Towards Price Stability in Tanzania During Economic Reforms: Does Fiscal Discipline Matter?

Flaviana P. Nyasebwa
Ministry of Finance and Economic Affairs
United Republic of Tanzania

and

Michael O. A. Ndanshau
Department of Economics
University of Dar es Salaam

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Abstract

This study attempts to establish empirically the extent to which prudent fiscal policy of the government in Tanzania accounted for successful containment of inflation during the period 1980-2010. The analysis, which is based on cointegration and error correction models (ECM) shows existence of a long-run relationship between inflation and its determinants, but over the short-run period budget deficits was an insignificant determinant of inflation in Tanzania. Empirical evidence could neither support the thesis that inflation aggravates budget deficits problems nor the thesis that budget deficits contribute to the expansion of money supply, at least in Tanzania. Instead, other factors account more for inflation dynamics in Tanzania: in particular, economic growth, depreciation of exchange rate, and price inertia. Importance of policies fiscal and monetary policies that guarantees stable exchange rate, attainment of sustainable rate of economic growth, and aversion of inflation inertia over the short-run period is underscored by the empirical results.

Key Words: Budget deficit, inflation, economic reforms

JEL Classification: E31, E 42, E62

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Towards Price Stability in Tanzania During Economic Reforms: Does Fiscal Discipline Matter?[1]

1. Introduction

Like many other sub-Saharan African (SSA) countries, Tanzania implemented World Bank and IMF (International Monetary Fund) supported Economic Recovery Programme (ERP) since the mid-1980s. The ERP, which was implemented in two successive phases, among others, targeted to lower inflation through prudent fiscal discipline: cuts in government expenditures and efforts to increase government tax revenues collection, coupled with implementation of stringent monetary and liberal trade policies.

This paper investigates the extent to which government's commitment to fiscal policy discipline since the adoption of economic reforms in the 1980s influenced the cause of the rate of change of the general price level, elsewhere referred to as inflation. The analysis is motivated by one main factor: a view in the literature that budget deficits cause inflation, especially when monetized by the government. In the same vein, fiscal prudence observed by the government of Tanzania during economic reforms is expected to have greatly contributed positively to the fight against inflation in the country. Moreover, the underlying hypothesis that budget deficit, defined here as the excess of government expenditure over tax revenue in a fiscal year, impact positively and directly on inflation is yet to be subjected to rigorous empirical test in Tanzania since the launch of economic reforms in 1986. The studies on Tanzania by Kilindo (1992, 1997) only used a data set for the period 1970-84, a period that was more characterized by rapid increase of the

[1] This paper was motivated by MA Dissertation prepared by Nyasebwa (2011). Corresponding Author: ndanshau@udsm.ac.tz. We acknowledge with thanks very valuable comments and suggestions made on the initial version of this paper by Prof. Nehemiah E. Osoro and Prof. Asmeron Kidane of the Department of Economics, University of Dar es Salaam. Their comments, including that from anonymous referees of the Journal, helped us to improve substantially this paper. The usual disclaimer, however, applies that we are solely responsible for the view and any errors of commission or omissions in this paper.

size of the government. Another study by Solomon and Wet (2004) only cover few data points in the economic reforms period.

The present study on Tanzania complements the previous studies in two main ways. It covers a larger sample period (1980-2010), a period which covers more data points in period of economic reforms that was characterized by government attempts to achieve price stability, among others, by commitment to fiscal discipline and contractionary monetary policy stance. In this regard, the study contributes to the existing knowledge on the relationship between budget deficits and inflation in Tanzania; and, in so doing, provides a broader and more policy relevant and up to date analysis of the effect of fiscal deficit on inflation in Tanzania.

Apart from this introductory section, Section 2 motivates the subsequent econometric analysis by presenting some stylized facts about the relationship between inflation, budget deficits, money supply and monetary base since the launch of economic reforms in the 1980s. Section 3 reviews the relevant literature; and Section 4 describes the methodology of the study. Section 5 presents, discusses and interprets the empirical results. Section 6 provides concluding remarks.

2. Inflation and Fiscal Deficits in Tanzania: Some Stylized Facts

By the early 1980s Tanzania was in severe macroeconomic crises. The rate inflation had risen rapidly from a low of 3.3 percent in 1970 to as high as 30.3 percent in 1980; the rate of economic growth had fallen from 5.8 percent in 1970 to negative 0.5 percent in 1981. The country also was faced by severe deficits in the balance of payments, leading to severe foreign exchange constraint that adversely affected the import capacity of the economy. Among others,

the low import capacity adversely affected production in the key sectors of the economy, especially the import dependent industrial manufacturing sector, transport and communication.

The macroeconomic crises in Tanzania were attributed to several factors. To the neo-liberalists the crises were a logical flow from the policies of the Arusha Declaration promulgated in 1967, particularly the *Ujamaa* and Self Reliance Policy.[2] The latter led to excessive government involvement in directly and indirectly productive economic activities evidenced by growth of public sector particularly through the state-owned enterprises that increased from 42 in 1967 to 425 in 1986 (Waigama, 2008: 3; Moshi, 1994: 3).[3] Others, commentators attributed the crises to neglect of agriculture, bias towards large scale industries, excessive rise of public administration that more than doubled in its share in the GDP, villagization programme, expansion of public sector, excessive government intervention in the economy, and weak performance of the parastatals (Bagachwa, Mbelle and Van Arkadie, 1992; Maliyamkono and Bagachwa, 1990; World Bank, 1991). The external factors included, worsening of the terms of trade (for traditional export crops), oil prices (1973-74, 1979-80), military spending occasioned by the war against Amin of Uganda in 1979-80, establishment of new institutions for the delivery of transport and communication services after the break down of the "first generation" of the East African Community (EAC) in 1977, and severe droughts in 1973-74, 1981-82, 1983-84.

The poor economic performance prompted the government to launch two "home made" stabilization rogrammes, that is, National Economic Survival Programme (NESP) implemented in the period 1981-1982; and Structural Adjustment Programme (SAPs) implemented between 1983 and 1985. In the two programmes the government targeted to

[2] The Arusha Declaration led to very active participation of the government in directly and indirectly productive sectors of the economy. This increased the size of the government and its demand on financial resources. For detail, see Ndanshau (forthcoming, a).

[3] State owned enterprises in Tanzania, by definition, are all organizations in which the Government owned more than 51 percent of the equity capital. Also, see Moshi (1994: 2).

achieve macroeconomic stability by, among others, restoring both internal and external balances by providing incentives to producers of the traditional export crops, practice of prudence in the use of foreign exchange earnings, cutting down of government spending, and limiting expansion in domestic credit (World Bank, 2001). And, in SAP the government particularly indicated a need to achieve a balance between an over ambitious investment programme and under-funded recurrent spending (Bagachwa, 1992: 40).

