treasury, 2011b).

Most developing and developed countries, including South Africa, implemented some fiscal stimuli to boost domestic demand and avert the negative impact of the global crisis since 2008. For example, South Africa implemented an infrastructure investment stimulus package amounting to R787 billion to be spent on infrastructure over a period of three years (National Treasury, 2009). Some of this amount was spent as a build-up to South Africa's hosting of the 2010 Soccer World Cup. The approach of South Africa to fiscal stimuli has been different from the rest of countries. Other countries, for example, the European countries, saw expenditure on bail-outs of financial institutions, which has not been the case in South Africa as such bail-outs were not required. This was in addition to the fact that investment, especially on infrastructure, gained momentum from 2004, ensuring that the country was cushioned in a period when the economy was in a negative phase of the business cycle (National Treasury, 2009). As Carmignani (2010) stated, stimulus packages that is adopted by different countries adhere to the Keynesian theory. The macroeconomic stability achieved in South Africa that was supported by the countercyclical fiscal policy has cushioned the country against major impact of the 2008/09 crisis (National Treasury, 2011b).

The countercyclical policy adopted was governed by the composition of government expenditure. As mentioned under the effectiveness of fiscal policy, the overall effectiveness of fiscal policy shocks will depend not on only the size, but also the composition of fiscal policy in terms of tax cuts as opposed to government spending. Several studies have been concluded on the use of taxes and the components of taxes as a proxy for fiscal policy as alluded above (for example, Thornton, 2007, and Jha *et al*, 2010 found different results as a results of economic characteristics and using different methodologies). However, where expenditure

was considered, most studies focused on aggregate government expenditure and not the composition thereof (Easterly and Rebelo, 1993 and Fatas and Mihov, 2003), except for Thornton (2007) who used components of both revenue and expenditure and found revenue to be acyclical while expenditure was countercyclical.

The structure and components of government revenue and expenditure is important in determining the capacity of a government to use its budget as an effective tool for macroeconomic policy and therefore stabilisation (Swanepoel and Schoeman, 2003). Fatas and Mihov (2003) used government expenditure as a proxy of discretionary fiscal policy when they studied the adverse effects of a procyclical fiscal policy because they associated discretionary fiscal policy as changes in government expenditure. Cyclicity of government expenditure components varies across countries, more so between developed and developing countries. Perotti (2004) made a comparison between the developed OECD countries and developing countries wherein it was found that government expenditure in the developed countries was countercyclical, while in the developing countries it was procyclical.

2.8 Conclusion

The literature shows mixed results in respect of cyclicity of fiscal policy and effectiveness of fiscal shocks in different countries. In light of a number of factors affecting the direction of fiscal policy, it is important for policy makers to understand the nature and extent of the business cycle a country is dealing with and the characteristics of types of countries. Having an understanding of these would direct a country to implement fiscal policy measures that would ensure achievement of the desired results. Also, an understanding of these factors would ensure that right conditions to maximise the effective fiscal policy are factored into the transmission mechanism.

Countries that implement fiscal action in response to fluctuations of business cycles, should take such action in a timely fashion, and it should be large enough to impact on aggregate demand and ensure sustainability in the future. Given that the effectiveness of countercyclical fiscal policy depends on its composition and size, it is crucial to analyse not only the cyclicity of aggregate government expenditure, but also the nature of components of government expenditure when determining the cyclicity of fiscal policy in a given time.

Chapter 3: Research Hypothesis

3.1 Introduction

A countercyclical fiscal policy, together with debt sustainability and intergenerational equity, are principles of a sustainable fiscal framework that underpin growth strategy in South Africa. This countercyclical fiscal policy has been adopted prior to recession and a number of literatures found differing results with regard to the cyclical characteristics of fiscal policy. This study aims to show such cyclical characteristics of fiscal policy.

3.2 Hypothesis

The main hypothesis is that fiscal policy, using general government expenditure as an instrument of fiscal policy, is countercyclical in line with Keynesian theory. An alternative is that general government expenditure is procyclical or acyclical. To determine the main hypothesis, the specific research hypotheses that will be made are described below:

3.2.1 Hypothesis 1: Test the relationship between total general government expenditure and business cycles using output and output gap

Using a regression model, the null hypothesis seeks to establish whether general government expenditure as an instrument of fiscal policy moves in the same or different direction as the business cycle. Real GDP or output and output gap would be used to proxy business cycle in line with Thornton, 2008 and Rahman (2010). Where it is found to move in the same direction, fiscal policy would be procyclical and where it is in the opposite direction, it would be concluded that fiscal policy is countercyclical.

3.2.2 Hypothesis 2: If government expenditure is countercyclical, test which components of general government expenditure follow the same direction of countercyclicality.

Using a similar regression model as in hypothesis 1, the null hypothesis seeks to establish the direction of movement for selected components of general government expenditure compared to the direction of business cycle.

Chapter 4: Research methodology and design

4.1 Introduction

The objective of the study is to determine the cyclicity of fiscal policy in South Africa since 1994, by investigating the relationship between macroeconomic variables since the democratic transition. In line with Saunders and Lewis (2012), the study focuses on a causal relationship between key economic variables and based on the research problem, its objective and the data availability. The study is of a quantitative nature.

4.2 Scope and unit of analysis

The scope of the study is the cyclicity of fiscal policy in South Africa since 1994. The data only considers the period since 1994 to limit comparison to the period the country has been in democracy. The unit of analysis will be a time series data on key fiscal variables that are defined as the tools for fiscal policy as well as real GDP or output as a key macroeconomic variable. Since there is no consensus in the literature on the appropriate methodology for the construction of cyclicity measures for fiscal policy, the study focuses on total government expenditure and its components as proxies for fiscal policy. This is consistent with arguments developed by Kaminsky, Reinhart and Vegh (2004), in which they argued that cyclicity of fiscal policy is better determined through its instruments rather than outcomes variables. As such this study use total government expenditure as an instrument of fiscal policy and its components to assess the cyclical properties of fiscal policy in South Africa.

4.3 Research design

A research design, which encompasses a number of research strategies, attempts to plan of how the research objectives will be achieved (Saunders and Lewis, 2012). According to Saunders and Lewis (2012), the choice of a research design should be based on type of research problem to be assessed; whether the type of study to be conducted is exploratory, descriptive or explanatory; what is the objective of the study; and the type of data available. As indicated above and considering these factors, this study will be of a quantitative nature with an attempt to establish causal relationships.

According to Akitoby *et al* (2004), the cyclicity of government spending is typically defined in terms of how spending moves with the output gap. However, measuring output gap is not easily achievable or realistically estimated, especially for developing countries, this study focuses on the co-movements between government spending and output, with a minimal co-movement with output gap. A fiscal reaction regression model of the following generic form will be estimated in line with the main hypothesis:

$$G_t = \beta_0 + \beta_1 X_t + \mu_t \dots \dots \dots (4.1)$$

where β_0 is a regression constant variable to be determined; the dependent variable G_t represents a fiscal variable (defined as general government expenditure or government expenditure as a share of real GDP) in time t as a proxy of fiscal policy; X_t represents output gap in period t . μ_t represents an error term in any regression model. According to the Statistics South Africa (2011), general government expenditure comprises the national, provincial, higher education institutions and the non-trading services of municipalities.

South Africa is a developing country and according to Keynesian literature, fiscal policy ought to follow a countercyclical policy during periods of recession and a

procyclical policy during boom periods. However, some government expenditure, such as capital expenditure, takes some time to impact the economy. As such Abedeji and Williams (2007) regressed fiscal indicators on output and lagged dependent variables. To effect such a lag, (G_{t-1}) will be added as an additional independent variable to main model (1). The main hypothesis will be extended where G_t will represent components of government expenditure and its lag as dependent variables to have the following form:

$$G_{t-1} = \beta_0 + \beta_1 X_t + \mu_t \dots \dots \dots (4.2)$$

This equation seeks to determine the cyclical characteristic of total general government expenditure as an indicator of fiscal policy. In line with the model, an indicator of fiscal policy is countercyclical if $\beta_1 < 0$; where fiscal policy indicator is procyclical if $\beta_1 > 0$; and lastly, where an indicator is acyclical if $\beta_1 = 0$.

Whereas Thornton (2007) calculated a budget balance and found evidence of countercyclical government expenditure and revenue in South Africa using a sample from 1972 to 2001, Burger and Jimmy (2006) quoted in Du Plessis et al (2007) found evidence of procyclical government expenditure and budget balance for South Africa. The sample for the two studies is long and involves a number of shocks for which some would have impacted on the findings. Du Plessis et al (2007) used a structural vector autoregression (SVAR) model with a sample from 1960 to the end of 2006. They used an impulse response function and incorporated the dynamic interaction between monetary and fiscal shocks on both the demand and supply sides and found evidence of countercyclical monetary policy and a procyclical fiscal policy. As much as this study is detailed in that it incorporates monetary policy interaction, how would the cyclical direction of fiscal policy differs if there was no interaction and policy only focused on government expenditure?

This study uses data only from the post-apartheid period and uses a more recent approach by Rahman (2010) to achieve the research objective. Rahman (2010) estimated the relationship between expenditure and output in Eastern Europe using different specifications such as the response of total government expenditure to real output; the response of expenditure to output gap; and the response of expenditure to GDP ratio with respect to output gap. Gupta *et al* (2005) found empirical evidence that there is a relationship between fiscal adjustment, expenditure components and economic growth in low-income countries. Darby and Melitz (2008) and Ocrane (2011) argued that the importance of decomposing several components of government expenditure is in order to avoid the assumption that the components of expenditure would move in a similar cyclical direction as aggregate government expenditure. The responsiveness of fiscal policy actions also differs across components. Gupta *et al* (2005) argued that a strong budgetary position and the composition of public outlays play a key role in determining whether fiscal expansion can lead to an expansion in output and therefore sustainable growth over time. A study by the International Monetary Fund (2008) reflected a combination of mildly procyclical revenues and small countercyclical current spending and large procyclical capital spending cuts, therefore indicating mixed results of cyclicity.

4.4 Population of relevance

The study is based on key fiscal and macroeconomic variables drawn from the National Treasury of South Africa and the South African Reserve Bank (SARB). The population of relevance consists of all data drawn from national accounts and economic statistics.

4.5 Sampling method and size

Based on a judgemental sampling type, variables were analysed from a period of democratic transition from 1994 to 2011 on a fiscal year frequency (that is from

1994/95 to 2010/11). A judgemental sampling is defined as a non-probability sampling based on a researcher's objective. It will be used in this study in line with Saunders and Lewis (2012). This sampling is chosen to ensure that only the cyclical pattern of government expenditure as an instrument of fiscal policy, the study's topic of interest, in relation to real output and output gap is assessed.

4.6 Data collection

The research approach of this study is quantitative in nature. As such, all data will be of secondary in nature. According to Saunders and Lewis (2012), a quantitative study using secondary data is defined as a study consisting of numbers in tables and figures. This study uses macroeconomic variable data on a fiscal year (financial year) frequency from 1994/95 to 2010/11. These variables are national total general government expenditure, general government expenditure by functional classification such as spending on education, health, defence, as well general government expenditure by economic classification (that is spending on compensation of employees, goods and services, interest payments and capital expenditure), while data on macroeconomic variables will include real GDP or output. Time series data on general government expenditure and its components are obtained from the Statistics South Africa (fiscal statistics of consolidated general government) and data on real GDP and its growth rates are obtained from the SARB. As indicated above, the choice of variables is in line with a number of previous studies such and Kaminsky et al (2004) and Rahman (2010).

4.7 Data analysis

In testing the hypothesis, the study estimates an ordinary least square (OLS) econometric model using time series data and the focus will be a time series regression analysis technique, used to establish a causal relationship of equation 1 above.

Prior to the regression model analysis, data will be analysed to establish the characteristics of the data. Thus, data tests will be conducted to establish stationary or non-stationary data in order to determine appropriate transformation needs.

4.8 Research limitations

The research conducted in this research project has, *inter alia*, the following limitations:

- The study focuses only on fiscal policy using government expenditure as an indicator or instrument of fiscal policy and data used in the study focused only on total general government expenditure by function and economic classification. The study does not make a determination of cyclicity based on tax rates, revenue or public debt as other tools of fiscal policy;
- The study does not attempt to compare or determine the cyclicity of monetary policy or a monetary-fiscal policy mix; and
- The study focuses on general government expenditure and excludes expenditure by state-owned enterprises.

Chapter 5: Analysis of results

5.1 Introduction

This chapter presents the results of the analysis of data for different components of general government expenditure.

The data series chosen is total general government expenditure, general expenditure per economic classification, general government expenditure by functional group and real gross domestic product (GDP). All data series covers a fiscal year, starting with the 1994/95 fiscal year. For real GDP data, three quarterly amounts of the last three quarters were added to the first quarter of the following year to make it an equivalent of a fiscal year. As such, the data to be analysed covers a period from April 1994 to end of March 2011. Published data was only available until the end of 2009/10 and to get the 2010/11 government expenditure data, the 2009/10 data was adjusted by the annual inflation to estimate the 2010/11 data. Statistics South Africa will publish the actual data for 2010/11 in November 2012.

As indicated in chapter 3, data will be analysed to align with the following research hypothesis:

Hypothesis 1: Test the relationship between total general government expenditure and business cycles using output

Hypothesis 2: If government expenditure is countercyclical, test which components of general government expenditure follow the same direction of countercyclicity.

The data series for the first hypothesis include total general government expenditure and real GDP, while data series for the second hypothesis cover government expenditure components per economic and functional classifications. Economic classification comprise of compensation of employees, purchases of goods and services, interest, subsidies and capital expenditure, while functional classification, which measures the purpose for which cash payment transactions for operating activities are undertaken, comprise of general public services, defence and public order, economic affairs, education, health and social protection, housing and community services, recreation and environmental protection. This data is generally used to measure allocation of resources by government in order to promote various services and objectives rendered to the community.

For the purpose of this study, all economic classifications except expenditure on current and capital transfers are used. The reason for this is that a new classification was introduced from 2004/05 which has impacted on the expenditure data on current and capital transfers. Under functional classification, only the general public services, defence and public order, economic services, health, education and social protection are used. Table 5.1 provides a list of all data variables and the code to be used in the model for both hypotheses. All data have been transformed to its natural logarithm form in order to linearise them as required by E-Views.

