Issues On The Zambian Economy

Bank *of* Zambia

THE BOZ READER, VOL.01, NO. 09, 2013

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2013

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Foreword

Since 2003, the Bank of Zambia has been publishing the Bank of Zambia (BOZ) Reader - Issues on the Zambian Economy. The main goal of this publication is to offer its readership with analyses of various social economic issues on the Zambian Economy.
In addition, the BOZ Reader continues to provide a platform through which researchers, within the Bank of Zambia and outside the Bank of Zambia, can present their findings on various economic issues affecting Zambia. Further, it is a medium through which theoretical and empirical literature on contemporary economic issues affecting the country can be shared.

This is the ninth publication in the series and contains six articles on contemporary issues of relevance to the Zambian economy. The articles contained in this publication include: Potential Impacts on Trade and Trade Tax Revenue of the COMESA Customs Union and Tripartite FTA; Domestic Debt Sustainability Analysis; The Incidence Analysis of the Value Added Tax in Zambia; Day-of-The-Week Effect in Returns and Volatility of the Kwacha/US Dollar Exchange Rate; An Estimation of the VAT Gap: A Quantification and Analysis of the VAT Gap in Zambia; and, "If Japan Can...Why Can't We?": Why Zambia should put Total Quality Management at the Centre of its Development Agenda.

With a lot of gratitude, we wish to thank the contributors of these articles to this publication and it is our hope that this will encourage other researchers and authors to share their empirical findings, and thereby contribute to the pool of ideas and literature on the Zambian economy. Additionally, we wish to invite comments or brief notes on the articles in this Reader to foster more debate. Further, articles are invited from researchers and writers on various topics that are relevant to the Zambian Economy. In this regard, all correspondence should be channelled to the Director, Economics Department, Bank of Zambia, P.O. Box 30080, Lusaka, Zambia or sent through email to pr@boz.zm.

The views and interpretations expressed in the articles contained in this Reader are those of the authors and do not necessarily represent the views and policies of the Bank of Zambia.

Michael Gondwe

Governor

Bank of Zambia

CHAPTER ONE

Potential Impacts on Trade and Trade Tax Revenue of the forthcoming COMESA Customs Union and Tripartite FTA[π]

Caesar Cheelo[β] and Bernard Band[∂]

Abstract

The paper seeks to assess the potential trade and trade tax revenue effects for Zambia of the forthcoming trade reforms implied in both the COMESA Customs Union and the COMESA-EAC-SADC Tripartite FTA. It uses the Tariff Reform Impact Simulation Tool of the World Bank in a comparative analysis of trade policy reforms in order to determine the required tariff changes. The study estimates that the economy would have potentially lost total trade tax revenues equal to about 2.3 percent of total tax revenue in 2010 due to the combined effect of consolidation of the COMESA FTA and implementation of the COMESA Common External Tariff under a Customs Union reform. On the other hand, pursuing tariff reforms under COMESA FTA consolidation and a Tripartite FTA, Zambia would have potentially lost tax revenues equivalent to 4.5 percent of the total tax revenue in 2010. Given the relatively low amount of revenue losses, tariff revenue losses are unlikely to be significant concerns under regional trade integration reforms. Similarly, the marginal potential increases in imports are unlikely to result in significant trade and competitiveness gains. Therefore, Zambia needs to identify additional offensive and defensive trade interests beyond customs revenue gains and losses.

1.0. Introduction

Zambia has actively participated in COMESA and SADC regional integration programmes. The country is a founding participant in the COMESA free trade area (FTA) and is looking ahead to participate in the establishment of the COMESA Customs Union. Within SADC Zambia is a full participant in the SADC FTA, granting duty-free and quota-free access to goods originating from the SADC region. The country is also committed to participate in the recently announced Tripartite FTA, which will establish a free trade area and then eventually a customs union, consolidating the regional economic communities of COMESA, the East African Community (EAC) and SADC. The underlying effects of these trade reforms on trade performance and custom revenues are likely to be significant.

However, quite often the potential and actual short-term or transitional impacts of the tariff reforms associated with regional integration are not paid attention to and are thus not well known. This is the case with respect to Zambia's commitments to achieve further integration under the forthcoming COMESA Customs Union and Tripartite FTA.

[π]**Disclaimer**: The original, full-length version of this paper was commissioned under the auspice of ZIPAR. Both the full version and this paper reflect the views of the authors and do not necessarily represent the opinions of any of the institutions to which the authors are currently or were previously affiliated. Errors and omissions are similarly the authors' own responsibility.

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Therefore, this paper seeks to assess the potential trade and trade tax revenue effects for Zambia of the forthcoming trade reforms implied in both the COMESA Customs Union and the COMESA-EAC-SADC Tripartite Free Trade Area (TFTA). The paper is based on a study that was undertaken in 2011, which used 2010 (the most recent full year with relevant trade and tariff data) as the main reference period. The study applied a partial-equilibrium simulation model to predict the potential trade and trade tax revenue effects of the forthcoming regional integration trade reforms.