It is acknowledged by domestic and foreign policy makers and even the development partners and practitioners that both NESP and SAP failed to stabilize the economy (Bagachwa, 1992; Lipumba, 1992). Accordingly, in 1986 the government conceded to implement the more comprehensive Economic Recovery Programme (ERP) of the World Bank and the IMF. The ERP was implemented in two phases: the first phase (ERP-I) that lasted between 1986-1989, aimed to achieve inter alia: high and sustainable real rates of economic growth, lower inflation, increase financial savings, stable domestic foreign exchange rate, fiscal and current account balance, and effective utilization and allocation of resources in the economy. The second phase (ERP-II), which was also referred to as Economic and Social Action Programme (ESAP) was implemented between 1989 and 1992. The programme targeted to consolidate the gains from the implementation of ERP-I by better allocation of resources and mitigation of adverse effect of reform policies, particularly the deterioration in the delivery of social services adversely affected by budget cuts and cost sharing policies. The emphasis of ERP-II was on "the rehabilitation and improvement of essential social services, particularly health, education, and clean water, that was more adversely affected by budget cuts in ERP-I period.[4]

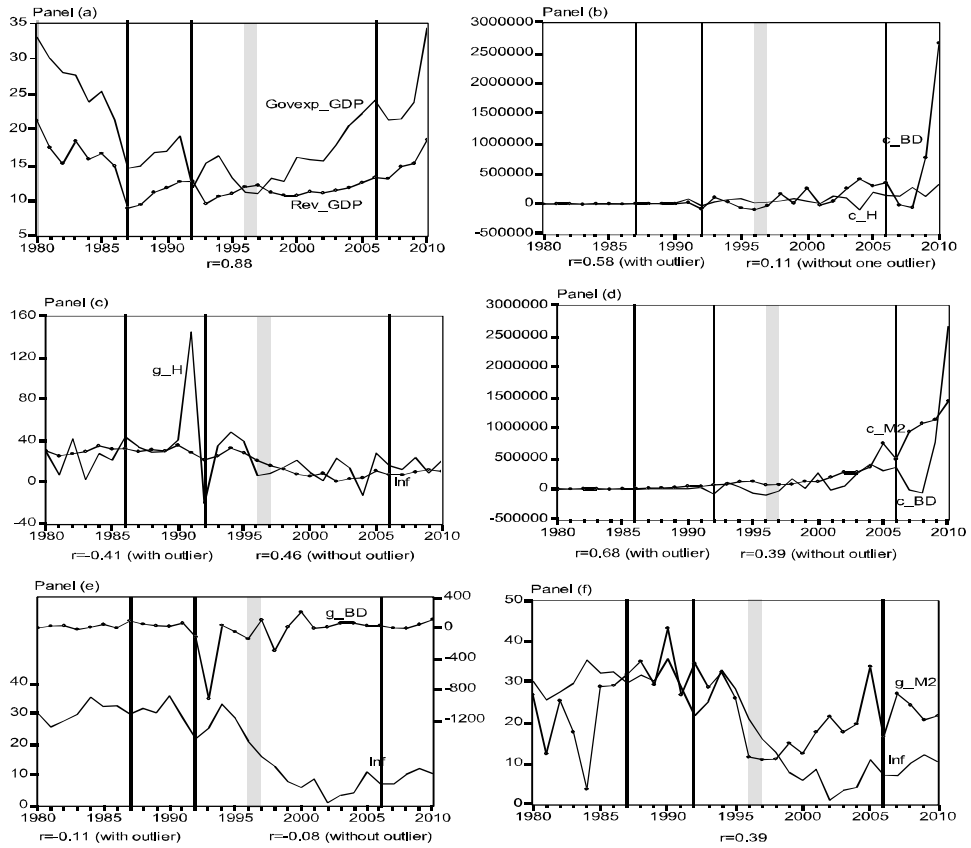
[4] The implementation of ERP-I and ERP-II was succeeded by monetary and tax reform programmes. The former led to the repeal of the charter of the Bank of Tanzania in 1995; and the latter led to the launch of Tanzania Revenues authority (TRA) and Value Added Tax (VAT) in 1998.

Several instruments were employed to this effect: check on domestic credit expansion, limit on the rate of money growth within the 15-20 percent per annum, and increase of interest rates to positive levels in real terms (Bagachwa, 1992: 36). On the fiscal policy front, both ERP-I and ERP-II aimed to achieve internal balance; and, the target was to reduce budget deficit to 6 percent of the nominal GDP during the period. This was to be achieved by simultaneous increase of the tax base and cuts in government expenditure. Thus, during the programme the government closed the budgetary front of financing parastatal organizations; implemented privatization policy that targeted more than 425 parastatal organizations that presented a substantial drag on the fiscal balance; and, introduced cash budgeting and, in relation, reduced central government recourse to the banking system to finance fiscal deficits.

Implementation of economic reforms since 1986 impacted positively on the real sector: the rate of economic growth rose from 1.9 percent in 1986 to 5.7 percent in 1990, with an annual average of 4.2 percent during the period. Moreover, good outcome was realized in the production of export crops, particularly cotton, which traditionally accounted for the lion's share of the total foreign exchange earnings in the country. Nevertheless, attainment of fiscal balance, by and large, proved elusive. Figure 1 (Panel a) shows that: first, the country experienced a very large budget deficit prior to the launching of ERP-1. In particular, the overall budget deficit as a percentage of the GDP rose from 10 percent in 1986 to approximately 14 percent in 1990. The mount of budget deficit during the period owed its explanation to several factors: unsustainable deficits in the balance of payments that exacerbated dependence on foreign aid for financing imports and government budget deficits; "soft budget constraint" enjoyed by state-owned enterprises (SOE), elsewhere referred to as parastatal organizations, not in borrowing from the central government but the banking system; over-expenditure caused by abandonment of checks and balances in government expenditure that led to mini-budgets financed by inflationary tax at

least until 1994; and, crowding out of increase in revenues by dramatic rise in external debt servicing after adoption of the economic reforms in the mid-1986 (Skoog, 2000: 325; Osoro, 2000: 13; Lipumba and Mbelle, 1990; Lipumba, 1992: 45).[5]

Figure 1: The Budget Deficits and Growth of Money Supply (M2), 1980 – 2010



Sources: Plot World Economic Outlook (2010); International Financial Statistics (IFS); and Bank of Tanzania.