Table 5-1: List of variables

Data Variable	Code	Explanation
Total general government (consolidated) expenditure	Intotgovexp	All government expenditure that takes place and general government expenditure at national and provincial department, extra budgetary accounts, expenditure on higher education institutions at municipalities
Real GDP	Inrgdp	GDP is a production measure as it is obtained through the sum of the gross value added of all resident institutional units in their capacity as producers, plus the values of any taxes less subsidies, on production or imports not already included in the values of the outputs and values added by resident producers. It is GDP at market prices, taking out inflation
Economic classification		
Compensation of employees	Incompemp	Total remuneration, in cash, payable to a government employee in return for work done during the accounting period, except for work connected with own account capital formation. It includes wages and salaries and social contribution
Purchases of goods and services	Ingoodserv	Expenditure on all goods and services, which are used (without further transformation in the production) by government units for the direct satisfaction of individual needs or wants or the collective needs of members of the community.
Interest	Ininterest	Interest payment and outlays for underwriting and floating government loans
Subsidies	Insubs	Current unrequited payments that government units make to enterprises/business on the basis of levels of their production activities or the quantities or values of the goods and services that they produce, sell, export or import
Consumption of fixed capital	Incapex	Produced assets that are used repeatedly or continuously in production processes
Functional classification		
General public services	General	Spending on executive and legislative organs, financial and fiscal affairs, external affairs; foreign economic aid; general personnel services; basic research; public debt transactions and transfers between different levels of government not allocated to a particular function
Defense and public order	Defense	Expenditure on military, civil and foreign military aid, research and development in defense, police services, law courts, fire protection services; research and development on public order and safety
Economic affairs	Economic	Includes general economic and commercial affairs; agriculture, forestry and fishing; fuel and energy; mining, manufacturing and construction; transport and communication
Education	Edu	Government outlays on education include services provided to individual pupils and students and expenditure on services provided on a collective basis. Include primary, secondary and tertiary education, education research and development
Health	Health	Expenditure on services provided to individual persons and services on a collective basis, which include medical products, appliances and equipment; outpatient services; hospital services; public health services and research and development
Social protection	Socwell	Includes spending on social services, housing and community amenities; sports, recreation and culture. Include spending on sickness, disability and old age grants; family and children; unemployment and housing
Data Variable		
Outputgap	outputgap	The difference between actual GDP or actual output and potential GDP
Ratio of total government debt to gdp	debtgdpratio	the total amount of money owed by the government as a consequence of its borrowing in the past as a ration of GDP

Source: International Monetary Fund, 2001; Statistics South Africa, 2012

5.2 Hypotheses tests

5.2.1 Diagnostic test and analysis- unit root tests for order of integration

In order to conduct any econometric analysis, certain tests statistics help identify the most appropriate regression model. After transforming the data, either in logs, log-differences or ratios we can test the data for stationarity. This is a crucial step in regression analysis or model building as it eliminates spurious relationships and is often used to characterise co-integrated relationships.

5.2.1.1 Unit root tests for stationarity

As a preliminary step, unit root tests are performed to test whether the data is stationary or not. These tests assist in determining whether these variables should be used in their original form or require to be differenced. Although there are a number of formal unit root tests, for example, the Dickey Fuller, Augmented Dickey Fuller (ADF), Phillips-Perron and Kwiatkowski-Phillips-Schmidt-Shin (KPSS), the notable and commonly used test is the ADF (Gujarati, 1999). The ADF test is used in this study to determine whether the series has a unit root. The KPSS test is used to justify the results on selected variables where stationarity of data cannot be concluded. However, unlike the ADF test, KPSS does not provide p-values but critical values instead, and it is more powerful than the ADF (Enders, 2005). The hypotheses used in the study are given as follows:

Null hypothesis (H_0): data variable has a unit root (non-stationary)

Alternative hypothesis (H_1): data variable does not have a unit root (stationary).

Table 5-2: ADF unit root tests for order of integration

Variable	Test level	t-statistic (absolute value)	p-value	Decision
lnotgovexp	Level	0.229197	0.9702	Do not reject H_0
	First difference	-3.345746	0.0311	Reject the H_0
lnrgdp	Level	0.889096	0.9917	Do not reject H_0
	First difference	2.474673	0.1403	Do not reject H_0
	Second difference	3.582016	0.0213	Reject the H_0
lncompemp	Level	0.030111	0.9484	Do not reject H_0
	First difference	3.313302	0.0344	Reject the H_0
lngoodserv	Level	0.001954	0.9455	Do not reject H_0
	First difference	4.959018	0.0016	Reject the H_0
lninterest*	Level	3.345739	0.0298	Reject the H_0
	First difference	n/a	n/a	n/a
lnsubs	Level	0.502726	0.9809	Do not reject H_0
	First difference	4.756922	0.0023	Reject the H_0
lnacapex	Level	0.083763	0.9358	Do not reject H_0
	First difference	4.114631	0.0075	Reject the H_0
lnrgdp*	Level	0.889096	0.9917	Do not reject H_0
	First difference	2.474673	0.1403	Do not reject H_0
	Second difference	3.582016	0.0213	Reject the H_0
lngeneral	Level	0.9769	0.7348	Do not reject H_0
	First difference	3.2105	0.0449	Reject the H_0
lndefense	Level	0.304	0.9705	Do not reject H_0
	First difference	3.675	0.0169	Reject the H_0
lneconomic	Level	0.8797	0.9921	Do not reject H_0
	First difference	5.4412	0.0007	Reject the H_0
lnedu*	Level	2.1613	0.9996	Do not reject H_0
	First difference	2.896	0.0692	Do not reject H_0
	Second difference	3.9676	0.0107	Reject H_0
lnhealth	Level	0.3226	0.9717	Do not reject H_0
	First difference	3.4617	0.0251	Reject the H_0
lnsocwell	Level	0.628	0.838	Do not reject H_0
	First difference	3.7649	0.018	Do not reject H_0
lnatotgovexp	Level	0.4146	0.9768	Do not reject H_0
	First difference	3.4572	0.0253	Reject the H_0

* variables are not integrated to the first order, use KPSS to confirm order of integration

Source: Author's calculation

Table 5-3: KPSS unit root tests for order of

Variable	Test level	t-statistic (absolute value)	Critical value	p-value	Decision
Lnrgdp*	Level	0.5321	0.463	n/a	Reject the H ₀
	First difference	0.1523	0.463	n/a	Do not reject H ₀
Ininterest*	Level	0.6545	0.463	n/a	Reject the H ₀
	First difference	0.3659	0.463	n/a	Do not reject H ₀
Inedu*	Level	0.5483	0.463	n/a	Reject the H ₀
	First difference	0.1561	0.463	n/a	Do not reject H ₀

Source: Author's calculation

All unit root tests were performed at a 5% level of significance and unit root tests for all data variables is presented in Tables 5.2 and 5.3 respectively. The ADF test has a null hypothesis that a variable has a unit root while the null hypothesis of the KPSS tests for stationarity. Whilst testing for the stationarity of LNRGPD using the ADF unit root test result shows that LNRGDP is an I(2) variable, there is a difference, which for KPSS tests assumes stationarity of a variable of interest (Wojcik and Rosiak-Lada, 2007).

5.2.2 Ordinary Least Square Regression

To determine the cyclicity of general government expenditure and its components, the relationship between expenditure and real GDP or output using the same model specification is estimated. The OLS regression model estimates is

$$G_t = \beta_0 + \beta_1 X_t + \mu_t \dots \dots \dots 5.1$$

where G_t is a government expenditure or its component and X_t is real GDP.

With the ordinary least squares (OLS) regression, the responsiveness of general government expenditure to output as proxied by real GDP and output gap is determined. Data variables were transformed into natural logarithm, where the response coefficients in both specifications show the rate of change in total general government expenditure or its components resulting from a 1 per cent change in real GDP (LNRGDP).

Table 5-4: Regression results for LNTOTGOVEXP and LNRGDP

Dependent Variable: LNTOTGOVEXP
 Method: Least Squares
 Date: 08/20/12 Time: 19:44
 Sample: 1995 2011
 Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-31.70016	1.218764	-26.01009	0.0000
LNRGDP	3.143843	0.085983	36.56344	0.0000
R-squared	0.988904	Mean dependent var		12.85888
Adjusted R-squared	0.988165	S.D. dependent var		0.549753
S.E. of regression	0.059808	Akaike info criterion		-2.685231
Sum squared resid	0.053655	Schwarz criterion		-2.587205
Log likelihood	24.82446	Hannan-Quinn criter.		-2.675487
F-statistic	1336.885	Durbin-Watson stat		1.014435
Prob(F-statistic)	0.000000			

Source: Author's calculations

To show the effect of lagged dependent variables in line with Abedeji and Williams (2007), the following results shows an extension of the main hypothesis where LNTOTGOVEXP(-1) represents a lag of total government expenditure as a dependent variables in line with equation 4.2:

Table 5-5: Regression results for LNTOTGOVEXP(-1) and LNRGDP

Dependent Variable: LNTOTGOVEXP(-1)
 Method: Least Squares
 Date: 10/02/12 Time: 16:56
 Sample (adjusted): 1996 2011
 Included observations: 16 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-31.02696	1.735049	-17.88247	0.0000
LNRGDP	3.089131	0.122271	25.26453	0.0000
R-squared	0.978537	Mean dependent var		12.80539
Adjusted R-squared	0.977004	S.D. dependent var		0.520086
S.E. of regression	0.078868	Akaike info criterion		-2.125626
Sum squared resid	0.087081	Schwarz criterion		-2.029052
Log likelihood	19.00500	Hannan-Quinn criter.		-2.120680
F-statistic	638.2964	Durbin-Watson stat		1.002265

Prob(F-statistic) 0.000000

Source: Author's calculations

Figure 5-1: Real GDP and potential GDP

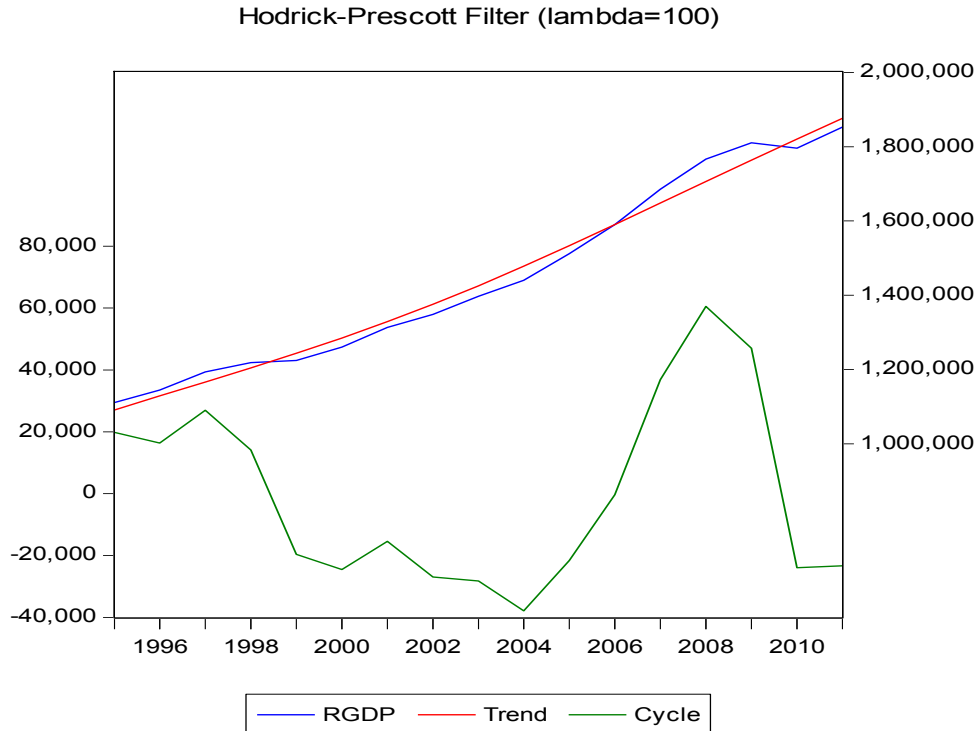


Table 5-6: Regression results for de-trended total government spending and output gap

Dependent Variable: DETRENDEDTOTEXP

Method: Least Squares

Date: 09/28/12 Time: 12:29

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
OUTPUTGAP	2.274201	0.993861	2.288249	0.0371
C	1.157802	1.926596	0.600957	0.5568
R-squared	0.258750	Mean dependent var		1.167652
Adjusted R-squared	0.209333	S.D. dependent var		8.933412
S.E. of regression	7.943540	Akaike info criterion		7.092726
Sum squared resid	946.4975	Schwarz criterion		7.190751
Log likelihood	-58.28817	Hannan-Quinn criter.		7.102470

F-statistic 5.236084 Durbin-Watson stat 0.595332
 Prob(F-statistic) 0.037056

Source: Author's calculations

Table 5-7: Summary of regression results, economic classification

	DEPENDENT VARIABLES				
	LNCOMPMP	LNGOODSERV	LNINTEREST	LNSUBS	LNCAPEX
Coefficient	2.7719	3.8549	1.3228	1.911983	4.2661
R-squared	0.9729	0.9766	0.8337	0.8829	0.9779
Adjusted R-squared	0.9711	0.975	0.8226	0.8751	0.9764
t-statistic	23.2198	25.044	8.6726	10.6351	25.7837
p-value	0.0000	0.0000	0.0000	0.0000	0.0000
F-statistic	539.1589	627.2049	75.214	113.1073	664.8023
SE of regression	0.081	0.107	0.106	0.125	0.115
Sum of squared resid	0.0995	0.1719	0.1688	0.2345	0.1986
Mean dependent var	11.8957	11.2696	10.735	9.2276	10.3667
S.D. dependent var	0.4793	0.6783	0.2519	0.3538	0.7501
Akaike info criterion	-2.0673	-1.5205	-1.5388	-1.21	-1.376
Schwarz criterion	-1.9693	-1.4225	-1.4408	-1.112	-1.278
Durbin Watson	0.7447	1.1105	0.5134	0.892	1.1499

Source: Author's calculations

Table 5-8: Summary of regression results, functional classification

	DEPENDENT VARIABLES					
	LNGENERAL	LNDEFENSE	LNECONOMIC	LNEDU	LNHEALTH	LNSOCWELL
Coefficient	2.9204	3.0996	3.2039	2.8473	3.3307	3.8598
R-squared	0.9764	0.9913	0.9407	0.9759	0.9805	0.9786
Adjusted R-squared	0.9749	0.9907	0.9367	0.9743	0.9792	0.9772
t-statistic	24.9624	41.4549	15.431	24.6819	27.4916	26.2117
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
F-statistic	623.1238	1718.509	238.1158	609.2006	755.7924	687.0582
SE of regression	0.0813	0.052	0.1444	0.0802	0.0842	0.1024
Sum of squared resid	0.0993	0.0405	0.3128	0.0965	0.1065	0.1573
Mean dependent var	11.4651	10.9598	10.6253	11.2333	10.5485	11.1911
S.D. dependent var	0.5139	0.5413	0.5744	0.5012	0.5849	0.6784
Akaike info criterion	-2.0693	-2.9646	-0.922	-2.0973	-1.9993	-1.6091
Schwarz criterion	-1.9712	-2.8666	-0.824	-1.9993	-1.9013	-1.5111
Durbin Watson	1.0053	1.2077	0.8967	0.7766	0.7472	0.9132

Source: Author's calculations

5.2.3 Granger causality test

Granger causality tests whether endogenous variables can be treated as exogenous variables. Thus, it tests of weak exogeneity between variables. For example, through the Pairwise Granger causality test, one can see whether government expenditure influences GDP and whether GDP influences government expenditure.