The rest of the paper is structured as follows: Section 2 presents background trade and tariff profiles for Zambia; Section 3 describes the methodology, including the data used, methods of analysis employed and set-up of the simulation scenarios; Section 4 presents the results as predicted impacts on trade tax revenue and on trade; Section 5 offers a discussion of the results; and, Section 6 concludes.

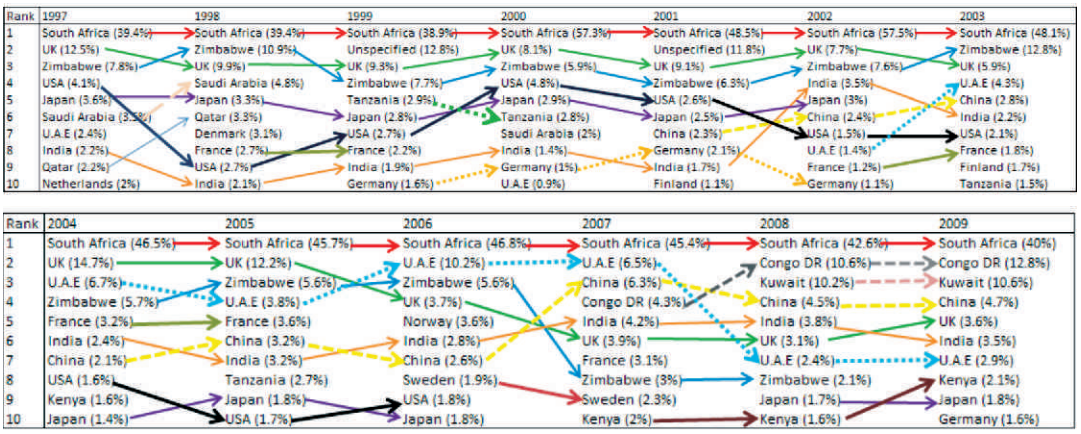
2.0. Trade and Tariff Profiles for Zambia

Typically, trade liberalisation measures relating to tariff reforms mainly affect trade through the effects on the liberalising country's imports. An understanding of the size and patterns of import trade and of the tariff profile before the reforms is therefore informative.

In 2010, Zambia's total imports amounted to K25.1 trillion[1]. This was about 32 percent of 2010 GDP[2] (or 192 percent of the K13.1 trillion total tax revenue of Government of the Republic of Zambia (GRZ), excluding grants and other non-tax revenues. Imports, therefore, formed a significant part of Zambia's economic activity and were an important tax base.

In terms of bilateral trade, South Africa dominated the trade profile in 2010, accounting for over 37 percent of Zambia's total imports. Kuwait, the Democratic Republic of Congo and China were other significant import sources in that year. The profile closely mimics Zambia's overall pattern of bilateral trade over the 13 years prior to 2010 (i.e., 1997 - 2009) with South Africa consistently at the top (Figure 1) and with some traditional partners such as the United Kingdom (UK) and Zimbabwe losing ground, and less traditional partners like DR Congo[3], Kuwait and China gaining considerable ground. The traditional import structure underwent a significant shift over the last one and a half decades.

Figure 1: Top 10 import sources for Zambia, by country, rank and share: 1997-2009



Source: Constructed from COMSTAT data (COMESA Secretariat)

[1]The study was undertaken before the 2012/2013 rebasing of the Zambian Kwacha thus all local currency amounts are stated in pre-rebase currency values.

[2]CSO estimated Zambia's GDP for 2010 at K77.7 trillion.

[3]DR Congo's new dominant position as an import source mainly stemmed from its copper ore exports that were imported into Zambia for processing and re-export as copper cathodes and sheets.

As of 2010, Zambia applied the following procedure for import trade taxation:

- *Customs duty*: a customs duty rate (either most-favoured-nation (MFN) or under special preferences such as FTAs) was applied on the CIF (Cost Insurance and Freight) value of the import consignment at the border.
- Excise tax: (on selected products) was applied on a compounded basis on the CIF value of imports plus the monetary value of customs duty tariff revenue collected.
- Value added tax (VAT): was applied on a compounded basis on the CIF value of imports plus the monetary value of customs duty tariff revenue collected and the monetary value of excise duties collected.

It was unlikely that the above formulae for trade tax application would change with trade reforms such as those implied under regional integration. On the other hand, the structure of the discriminatory component of trade taxes was likely to change.