Second, the plot in Panel (a) shows attainment of fiscal balance in 1992 that appears to have resulted from two areas of fiscal policy administration: (a) tax revenue enhancement; and, (b) liberalization of the financial sector in 1991 that paved way to an end of 'soft budget

[5] Credit to the Government was reduced but domestic credit remained above the target of the programme and money (M2) grew more rapidly by an average of 33-35 percent per annum instead of the anticipated 15-20 percent. The over shooting of the target resulted from continued extension of large loans to the state-owned crop marketing enterprises and agricultural crop marketing unions and boards that lacked capacity to repay and were not credit worthy.

constraint" enjoyed by the parastatals in accessing bank loans (Skoog, 2000: 325). Third, a burgeoning deficit occurred during the period 1993-96, mainly due to decrease in tax and non-tax revenues collection caused by massive tax avoidance, poor tax incentives, evasion and generous tax exemptions offered by the government to attract foreign direct investments (FDI).

In 1996-97 the central government attained an unprecedented surplus budget, an outcome that partly resulted from cash budget discipline and mini-budget practice started and followed by the government, its ministries and other government agencies since 1995/96 fiscal year, and more significantly the reforms in the public sector. On the one hand, the Parastatal Reforms Policy (PRC) launched by the government in January 1992 led to liquidation, restoration, privatization or otherwise of about 60 percent of over 400 parastatals in 1998 (AFRODAD, 2007: 7).[6] On the other hand, retrenchment and other reforms implemented under the Civil Service Reform Programme (CSRP) that aimed at "right sizing of civil service" also led to a significant reduction of government budget deficit. According to Yambesi (n.d.), while the public services wage bill exceeded the budget by 40 percent in 1994-95, it had been reduced to 2 percent in 1996-97 due to a 25 percent reduction in Ministerial structures in 1992-98 and was balanced in 1999-2004 due to a 26 percent reduction of work force from 355,900 in 1992 to 264,000 in 1998.[7] Fourth, tax reforms implemented by the government since 1998 led to a significant increase in tax revenue collections that gradually reduced the burgeoning of budget deficit albeit the increase in government expenditure caused by both internal and external shocks, including the increase in oil prices in 2000s, decrease in the taxable capacity of the economy, mainly due to poor performance in key sectors of the economy, including agriculture,

[6] The Parastatal Reforms Policy (1992), which led to the establishment of Parastatal Reform Commission (PSRC) in 1993, had several objectives of which the most relevant here were: a) "to give a sharper focus to the government's traditional role, namely, maintenance of law and order, provision of economic and social infrastructure, assurance of a level playing field for efficient economic competition and balancing of economic and social activities" (Waigama, 2008: 6).

[7] The CSRP also aimed to, among others, redefine the roles and functions of the Government; reduce government operations to affordable level and control the size and growth of employment.

mining and industry; and, a spill-over into the country of global financial crisis as well as drought in the 2008/09 fiscal year.[8]

The plots in Figure 1 lacks evidence for a positive link between fiscal discipline (indiscipline) and inflation in Tanzania during the period 1980-2010. The plot in Figure 1 (Panel b appears to suggest lack of budget deficit monetization during the sample period. The time trend of the change in budget deficit (c_bd) appears to be inversely related and seemingly independent of the time trend of the change in monetary base (c_h). Similarly, the inflation rate (Inf) appears to be inversely related and seemingly independent of the time trend of the change in monetary base (c_h, which is a proxy measure of seigniorage revenues (Figure 1, Panel c). This finding appears to be supported by Lipumba (1992) who notes that the financing of the central government budget deficits was less dependent on borrowing from the banking system; and, in 1988/89 the central government even managed to reduce its indebtedness to the banking system by TShs. 4.4 billion (Lipumba, 1992:47).[9] Instead, to finance the budget deficits the government increasingly took recourse to external loans and grants, especially import support counterpart revenues (Lipumba, 1992:47).[10]

It should be noted, however, that the financing of budget deficits by using external loans and grants also did not lead to the expansion of money supply, probably due to sterilization operation by the central bank (Panel d). The simple correlation coefficient between fiscal deficits and the growth rate of money supply (M2) is 0.39--- without an outlier in the growth rate of the budget deficit (Figure 1, Panel (d)). Moreover, the plot in Figure 1 (Panel e) shows a lack of systematic and close relationship between the time trend of the growth in budget deficits and the

[8] For details, among others, see Ndanshau (forthcoming, b) and Kitillya (2011).

[9] Tshs stands for Tanzanian shilling, a measure of currency in the country.

[10] According to Lipumba (1992) external funds directly financed 30 percent of the central government total expenditure during the ERP period; and, since then even recurrent government expenditure increasingly continued to depend on external funding (Osoro, 2000).

rate of change of the general price level, that is, inflation (INF) in Tanzania during the sample period. Only between 2000 and 2005 were inflation and budget deficits positively correlated.[11] Notable, however, over the sample period the correlation between budget deficits and inflation was 0.5, that is, relatively stronger than that between budget deficit and money growth. This finding is consistent with a note by Perkash (2007) that: "even though an imbalance in the fiscal sphere may be considered to be one of the major reasons for high inflation, statistical data often do not explicitly show a correlation between a decrease in the deficit and a fall in the inflation rate" (p. 2). Notable, however, the plots in Panel (f) suggest existence of a co-movement between inflation and money (M2) growth in some but not all years of the sample period. During the sample period, the simple correlation coefficient between money growth and inflation was 0.39. Again, while the correlation coefficient may not suggest causality, it is indicative of the influence of money growth on inflation. Evidently, factors other than money have also been important in explaining inflation in Tanzania.

3. Literature Review

3.1 The Theoretical Literature

Macroeconomic theory posits existence of a link between budget deficits and inflation rates. The dominant view is that monetization of fiscal deficits has unidirectional "causal effect" on inflation (Agénor and Montiel, 2008; Kiguel, 1989; Sargent and Wallace, 1981; Friedman, 1968). The commonly referred to transmission channel is thus: monetization of budget deficits increases the monetary base that, through a stable money multiplier, sets in motion an increase in money supply and finally inflation. The other channel of fiscal deficit effect on inflation works

[11] Osoro (2000) notes an increase in inflation after the launch of VAT in Tanzania in July 1998.

through the real sector: an increase in government borrowing from the banking system increases interest rates, leading to a decrease in private investment and consequently the volume of goods and services that, given the existing money balances, cause an increase in price level in the economy.