Table 5-9: Pairwise Granger causality test, LNTOTGOVEXP and LNRGDP

Pairwise Granger Causality Tests

Date: 08/25/12 Time: 15:20

Sample: 1995 2011

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNTOTGOVEXP does not Granger Cause LNRGDP	15	9.24177	0.0053
LNRGDP does not Granger Cause LNTOTGOVEXP		4.57135	0.0389

Source: Author's calculation

Table 5-10: Pairwise Granger causality test between expenditure components variable

Pairwise Granger Causality Tests

Date: 09/09/12 Time: 16:24

Lags: 1

Economic classification			
Null Hypothesis:	Obs	F-Statistic	Prob.
LNRGDP does not Granger Cause LNCOMPEMP	16	14.9598	0.0019
LNCOMPEMP does not Granger Cause LNRGDP		0.15569	0.6996
LNRGDP does not Granger Cause LNINTEREST	16	5.18342	0.0404
LNINTEREST does not Granger Cause LNRGDP		0.49871	0.4925

LNRGDP does not Granger Cause LNSUBS	16	10.8021	0.0059
LNSUBS does not Granger Cause LNRGDP		0.69971	0.418
LNRGDP does not Granger Cause LNCAPEX	16	21.0696	0.0005
LNCAPEX does not Granger Cause LNRGDP		2.98046	0.1079
LNRGDP does not Granger Cause LNGOODSERV*	15	1.64376	0.2414
LNGOODSERV does not Granger Cause LNRGDP		6.63307	0.0147
Functional classification			
Null Hypothesis:	Obs	F-Statistic	Prob.
LNRGDP does not Granger Cause LNGENERAL	16	0.38004	0.5482
LNGENERAL does not Granger Cause LNRGDP		6.62085	0.0232
LNRGDP does not Granger Cause LNDEFENCE	16	5.35146	0.0377
LNDEFENCE does not Granger Cause LNRGDP		0.23101	0.6388
LNRGDP does not Granger Cause LNECONOMIC	16	29.1765	0.0001
LNECONOMIC does not Granger Cause LNRGDP		1.20366	0.2925
LNRGDP does not Granger Cause LNEDU	16	12.4157	0.0037
LNEDU does not Granger Cause LNRGDP		0.36843	0.5543
LNRGDP does not Granger Cause LNHEALTH	16	19.214	0.0007
LNHEALTH does not Granger Cause LNRGDP		1.46814	0.2472
LNRGDP does not Granger Cause LNSOCWELL	16	6.4832	0.0244
LNSOCWELL does not Granger Cause LNRGDP		0.03749	0.8495

* both 1 and 2 lags shows same results

Source: Author's calculation

5.2.4 Cointegration test

Literature states that integrated variables of order one, $I(1)$, may have a cointegration relationship whose existence need to be tested (Johansen, 1998). From the analysis of diagnostic tests, all data variables had a unit root and the data had to be differenced once to achieve stationarity. Thus, all data variables, in their log form, are all $I(1)$. Johansen (1998) also states that if data variables are

individually integrated of the same order and there is at least one linear combination of variables that is stationary, then variables are set to be cointegrated. If the time series are not cointegrated, then the first differences form is appropriate for all test variables. If two data series are cointegrated, the variables may drift apart but there will be a tendency for them to retain a close proximity to each other and therefore have a long run relationship.

The cointegration tests for the long run relationship between variables and therefore determines the actual form of the data used in subsequent regression analysis, although theory distinguishes ration between a number of tests for cointegration, namely, Johansen, two step Engle-Granger and Phillips-Ouliaris. In this paper, a simple Engle-Granger procedure is used as it is useful in the sense that it shows whether government expenditure influences GDP and whether GDP influences government. The two step of the Engle-Granger test involves determining residuals of the regression model of all variables against real GDP and then testing for cointegration by determining the stationarity of residuals.

Table 5-11: Residual tests for cointegration

Dependent variable	Test level	t-statistic (absolute value)	5% Critical value	p-value	Decision
LNTOTGOVEXP	Level	0.0682	0.463	n/a	Do not reject H_0
LNCOMPEMP	Level	0.0864	0.463	n/a	Do not reject H_0
LNGOODSERV	Level	0.1087	0.463	n/a	Do not reject H_0
LNINTEREST	Level	0.1523	0.463	n/a	Do not reject H_0
LNSUBS	Level	0.1734	0.463	n/a	Do not reject H_0
LNCAPEX	Level	0.1201	0.463	n/a	Do not reject H_0
LNGENERAL	Level	0.1839	0.463	n/a	Do not reject H_0
LNDEFENSE	Level	0.0738	0.463	n/a	Do not reject H_0
LNECONOMIC	Level	0.1280	0.463	n/a	Do not reject H_0
LNEDU	Level	0.0795	0.463	n/a	Do not reject H_0
LNHEALTH	Level	0.0959	0.463	n/a	Do not reject H_0
LNSOCWELL	Level	0.1477	0.463	n/a	Do not reject H_0

Source: Author's calculations

5.2.5 Error correction model

Having concluded that there exist cointegration between LNTOTGOVEXP and LNRGDP, there must be an error correction model (ECM) that determines a portion of disequilibrium from one period to the other. Thus, an ECM describes the short run adjustment of the integrated variables towards equilibrium values

Table 5-12: Error correction model results

Dependent Variable: D(LNTOTGOVEXP)

Method: Least Squares

Date: 09/09/12 Time: 14:29

Sample (adjusted): 1997 2011

Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.93594	6.384972	-1.869380	0.0884
D(LNRGDP(-1))	0.445887	0.698944	0.637944	0.5366
LNRGDP(-1)	1.199704	0.633346	1.894230	0.0848**
LNTOTGOVEXP(-1)	-0.386896	0.201591	-1.919210	0.0813**
R-squared	0.481708	Mean dependent var		0.107883
Adjusted R-squared	0.340356	S.D. dependent var		0.041929
S.E. of regression	0.034054	Akaike info criterion		-3.698545
Sum squared resid	0.012757	Schwarz criterion		-3.509732
Log likelihood	31.73909	Hannan-Quinn criter.		-3.700557
F-statistic	3.407853	Durbin-Watson stat		1.511603
Prob(F-statistic)	0.056836			

*Significant at 5% level of significance

** Significant at 10% level of significance

Source: Author's calculation

The speed of adjustment or ECM = 0.386896, indicates a slow adjustment to equilibrium. Long run coefficient = $1.199704 / \text{absolute value of } -0.386896 = 3.1008$. Short run coefficient = 0.445887

Table 5-13: Summary of error correction model results, economic and functional classification

Economic classification						
	Dependent variable					
	dlncompemp	dlngoodserv	dlninterest	dlnsubs	dlnacapex	
dlnrgdp(-1)	-1.9155*(0.0095)*	2.1209(0.1104)	-1.0748(0.1667)	0.3561(0.8401)	0.4790(0.7114)*	
lnrgdp(-1)	2.3148 (0.0001)***	0.4555(0.5863)	0.3808(0.0942)*	1.3881(0.0319)**	3.2182(0.0023)***	
1 lag of economic classification	-0.8714 (0.0001)***	-0.1519 (0.4675)	-0.4078 (0.0342)**	-0.6013 (0.0050)**	-0.7126 (0.0035)***	
R-squared	0.8025	0.2994	0.4629	0.4603	0.8047	
Adjusted R-squared	0.7486	0.1084	0.3165	0.3131	0.7514	
ECM Coefficient	-0.8714	-0.1519	-0.4078	-0.6013	-0.7126	
SR coefficient	-1.9155	2.1209	-1.0748	0.3561	0.479	
LR coefficient	2.1982	13.9625	2.6356	0.5922	0.6722	

Functional classification						
	Dependent variable					
	dlngeneral	dlndefense	dlineconomic	dlnedu	dlnhealth	dlnsocwell
dlnrgdp(-1)	0.2948 (0.8048)	1.2989 (0.1066)	1.6143 (0.4807)	-1.0922 (0.3028)	-2.1883 (0.0539)*	0.103621 (0.9364)
lnrgdp(-1)	0.4848 (0.5312)	0.65411 (0.4041)	2.5029 (0.0212)**	2.0107 (0.0112)**	3.4377 (0.0007)***	1.991125 (0.0394)**
1 lag of economic classification	-0.2032 (0.4427)	-0.2107 (0.4029)	-0.7013 (0.0260)**	-0.7060 (0.0127)**	-1.0429 (0.0007)***	-0.543329 (0.0328)**
R-squared	0.106072	0.448712	0.452538	0.446566	0.75662	0.430691
Adjusted R-squared	-0.137726	0.298361	0.30323	0.040179	0.690243	0.275425
ECM coefficient	-0.2032	-0.2107	-0.7013	-0.706	-1.0429	-0.5433
SR coefficient	0.4848	0.6541	2.5029	2.0107	3.4377	1.9911
LR coefficient	2.3858	3.1044	3.5689	2.8480	3.2963	3.6648

Probability in parenthesis
 * denotes significance at 10% level of significance
 ** denotes significance at 5% level of significance
 *** denotes significance at 1 level of significance

Source: Author's calculation

5.2.6 Diagnostic tests for ECM residuals

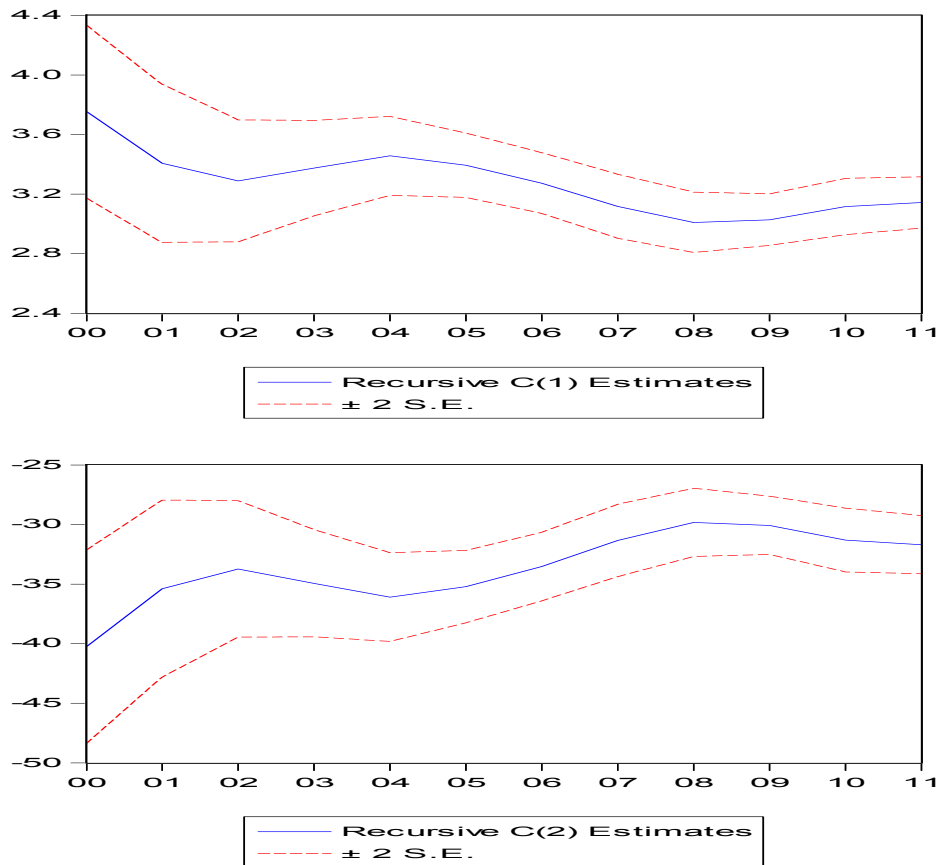
ECM diagnostic tests are conducted in order to determine which variables should be included in the final specification of the ECM (Enders, 2004). However, since our ECM consist of the one independent variable and a lag of the dependent variable, the diagnostic test are determined in order to decide on significance of each ECM

Table 5-14: Summary of ECM diagnostic tests

Null Hypothesis	Test	Test statistic	Probability
d(Intotgovexp)			
Normality	Jarque Bera	0.22	0.89
Heteroskedasticity	White	1.30	0.72
Autocorrelation	Breusch-Godfrey	1.13	0.56
d(Incompemp)			
Normality	Jarque Bera	0.20	0.58
Heteroskedasticity	White	1.20	0.25
Autocorrelation	Breusch-Godfrey	1.61	0.20
d(Ingoodserv)			
Normality	Jarque Bera	0.82	0.66
Heteroskedasticity	White	1.10	0.77
Autocorrelation	Breusch-Godfrey	2.85	0.24
d(Ininterest)			
Normality	Jarque Bera	0.01	0.99
Heteroskedasticity	White	3.28	0.35
Autocorrelation	Breusch-Godfrey	3.46	0.17
d(Insubs)			
Normality	Jarque Bera	0.68	0.70
Heteroskedasticity	White	0.72	0.86
Autocorrelation	Breusch-Godfrey	4.50	0.10
d(Incapex)			
Normality	Jarque Bera	1.25	0.53
Heteroskedasticity	White	1.86	0.60
Autocorrelation	Breusch-Godfrey	0.87	0.64
d(Ingeneral)			
Normality	Jarque Bera	2.30	0.30
Heteroskedasticity	White	5.56	0.13
Autocorrelation	Breusch-Godfrey	3.25	0.19
d(Indefense)			
Normality	Jarque Bera	2.70	0.25
Heteroskedasticity	White	3.70	0.29
Autocorrelation	Breusch-Godfrey	0.62	0.73
d(Ineconomic)			
Normality	Jarque Bera	1.38	0.50
Heteroskedasticity	White	1.54	0.67
Autocorrelation	Breusch-Godfrey	2.76	0.25
d(Inedu)			
Normality	Jarque Bera	0.08	0.95
Heteroskedasticity	White	4.58	0.20
Autocorrelation	Breusch-Godfrey	3.48	0.07
d(Inhealth)			
Normality	Jarque Bera	0.33	0.84
Heteroskedasticity	White	7.03	0.07
Autocorrelation	Breusch-Godfrey	4.01	0.13
d(Insocwell)			
Normality	Jarque Bera	1.20	0.54
Heteroskedasticity	White	1.17	0.75
Autocorrelation	Breusch-Godfrey	0.90	0.99

Source: Author's calculations

Figure 5-2: Recursiveness coefficients test for stability, LNTOTGOVEXP and LNRGDP