In 2010, Zambia's multilateral (or MFN) trade was based on a fairly streamlined ad valorem external tariffs structure, comprising four bands: 0%, 5%, 15%, and 25%. Within this structure, tariffs were applied on an MFN basis on goods from other WTO Member States as shown in Table 1:

Table 1: Zambia's Tariff Structure, 2010

	CD		SSA		SDC	
Tariff band:	Number of lines	(%)	Number of lines	(%)	Number of lines	(%)
0%	1,328	22%	2,114	35%	4,399	73%
5%	884	15%	2,913	48%	3	0%
10%	0	0%	21	0%	0	0%
15%	1,923	32%	36	1%	25	0%
25%	1,874	31%	175	3%	154	3%
blank lines	0	0%	750	12%	1,428	24%
Lines not matched	0	0%	0	0%	0	0%
All bands	6,009	100%	6,009	100%	6,009	100%

Source: constructed from ZRA customs data
Note: CD = MFN customs duty rate; SSA = rate to goods originating from South Africa only; SDC = rate to goods originating from other SADC member states, excluding South Africa

The Zambian tariff structure in 2010 had 6,009 tariff lines at the HS 8-digit (transactional) level, a reduction from the estimated 6,234 lines in 2004. This suggests some amount of tariff simplification and harmonization. As the table reveals, during 2010 the majority of MFN tariffs (31 percent of all tariff lines across all bands) were in the 25% tariff band and the least (15 percent) were in the 5% band.

Beyond the existing COMESA and SADC FTAs that Zambia now fully participates in, the country is considering establishing the COMESA Customs Union within its territory. The COMESA Customs Union will require the adoption of a Common External Tariff (CET) structure, a Common Tariff Nomenclature (CTN), and common Customs Management Regulations (CMR). This will essentially define Zambia's common external trade policy position going forward. The CET for COMESA has been proposed as shown in Table 2 below:

Table 2: COMESA CET Structure

CET Category	# of Tariff Lines	% of Total Tariff Lines on CET
0%	2,709	39%
10%	2,196	32%
25%	1,998	29%
Total Tariff Lines	6,903	100%

Source: author's contraction (CET data provided by the COMESA Secretariat)
Note: the CTN that underpins the version of the CET presented in the Table is based on the 2007 version of Harmonized System (HS2007)

Clearly, the CET in Table 2 structure does not match with Zambia's MFN tariff structure presented in Table 1. Looking ahead, the formation of the COMESA Customs Union will require Zambia to undertake considerably more tariff liberalization and trade policy reforms.

Based on the country's 2010 trade tax structure, Zambia generated sizable trade tax revenues from its 2010 import trade. The actual trade tax revenues are presented in Table 3. The total amount of revenue collected was K7.9 trillion, equivalent to 32.3 percent of the national budget (or 7 percent of GDP). Because of the compounding formula applied in tax collection at point of collection, VAT which applied last has the largest share of trade taxes (69.7 percent) followed by Customs duty (CD) collections at 24.8 percent of the total. The tariff revenue or collected customs duty represented 10.2 percent of the K13.1 trillion, which was estimated as the 2010 total tax revenue of GRZ, excluding grants and other (non-tax) revenues (or 1.7 percent of the 2010 GDP of K77.7 trillion).

Table 3: Zambia's Trade Taxes, 2010

	Statutory tariff*	Collected CD	Excise tax	VAT	Total
Total Value (K billion)	2,463.3	1,339.8	296.2	3,766.3	7,865.5
Share of total revenue (%)	-	24.8%	5.5%	69.7%	100.0%
Simple Average rate (%)	15.1%	12.9%	0.6%	14.7%	-
Weighted Average rate (%)	9.8%	5.3%	1.1%	14.1%	-
% of total tax revenue**	-	10.2%	2.3%	28.7%	41.2%

Source: Calculated from 2010 customs (ZRA) data using TRIST
* Statutory tariffs are not actual collection of revenue; they depict what would have been collected had the tariff book been applied to the letter; the difference between collected CD and statutory tariffs provides an estimate of duty exemptions that Zambia granted.
** Total tax revenue for 2010 was measured as the total tax revenue of GRZ, excluding grants and other (non-tax) revenues, which was estimated at K13.1 trillion.

An important observation is that actual customs duty collections in 2010 were 45.6 percent less than they would have been had the statutory duty rates been applied strictly in accordance with the tariff book. The difference captures the significant amount of exemptions that Zambia grants on its imports under various trade protocols and bilateral trade agreements as well as to special importer groups such as State House, selected non-profit making organizations and other holders of appropriate Statutory Instruments exempting them from paying customs duties. The implication is that Zambia lost approximately K1.1 trillion or 8.6 percent of total tax revenue in import duty exemptions in 2010.

The actual simple average and trade weighted average rates of protection were 12.9 and 5.3 percent, respectively, suggesting that Zambia's effective rate of protection (or customs duty) was quite low when the pattern of trade on which tariffs are applied was taken into account. Actual or effective protection was lower than statutory protection in both simple and trade

weighted terms. The effective VAT rate applied at the point of entry (14.1 percent, trade weighted average) was also lower than the statutory rate of 16 percent.