According to Easterly and Schmidt-Hebbel (1993) the monetary effect of budget deficits on inflation could be blurred, among others, by: a) borrowing from internal and/or external sources; b) unstable money demand function, that is, unstable money multiplier; and, c) depreciation of domestic currency (Easterly and Schmidt-Hebbel (1993). In most developing countries, sources of financing fiscal deficits are limited. The tax base is very small due to low incomes per capita and widespread poverty; capital markets are underdeveloped such that only few firms and households hold government debt papers; and, while inflow of external finance to developing countries has been substantial, the resource gap has remained big and wanting for a fill by money creation, a phenomenon referred to in the literature as "printing money". The outcome, assuming a stable money demand function or money multiplier, is inflation. In this regard, the monetarist's position that there exists a one way direct effect of budget deficits on money supply and inflation could hold water in the LDCs. Aghevli and Khan (1978), however, argue for an existence of a "reverse causality, that is, causality that runs from inflation to budget deficits. The argument here is that while persistent government budget deficits cause inflation, prolonged inflation also may cause large government expenditure that lead to the widening of budget deficits that causes inflation when monetized. Similarly, through the so-called Olivera-Tanzi effect, inflation may adversely affect budget deficit by reducing tax revenue, more so due to collection lags (Islam and Wetzel, 1991: 38).

3.2 Empirical Literature

Literature is rich with empirical studies on the nature of the causality between budget deficits and inflation in and outside the developing world. Other studies have also tested the causality between budget deficits and either or both money supply and real interest in developing and developed countries. The results in studies on developed countries are mixed. Some country specific and cross-country type of studies show existence of a significant positive effect of budget deficits on inflation: Allen and Smith (1983), Hamburger and Zwick (1981), Barro (1979), Darrat (1984-85) and Dhakal *et al.* (1994) in the case of the United States of America (USA); Akhtar (1981) and also Darrat (1984-85) in the United Kingdom (UK). Similar evidence was obtained by Edwards and Tabellini (1991) in a study of a cross-section of some developed countries. Other studies, however, have failed to establish existence of a positive effect of budget deficits on inflation in developed countries, for example, Bassetto and Butters (2010) in a study that covered the Finland, Japan, Sweden and the USA.

Some studies on countries in Eastern Europe, Asian and Latin America have also establish existence of a significant positive influence of budget on inflation: Aghevli and Khan (1978) in a study that covered Brazil, Colombia, Dominican Republic and Thailand; Catão and Terrones (2001) in a study of 23 emerging market economies; Hondroyiannis and Papapetrou (1994); Hondroyiannis and Papapetrou (1997) in a study covering a sample of 47 countries in Organization of Economic Cooperation and Development (OECD), central and eastern Europe (CEE) and in the former Soviet Union (FSS); Darrat (2000) in the case of Greece; and, Habibullah *et al.* (2011) in a study of 13 Asian countries. Existence of a positive effect of budget deficits on inflation has also emerged from, among others, studies on India, Turkey, Ukraine, Pakistan (Khundrakpam and Pattanai, 2009; Catão and Terrones, 2001; Piontkivsky, 2001; Agha

and Khan, 2006); and, also in some ten developing countries (Easterly and Schmidt-Hebbel, 1993).[12]

On the one hand, however, some studies have established existence of a feedback between inflation and budget deficit. For example, the empirical findings by Aghevli and Khan (1978) suggest that budget deficits that engender inflation could be enlarged by an existence of a fast response of government expenditures to inflation than government revenues; and, in relation, monetization of budget deficits was a fundamental cause of high inflation rates in on Brazil, Colombia, the Dominican Republic (DRC), and Thailand. On the other hand, other studies on developing countries, particularly those with developed capital markets (Paldam, 1994), have failed to establish existence of a positive and direct effect of budget deficits on inflation, for example, Protopapadakis and Siegel (1987) in a study on ten industrialized countries and Hondroyiannis and Papapetrou (1997) in a study on Greece. Other several studies, however, have found existence of a positive effect of budget deficits on money supply but lack of a strong evidence in support of the conventional view that budget deficits causes inflation, for example, de Haan and Zelhorst (1990), Roubini and Sachs (1988), and Catão and Terrones (2001).

The studies specific to developing countries in the sub-Sahara African (SSA) region are few. Like the studies on developed and other developing countries, the evidence in studies on SSA countries is mixed. Study by Oladipo and Akinbobola (2011) and Wolde-Rufael (2008) respectively established existence of a direct unidirectional positive effect of budget deficits on inflation in Nigeria and Ethiopia. Similarly, studies by Makochekanwa (2008), Nachega (2005), and Ghartey (2001) respectively found monetization of fiscal deficit was a leading cause of inflation in Zimbabwe, the Democratic Republic of Congo and Ghana, respectively. Moreover, a

[12] The countries covered by the study are: Ghana, Cote d'Ivore, Zimbabwe, Morocco, Argentina, Chile, Colombia, Mexico, Pakistan, and Thailand.

study on Nigeria by Okpanachi (2004) and Sandy (2003) in Sierra Leone found existence of dual-causality between inflation and budget deficit; and, even more significant, both studies found positive effect of the monetization of budget deficits on money supply that had a "causal effect' on inflation. Furthermore, Nachega (2005) established existence of a long-run positive effect of budget deficit on money growth and also a positive effect of money growth on inflation in the Democratic Republic of Congo (DRC). In contrast, some studies on SSA countries have failed to established existence of a positive effect of budget deficits on inflation: for example, Egwaikhide, Chete and Falokun (1994) in a study that sought to establish effect of devaluations on budget deficit and price stability in Nigeria. Nevertheless, Egwaikhide, Chete and Falokun (1994) found instead that existence of a positive effect of fiscal deficit on money supply in Nigeria. Another study by Sowa (1994) found inflation in Ghana was more explained by output volatility rather than monetary factors induced by the government budget deficits. Interestingly, however, Sowa (1994) found that inflation was on target during the periods of fiscal discipline regimes and exceeded the target during periods of fiscal incoherence.

In the case of Tanzania there have been several studies on inflation since the launch of economic reforms in 1986.[13] It is notable, however, that there have been only three studies that have focused on the relationship between budget deficits and either or both inflation and money supply in the country since the launch of economic reforms in 1986. The studies are by Solomon and Wet (2004), Laryea and Sumaila (2001), Kilindo (1992) and Kilindo (1997). Solomon and Wet (2004) applied cointegration and error correction model (ECM) to annual time series data to examine the effect of budget deficit on inflation in Tanzania during the period 1967 - 2001. The study established monetization of budgets had a significant and unidirectional direct causal effect on inflation during the sample period. Laryea and Sumaila (2001) used quarterly time series data

[13] For a brief review of the studies, among others, see Ndanshau (2010).

for the period 1992-1998 to analyse the evolution and determinants of inflation in Tanzania in the context of both demand and cost-push or structural elements of price movements. The study found output and monetary factors were the main determinants of inflation over the short-run; and, over the long-run inflation in Tanzania were determined by the parallel exchange rate, in addition to output and money. Kilindo (1997) uses Self Generating Inflation Model (SGIM) associated with Aghevli and Khan (1978, 1977) to study the link between budget deficits, money supply and inflation in Tanzania during the period 1970-91. The study finds budget deficit had positive impact on money growth and inflation, as in the monetarist's tradition. More specifically, Kilindo (1997) singled out monetization of budget deficits as one of the factors that perpetuated inflation in Tanzania.