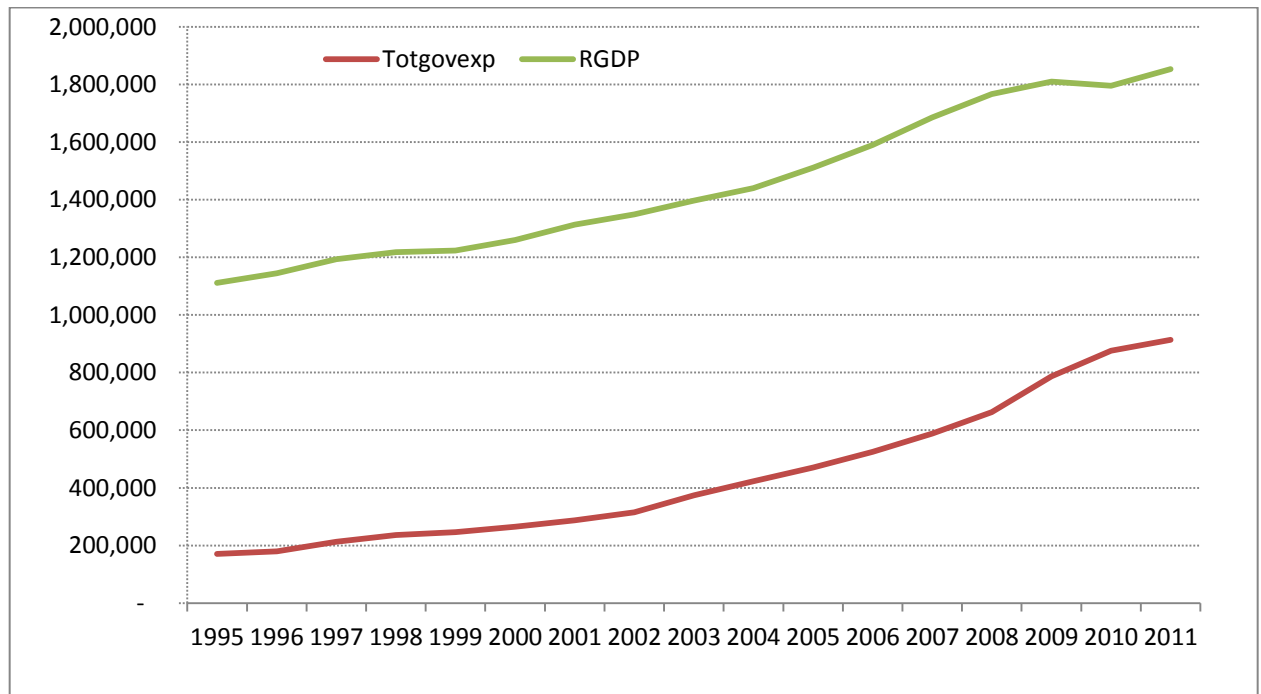


Source: Author's calculations

5.3 Determination of the cyclical nature of total government expenditure

In order to determine the cyclical nature of total government expenditure, it was ascertained how total government expenditure has changed during period of real GDP growth by creating a variable called "dummyscycle".

Figure 5-3: Total government expenditure and real GDP, 1994/5 – 2010/11



Source: Statistics South Africa, various publications

Table 5-15: Cyclicity of total government expenditure

Dependent Variable: D(LNTOTGOVEXP)

Method: Least Squares

Date: 08/25/12 Time: 17:05

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$$D(LNTOTGOVEXP) = C(1) + C(2) * D(LNRGDP) * DUMMYCYCLE + C(3) * D(LNRGDP) * (1 - DUMMYCYCLE)$$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.067726	0.032090	2.110507	0.0548
C(2)	-4.879088	6.798324	-0.717690	0.4856
C(3)	1.044705	0.866317	1.205914	0.2493
R-squared	0.100867	Mean dependent var		0.104094
Adjusted R-squared	-0.037461	S.D. dependent var		0.043249
S.E. of regression	0.044052	Akaike info criterion		-3.239529
Sum squared resid	0.025228	Schwarz criterion		-3.094669
Log likelihood	28.91623	Hannan-Quinn criter.		-3.232111
F-statistic	0.729188	Durbin-Watson stat		1.669172
Prob(F-statistic)	0.501020			

Source: Author's calculation

Chapter 6: Discussion of results

6.1 Introduction

This chapter discusses the findings from the analysis of data as per the two hypotheses and relates the results to theoretical literature:

Hypothesis 1: Test the relationship between total general government expenditure and business cycles using output

Hypothesis 2: If government expenditure is countercyclical, test which components of general government expenditure follow the same direction of countercyclicity; expenditure per economic classification and functional classification.

Both hypotheses aimed at establishing the cyclicity of total government expenditure to real gross domestic product (GDP) or output. In terms of economic cycle analysis, government expenditure can either be countercyclical when it increases as the economy is experiencing a downturn or procyclical when government expenditure increases as the economy is booming.

In order to determine the cyclicity, the chapter first presents the specification of the regression equation. This is followed by examination results of statistical properties of the time series used for all and estimation results. Residuals from the regression estimation output are then used to test for cointegration between given sets of data variables in the long run equation. By obtaining one set of cointegrating vector in the long run allowed estimation of the error correction model (ECM) for the equations. The errors or residuals from the ECM were used to determine the validity of the assumptions of the classical linear regression model (CLRM), which are normality, serial correlation, heteroskedasticity and also misspecification and stability of parameters over the sample period.

6.2 Statistical properties of time series

Accordingly, all data was subjected to diagnostic tests as required for regression modeling. Formal unit root test, namely the Augmented Dickey-Fuller (ADF) unit root test, and where appropriate, the KPSS, are used to assess unit roots or the order of integration of the individual time series used in this study. The ADF and KPSS unit root test results are presented in Tables 5.2 and 5.3 respectively. Both the Tables show that all data variables are found to be non-stationary in levels. All data variables, except LNINTEREST, LNRGDP and LNEDU functional classification, were found to be integrated of the first order. KPSS stationary test was used to confirm the stationarity of these three variables and they were also found to be integrated of the first order in Table 5.2 respectively.

Based on the ADF unit root test for all general government expenditure and expenditure per economic classification variables, and also KPSS test for LNRGDP, LNINTEREST and LNEDU variables, we make an implicit assumption that all variables are stationary or integrated of the first order, $I(1)$.

6.3 Estimation results of the OLS model

The OLS regression model was

$$G_t = \beta_0 + \beta_1 X_t + \mu_t \dots \dots \dots 6.1$$

where G_t is a government expenditure or its component and X_t is real GDP.

6.3.1 Total government expenditure

Table 5.4 presents the regression result for total government expenditure (LNTOTGOVEXP) regressed with real GDP (LNRGDP) and the regression output is

$$\text{LNTOTGOVEXP} = -31.70016 + 3.143843 \text{ LNRGDP} \dots\dots\dots 6.2$$

From the regression result, the sign of LNRGDP conform to economic theory that there is a positive relationship between real GDP and total government expenditure and hence a sound model. The result indicates that real GDP is an important determinant of government expenditure as LNRGDP is statistically significant in explaining LNTOTGOVEXP, mainly because of the low probability value and t-statistic values. From the result, an increase in real GDP by 1% would lead to a 3.14% increase in government expenditure. The model also exhibits a high R-squared and adjusted R-squared of 98%, indicating a good measure of the goodness of fit.

To determine the effect of real GDP on a lag of government spending on real GDP to capture the fact that South Africa is a developing country, Table 5.5 shows that an increase in real GDP by 1% would lead to a 3.08% increase in government expenditure. This result is similar as a normal regression in Table 5.4.

$$\text{LNTOTGOVEXP} = -31.70016 + 3.0891 \text{ LNRGDP} \dots\dots\dots 6.3$$

Regression result for a de-trended total government expenditure and output gap indicates similar results as those in Table 5.6 in terms of economic priori. Although the results are statistically significant in terms of t-value of 2 and probability values of 0.0371, the R-squared and adjusted R-squared are small to defend the results. From the results, a 1% increase in output gap leads to a 2.27% in government expenditure. Since there is not much difference in the results, the test continues with results from Table 5.5. Figure 5.1 shows the output gap, thus, the difference between actual and potential GDP, in which one can see the periods of positive and negative output gaps.

6.3.2 Government expenditure per economic classification

Table 5.7 presents a summary of regression results for government expenditure per economic classification and the regression outputs are:

$\text{LNCOMPENP} = -26.6445 + 2.7191\text{LNRGDP}$	6.4
$\text{LNGOODSERV} = -43.3686 + 3.8549\text{LNRGDP}$	6.5
$\text{LNINTEREST} = -8.0138 + 1.3228\text{LNRGDP}$	6.6
$\text{LNSUBS} = -17.8717 + 1.9119\text{LNRGDP}$	6.7
$\text{LNCAPEX} = -50.0993 + 4.2661\text{LNRGDP}$	6.8

Similar to total government expenditure, the sign of LNRGDP conform to economic theory that there is a positive relationship between real GDP and economic classification components of government expenditure. Based on the high R-squared and adjusted R-squared values, it is concluded that they are all sound models. From the results, a 1% increase in real GDP will resulted in increases of 4,2% in capital spending, 3,8% in goods and services, 2,7% in compensation of employees and 1,9% and 1,3% in interest and subsidies respectively. This has been the case with South Africa given the high increases in the public sector wage bill, therefore increasing compensation of employees. The large increase in interest payment is attributed to South Africa's access to finance or its increased loans to finance its budget deficit due to increased spending during the 2010 World Cup preparations.

The result indicates that real GDP is an important determinant of all economic classifications and LNRGDP is statistically significant in explaining all components, based on low probability and high t-statistics values from Annexure 5.2.

6.3.3 Government expenditure per functional classification

Table 5.8 presents the regression results for government expenditure per functional classification and the regression outputs are:

$\text{LNGENERAL} = -29.9273 + 2.9204\text{LNRGDP}$	6.9
$\text{LNDEFENSE} = -32.9724 + 3.0996\text{LNRGDP}$	6.10
$\text{LNECONOMIC} = -34.7853 + 3.2039\text{LNRGDP}$	6.11
$\text{LNEDU} = -29.1240 + 2.8473\text{LNRGDP}$	6.12
$\text{LNHEALTH} = -36.6601 + 3.3307\text{LNRGDP}$	6.13
$\text{LNSOCWELL} = -43.5160 + 3.8598\text{LNRGDP}$	6.14

Annexure 5.2 provides detailed presentation of regression estimation results and the significance of the regressions. High R-squared and adjusted R-squared ranges between 0.9367 and 0.9913, indicating a measure of goodness of fit. In terms of functional classification, regression results indicate that a 1% increase in real GDP resulted in increases in the growth rates of 3,8% in social welfare spending, 3,3% in health, 3,2% in economic services, 3% in defence and 2,9% on spending on general services during the 1994/5 to 2010/11.

6.4 Granger causality

Economic literature indicates that as much as government expenditure is significantly explained by real GDP, the opposite is true for real GDP being dependent on the level of government expenditure. However, it has to be tested empirically whether this holds for South Africa. In order to test this, a Pairwise Granger causality test was conducted to tests for weak exogeneity between the two variables. From the Granger causality tests result from Table 5.9, the null hypothesis of no Granger causality in both cases is rejected and it is concluded that the LNTOTGOVEXP and LNRGDP variables are endogenous, which is in line with economic priori. Thus, government expenditure and real GDP influence each

other. This is true for South Africa given that government expenditure contribute more than a third to real GDP in the income/expenditure model.

In terms of economic classification, results from Table 5.10 indicate that the null hypotheses are that each of the expenditure per economic classification variables does not Granger cause LNRGDP or are not endogenous. Also LNRGDP does not Granger cause any of the economic classification variables. The null hypothesis that LNRGDP does not Granger cause LNCOMPMP, LNINTEREST, LNSUBS and LNCAPEX is rejected. However, the null hypothesis that LNRGDP Granger causes LNGOODSERV at all lags of 1 and 2 is not rejected. This is true as goods and services are not expected to react to changes in GDP due to increased compensation of employees and a decrease in taxes during recession. This finding is in line with Ilzetzki and Vegh as quoted in Rahman (2010) who have conducted endogeneity tests to see whether for developing countries output growth is affected by fiscal policy and concluded negatively. However, the entire null hypothesis that all expenditure per economic classification does not Granger causes LNRGDP cannot be rejected.

For functional classification expenditure variables, results from Table 5.8 indicates that the null hypothesis that LNRGDP does not Granger cause LNDEFENCE, LNECONOMIC, LNEDU, LNHEALTH and LNSOCWELL can be rejected, but the null hypothesis that LNRGDP does not Granger cause LNGENERAL at a 5% level is not rejected. On the functional classification, the null hypothesis that LNDEFENCE, LNECONOMIC, LNEDU, LNHEALTH and LNSOCWELL do not Granger cause LNRGDP is not rejected in line with the finding that not all fiscal policy decisions would affect output growth. In contrast, the null hypothesis that LNGENERAL does not Granger cause LNRGDP is rejected.

6.5 Cointegration equation and test

In terms of literature, government expenditure is a proxy for fiscal policy. The residuals of the above equations are used to test for cointegration between a set of variables and should be integrated of the order zero, $I(0)$ in order not to reject the null hypothesis of stationarity.

Tables 5.11 presents a summary of cointegration test results for the long run relationship between variables and therefore determines the actual form of the data used in subsequent regression analysis. Cointegration means the long run relationship between non-stationary time series, which is LNTOTGOVEXP and LNRGDP. Using the KPSS tests for unit root test from the results, the null hypothesis states that the residuals are stationary. As such, the cointegration between LNTOTGOVEXP and LNRGDP indicates that a long run relationship between the two variables exists. This further confirms the granger causality results indicated above. This is true as the cyclicity of government expenditure does not matter whether there is short run or long run, there remains relationship between the two variables.

In terms of economic classification, the KPSS test for unit root test indicates that the null hypothesis of stationarity of residuals for expenditure components cannot be rejected as they are stationary. As such, the cointegration between the individual expenditure variables per economic classification and LNRGDP exists. These indicate a long run relationship between these variables. Annexure 5.3 provides details of the cointegration test for all variables.

6.6 Error correction model

After having found cointegration, an error correction models (ECM) were estimated in order to capture the short run dynamic adjustment process to the long run equilibrium for all government expenditure component variables and real GDP

regressions. In order to this, residuals terms are incorporated from the long run equilibrium. Literature indicates that planned government spending that is forward looking is likely to boost GDP. With a Granger causality test, it is established that the two variables Granger cause each other and therefore estimate the ECM. Table 5.12 shows that the ECM takes the following form:

$$dLNTOTGOVEXP = -11.9359 + 0.4458d(LNRGDP(-1)) + 1.1997LNRGDP(-1) - 0.3868LNTOTGOVEXP(-1) \dots\dots\dots 6.15$$

Equation 6.15 is standard ECM form for total government expenditure and real GDP, with an added lagged of the dependent variable. The lags in the ECM are restricted to two second order so as to preserve the degrees of freedom. Different speed of adjustments across economic cycles can be conducted by analysing different coefficients for the error correction term in the ECM and also consider the statistical significance between the speeds of adjustment.