The ensuing section presents the methodology applied to predict the potential trade and trade tax revenue effects of the forthcoming regional integration trade reforms.

3.0. Methodology

3.1 Data

The data used for the analysis on trade, tariff and tariff revenue are mainly customs data. These were mainly obtained from the Zambia Revenue Authority's (ZRA's) Automated System for Customs Data (ASYCUDA). The detailed data were collected for 2010 at the Harmonized System (HS) 8-digit (transactional) level. Additional data such as on CETs were obtained from the COMESA Secretariat. For basic background analysis and macroeconomic aggregates like GDP and government revenue figures, extra data for the analysis were obtained from the Central Statistical Office (CSO), Ministry of Finance (MoF), the World Trade Organization's (WTO) World Integrated Trade System (WITS) database and the World Bank's World Development Indicators (WDI), among others.

3.2 Methods of Analysis

The study underpinning this paper focused on Zambia and covered the country's bilateral trade and tariff relations with its major trading partners, including both countries and Regional Economic Communities. It applied the Tariff Reform Impact Simulation Tool (TRIST), developed by Brenton et al (2009) for the World Bank – an ex-ante (or pre-reform) empirical model. TRIST is an interactive Excel-based partial-equilibrium trade model that helps to simulate the short-term impacts of tariff reform on fiscal revenue, import volumes (measured in monetary value terms) and protection, at country level. It makes theory consistent assumptions about effects of trade liberalisation on export substitution, domestic substitution and import demand.

For this study, the model was used to predict the potential short-term impact of various tariff reform scenarios on Zambia's trade revenues and import trade. The TRIST results were mainly presented as marginal effects or changes between the pre- and post-reform simulation scenarios.

3.3 Setting up the Simulation Scenarios

In order to properly assess the potential import trade and revenue impacts of the trade reforms of interest, the simulations were deliberately designed to disaggregate the impacts according to Zambia's existing and forthcoming bilateral and regional trade policy commitments as of 2010. Two simulation scenarios were created. Firstly, a scenario for trade liberalisation relating to the establishment of the COMESA Customs Union (dubbed "CET w Full intra-FTA") was created which classified all of Zambia's trading partners into the following country and economic community groups: a) Intra COMESA FTA, comprising of all COMESA countries under the assumption that they all engaged in reciprocal free trade; b) Gulf States, a grouping created from the empirically observed significance of similar imports from the group to Zambia but without formal or legal ties establishing the group as a specific economic configuration; c) China; d) USA; e) UK; f) India; g) Japan; and h) ROW, an aggregate grouping of all other import sources from the Rest of the World.

Secondly, a scenario for the establishment of the Tripartite (COMESA-EAC-SADC) FTA was created (dubbed "TFTA w Full intra-FTA"), with the following additional configurations: a)

SADC (excl RSA), which comprised of all SADC countries excluding South African and not overlapping with the COMESA configuration (Intra-COMESA FTA); and b) RSA, capturing South African separately given the country's dominance on Zambia's import trade profile.

In the absence of appropriate data and information about import products that would be exempted and excluded from the forthcoming tariff reforms under COMESA and the TFTA framework, the simulations assumed that there would be no sensitive products or exclusions. That is, it was assumed that all of Zambia's imports would be liberalised in accordance with the regional reform requirements. The default TRIST Model elasticities of 1.5, 1 and 0.5 for export substitution effects, domestic substitution and demand effects, respectively, were applied.

As appropriate, the TRIST simulations were run for full free trade scenarios (0% tariff for all tariff lines) on the country groups of interest as well as for a full customs union applying the COMESA CET for other countries of interest. In a final step of analysis, the analysis compared the marginal effects under the Tripartite FTA to those under the COMESA Customs Union.

4.0. Predicted Impacts on Revenue and Trade

The summary results for the scenario of liberalization under the COMESA FTA and then application of the COMESA CET under the Customs Union (CET with Full intra-FTA) or the COMESA Customs Union Scenario, with no sensitive products or exclusions are shown in Table 4:

Column 1 of the Table shows the potential impacts on 2010 trade and revenues if a full free trade area was established under the COMESA FTA, assuming countries like DR Congo, Eritrea, Ethiopia, Seychelles and Uganda joined the COMESA FTA, enabling Zambia to reciprocate on imports for these countries.

The potential marginal effect of implementing the Customs Union compared to the baseline trade and customs values of 2010 was estimated as a small increase (0.03 percent) in imports and similarly a small reduction in customs duty (or tariff) collections of 1.4 percent depicting marginal revenue collection losses. Total trade taxes would reduce but by a smaller amount (0.4 percent) given the compensating effects of higher trade tax revenue collections on excise duty and VAT as imports expand. Thus, there was potentially little scope for Zambia to benefit from further trade expansion and to experience significant revenue losses through deeper intra-COMESA integration under the COMESA FTA.