Several aspects of analytical interest emerge from studies on both developed and developing countries. One is the finding that the effect of budget deficit on inflation can be bidirectional rather than strictly unidirectional (Aghevli and Khan, 1978; Ahling and Miller, 1985; Barnhart and Darrat, 1988; Hondroyiannis and Papapetrou, 1997). Second, is the finding by Catão and Terrones (2001) that the effect of budget deficits on inflation is less obvious in countries with institutional arrangements that can curb fiscal dominance, have a wide success to external finance and broader seigniorage tax bases (p. 15). Third is the evidence which suggests that the impact of public sector deficits on macroeconomic indicators, such as inflation and private capital, could differ across countries and with the alternative ways of financing the deficit (Easterly *et al.*, 1994). And, finally is evidence which suggests that strong positive relationship between fiscal deficits and inflation more exists in purely high-inflation and developing country groups, but not the low-inflation advanced economies (Catão and Terrones, 2003; Kiguel, 1989). These novel findings are used to inform the analysis and interpretation of the results of this study on Tanzania.

4. Methodology

4.1 Model Specification

The estimation model nests two types of hypotheses of pedagogical and policy interest in Tanzania. One is the theory that large budget deficits (bd), if monetized, exert a direct effect on inflation. This fall in the so-called monetarist's view of inflation. The other hypotheses nested in the monetarists view flow from structuralist's view on inflation and its determinants in developing countries. Accordingly, the estimation model is specified to include structural factors, in particular, real income and nominal exchange rate (er_t). The estimation model thus reads as,

$$\Delta p_t = \beta_0 + \beta_1 bd_t + \beta_2 m_{t,} + \beta_3 y_{t,} + \beta_4 er_t + u_t \qquad (1)$$

where, Δp_t is the inflation rate measured as the first difference of the natural logarithm of consumer price index (CPI), bd_t is nominal government budget deficit (in level), measured as the difference between government expenditure and total revenues), m_t is nominal money supply measured by broad money supply (M2),[14] y_t is real gross domestic product (GDP) and er_t is the nominal foreign exchange rate measured by domestic purchase price of a unit of dollar of the USA (USD), and ε_t is a stochastic error term that, by assumption, is normally distributed with a zero mean and a constant variance.

In monetarist's theoretical context the central null hypothesis tested is that the effect of budget deficits on inflation is positive and statistically significant; and, given the money

[14] Three measures of money supply are reported and monitored by the central bank: the traditional narrow money (M_1), which is the sum of currency in circulation and demand deposits denominated domestic currency; the broad money (M_2), which aggregates M_1 and both savings deposits and time deposits denominated in domestic currency; and extended broad money which aggregates M2 and foreign currency deposits denominated in domestic currency. The M2 has been used because of its policy importance: the central bank considers it to have closest relationship with the rate of inflation (Bank of Tanzania, 2008).

multiplier or a stable money demand function, the effect on inflation of money supply or monetary base is positive. Moreover, in the quantity theory of money tradition the effect of economic growth on inflation is expected to be negative. The domestic exchange rate, which is one of the channels of monetary policy, is also expected to bear a positive influence on inflation through the effect of import of consumables and intermediate goods on the consumer price index (Svensson, 2000:157-58). Besides, devaluation of the domestic currency per se is expected to be inflationary.

Some commentators in the literature, among others, Aghevli and Khan (1978) have maintained existence of bi-directional rather than unidirectional causality between budget deficits and inflation. Others have maintained existence of a positive effect of budget deficits on money supply that contributes to inflationary pressure. The endogeneity of budget deficits and money supply is accommodated in the analysis by the following two additional equations for estimation:

$$bd_t = \alpha_0 + \alpha_1 \Delta p_t + \alpha_2 m_{t,} + \alpha_3 y_t + \alpha_4 er_t + e_t \quad (2)$$

$$m_t = \varphi_0 + \varphi_1 bd_t + \varphi_2 \Delta p_{t,} + \varphi\alpha_3 y_t + \alpha\varphi_4 er_t + \varepsilon_t \quad (3)$$

where all the variables are in natural logarithm form and as already defined, and both e_t and $\varepsilon_t$are additive and normally distributed independent error terms, that is, $E(e_i \varepsilon_j) = 0, i \neq$j and $e_t, \epsilon_j \sim N(0, \sigma^2), \forall i, j$. The hypothesis tested in (2) and (3) are two-fold: the effect of inflation on budget deficit is positive; and, the effect of budget deficit on money supply is also positive.

4.2 Estimation Method

The classical approach would be to apply simultaneous equation method to estimate equations (1), (2) and (3). However, such an approach would not provide an insight on the short-run and

long-run relation, among others, between inflation and budget deficit. The alternative and preferred method used here is the error correction method (ECM). On this ground, first, Augmented Dickey Fuller (ADF) method is used to establish the order of integration of the data in level. The ADF procedure is based on the equation, [15]

$$\Delta x_t = \alpha + \beta x_{t-1} + \theta t + \sum_{i=1}^{p} \delta_i \Delta x_{t-1} + u_t \qquad (4)$$

where Δ is a difference operator applicable to each variable (x) and p is the lag length which is determined automatically in estimation by the Akaike Information Criteria (AIC). Equation (4) include a constant (α) and a deterministic trend (t) in order to respectively test significance in stationarity test of the drift and trend established by exploratory data analysis (EDA) method in some of the variables, for example, inflation (Inf), money supply ($M2$), and budget deficit (BD).

The Engle-Granger two-step procedure is used to test for existence of a long-run relationship, that is, cointegration of the variables.[16] Lack of cointegration is the null hypothesis tested. The test and confirmation of cointegration of variables suggested that estimation of (1) would not lead to spurious regressions. By Granger (1986) Representation Theorem, short-run dynamics between inflation and budget deficits was estimated by using three independent unrestricted error correction model (ECM) that reads as follows:

[15] According to Thomas (1997) the ADF results should be interpreted with care because the method quite frequently fails to reject the non-stationarity hypothesis even in cases where the variables are cointegrated.