From results, the speed of adjustment or ECM is -0.386896, which is close to zero indicating that government expenditure takes long or slow to adjustment to equilibrium. The long run coefficient is 1.199704/(absolute value of -0.386896) = 3.1008, indicating that the long run is three years. The short run coefficient is 0.445887, any number closer to zero indicate a slow speed of adjustment.

Tables 5.13 presents a summary of the ECM results for expenditure components by economic and functional classifications respectively (detailed ECM regression results in Appendix 5.4). In many cases, the estimated coefficients of the ECM are not interpreted because all variables were used in their differenced form (Enders, 2004). According to the results of the ECM, some interaction between expenditure components and the error correction term (residuals) are not statistically significant. That is, spending on goods and service ($dLNGOODSERV$), general services ($dLNGENERAL$) and defence ($dLNDEFENCE$) are all statistically

insignificant at all levels of significance. This could be due the change in spending priorities as a result of economic performance.

All the signs of the estimated coefficients of the residual are negative as expected by theory. This is in order for the dynamics to adjust into the long run equilibrium equation and not away from the equilibrium path. All probability values are presented in the parenthesis in both Tables and the t-statistic values are presented in Annexure 5.4. The R-squared and adjusted R-squared of $d(\text{LNCOMPEMP})$, $d(\text{LNCAPEX})$, and $d(\text{LNHEALTH})$ are high and defendable. However, in terms of spending priorities, one would expect the economic (LNECONOMIC) and education (LNEDU) functional classifications to exhibit high R-squared values and therefore evidence of a very good fit. As much as there results shows a slow speed of adjustment for most expenditure components variables, the slow speed of adjustment for spending on is explained by the long time it takes for capital projects to be delivered. In terms of the medium term expenditure priorities in South Africa, capital spending is lower in the first years of project and increase as projects reach completion. For most expenditure components variables, spending estimates are made in line with GDP forecasts linked to the medium term planning over the MTEF, hence a slow speed of adjustment.

From the results, the ECM regressions show that the overall speeds of adjustment differ for all expenditure components. Specifically, the speed of adjustment or the ECM for spending per economic classification ranges between 0.15 for goods and services, which is much closer to 0, -0.87 for compensation of employees, which is closer to 1. This indicates that spending on goods and services is much slower in adjusting to equilibrium than compensation of employees. Differences are also found with regard to spending per functional classification which ranges from 0.20 of general services to 1.04 in health spending. As such, while it would take spending on general services long to adjust to equilibrium, spending on health indicates a much faster adjustment.

6.6.1 Evaluation of diagnostic test of the ECM

Diagnostic test of the residuals show how they do not violate any of the assumptions of classical OLS regression analysis, except for the test for errors in specification of regressions. Since all errors of the estimated model were stationary, the estimates ECMs was subjected to diagnostic testing to ensure that the classical assumptions of OLS are fulfilled. The diagnostic test results from Table 5.14 shows that all the residuals, except that of LNINTEREST, are normally distributed, no serially correlation and homoscedastic, which means that the model passes the relevant diagnostic test and can be included in the regressions. Figure 5.2 further indicates that total government expenditure coefficients indicate stability as more data is added.

6.7 Cyclicity of total government expenditure and its components

However, this result does not necessarily indicate the cyclicity of government expenditure because it is not known by how much government expenditure changed during negative growth periods and during positive growth periods. In order to understand the dynamics around the government expenditure changes during different economic performance, a regression model was used to determine how total government expenditure (or its components) changes during periods of economic growth or downturn. A summary of the OLS tests was presented in Tables 5.4 to 5.8 in order to validate the regression specification.

Although an analysis of the OLS results (as presented in Tables 5.4 to 5.8) proved to be significant, their results do not necessarily indicate cyclicity because it is not known by how much government expenditure changed during negative growth periods and during positive growth periods and as such require testing how such change was effected. To see whether total government expenditure and its components have been countercyclical, the relationship between government

expenditure and output is estimated using the responsiveness of government expenditure to real output or GDP.

6.7.1 Cyclicalities of total government expenditure

Figure 5.3 shows a quick glance at the movement of both total government expenditure and real GDP over the sample period. However, co-movement between the two variables does not necessarily confirm procyclicality but gives an indication of how expenditure performed. However, in order to obtain an indication of cyclicalities, a dummy was created to determine how government expenditure changed during negative growth periods and during positive growth periods. Table 5.15 presents the statistical test of the cyclicalities of total government expenditure for the period under review. Where the coefficient of $D(LNRGDP) * DUMMYCYCLE$ is greater than $D(LNRGDP) * (1 - DUMMYCYCLE)$, this indicates procyclicality. However, the results do not show any statistical significance based on high probability and low t-statistics values. One of the reasons for the insignificance is attributed to the small adjusted sample period. Despite the statistical insignificance of the results, the results of procyclicality can further be substantiated by the comparison of the movement between total government expenditure and real GDP. Based on the two, the original OLS regression result is used, which is highly statistically significant.

Being a developing country, the results of procyclicality is not surprising and in line with empirical literature regarding the procyclicality of government expenditure in developing and emerging countries during good times as indicated by Rahman (2010) and Kaminsky et al (2004). For South Africa, this could be attributed to its continued access to finance during boom periods and even during the 2008 economic recession. In addition, South Africa was somehow insulated from the severe impacts of the economic recession by its inception of the National Credit Act that limited the availability of funds to households, in addition to its strict bank regulations. However, the cyclical test did not factor in control variables such as

access to finance. In general, the findings of procyclicality seems to be pronounced for South Africa as a developing countries as concluded by Thornton (2007) and Du Plessis et al (2007), although they used different methodologies.

6.7.2 Cyclicity of the components of government expenditure

In terms of expenditure components' cyclicity of government spending and its comparison to total spending, Annexure 5.5 presents regression results of the cyclical test results per economic and functional classifications. Regression results show that the procyclicality in total government expenditure is mainly driven by spending compensation of employees, goods and services, subsidies and interest, while spending on capital and general services show countercyclical characteristics, although the results shows that they are statistically insignificant. However, the cyclical test for spending interest payments is excluded from the test, given that it was found to be not normally distributed and therefore in violation of classical OLS assumptions. The procyclicality of spending on compensation of employees is in line with the National Treasury's decisions to reduce tax rates during recession in order to boost the domestic spending, which is in line with literature. For example, Aydin (2010) found that a countries change tax during upturns owing to improvements on the supply side while government expenditure would be lower on cyclical accounts such as unemployment benefits.

The procyclicality of compensation of employees is compounded by South Africa's high public sector wage bill, which the International Monetary Fund has indicated a concern about South Africa as having one of the highest wage bills of comparable countries (International Monetary Fund, 2012). The fact that spending on compensation of employees, goods and services and most of functional components such social welfare, health and education are insensitive to economic cycles shows that South Africa used the "good times" to push its socio economic development objectives.

The fact that spending on capital is countercyclical as compared to the other economic classification is explained by South Africa's prioritisation of large infrastructure projects in preparations for the 2012 World Cup, which explains the countercyclicality in capital expenditure. This is in line with economic literature that indicates that government need to create automatic stabilisers during periods of recession as found by Swanepoel (2004) and Ducanes *et al* (2006) that increased government spending on capital might work as a stabilisation tool.

The regression results per functional classification indicates that some countercyclicality from spending in interest payments and general services, which contains an interest payment portion. It was ideal for government to reprioritise spending from general services to other functions so as to spend more on social and economic projects. Spending on other functional classifications such as health, education, social welfare and defence have been procyclical along with total government expenditure. This is true for all as South Africa's fiscal policy has been about pursuing economic growth and redistribution since 1994 as stated in its policies such as the Reconstruction and Development Programmes (RDP) and Growth, Employment and Redistribution (GEAR). This is in line with Darby and Melitz (2008) who concluded that the cyclical responsiveness of government spending on social services is limited to certain elements such as unemployment benefits.

Given that all the tests for cyclicity, total government expenditure and all its components are statistically insignificant, all the tests are rejected and it is concluded that government expenditure in South Africa has been procyclical since 1994. This is mainly because government has focused initially on macroeconomic stability and later moved to increase public spending in an effort to increase aggregate demand and social welfare priorities.

6.8 Summary of results

The objective of the research was to assess the cyclical nature of fiscal policy using total government expenditure and its components since 1994. In this chapter, a simple one variable regression model was used for both hypotheses and both found to be statistically significant. Furthermore, the long run and short run behaviour of the regression model was determined separately with cointegration equations and error correction models respectively. In terms of the error correction model, it was found that the speed of adjustment indicates that government expenditure (or its components) takes long (or is slow) to adjust to equilibrium. However, it has been shown that the speed of adjustment differs across all components of government expenditure. The slow adjustments to equilibrium could be attributed to the medium term expenditure planning that South Africa uses, given that the main spending decisions are made once a year, while reprioritisation may take place during the year.

Most of the government expenditure has been found to be procyclical in line with most empirical literatures conducted on developing countries. However, the regressions did not include control factors that may explain changes in cyclical patterns over time.

Chapter 7: Conclusion and recommendation

7.1 Introduction

This chapter provides by means of a summary an overview of various conclusions reached in this study and recommends an area for possible further research. The purpose of this study was to determine the cyclicity of fiscal policy in South Africa since 1994. Specifically, this study documented the cyclicity of government spending with respect to output or real gross domestic product. The identification of the cyclicity comes after government indicated that it is following a countercyclical fiscal policy, especially after the 2008 economic crisis. Such a determination is useful in assisting decision-makers in restructuring the composition of government expenditure. Section 7.2 reflects on the two hypotheses that were tested in this study, while sections 7.3 and 7.4 present recommendations and areas of future research respectively.

7.2 Reflection on the hypotheses and conclusion

South Africa's fiscal consolidation has played a critical part in the stabilisation of the economy post 1994. As part of economic policy reforms, government pursued a countercyclical fiscal policy in order to support economic activities. The goal of this study as centred around two hypotheses, was to determine whether the pursuance of a countercyclical fiscal policy is applicable to government total expenditure or only applicable to certain components of expenditure, namely, economic or functional classification. The hypotheses were tested by means of analyses of government expenditure, its components and real gross domestic product (GDP) using E-Views software package.

This study covered a review of literature on the role of fiscal policy and its cyclicity and also the effectiveness of fiscal policy in influencing the achievement of macroeconomic goals, mainly focusing on government expenditure as a tool of

fiscal policy. Although the main focus of this study was South Africa's government expenditure, a review of literature made a comparison with international findings. Considerable literature on the cyclicity of fiscal policy exists, but reports mixed results, although they use different methodologies to test the cyclicity. This study builds on the existing literature and further disaggregate government spending into components.

Government has adopted a countercyclical fiscal policy, which means expansionary fiscal policy during periods of recession as asserted by the Keynesian theory. However, after assessing cyclicity of total government expenditure and its components, the conclusion was procyclical government expenditure. This is in contrast to the National Treasury's stance of countercyclical fiscal and monetary policies that support growth and investments in South Africa.

As a tool of fiscal policy, government expenditure contributes to economic growth and job creation, and therefore, economic stability. However, achievement of such stability depends on the composition of actual government expenditure. And as such government spending has prioritised socio-economic development since 1994. In line with this, social spending on education, health and social welfare was found to be procyclical. This corresponds with findings from developing countries as concluded by Granado *et al* (2010) and Rahman (2010). The view that government tends to decrease social spending during recession as observed by Granado *et al* (2010) does not apply to South Africa, as spending on these functions has increased since 1994, irrespective of output fluctuations. This is contrary to the fact that social spending has properties of automatically stabilising economic fluctuations.

7.3 Recommendations

From a policy point of view, the implication of the findings of this study appears to be of great importance in the event of a review of the composition of government

expenditure in future. Whilst economic policies attempt to phase in a fiscal consolidation to avoid social and economic dislocation associated with more adjustments, a lot of reprioritisation needs to take place. There is a need to implement mechanisms that aim at stabilising the economy. In fact, the public sector wage bill, which has become a concern even for the IMF (2012), is increasing at an alarming rate. This is also coupled with an increase in the size and number of government departments, which increases total government expenditure, specifically compensation of employees. As such, there is a need to move away from consumption spending to investment spending, thereby changing the procyclicality of government spending to countercyclical government spending.

However, one another area to note is that South Africa still faces a challenge of conducting policy under a highly uncertain global environment and making firm progress on reforms that promote the long-run inclusive growth needed for maintaining social cohesion. The change in the composition of expenditure needs to take into account the social challenges facing the country, more so, government's priority to reduce poverty. Another area of concern around shifting the composition of spending is that budgeting gives a greater emphasis to infrastructure, employment and economic growth. Yet, high levels of social and economic investment by government may crowd out private sector investment spending, leading to only the public sector creating jobs. This would also balloon the share government is spending on compensation of employees and goods and services. This will be in contrast with the international experience that higher levels of public and private investment or infrastructure spending promote rapid GDP growth and broaden economic activity, and can therefore result in slower economic growth.

While capital spending has shown countercyclicity in line with theory, such countercyclicality was not enough to push total government spending to be procyclical. An area of concern about spending on capital is the slow pace of spending. Many of the decisions about capital projects are planned in view of

government's three years' spending priorities. However, the actual spending is often not in line with the initial plans, rendering spending not to be in line with government planned priorities. This point highlights the importance of capacity around spending on key projects, given that spending on capital can assure that government spending is countercyclical.

7.4 Areas of further research

This study followed a Keynesian perspective where government spending is supposed to be an automatic stabiliser. In addition, this study was limited to the effects of the economic cycles on total government spending and its components and has not considered changes in the budget deficit, therefore not focusing on the primary balance. Also, this study has assumed political stability and therefore, has not considered issues such as election years and exchange rates that affect the spending owing to South Africa's financial market openness as possible control factor. This study has also not considered the impact of changes in the number of government departments since 1994. Since this study was more of a univariate model, some important general factors are left pending. As Akitoby *et al* (2004) and Ducanes *et al* (2006) observed in their findings, government spending responses to economic cycles have different effects. Possible areas of future research include considering the control factors in totality, including disaggregating expenditure to assess the impact of discretionary government spending and assessing changes in household spending in line with the neo-classical perspective.

Reference List

- Adedeji, O and Williams, O. (2007). Fiscal reaction function in the CFA zone: an analytical perspective. *International Monetary Fund Working Paper*, 07(232), 1-21.
- Akitoby, B., Clements, B., Gupta, S. and Inchauste, G. (2004). The cyclical and long-term behaviour of government expenditure in developing countries. *International Monetary Fund Working Paper*, 04(202), 1-23.
- Aydin, B. (2010). Cyclicity of revenue and structural balances in South Africa. *International Monetary Fund Working Paper* 10(216), 1-24
- Baldacci, E., Hillman, A. L. and Kojo, A.C. (2004). Growth, governance and fiscal policy transmission in low income countries. *European Journal of Political Economy*. Vol.20(2004), 517-549.
- Basic, T. (2007). On fiscal policy effects and mechanisms in Serbia. Economic analysis and research department, National Bank of Serbia, Retrieved 17 April 2012
- Black, P. Calitz, E. and Steenkamp, T. (2005). *Public Economics*. Third Edition. Oxford University Press.
- Budnevich, C. (2002). Countercyclical fiscal policy: a review of the literature, empirical evidence and some policy proposals. *UNU/WIDER Discussion Paper* 2000/41, 1-22.
- Carmignani, F. (2010). Cyclical fiscal policy in Africa. *Journal of Policy Modelling*. Vol.32 (2010), 254-267.