Table 4: Potential impact of COMESA Customs Union on Zambia's 2010 imports and revenue

	COMESA FTA	Gulf States*	ROW	China	USA	UK	India	Japan	Cumulative
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Impact on imports:									
Change in imports (K m)	8,628.3	129,713.4	26,664.6	13,989.4	5,847.8	5,382.2	-2,688.9	-9,397.5	178,139.4
% change in imports	0.03%	0.52%	0.11%	0.06%	0.02%	0.02%	-0.01%	-0.04%	0.71%
Impact on revenue:									
Change in tariff revenue (K m)	-18,096.6	-188,440.6	-63,192.1	-31,123.5	-13,566.8	-11,335.1	2,215	18,354.2	-305,185.6
% change in tariff revenue	-1.4%	-14.1%	-4.7%	-2.3%	-1.0%	-0.8%	0.2%	1.4%	-22.8%
Total Tax Revenues on Imports:									
Change in Total revenue (K m)	-19,589.8	-197,823.	-68,569.6	-33,767.1	-14,744.8	-12,179.6	2,182.6	20,946.7	-323,544.6
% change in Total revenue	-0.4%	-3.7%	-1.3%	-0.6%	-0.3%	-0.2%	0.04%	0.4%	-6.0%
Collected Tariff rate:									
Collected applied tariff rate pre	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.3%
Collected applied tariff rate post	-0.1%	-0.8%	-0.3%	-0.1%	-0.1%	0.0%	0.0%	0.1%	4.1%
% change in collected applied tariff rate	-1.4%	-14.5%	-4.8%	-2.4%	-1.0%	-0.9%	0.2%	1.4%	-23.3%

Source*:* author's construction from TRIST simulation results
Notes:* Gulf States are defined as Kuwait and UAE

Outside the COMESA FTA effects, the largest-to-smallest potential trade and revenue collection changes of the Customs Union are reflected in sequence in Columns 3 and 9, respectively, of Table 4. The largest potential increases in trade and revenue losses would be associated with the CET being applied on the Gulf States (Kuwait and UAE) followed by Rest of the World (ROW), China, USA and UK, in that order. The potential reductions in the trade tax revenues would range from -3.7 to -0.2 percent, respectively, for the country groups. The most significant potential revenue losses from the Gulf States is from the fact that petroleum product imports from the two countries in 2010 accounted for K3.5 trillion or 13.7 percent of the total import bill and yielded revenues worth K173.7 billion (or 13 percent of the total import trade tax revenue in that year).; these revenues along with the 1.1 percent revenue from other imports from UAE (or 14.1%) would essentially be lost under this COMESA CET TRIST scenario. Thus, outside the COMESA and SADC regions, petroleum products from the Gulf States were the most significant import trade tax contributor to Zambia's government taxes in 2010.

The potential increases in imports would range from 0.02 percent in relation to UK imports to 0.52 percent for the two Gulf States combined. On the other hand, potential import trade reductions and potential trade tax increases would be expected with respect to a CET on trade with India and Japan. These latter observations have to do with the types of goods being imported from these two countries. For instance, a major part of imports from India are pharmaceutical products that Zambia grants duty free access, which in the Customs Union scenario are assumed to move to the appropriate CET levels.

Overall, the establishment of full free intra-COMESA trade and then a Customs Union would potentially result in a cumulative 0.7 percent increase in 2010 imports and a trade tax revenues loss of 6 percent or K323.5 billion. The estimated potential tax revenue loss would be equivalent to about 2.5 percent of total tax revenue. With such a revenue loss and a less than one percentage point potential increase in imports, it can be expected that the trade reforms associated with the Customs Union would potentially not change the pattern and size of Zambia's import trade significantly.

The summary results for a scenario of full liberalisation under the Tripartite FTA, assuming no common external trading position (i.e., without COMESA CET under the Customs

Union) and no sensitive products or exclusions (the TFTA w Full intra-FTA scenario results), are shown in Table 5. For internal consistency, the scenario also assumes that in moving to a wider internal market under the Tripartite FTA, the COMESA FTA would first be consolidated. Thus again, the analysis first assesses the potential impact of full (tariff-free and quota-free) COMESA trade.

Table 5: Potential impact of Tripartite FTA on Zambia's 2010 trade and revenue

	COMESA FTA	SADC (excl RSA)	RSA only	Cumulative
(1)	(2)	(3)	(4)	(5)
Impact on imports:				
Change in imports (K m)	8,628.3	13,969.5	229,431.8	252,029.6
% change in imports	0.03%	0.06%	0.91%	1.0%
Impact on revenue:				
Change in tariff revenue (K m)	-18,096.6	-31,862.2	-510,581.9	-560,540.7
% change in tariff revenue	-1.4%	-2.4%	-38.1%	-41.8%
Total Tax Revenues on Imports:				
Change in Total revenue (K m)	-19,589.8	-35,098.4	-558,347.	-613,035.3
% change in Total revenue	-0.4%	-0.6%	-10.3%	-11.3%
Collected Tariff rate:				
Collected applied tariff rate pre	0.0%	0.0%	0.0%	5.3%
Collected applied tariff rate post	-0.1%	-0.1%	-2.1%	3.1%
% change in collected applied tariff rate	-1.4%	-2.4%	-38.6%	-42.4%

Source*:* author's construction from TRIST simulation results

The estimated potential impacts of a full FTA (COMESA FTA) were established, assuming DR Congo, Eritrea, Ethiopia, Seychelles and Uganda join the COMESA FTA (Column 2). The results are naturally exactly the same as those in Table 4 (thus, their narrative presentation is not repeated here).