[16] There are several other procedures but the Engle-Granger approach is used because is the simplest and efficient. The other common test for cointegration in contemporary literature is that associated with Johansen and Juselius (1990) and Johansen (1991). This is considered suitable for large rather than small samples as used in this study. Pesaran, Shin and Smith (2001) have also innovated a cointegation test based on unbound autoregressive distributed lag (ARDL) schema. The procedure has not been tried here because it also requires a relatively larger sample.

$$\Delta p_t = \beta_0 + \sum_{i=1}^{p} \beta_{1,i} \Delta p_{t-i} + \sum_{i=0}^{p} \beta_{2,i} \Delta bd_{t-i} + \sum_{i=0}^{p} \beta_{3,i} \Delta m_{t-i} + \sum_{i=0}^{p} \beta_{4,i} \Delta y_{t-1} + \sum_{i=0}^{p} \beta_{5,i} \Delta er_{t-1} + \theta_1 ec_{t-1} + u_t \quad (5)$$

$$\Delta bd_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1,i} \Delta bd_{t-i} + \sum_{i=0}^{p} \alpha_{1,i} \Delta p_{t-i} + \sum_{i=0}^{p} \alpha_{3,i} \Delta m_{t-i} + \sum_{i=0}^{p} \alpha_{4,i} \Delta y_{t-1} + \sum_{i=0}^{p} \alpha_{5,i} \Delta er_{t-i} + \theta_2 e_{t-1} + \varepsilon_{2t} \quad 6)$$

$$\Delta m_t = \phi_0 + \sum_{i=1}^{p} \phi_{1,i} \Delta m_{t-i} + \sum_{i=0}^{p} \phi_{2,i} \Delta bd_{t-i} + \sum_{i=0}^{p} \phi_{3,i} \Delta p_{t-i} + \sum_{i=0}^{p} \phi_{4,i} \Delta y_{t-1} + \sum_{i=0}^{p} \phi_{5,i} \Delta er_{t-i} + \theta_3 ec_{t-1} + \mu_t \quad (7)$$

where Δ is a first difference operator, ec_{t-1} is a one period lagged error term estimated by the long-run equation (1), p is the lag length, (u_t), (ε_t), and (μ_t) are white noise error terms that, by assumption, are independent and normally distributed with a zero mean and a constant variance, that is, is $iidd(0, \delta^2)$, and other variables are as already defined. The coefficient $(\theta_i, i = 1,2,3)$, of the one-period lagged error terms $(e_{i,t-1}, i = 1,2,3)$, which are the measures of long run equilibrium relation, are expected to be negative and statistically significant to imply that the error correction work to push back to long-run equilibrium the adjustment between the regressors and the regressands of the estimation models.

4.2 Data Type, Sources and the Estimation Methods

This analysis is based on annual time series data for the period 1980-2010. The sample period chosen perfectly fits the subject matter of this study in that it was characterized by implementation of stabilization programmes that emphasized fiscal discipline since 1981. The data used in the analysis are obtained from two sources, *viz*, CD-Rom of the International Financial Statistics (IFS) produced by the IMF and publications of the Bank of Tanzania. The

two institutions are primary stakeholders in monetary affairs in and outside Tanzania; and, therefore, the data used in the analysis are very reliable.[17]

5. Empirical Results

5.1 Exploratory Data Analysis

Following Mukherjee, White and Wuyts (1998), the Jarque-Bera statistics in Table 1 suggests that all the variables (in natural logarithm), serve for the exchange rate (er), are normally distributed.

Table 1: Descriptive Statistics of the Variables

	Δp	bd	$m2$	y	er
Mean	17.73	12.22	12.91	6.81	5.52
Median	19.76	11.78	13.33	7.32	6.31
Maximum	30.62	15.46	15.90	9.68	7.28
Minimum	0.99	8.12	9.77	3.06	1.98
Std. Dev.	9.57	1.58	1.897	2.12	1.76
Skewness	-0.22	0.07	-0.18	-0.439	-0.93
Kurtosis	1.49	3.03	1.80	1.88	2.41
Jarque-Bera	3.18	0.02	2.01	2.63	4.91
Probability	0.20	0.99	0.36	0.27	0.09
Sum	549.63	378.75	400.08	211.15	171.26
Sum Sq. Dev.	2747.68	75.40	108.01	134.73	93.46
Observations	31	31	31	31	31

Notes: The variables are as already defined and in natural logarithm.

Particularly notable, the fact that the mean and median values of the variables are not significantly different suggests impotence of outliers in data, which is a requirement for robust estimates.

[17] According to Osoro (2000) fiscal data in Tanzania exhibit "wide unexplained divergences even when official publications are used. As a result, the extent of their reliability is not always clear" (p. 1).

The plots in Figure 2 (Panel a) shows that all the variables of the estimation models, serve for budget deficits have a trend, suggesting possibility that they were not stationary in level.