Colander, (2008). *Macroeconomics*. Eighth Edition. McGraw Hill Irwin.

Del Granado, J., Gupta, S., and Hajdenberg, A. (2010). Is social spending procyclical? *IMF Working Paper* 10(234), 1-17.

Darby, J. and Melitz, J. (2008). Social spending and automatic stabilisers in the OECD. *Economic Policy* October 2008, 717-756.

Du Plessis, S., Smit, B. & Sturzenegger, F, (2007). The cyclicity of monetary and fiscal policy in South Africa since 1994. *South African Journal of Economics*, Vol.75(3), 391-411.

Ducanes, Gagas, Quising and Razzaque (2006). Macroeconomic effects of fiscal policies: Empirical evidence from Bangladesh, People's Republic of China, Indonesia and Philippines. *Asian Development Bank*, ERD Working Paper 85, 1-20.

Easterly, W. and Rebelo, S. (1993). Fiscal policy and economic growth. *Journal of Monetary Economics*. Vol.32(3), 417-458.

Economic Development Department. (2010). The New Growth Path: The Framework. Presentation to the Parliamentary Portfolio Committee by Minister Ebrahim Patel on 23rd November 2010. Retrieved on 26 May 2012 from www.info.gov.za/speech/DynamicAction?pageid=461&sid=14787&tid=2485.

Enders, W. (2004). *Applied econometric time series*. Second edition. John Wiley & Sons

- Fatas, A. and Mihov, I. (2003). The case for restricting fiscal policy discretion. *The Quarterly Journal of Economics* 118(4), 1419-1447.
- Fofack, H. (2010). Fiscal adjustment and growth in Sub-Saharan Africa. World Bank Policy Research Working Paper 5306, 1-33
- Fontana, G, (2009). The transmission mechanism of fiscal policy: a critical assessment of current theories and empirical methodologies. *Journal of Post Keynesian Economics*, 31(4), 587-604.
- Fourie, F. and Burger, P. (2010). *How to think and reason in Macroeconomics*. Third Edition. Juta & Co Ltd.
- Gujarati, D. (1999). *Basic Econometrics*. Fourth edition. McGraw-Hill Irwin
- Gupta, S., Clements, B., Baldacci, E. and Mulas-Granados, C. (2005). Fiscal policy, expenditure composition and growth in low-income countries. *Journal of International Money and Finance*. Vol.24(2005), 441-463.
- Hou, Y. (2006). Budgeting for fiscal stability over the business cycle: a countercyclical fiscal policy and the multiyear perspective on budgeting. *Public Administration Review*, September/October, 2006.
- International Monetary Fund. (2008). Fiscal Policy as a countercyclical tool. World Economic Outlook, Chapter 5. Retrieved 17 June 2012 from www.imf.org.
- International Monetary Fund (2009). Regional Economic Outlook: Sub-Saharan Africa. Retrieved 12 April 2012 from <http://www.imf.org/external/pubs/ft/reo/2009/afr/eng/sreo0409.pdf>.

- International Monetary Fund. (2012). Article IV consultation with South Africa. Public Information Notice (PIN) No. 12/98 Retrieved 28 September 2012 from <http://www.imf.org/external/np/sec/pn/2012/pn1298.htm>.
- Jha, S., Mallick, S., Park, D. and Quising, P. (2010). Effectiveness of countercyclical fiscal policy: time-series evidence from developing Asia. *Asian Developing Bank Working Paper Series No.211*, 1-34.
- Johansen, S. (1998). Statistical analysis of cointegration vectors. *Journal of Dynamics and Control*. 12(1998), 23154
- Jooste, C. and Marinkov, M. (2012). South Africa's transition to a consolidated budget. *South African Journal of Economics*, Vol. 80(2), 181-199.
- Kandil, M. (2006). On the transmission mechanism of policy shocks in developing countries. *Oxford Development Studies* 34(2), 117-139.
- Kaminsky, G., Reinhart, C. and Vegh, C.A. (2004). When it rains, it pours: Procyclical capital flows and macroeconomic policies. *NBER Working Paper 10780*. Retrieved 09 April 2012 from <http://www.nber.org/papers/w10780>.
- Koop, G. (2005). *Analysis of economic data*. Second edition, John Wiley & Sons, West Sussex.
- Lane, P.R. (2003). The cyclical behaviour of fiscal policy: evidence from the OECD. *Journal of Public Economics* 87(2003), 2661-2675.
- Lledo, V., Yackvlev, I. and Selassie, A. (2009). Cyclical patterns of government expenditure in Sub-Saharan Africa: facts and factors. IMF Working Paper WP/09/274.

- Magud, N. (2008). On asymmetric business cycles and the effectiveness of counter-cyclical fiscal policies. *Journal of Macroeconomics*, 30(2008), 885-905.
- Mboweni, T. (2006). The restructured South African economy. Address by Mr. TT Mboweni, Governor of the South African Reserve Bank, at the South Africa ten years on- empowerment, finance, trade and investment conference, Cape Town on 20 May 2004. Retrieved on 04 July 2012 from <http://www.bis.org/review/r040524c.pdf>.
- National Treasury. (2009). Budget Review. Retrieved 10 June 2012 from www.treasury.gov.za.
- National Treasury (2010). *Budget Review*. Retrieved 01 April 2012 from www.treasury.gov.za.
- National Treasury (2011a). Budget Review. Retrieved 01 April 2012 from www.treasury.gov.za.
- National Treasury. (2011b). Medium Term Budget Policy Statement. Retrieved 10 June 2012 from www.treasury.gov.za.
- National Treasury (2012). *Budget Review*. Retrieved 09 April 2012 from www.treasury.gov.za.
- Ocrane, M.K. (2011). Fiscal policy and economic growth in South Africa. *Journal of Economic Studies*. Vol. 38(5), 604-618
- Parkin, M., Powell, M. and Matthews, K. (2003). *Economics*. Fifth edition, Harlow: Addison-Wesley

Perotti, R. (2004). Estimating the effects of fiscal policy in OECD countries. Innocenzo Gasparini Institute for Economic Research Working Paper 276. Retrieved on 10 June 2012 from <ftp://ftp.igier.uni-bocconi.it/wp/2004/276.pdf>.

Perotti, R. (2008). In search of transmission mechanism of fiscal policy, in *National Bureau of Economic Research Macroeconomics Annual 2007, Volume 22*. Retrieved on 10 June 2012 from <http://nber.org/books/acem07-1>.

Rahman, J. (2010). Absorption boom and fiscal stance: What lies ahead in Eastern Europe. *IMF Working Paper* 10(97), 1-31.

Republic of South Africa. 2005. Accelerated and Shared Growth Initiative for South Africa. Retrieved on 08 July 2012 from www.gov.za.

Romer, C. (2009). Fiscal Policy and Economic Recovery. *Business Economics*, Vol. 44(3), 132-135.

Spilimbergo, A. Symansky, S. Blanchard, O. and Cottarelli, C. (2008). Fiscal policy for the crisis. International Monetary Fund Staff Position Note SPN/08/01, 1-38.

Spilimbergo, A., Symansky, S. and Schindler, M. (2009). Fiscal multipliers. International Monetary Fund Staff Position Note SPN/09/11, 1-15.

Statistics South Africa. (2011). Financial statistics of consolidated general government 2009/10. Retrieved 10 August 2012 from <http://www.statssa.gov.za/publications/P9119.4.pdf>

Statistics South Africa. (2012). *Gross Domestic Product*. Retrieved 02 June 2012 from <http://www.statssa.gov.za/publications/P0441/P04413rdQuarter2011.pdf>

- Swanepoel, J. (2004). The Monetary-Fiscal policy mix in South Africa. *South African Journal of Economics*, 72(4), 730-758.
- Swanepoel, J. and Schoeman, N. (2003). The fiscal impact of unemployment insurance programmes as automatic stabilisers: the South African experience. *Journal of Public Administration*. Vol 38(4), 397-420
- Talvi, E. and Vegh, C. (2005). Tax base variability and procyclical fiscal policy in developing countries. *Journal of Development Economics*, 78(2005), 156-190.
- Tanzi, V. and Schuknecht, L. (2000). Public spending in the 20th century: a global perspective. New York: Cambridge University Press.
- Tcherneva, P.R. (2008). The return of fiscal policy: Can the new developments in the New Economic Consensus be reconciled with the Post-Keynesian View? *The Levy Economics Institute Working Paper 539*, 1-48.
- Thornton, J. (2007). On The Cyclical of South African Fiscal Policy. *South African Journal of Economics*, 75(2), 258-264.
- Thornton, J. (2008). Explaining procyclical fiscal policy in African countries. *Journal of African Economies*, 17(3), 451-464.
- Van der Berg, S. (2006). Public Spending and The Poor Since The Transition To Democracy in 'Poverty and Policy in Post-Apartheid South Africa'. Cape Town: Human Science Research Council (HSRC) Press
- Visser, W. (2004). Shifting RDP into GEAR: The ANC Government's Dilemma in Providing and Equitable System of Social Security for the 'new South Africa'.

Paper presented at the 40th ITH Linzer Konferenz, 17 September 2004.
Retrieved 10 July 2012 from www.sun.ac.za.

Woo, J. (2009). Why do more polarized countries run more procyclical fiscal policy? *The Review of Economics and Statistics*, 91(4), 850-870.

Wojcik, P. and Rosiak-Lada, K. (2007). Macroeconometric. Retrieved on 19 August 2012 from <http://coin.wne.uw.edu.pl/~lgoczek/pdf/macroeconometrics2.pdf>.

Appendices

Appendix 5.1: Unit root tests

a. Total general government expenditure: LNTOTGOVEXP

ADF test in level

Null Hypothesis: LNTOTGOVEXP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.299197	0.9702
Test critical values:		
1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.

ADF test in first difference

Null Hypothesis: D(LNTOTGOVEXP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.345746	0.0311
Test critical values:		
1% level	-3.959148	
5% level	-3.081002	
10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 15

b. Compensation of employees: LNCOMPEMP

ADF test in level

Null Hypothesis: LNCOMPEMP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.030111	0.9484

Test critical values:	1% level	-3.920350
	5% level	-3.065585
	10% level	-2.673459

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 16

ADF test in first difference

Null Hypothesis: D(LNCOMPEMP) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.313302	0.0344
Test critical values:		
	1% level	-4.004425
	5% level	-3.098896
	10% level	-2.690439

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 14

c. Purchases of goods and service: LNGOODSERV

ADF test in level

Null Hypothesis: LNGOODSERV has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.001954	0.9455
Test critical values:		
	1% level	-3.920350
	5% level	-3.065585
	10% level	-2.673459

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 16

ADF test in first difference

Null Hypothesis: D(LNGOODSERV) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
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Augmented Dickey-Fuller test statistic		-4.959018	0.0016
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	
	10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.

d. Interest: LNINTEREST

ADF unit root test for LNINTEREST

Null Hypothesis: LNINTEREST has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.345739	0.0298
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 16

KPSS unit root test for LNINTEREST

KPSS unit root test in level

Null Hypothesis: LNINTEREST is stationary

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.654539
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

KPSS unit root test in first difference I(1)

Null Hypothesis: D(LNINTEREST) is stationary

Exogenous: Constant

Bandwidth: 2 (Newey-West using Bartlett kernel)

LM-Stat.

Kwiatkowski-Phillips-Schmidt-Shin test statistic			0.365907
Asymptotic critical values*:	1% level		0.739000
	5% level		0.463000
	10% level		0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

e. Subsidies: LNSUBS

ADF test in level

Null Hypothesis: LNSUBS has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.502726	0.9809
Test critical values:	1% level	-3.920350
	5% level	-3.065585
	10% level	-2.673459

*MacKinnon (1996) one-sided p-values.

ADF test in first difference

Null Hypothesis: D(LNSUBS) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.756922	0.0023
Test critical values:	1% level	-3.959148
	5% level	-3.081002
	10% level	-2.681330

*MacKinnon (1996) one-sided p-values.

f. Capital expenditure: LNCAPEX

ADF test in level

Null Hypothesis: LNCAPEX has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.083763	0.9358

Test critical values:	1% level	-3.920350
	5% level	-3.065585
	10% level	-2.673459

*Mackinnon (1996) one-sided p-values.

ADF test in first difference

Null Hypothesis: D(LNCAPEX) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.114631	0.0075
Test critical values:		
	1% level	-3.959148
	5% level	-3.081002
	10% level	-2.681330

*Mackinnon (1996) one-sided p-values.

g. Real GDP: LNRGDP

ADF test in level

Null Hypothesis: LNRGDP has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.889096	0.9917
Test critical values:		
	1% level	-4.004425
	5% level	-3.098896
	10% level	-2.690439

*Mackinnon (1996) one-sided p-values.

ADF test in first difference

Null Hypothesis: D(LNRGDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.474673	0.1403
Test critical values:		
	1% level	-3.959148
	5% level	-3.081002
	10% level	-2.681330

*Mackinnon (1996) one-sided p-values.

ADF test in second difference

Null Hypothesis: D(LNRGDP,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.582016	0.0213
Test critical values:		
1% level	-4.004425	
5% level	-3.098896	
10% level	-2.690439	

*Mackinnon (1996) one-sided p-values.