The results on the potential marginal effect of subsequently fully liberalizing trade with all SADC countries, excluding South Africa (which is singled out for reasons explained above), are presented in Column 3. The potential impact of removing tariff barriers with all SADC countries excluding South Africa would be: a 0.06 percent increase in imports compared to the baseline value; a 2.4 percent reduction in tariff revenues relative to baseline; and a 0.6 percent reduction in overall trade tax collection.

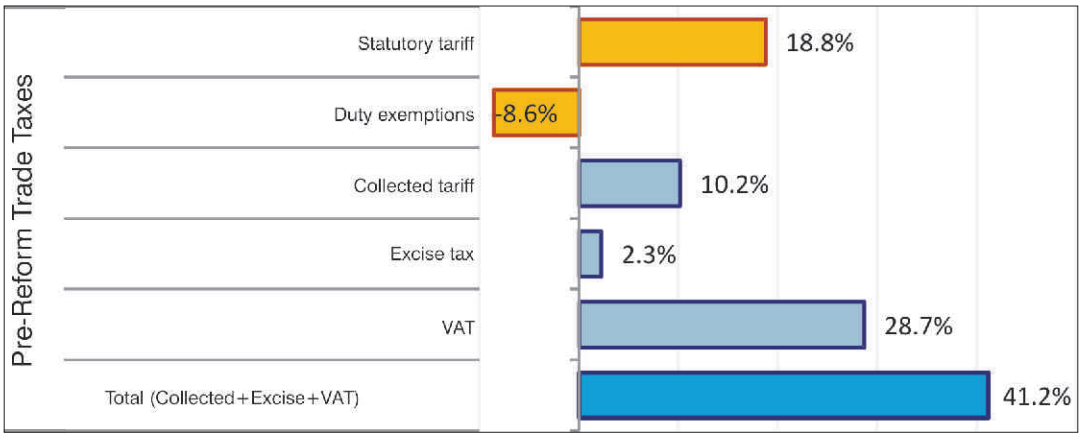
Column 4 presents results for trade liberalising with South Africa only. The results show that the potential impact of duty free importation of South African goods would be an increase in imports of 0.9 percent of the baseline value, a tariff revenue reduction of 38.1 percent relative to the baseline and an overall trade taxes revenue reduction of 10.3 percent. South African's potential impact would be much the single most significant impact of regional integration trade reforms. This sizable impact reflects the dominance of South African imports as a share of Zambia's total imports (37.2 percent) in 2010. The potential trade tax revenue loss associated with South Africa alone would be 4.3 percent of the 2010 total tax revenue of Zambia.

Overall, Zambia's joining the Tripartite FTA (Column 5) would result in a potential cumulative increase in imports of one percent and a reduction in trade tax revenue of 11.3 percent. The potential increase in imports would be equivalent to 1.9 percent of the total tax revenue (and 1.7 percent in relation to South Africa alone), while the potential reduction in collected trade taxes would be 4.7 percent of the budget (4.3 percent for South Africa alone).

5.0. Discussion

Some of the key observations from this paper are perhaps worth a brief discussion. Firstly, an interesting observation made earlier is that in 2010, the collection of customs duty was 45.6 percent less than it should have been had statutory duty rates been strictly applied, the deviation reflecting the amount of exemptions granted on imports under various trade protocols and bilateral trade agreements as well as those granted to special importer groups. As a result of import duty exemptions, in 2010, Zambia lost approximately K1.1 trillion or 8.6 percent of total tax revenue. Figure 2 presents a graphical illustration of the full pre-reform (or 2010 baseline) situation of import tax revenue collections, and specifically shows the losses associated with exemptions relative to the potential statutory collections that could have been achieved.