Figure 2: Trend of Key Variables of the Estimation Models in Level

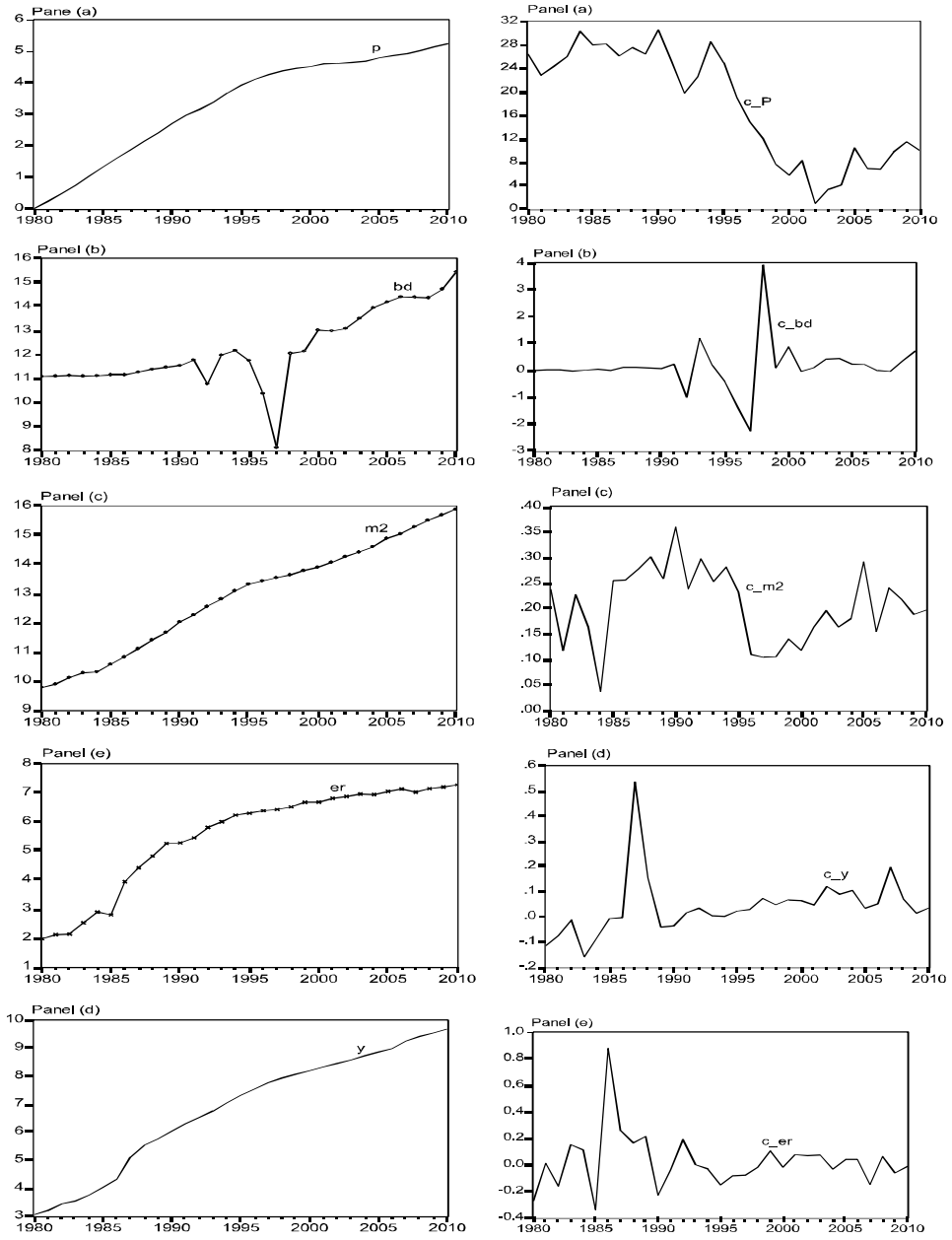


Figure 2 (Panel b) shows that the some of the variables are time invariant after transformation by a first difference operator. Only the price level (P) appear to remain time variant and therefore non-stationary after first differencing (Figure 2, Panel a).

5.2 Unit Root Test

The variables (in natural logarithm) of the estimation model were tested for stationarity by using the ADF method.[18] The ADF test results (with an intercept) shows that the general price level (p) was stationary in level; and, the rest of the variables are first difference stationary at least at the 5 percent significance test level (Table 2). The ADF results (with intercept and trend) shows that all the variables, except the inflation rate (Δp), are not stationary in level but are first difference stationary at least at the 5 percent test level. Notable ADF result for the inflation rate are consistent with the EDA results.

Table 2: ADF Unit Root Test Results for the Variables of the Model

Variable	ADF (Intercept)		ADF (Intercept and trend)	
	level	First Difference	Level	First Difference
p	-3.978**	-1.240	-1.709	-3.566**
Δp	-1.240	-5.294*	-3.565**	-5.342*
bd	-1.099	6.736*	-2.654	-6.767*
m2	-0.370	-4.067*	-2.643	-3.937*
y	-1.620	-3.236**	-0.990	-3.572*
er	-2.052	-4.545*	-0.431	-5.028*

Notes: The statistical test per McKinnon's (1990) critical values are: *=1%, **=5%, and ***=10% test level.

[18] The lag length was determined automatically by Schwarz's Bayesian Information Criterion (BIC) in EViews Vers.5.1.

On the basis of the latter ADF results, the null hypothesis that the variables are non-stationary is rejected. Notable also in ADF results is that the variables are integrated of the same order, that is, I(1).

5.3 Results of Cointegration Test and Error Correction Model

The Engle-Granger cointegration test demand for all variables to be non-stationary in levels and cointegrated of the same order. This condition is satisfied by the variables of the estimation model. Accordingly, following the Engle and Granger two step method a) residuals were estimated by treating as regressor each of the central variables of the model, namely, [p, bd, m]; and, b) and estimation of the residuals of the cointegrating equations, namely, [p|bd, m, y, er], [bd|p, m, y, er] and [m|p, bd, y, er]. Accordingly, the residuals were subjected to stationarity test by using the ADF method.[19] The results in Table 3 shows the variables are cointegrated such that estimation of ECMs is appropriate.

Table 3: ADF Test of the Error Terms

Dependent variable	ADF (with intercept)	Order of Integration
p|bd, m, y, er	-2.849***	I(0)
bd|p, m, y, er	-3.869*	I(0)
m|p, bd, y, er	-3.211**	I(0)

Notes: * is 1% critical value in McKinnon's (1990) critical values.

A priori an ECM with a contemporaneous and three lags for each variable were estimated for each estimation model. The choice of lag length of the "over-parameterised" models was guided by intuition and set initially at three lags due to the small sample size covered by the study. The

[19] The lag length was also determined automatically by Schwarz's Bayesian Information Criterion (BIC) in EViews Vers.5.1

"over-parameterised" models estimated were, on the basis of R^2, Schwarz's Bayesian Information Criterion (BIC) and F-statistics, gradually reduced to a parsimonious model by eliminating regressors with very low explanatory power.

The results presented in Table 4 show that the parsimonious models estimated were very powerful. The F-statistic of equation (5) is very large (22.522) and statistically significant at the 1 percent test level. The F-statistic estimated in equations (6) and (7) are relatively smaller but statistically significant at 5 percent and 1 percent test level, respectively. The statistical significance of the F-statistics suggests that the regressors were jointly important determinants of the variation of the three regressands of the models estimated. The adjusted coefficient of determination (R^2) of equation (5) suggests that the regressors of the model explain about 88.4 percent of the variation of the inflation rate. In equations (6) and equations (7) the regressors, respectively, explains about 72.3 percent and 64.9 percent of the growth in budget deficit and money supply (Table 4). In this regard, the R^2 estimated for the three equations indicates that the right-hand variables of the estimation model "significantly" accounted for the variations of the left-hand variables, that is, inflation, growth of budget deficits and money growth in Tanzania.

In the basic equation (5), first, the estimated coefficient of the error correction terms term (ec_{t-1}) has the expected negative sign and is statistically significant at the 5 percent test level. This suggests existence of revert to long-run equilibrium of the diversion between inflation and budget deficits which is at a speed of about 18.1 percent per annum. This speed is unexplainably very low but far higher than 5.4 percent obtained by Solomon and de Wet (2004). Second, the results fail to support the null hypothesis that budget deficits have a significant positive effect on inflation in Tanzania. Instead, the parameter estimated for budget deficit is negative signed, statistically insignificant and very low indeed (Table 4). Third, empirical results

of the parsimonious budget deficit equation (6) estimated shows that the effect of budget deficit on inflation is statistically insignificant at the conventional test levels.