KPSS unit root test in level: LNRGDP

Null Hypothesis: LNRGDP is stationary

Exogenous: Constant

Bandwidth: 3 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.532143
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Appendix 5.2: OLS Regression results

Economic classification

Dependent Variable: LNTOTGOVEXP

Method: Least Squares

Date: 08/20/12 Time: 19:44

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-31.70016	1.218764	-26.01009	0.0000
LNRGDP	3.143843	0.085983	36.56344	0.0000
R-squared	0.988904	Mean dependent var		12.85888
Adjusted R-squared	0.988165	S.D. dependent var		0.549753
S.E. of regression	0.059808	Akaike info criterion		-2.685231
Sum squared resid	0.053655	Schwarz criterion		-2.587205
Log likelihood	24.82446	Hannan-Quinn criter.		-2.675487
F-statistic	1336.885	Durbin-Watson stat		1.014435
Prob(F-statistic)	0.000000			

Dependent Variable: LNCOMPEMP

Method: Least Squares

Date: 08/20/12 Time: 20:15

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-26.64452	1.659920	-16.05169	0.0000
LNRGDP	2.719192	0.117107	23.21980	0.0000
R-squared	0.972932	Mean dependent var		11.89576
Adjusted R-squared	0.971127	S.D. dependent var		0.479383
S.E. of regression	0.081456	Akaike info criterion		-2.067366
Sum squared resid	0.099527	Schwarz criterion		-1.969341
Log likelihood	19.57261	Hannan-Quinn criter.		-2.057622
F-statistic	539.1589	Durbin-Watson stat		0.744789
Prob(F-statistic)	0.000000			

Dependent Variable: LNGOODSERV

Method: Least Squares

Date: 08/20/12 Time: 20:15

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-43.36860	2.181840	-19.87708	0.0000
LNRGDP	3.854978	0.153928	25.04406	0.0000
R-squared	0.976643	Mean dependent var		11.26966
Adjusted R-squared	0.975086	S.D. dependent var		0.678325
S.E. of regression	0.107068	Akaike info criterion		-1.520568
Sum squared resid	0.171954	Schwarz criterion		-1.422543
Log likelihood	14.92482	Hannan-Quinn criter.		-1.510824
F-statistic	627.2049	Durbin-Watson stat		1.110548
Prob(F-statistic)	0.000000			

Dependent Variable: LNINTEREST

Method: Least Squares

Date: 08/20/12 Time: 20:15

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.013895	2.162011	-3.706686	0.0021
LNRGDP	1.322822	0.152529	8.672601	0.0000
R-squared	0.833729	Mean dependent var		10.73503
Adjusted R-squared	0.822644	S.D. dependent var		0.251926
S.E. of regression	0.106095	Akaike info criterion		-1.538828
Sum squared resid	0.168843	Schwarz criterion		-1.440803
Log likelihood	15.08003	Hannan-Quinn criter.		-1.529084
F-statistic	75.21401	Durbin-Watson stat		0.513448
Prob(F-statistic)	0.000000			

Dependent Variable: LNSUBS

Method: Least Squares

Date: 08/20/12 Time: 20:16

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.87174	2.548265	-7.013297	0.0000
LNRGDP	1.911983	0.179779	10.63519	0.0000
R-squared	0.882911	Mean dependent var		9.227625

Adjusted R-squared	0.875105	S.D. dependent var	0.353842
S.E. of regression	0.125050	Akaike info criterion	-1.210079
Sum squared resid	0.234562	Schwarz criterion	-1.112054
Log likelihood	12.28567	Hannan-Quinn criter.	-1.200335
F-statistic	113.1073	Durbin-Watson stat	0.892091
Prob(F-statistic)	0.000000		

Dependent Variable: LNCAPEX

Method: Least Squares

Date: 08/20/12 Time: 20:16

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
C	-50.09936	2.345290	-21.36169	0.0000
LNRGDP	4.266159	0.165459	25.78376	0.0000

R-squared	0.977935	Mean dependent var	10.36675
Adjusted R-squared	0.976464	S.D. dependent var	0.750181
S.E. of regression	0.115089	Akaike info criterion	-1.376087
Sum squared resid	0.198683	Schwarz criterion	-1.278062
Log likelihood	13.69674	Hannan-Quinn criter.	-1.366343
F-statistic	664.8023	Durbin-Watson stat	1.149978
Prob(F-statistic)	0.000000		

Functional classification

a. LNGENERAL

Dependent Variable: LNGENERAL

Method: Least Squares

Date: 09/09/12 Time: 12:49

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	2.920431	0.116993	24.96245	0.0000
C	-29.92735	1.658309	-18.04691	0.0000

R-squared	0.976494	Mean dependent var	11.46517
Adjusted R-squared	0.974926	S.D. dependent var	0.513921
S.E. of regression	0.081377	Akaike info criterion	-2.069308
Sum squared resid	0.099334	Schwarz criterion	-1.971283
Log likelihood	19.58911	Hannan-Quinn criter.	-2.059564
F-statistic	623.1238	Durbin-Watson stat	1.005376
Prob(F-statistic)	0.000000		

b. LNDEFENCE

Dependent Variable: LNDEFENCE

Method: Least Squares

Date: 09/09/12 Time: 12:52

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	3.099625	0.074771	41.45491	0.0000
C	-32.97249	1.059837	-31.11091	0.0000
R-squared	0.991347	Mean dependent var		10.95984
Adjusted R-squared	0.990770	S.D. dependent var		0.541353
S.E. of regression	0.052009	Akaike info criterion		-2.964675
Sum squared resid	0.040574	Schwarz criterion		-2.866650
Log likelihood	27.19974	Hannan-Quinn criter.		-2.954931
F-statistic	1718.509	Durbin-Watson stat		1.207711
Prob(F-statistic)	0.000000			

c. LNECONOMIC

Dependent Variable: LNECONOMIC

Method: Least Squares

Date: 09/09/12 Time: 12:53

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	3.203930	0.207629	15.43100	0.0000
C	-34.78532	2.943030	-11.81956	0.0000
R-squared	0.940739	Mean dependent var		10.62535
Adjusted R-squared	0.936788	S.D. dependent var		0.574424
S.E. of regression	0.144422	Akaike info criterion		-0.922026
Sum squared resid	0.312865	Schwarz criterion		-0.824000
Log likelihood	9.837217	Hannan-Quinn criter.		-0.912282
F-statistic	238.1158	Durbin-Watson stat		0.896762
Prob(F-statistic)	0.000000			

d. LNEDU

Dependent Variable: LNEDU

Method: Least Squares

Date: 09/09/12 Time: 12:53

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	2.847397	0.115363	24.68199	0.0000
C	-29.12407	1.635210	-17.81059	0.0000
R-squared	0.975969	Mean dependent var		11.23332
Adjusted R-squared	0.974367	S.D. dependent var		0.501203
S.E. of regression	0.080244	Akaike info criterion		-2.097362
Sum squared resid	0.096586	Schwarz criterion		-1.999337
Log likelihood	19.82758	Hannan-Quinn criter.		-2.087618
F-statistic	609.2006	Durbin-Watson stat		0.776647
Prob(F-statistic)	0.000000			

e. LNHEALTH

Dependent Variable: LNHEALTH

Method: Least Squares

Date: 09/09/12 Time: 12:53

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	3.330790	0.121156	27.49168	0.0000
C	-36.66015	1.717322	-21.34728	0.0000
R-squared	0.980540	Mean dependent var		10.54857
Adjusted R-squared	0.979242	S.D. dependent var		0.584923
S.E. of regression	0.084273	Akaike info criterion		-1.999372
Sum squared resid	0.106530	Schwarz criterion		-1.901347
Log likelihood	18.99467	Hannan-Quinn criter.		-1.989629
F-statistic	755.7924	Durbin-Watson stat		0.747274
Prob(F-statistic)	0.000000			

f. LNSOCWELL

Dependent Variable: LNSOCWELL

Method: Least Squares

Date: 09/09/12 Time: 12:54

Sample: 1995 2011

Included observations: 17

	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	3.859839	0.147256	26.21179	0.0000
C	-43.51601	2.087268	-20.84831	0.0000
R-squared	0.978634	Mean dependent var		11.19115

Adjusted R-squared	0.977210	S.D. dependent var	0.678489
S.E. of regression	0.102427	Akaike info criterion	-1.609193
Sum squared resid	0.157371	Schwarz criterion	-1.511168
Log likelihood	15.67814	Hannan-Quinn criter.	-1.599449
F-statistic	687.0582	Durbin-Watson stat	0.913234
Prob(F-statistic)	0.000000		

Appendix 5.3: Engle-Granger cointegration test

a. LNTOTGOVEXP

Null Hypothesis: RESID01 is stationary
 Exogenous: Constant
 Bandwidth: 1 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.068263
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

b. LNCOMPEMP

Null Hypothesis: RESID02 is stationary
 Exogenous: Constant
 Bandwidth: 1 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.086414
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

c. LNGOODSERV

Null Hypothesis: RESID03 is stationary
 Exogenous: Constant
 Bandwidth: 1 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.108780
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

d. LNINTEREST

Null Hypothesis: RESID04 is stationary
 Exogenous: Constant
 Bandwidth: 2 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.152301
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

e. LNSUBS

Null Hypothesis: RESID05 is stationary
 Exogenous: Constant
 Bandwidth: 2 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.173455
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

f. LNCAPEX

Null Hypothesis: RESID06 is stationary
 Exogenous: Constant
 Bandwidth: 1 (Newey-West using Bartlett kernel)

	LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic	0.120144
Asymptotic critical values*:	
1% level	0.739000
5% level	0.463000
10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Appendix 5.4: Error Correction Model results

Total government expenditure

Dependent Variable: D(LNTOTGOVEXP)
 Method: Least Squares
 Date: 09/13/12 Time: 19:09
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.93594	6.384972	-1.869380	0.0884
D(LNRGDP(-1))	0.445887	0.698944	0.637944	0.5366
LNRGDP(-1)	1.199704	0.633346	1.894230	0.0848
LNTOTGOVEXP(-1)	-0.386896	0.201591	-1.919210	0.0813
R-squared	0.481708	Mean dependent var		0.107883
Adjusted R-squared	0.340356	S.D. dependent var		0.041929
S.E. of regression	0.034054	Akaike info criterion		-3.698545
Sum squared resid	0.012757	Schwarz criterion		-3.509732
Log likelihood	31.73909	Hannan-Quinn criter.		-3.700557
F-statistic	3.407853	Durbin-Watson stat		1.511603
Prob(F-statistic)	0.056836			

Economic classification

a. LNCOMPMP

Dependent Variable: D(LNCOMPMP)
 Method: Least Squares
 Date: 09/09/12 Time: 17:44
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-22.28272	3.653168	-6.099561	0.0001
D(LNRGDP(-1))	-1.915523	0.611501	-3.132491	0.0095
LNRGDP(-1)	2.314820	0.377426	6.133173	0.0001
LNCOMPMP(-1)	-0.871428	0.142634	-6.109542	0.0001
R-squared	0.802522	Mean dependent var		0.098999
Adjusted R-squared	0.748665	S.D. dependent var		0.049879
S.E. of regression	0.025006	Akaike info criterion		-4.316225
Sum squared resid	0.006878	Schwarz criterion		-4.127412
Log likelihood	36.37169	Hannan-Quinn criter.		-4.318237
F-statistic	14.90085	Durbin-Watson stat		1.305211
Prob(F-statistic)	0.000344			

b. LNGOODSERV

Dependent Variable: D(LNGOODSERV)
 Method: Least Squares
 Date: 09/09/12 Time: 17:44
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.682618	9.276149	-0.504802	0.6237
D(LNRGDP(-1))	2.120939	1.221384	1.736505	0.1104
LNRGDP(-1)	0.455524	0.812578	0.560591	0.5863
LNGOODSERV(-1)	-0.151990	0.201960	-0.752579	0.4675
R-squared	0.299479	Mean dependent var		0.129381
Adjusted R-squared	0.108427	S.D. dependent var		0.083881
S.E. of regression	0.079203	Akaike info criterion		-2.010417
Sum squared resid	0.069005	Schwarz criterion		-1.821603
Log likelihood	19.07813	Hannan-Quinn criter.		-2.012428
F-statistic	1.567530	Durbin-Watson stat		1.473433
Prob(F-statistic)	0.252796			

c. LNINTEREST

Dependent Variable: D(LNINTEREST)
 Method: Least Squares
 Date: 09/09/12 Time: 17:43
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.929415	1.449544	-0.641178	0.5345
D(LNRGDP(-1))	-1.074881	0.725754	-1.481054	0.1667
LNRGDP(-1)	0.380813	0.207921	1.831528	0.0942
LNINTEREST(-1)	-0.407863	0.168737	-2.417148	0.0342
R-squared	0.462998	Mean dependent var		0.047617
Adjusted R-squared	0.316542	S.D. dependent var		0.057186
S.E. of regression	0.047276	Akaike info criterion		-3.042439
Sum squared resid	0.024585	Schwarz criterion		-2.853626
Log likelihood	26.81830	Hannan-Quinn criter.		-3.044451
F-statistic	3.161360	Durbin-Watson stat		1.978251
Prob(F-statistic)	0.068080			

d. LNSUBS

Dependent Variable: D(LNSUBS)
 Method: Least Squares

Date: 09/09/12 Time: 17:42
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-14.08522	5.616979	-2.507615	0.0291
D(LNRGDP(-1))	0.356101	1.723754	0.206585	0.8401
LNRGDP(-1)	1.388139	0.565132	2.456308	0.0319
LNSUBS(-1)	-0.601384	0.273215	-2.201142	0.0500
R-squared	0.460364	Mean dependent var		0.064910
Adjusted R-squared	0.313190	S.D. dependent var		0.115036
S.E. of regression	0.095335	Akaike info criterion		-1.639671
Sum squared resid	0.099975	Schwarz criterion		-1.450857
Log likelihood	16.29753	Hannan-Quinn criter.		-1.641682
F-statistic	3.128036	Durbin-Watson stat		2.292060
Prob(F-statistic)	0.069792			

e. LNCAPEX

Dependent Variable: D(LNCAPEX)
 Method: Least Squares
 Date: 09/09/12 Time: 16:07
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-38.11368	9.555152	-3.988810	0.0021
D(LNRGDP(-1))	0.479006	1.261620	0.379676	0.7114
LNRGDP(-1)	3.218251	0.815889	3.944473	0.0023
LNCAPEX(-1)	-0.712619	0.192338	-3.705040	0.0035
R-squared	0.804734	Mean dependent var		0.129622
Adjusted R-squared	0.751479	S.D. dependent var		0.108249
S.E. of regression	0.053964	Akaike info criterion		-2.777817
Sum squared resid	0.032033	Schwarz criterion		-2.589004
Log likelihood	24.83363	Hannan-Quinn criter.		-2.779828
F-statistic	15.11111	Durbin-Watson stat		2.314855
Prob(F-statistic)	0.000323			

Functional classification

a. LNGENERAL

Dependent Variable: D(LNGENERAL)

Method: Least Squares
 Date: 09/09/12 Time: 19:22
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.454857	7.760624	-0.574033	0.5775
D(LNRGDP(-1))	0.294800	1.164364	0.253186	0.8048
LNRGDP(-1)	0.484841	0.749943	0.646504	0.5312
LNGENERAL(-1)	-0.203212	0.255214	-0.796241	0.4427
R-squared	0.106072	Mean dependent var		0.094814
Adjusted R-squared	-0.137726	S.D. dependent var		0.071073
S.E. of regression	0.075809	Akaike info criterion		-2.098020
Sum squared resid	0.063217	Schwarz criterion		-1.909207
Log likelihood	19.73515	Hannan-Quinn criter.		-2.100031
F-statistic	0.435082	Durbin-Watson stat		1.626412
Prob(F-statistic)	0.732235			

b. LNDEFENCE

Dependent Variable: D(LNDEFENCE)
 Method: Least Squares
 Date: 09/09/12 Time: 19:22
 Sample (adjusted): 1997 2011
 Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.900718	8.028961	-0.859478	0.4084
D(LNRGDP(-1))	1.298930	0.739080	1.757495	0.1066
LNRGDP(-1)	0.654114	0.753793	0.867763	0.4041
LNDEFENCE(-1)	-0.210719	0.242187	-0.870067	0.4029
R-squared	0.448712	Mean dependent var		0.102911
Adjusted R-squared	0.298361	S.D. dependent var		0.046022
S.E. of regression	0.038549	Akaike info criterion		-3.450569
Sum squared resid	0.016347	Schwarz criterion		-3.261756
Log likelihood	29.87927	Hannan-Quinn criter.		-3.452580
F-statistic	2.984427	Durbin-Watson stat		2.164348
Prob(F-statistic)	0.077765			

c. LNECONOMIC

Dependent Variable: D(LNECONOMIC)
 Method: Least Squares
 Date: 09/09/12 Time: 19:23
 Sample (adjusted): 1997 2011

Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-27.89325	10.33464	-2.699005	0.0207
D(LNRGDP(-1))	-1.178223	1.614348	-0.729845	0.4807
LNRGDP(-1)	2.502974	0.932446	2.684311	0.0212
LNECONOMIC(-1)	-0.701342	0.272784	-2.571054	0.0260
R-squared	0.452538	Mean dependent var		0.115848
Adjusted R-squared	0.303230	S.D. dependent var		0.097849
S.E. of regression	0.081677	Akaike info criterion		-1.948911
Sum squared resid	0.073382	Schwarz criterion		-1.760098
Log likelihood	18.61683	Hannan-Quinn criter.		-1.950922
F-statistic	3.030901	Durbin-Watson stat		1.667479
Prob(F-statistic)	0.075074			

d. LNEDU

Dependent Variable: D(LNEDU)

Method: Least Squares

Date: 09/09/12 Time: 19:23

Sample (adjusted): 1997 2011

Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-20.43352	6.695657	-3.051757	0.0110
D(LNRGDP(-1))	-1.092225	1.010397	-1.080986	0.3028
LNRGDP(-1)	2.010769	0.661035	3.041849	0.0112
LNEDU(-1)	-0.706055	0.237549	-2.972249	0.0127
R-squared	0.565159	Mean dependent var		0.102170
Adjusted R-squared	0.446566	S.D. dependent var		0.054009
S.E. of regression	0.040179	Akaike info criterion		-3.367753
Sum squared resid	0.017758	Schwarz criterion		-3.178940
Log likelihood	29.25815	Hannan-Quinn criter.		-3.369764
F-statistic	4.765527	Durbin-Watson stat		1.126907
Prob(F-statistic)	0.022979			

e. LNHEALTH

Dependent Variable: D(LNHEALTH)

Method: Least Squares

Date: 09/09/12 Time: 19:24

Sample (adjusted): 1997 2011

Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
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C	-37.53782	8.023085	-4.678727	0.0007
D(LNRGDP(-1))	-2.188374	1.013977	-2.158209	0.0539
LNRGDP(-1)	3.437784	0.734783	4.678636	0.0007
LNHEALTH(-1)	-1.042994	0.225081	-4.633864	0.0007
R-squared	0.756620	Mean dependent var		0.118648
Adjusted R-squared	0.690243	S.D. dependent var		0.062411
S.E. of regression	0.034735	Akaike info criterion		-3.658934
Sum squared resid	0.013272	Schwarz criterion		-3.470121
Log likelihood	31.44201	Hannan-Quinn criter.		-3.660946
F-statistic	11.39891	Durbin-Watson stat		2.365973
Prob(F-statistic)	0.001059			

f. LNSOCWELL

Dependent Variable: D(LNSOCWELL)

Method: Least Squares

Date: 09/09/12 Time: 19:24

Sample (adjusted): 1997 2011

Included observations: 15 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-22.00743	9.598439	-2.292814	0.0426
D(LNRGDP(-1))	0.103621	1.268922	0.081661	0.9364
LNRGDP(-1)	1.991125	0.852302	2.336174	0.0394
LNSOCWELL(-1)	-0.543329	0.222661	-2.440167	0.0328
R-squared	0.430691	Mean dependent var		0.133028
Adjusted R-squared	0.275425	S.D. dependent var		0.084354
S.E. of regression	0.071804	Akaike info criterion		-2.206575
Sum squared resid	0.056714	Schwarz criterion		-2.017761
Log likelihood	20.54931	Hannan-Quinn criter.		-2.208586
F-statistic	2.773892	Durbin-Watson stat		1.980245
Prob(F-statistic)	0.091453			

Appendix 5.5: Dummy Simulation equation

Economic classification

a. LNCOMPEMP

Dependent Variable: D(LNCOMPEMP)

Method: Least Squares

Date: 09/09/12 Time: 17:36

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNCOMPEMP) = C(1) + C(2) * D(LNRGDP) * DUMMYCYCLE + C(3) * D(LNRGDP) * (1 - DUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.073036	0.035167	2.076857	0.0582
C(2)	-10.58133	7.450147	-1.420285	0.1791
C(3)	0.605685	0.949380	0.637980	0.5346
R-squared	0.136038	Mean dependent var		0.098006
Adjusted R-squared	0.003121	S.D. dependent var		0.048351
S.E. of regression	0.048276	Akaike info criterion		-3.056414
Sum squared resid	0.030297	Schwarz criterion		-2.911553
Log likelihood	27.45131	Hannan-Quinn criter.		-3.048996
F-statistic	1.023480	Durbin-Watson stat		1.736200
Prob(F-statistic)	0.386558			

b. LNGOODSERV

Dependent Variable: D(LNGOODSERV)

Method: Least Squares

Date: 09/09/12 Time: 17:36

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNGOODSERV) = C(1) + C(2) * D(LNRGDP) * DUMMYCYCLE + C(3) * D(LNRGDP) * (1 - DUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.088118	0.078740	1.119104	0.2833
C(2)	1.738187	16.68115	0.104201	0.9186
C(3)	0.823671	2.125696	0.387483	0.7047
R-squared	0.022176	Mean dependent var		0.113993
Adjusted R-squared	-0.128258	S.D. dependent var		0.101762
S.E. of regression	0.108091	Akaike info criterion		-1.444322

Sum squared resid	0.151888	Schwarz criterion	-1.299462
Log likelihood	14.55458	Hannan-Quinn criter.	-1.436904
F-statistic	0.147416	Durbin-Watson stat	1.852130

c. LNINTEREST

Dependent Variable: D(LNINTEREST)

Method: Least Squares

Date: 09/09/12 Time: 17:35

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNINTEREST)=C(1)+C(2)*D(LNRGDP)*DUMMYCYCLE+C(3)*D(LNRGDP)*(1-DUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.054771	0.055060	0.994759	0.3380
C(2)	-1.758371	11.66449	-0.150746	0.8825
C(3)	0.088850	1.486417	0.059775	0.9532
R-squared	0.001804	Mean dependent var		0.058537
Adjusted R-squared	-0.151764	S.D. dependent var		0.070428
S.E. of regression	0.075584	Akaike info criterion		-2.159783
Sum squared resid	0.074268	Schwarz criterion		-2.014923
Log likelihood	20.27827	Hannan-Quinn criter.		-2.152365
F-statistic	0.011749	Durbin-Watson stat		1.212527
Prob(F-statistic)	0.988330			

d. LNSUBS

Dependent Variable: D(LNSUBS)

Method: Least Squares

Date: 09/09/12 Time: 17:35

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNSUBS)=C(1)+C(2)*D(LNRGDP)*DUMMYCYCLE+C(3)*D(LNRGDP)*(1-DUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.004542	0.087226	0.052077	0.9593
C(2)	-15.08738	18.47896	-0.816463	0.4289
C(3)	1.416251	2.354792	0.601433	0.5579
R-squared	0.051076	Mean dependent var		0.058091
Adjusted R-squared	-0.094912	S.D. dependent var		0.114433
S.E. of regression	0.119741	Akaike info criterion		-1.239616

Sum squared resid	0.186392	Schwarz criterion	-1.094756
Log likelihood	12.91693	Hannan-Quinn criter.	-1.232198
F-statistic	0.349864	Durbin-Watson stat	2.722177
Prob(F-statistic)	0.711220		

e. LNCAPEX

Dependent Variable: D(LNCAPEX)

Method: Least Squares

Date: 09/09/12 Time: 17:24

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNCAPEX) = C(1) + C(2) * D(LNRGDP) * DUMMYCYCLE + C(3) * D(LNRGDP) * (1 - DUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.099142	0.091510	1.083401	0.2983
C(2)	8.725624	19.38669	0.450083	0.6601
C(3)	1.568016	2.470465	0.634705	0.5366

R-squared	0.092189	Mean dependent var	0.145687
Adjusted R-squared	-0.047474	S.D. dependent var	0.122743
S.E. of regression	0.125623	Akaike info criterion	-1.143708
Sum squared resid	0.205154	Schwarz criterion	-0.998847
Log likelihood	12.14966	Hannan-Quinn criter.	-1.136290
F-statistic	0.660082	Durbin-Watson stat	1.779761
Prob(F-statistic)	0.533298		

Functional classification

a. LNGENERAL

Dependent Variable: D(LNGENERAL)

Method: Least Squares

Date: 09/10/12 Time: 17:16

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNGENERAL) = C(1) + C(2) * D(LNRGDP) * FUNCTIONALDUMMYCYCLE + C(3) * D(LNRGDP) * (1 - FUNCTIONALDUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.120472	0.051590	2.335191	0.0362
C(2)	11.41777	10.92944	1.044680	0.3152
C(3)	-0.592165	1.392750	-0.425177	0.6777

R-squared	0.079557	Mean dependent var	0.095523
Adjusted R-squared	-0.062049	S.D. dependent var	0.068721
S.E. of regression	0.070821	Akaike info criterion	-2.289961
Sum squared resid	0.065203	Schwarz criterion	-2.145100
Log likelihood	21.31969	Hannan-Quinn criter.	-2.282543
F-statistic	0.561820	Durbin-Watson stat	1.642891
Prob(F-statistic)	0.583416		

b. LNDEFENCE

Dependent Variable: D(LNDEFENCE)

Method: Least Squares

Date: 09/10/12 Time: 17:19

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNDEFENCE) = C(1) + C(2) * D(LNRGDP) * FUNCTIONALDUMMYCYCLE + C(3) * D(LNRGDP) * (1 - FUNCTIONALDUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.071364	0.033505	2.129961	0.0529
C(2)	0.289002	7.098121	0.040715	0.9681
C(3)	0.910912	0.904521	1.007066	0.3323

R-squared	0.104837	Mean dependent var	0.100799
Adjusted R-squared	-0.032880	S.D. dependent var	0.045257
S.E. of regression	0.045995	Akaike info criterion	-3.153221
Sum squared resid	0.027502	Schwarz criterion	-3.008361
Log likelihood	28.22577	Hannan-Quinn criter.	-3.145803
F-statistic	0.761249	Durbin-Watson stat	2.294858
Prob(F-statistic)	0.486814		

c. LNECONOMIC

Dependent Variable: D(LNECONOMIC)

Method: Least Squares

Date: 09/10/12 Time: 17:20

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNECONOMIC) = C(1) + C(2) * D(LNRGDP) * FUNCTIONALDUMMYCYCLE + C(3) * D(LNRGDP) * (1 - FUNCTIONALDUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.033608	0.102121	-0.329099	0.7473
C(2)	-17.60854	21.63466	-0.813904	0.4304

C(3)	3.549927	2.756927	1.287639	0.2203
R-squared	0.114069	Mean dependent var		0.090488
Adjusted R-squared	-0.022228	S.D. dependent var		0.138657
S.E. of regression	0.140189	Akaike info criterion		-0.924288
Sum squared resid	0.255489	Schwarz criterion		-0.779428
Log likelihood	10.39430	Hannan-Quinn criter.		-0.916870
F-statistic	0.836913	Durbin-Watson stat		1.456053
Prob(F-statistic)	0.455093			

d. LNEDU

Dependent Variable: D(LNEDU)

Method: Least Squares

Date: 09/10/12 Time: 17:20

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNEDU) = C(1) + C(2) * D(LNRGDP) * FUNCTIONALDUMMYCYCLE + C(3) * D(LNRGDP) * (1 - FUNCTIONALDUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.057092	0.037123	1.537896	0.1481
C(2)	-12.97834	7.864681	-1.650205	0.1228
C(3)	1.158193	1.002204	1.155645	0.2686
R-squared	0.177777	Mean dependent var		0.101204
Adjusted R-squared	0.051281	S.D. dependent var		0.052321
S.E. of regression	0.050962	Akaike info criterion		-2.948117
Sum squared resid	0.033762	Schwarz criterion		-2.803257
Log likelihood	26.58494	Hannan-Quinn criter.		-2.940699
F-statistic	1.405395	Durbin-Watson stat		1.701162
Prob(F-statistic)	0.280178			

e. LNHEALTH

Dependent Variable: D(LNHEALTH)

Method: Least Squares

Date: 09/10/12 Time: 17:20

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

$D(LNHEALTH) = C(1) + C(2) * D(LNRGDP) * FUNCTIONALDUMMYCYCLE + C(3) * D(LNRGDP) * (1 - FUNCTIONALDUMMYCYCLE)$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.036947	0.040529	0.911619	0.3786

C(2)	-15.77038	8.586219	-1.836708	0.0892
C(3)	2.218579	1.094151	2.027673	0.0636
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R-squared	0.271955	Mean dependent var	0.116891	
Adjusted R-squared	0.159948	S.D. dependent var	0.060703	
S.E. of regression	0.055637	Akaike info criterion	-2.772564	
Sum squared resid	0.040242	Schwarz criterion	-2.627704	
Log likelihood	25.18051	Hannan-Quinn criter.	-2.765146	
F-statistic	2.428021	Durbin-Watson stat	1.888804	
Prob(F-statistic)	0.127066			

f. LNSOCWELL

Dependent Variable: D(LNSOCWELL)

Method: Least Squares

Date: 09/10/12 Time: 17:21

Sample (adjusted): 1996 2011

Included observations: 16 after adjustments

D(LNSOCWELL)=C(1)+C(2)*D(LNRGDP)* FUNCTIONALDUMMYCYCLE
 +C(3)*D(LNRGDP)*(1- FUNCTIONALDUMMYCYCLE)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.093247	0.062734	1.486382	0.1610
C(2)	-5.352170	13.29039	-0.402710	0.6937
C(3)	1.124568	1.693608	0.664008	0.5183
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R-squared	0.032946	Mean dependent var	0.132446	
Adjusted R-squared	-0.115832	S.D. dependent var	0.081527	
S.E. of regression	0.086120	Akaike info criterion	-1.898799	
Sum squared resid	0.096416	Schwarz criterion	-1.753938	
Log likelihood	18.19039	Hannan-Quinn criter.	-1.891381	
F-statistic	0.221442	Durbin-Watson stat	1.895980	
Prob(F-statistic)	0.804324			