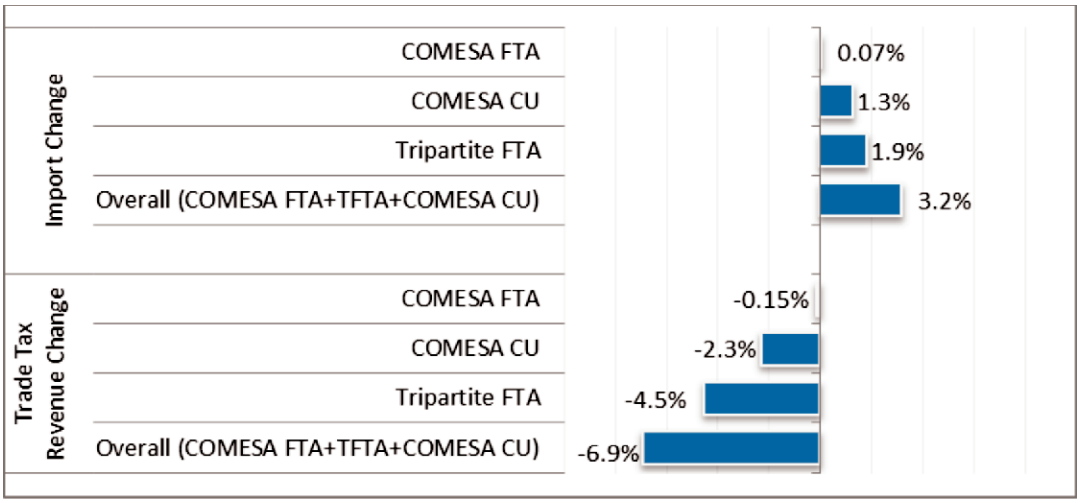
Figure 2: Import Trade Tax Revenues, % of Total Government Tax Revenue, 2010



Source: Calculated from 2010 customs (ZRA) data using TRIST

Secondly, Figure 3 summarizes the potential import trade and collected trade tax revenue impacts was Zambia to establish full intra-COMESA free trade under the COMESA FTA and then either apply a CET under the COMESA Customs Union or establish full free trade in the Tripartite FTA. It also shows the overall potential effects of the COMESA FTA, the COMESA Customs Union and the Tripartite FTA. All the potential impacts are in proportions of the 2010 total tax revenue (excluding grants and other (non-tax) revenues). The largest effects would be associated with the establishment of the Tripartite FTA, mainly on account of the underlying influence of trade with South Africa. Under the Tripartite alone, Zambia's 2010 imports could be expected to potentially increase by 1.9 percent of the total tax revenue compared to potential increases of 0.07 and 1.3 percent of the tax revenue, respectively, under the COMESA FTA consolidation and COMESA Customs Union scenarios. The overall potential import increase would thus be an estimated 3.2 percent of total tax revenue.

Figure 3: Trade reform impacts on imports and trade tax collections (% of total government tax revenue), 2010



Source: author's construction from TRIST simulation results

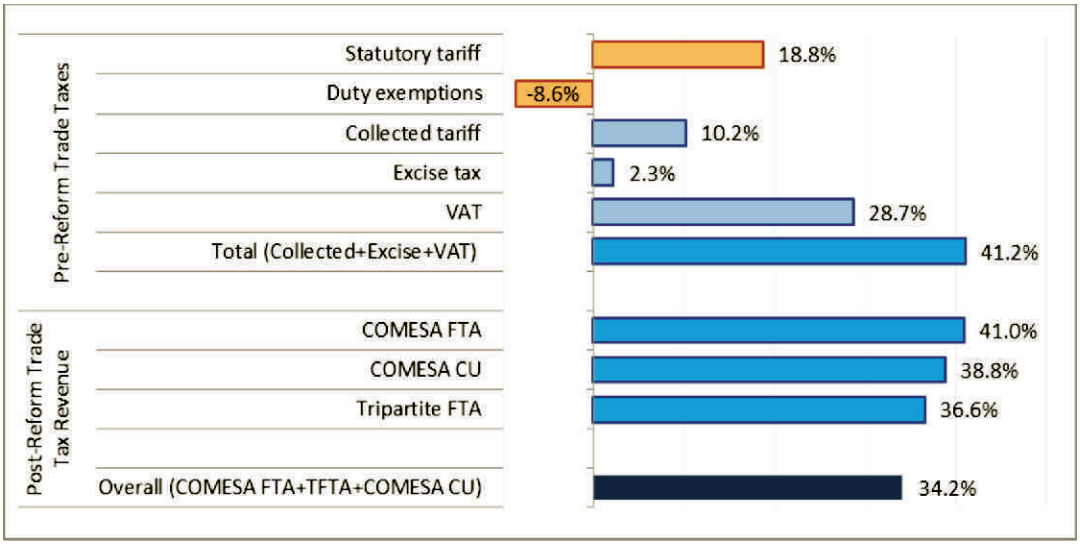
Similarly, but in the opposite direction, trade tax revenues would potentially reduce by 4.5 percent of tax revenue under the Tripartite FTA (the largest potential revenue loss) and by 0.15 and 2.3 percent of total tax revenue, respectively, under the COMESA FTA and the COMESA Customs Union. Overall, the potential combined effect of full trade reform (COMESA FTA consolidation plus COMESA Customs Union establishment and Tripartite FTA establishment) was estimated at 6.9 percent of total tax revenue. Revenue losses could naturally be expected to be higher under the Tripartite FTA because this trade reform arrangement would involve liberalising trade with South Africa, Zambia's largest trading partner by far in 2010.