Table 4: Estimated Results of Parsimonious Error Correction Models for Inflation

Equation	Equation 5		Equation 6		Equation 7	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
C	0.054 (1.673)	0.111	2.147* (3.647)	0.003	-0.047 (-1.032)	0.318
DLCPI(-1)	0.815* (8.946)	0.000	-1.317 (-0.698)	0.499	0.494** (2.355)	0.032
DLCPI(-3)					-0.841* (-4.349)	0.001
DL_DEF_GOVRE_A	-0.006 (-.734)	0.472			0.011 (1.224)	0.239
DL_DEF_GOVRE_A(-1)			0.495** (2.498)	0.028		
DL_DEF_GOVRE_A(-2)			0.251 (1.632)	0.129		
D_LM2	0.064 (0.591)	0.562	7.645* (3.264)	0.007		
D_LM2(-1)			5.377 (2.877)**	0.014	-0.053 (-0.306)	0.764
D_LM2(-2)			-2.554 (-1.276)	0.226		
D_LM2(-3)			-6.927** (-2.332)	0.038	0.917* (4.202)	0.001
D_LY	-0.063 (-0.551)	0.588	-5.063** (-2.348)	0.037	0.641* (5.226)	0.000
D_LY(-1)	-0.247* (-2.196)	0.041	-5.956** (-2.770)	0.017		
D_LY(-2)	-0.102 (-1.423)	0.171	-5.953** (-2.351)	0.037	-0.043 (-0.502)	0.623
D_LY(-3)			-2.822** (-2.192)	0.049	0.108	0.302
D_LER	0.101** (2.611)	0.017			0.052 (1.067)	0.425
D_LER(-1)	0.094 (1.655)	0.114	3.569* (3.217)	0.007		
D_LER(-2)	0.117** (2.197)	0.041	4.562* (3.981)*	0.002	-0.129*** (-1.983)	0.065
D_LER(-3)			2.439*** (2.094)	0.058		
ec(-1)	-0.181** (-2.546)	0.020				
ec(-1)			-2.040* (-6.463)	0.000		
ec(-1)					-0.460* (-3.652)	0.002
R-Squared	0.922		0.877		0.792	
Adjusted R-Squared	0.881		0.723		0.649	
S.E. of regression	0.033		0.521		0.044	
F-statistic	22.522		5.690		5.546	
Prob (F-Stat.)	0.000		0.002		0.001	
BIS	-3.191		2.592		-2.522	
Durbin-Watson stat	1.932		2.755		2.226	

Note: Figures in parentheses are t-statistics.

Fourth, the results obtained for the parsimonious money growth equation (7) estimated shows that the effect of budget deficits on money growth is very statistically insignificant at the conventional test levels (Table 4). This finding is consistent with the descriptive analysis and findings obtained by de Haan and Zelhorst (1990) in a study that covered a sample of developing countries.

The lack of a significant positive effect of budget deficits on inflation in Tanzania is consistent with that obtained by some of the previous studies in developing countries: among others, Sowa (1994) in Ghana and Ezeabasili, Mojekwu and Herbert (2012) and Egwaikhide, Chete and Falokun (1994) in the case of Nigeria. The finding is also consistent with finding of an accompaniment of high deficits with decline of inflation, but in some relatively developed economies, in particular Italy and the USA (Fischer and Easterly, 1990:138). Closely related, is empirical evidence that shows inflation decrease rather than increases fiscal deficits, for example, in Ghana (Islam and Wetzel (1991). In this specific case of Tanzania the small negative effect of budget deficits on inflation may suggest that fiscal prudence observed by the government undermined the fight against inflation, seemingly from its effect on the supply-side of the economy. As Fischer and Easterly (1990) also notes the "programmes to reduce deficits are often inflationary" (p. 138). And this may lack a concrete basis in Tanzania given the effect of adverse effects and outcomes of privatization of the SOE on productive economic sector of the economy, the manufacturing sector in particular, after the launch of the stabilization programmes in 1986.

The results in Table 4 show that the short-run effect of money supply on inflation is very statistically insignificant at the conventional test levels. The insignificance of money in explaining inflation in Tanzania over the short-run during the sample period differs with that obtained by some of the previous studies, for example Kilindo (1997) in a study on Tanzania. Suffice it to

note, however, that the insignificant effect of money growth on inflation established by this study could be attributed to two factors: one is prudent monetary policy regime observed by the central bank during the sample period that targeted price stability. The other factor is the fact that inflation in Tanzania could be more of a structural (supply-side) variant than a purely monetary phenomenon. This is evidenced first, by the effect of the one-period lagged effect of economic growth on inflation is negative and statistically significant at the 5 percent test level (Equation 5, Table 4). The significant short-run negative effect of economic growth on inflation is consistent with theory and empirical findings in some previous studies on SSA: among others, Egwaikhide, Chete and Falokun (1994) in a study on Nigeria, Sandy (2003) in the case of Sierra Leone, and Laryea and Sumaila (2002) in a study on Tanzania. Second, is positive and very statistically significant effect of the contemporaneous and two-period lagged official nominal exchange rate on inflation (Equation 5, Table 4). This evidence is consistent with theory and empirical findings of some of the previous studies, for example, Ndanshau (2010). Third, is inertia evidenced by a positive and very statistically significant effect of the one period lagged inflation rate (Equation 5, Table 4). This result may suggest that expectations of high inflation increased inflation by increasing an excess of aggregate demand over aggregate supply.

In general, the empirical evidence suggests lack of a positive short-run effect of budget deficits on inflation in Tanzania during the sample period. Besides, over short-run structural rather than monetary factors appear more important in explaining inflation dynamics in Tanzania. Over the long-run, however, budget deficits and monetary factors may have respectively exerted a negative and positive effect on inflation in Tanzania but more so due to fiscal and monetary prudence observed by the government. Speculatively, fiscal prudence may have induced supply-side inflation.

6. Conclusion

The main purpose of this paper was to investigate the impact of fiscal budget prudence on policy objective of price stability in Tanzania during the period 1980-2010. The study brought annual time series data to bear on a cointegration and error correction model (ECM). The estimated ECM results lack evidence on existence of a significant positive effect of budget deficits and money supply on inflation dynamics in Tanzania during the sample period. Instead, over the short-run inflation was more significantly determined by changes in both real income and the nominal exchange rate. The findings of the price equation underscore importance of policy measures directed to the attainment of exchange rate stability and attainment of stable rates of economic growth if price stability is to be attained. Importance of fiscal discipline is indirectly emphasized by its insignificance in the period of fiscal prudence in the sample period covered by the study.

The findings and policy implications of the study are not foolproof: they only indicative. The sample of annual data points used was small; and, effects on inflation of structural factors, such as rainfall, drought, oil price effect, and spillover into the country of global economic crises could not be modeled in either the estimated ECM and the error augmented VAR model. Further empirical test could thus be informative.

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