Both avenues of tariff reform would be significantly less than the revenue of 8.6 percent of total trade taxes that the country actually lost due to exemptions in 2010. Indeed, the overall or combined effects of consolidation of the COMESA FTA, implementation of the COMESA Customs Union and establishment of the Tripartite FTA would have resulted in potential revenue losses of 6.9 percent of total tax revenue, amount to lesser losses than the duty exemption losses of 2010.

To further understand the potential revenue effects under the trade reforms aforementioned, we compare them with the pre-reform levels of trade tax revenue collection and non-collection (Figure 4). As earlier observed, there is a deviation between what was collected and what could have been collected had statutory tariffs been collected exactly as designed in the tariff book. The deviation or level of customs duty exemptions was estimated at 8.6 percent of total tax revenue whereas the duty collected was estimated at 10.2 percent of total tax revenue. This essentially means that even before any reforms, the country was forfeiting nearly half (46 percent) of its would-be duty collection as statutory exemptions.

The total pre-reform trade tax revenue collection would be 41.2 percent of total tax revenue, reflecting the importance of trade taxes to Zambia's overall fiscal revenue position. The different trade reforms explored in this study would potentially result in trade tax revenue collections ranging from 36.6 to 41.2 percent of total tax revenue, respectively under the Tripartite FTA and COMESA FTA scenarios. Overall, with all trade reforms undertaken in combination, the trade tax revenue collection would be an estimated 34.2 percent of total tax revenue.

Figure 4: Pre- and Post-reform aggregate outcomes on imports and trade tax collections (% of total government tax revenue), 2010



Source: author's construction from TRIST simulation results

The trade reforms implied in the regional integration commitments would therefore not be expected to significantly change the contribution of trade taxes to total government tax revenue; revenue losses would not be among Zambia's main concerns under the explored trade reforms, particularly bearing in mind the reforms that maybe already taking place under the SADC FTA.

6.0. Conclusion

The simulation results of this paper have shown that the various tariff reforms Zambia would be required to undertake under the COMESA Customs Union and Tripartite FTA are unlikely to significantly change the size or pattern of import trade. Thus, while tariff reforms are a particularly good sign of deeper regional integration, the benefits of regional integration will remain potentially small for this African country. The country, like many others on the continent, is likely to continue trailing in terms of realising the potential benefits of integration outlined in international trade literature (World Bank, 2011).

Zambia will need to pay close attention to formulating and applying reliable trade and investment policies and strategies that go beyond the first step of tariff liberalisation into deeper regional cooperation as tariff reforms alone will offer limited gains.

With respect to the Customs Union specifically, trade policy-makers will have to be careful to comprehensively understand offensive and defensive trade interests of the private sector in Zambia. They will have to articulate this interest in regional trade negotiations and ensuring that the interests become an integral part of the common negotiating position of the Customs Union, bearing in mind the anticipated trade policy space losses.

In a similar and perhaps more significant way, the TFTA results of the paper in particular raised an important issue, concerning the additional benefits the country can anticipate from participation in the Tripartite FTA. What additional incentives might the country purse considering that it would have already fully liberalised trade with all the countries of the Tripartite under either the COMESA or SADC FTAs and would have borne the liberalisation (revenue loss) costs? With this consideration in mind, under the coordination

and stewardship of the Ministries of Finance and of Commerce, Zambian stakeholders in the public and private sectors will do well to consult carefully and clearly define additional interests beyond revenue loss compensation that they see as potential benefits of participating in regional free trade under the FTA. Such interests might include regional support in marketing Zambia as a preferred regional destination for foreign direct investment and priority treatment of the economy in regional infrastructure and human development projects, both of which could be justified as rewards for being an early trade reformer or a "trail blazer" of regional integration.

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CHAPTER TWO

Domestic Debt Sustainability Analysis - The Case for Zambia

Philippe C. Masengo

Abstract

The paper analyses domestic debt sustainability (DDSA) using the concept of the Present Value Budget Constraint (PVBC). The analysis is performed with total revenue (with grants) and also with domestic revenue (without grants) over the period 1980 - 2010. Both expenditure with revenue plus grants and expenditure with only domestic revenue are examined for debt sustainability in the Johansen's cointegration framework. The results suggest that Zambia's domestic debt is sustainable whether revenue includes grants or not. This result can be attributed to the cancellation of most of the external debt and the growing gross domestic product (GDP). Nevertheless, the sustainability of Zambia's domestic debt is still threatened by its dependency on exports of raw copper as the major source of revenue. Therefore, there is a need to quickly diversify the economy, to widen the tax base and also to build a substantial fund to hedge against copper and oil price shocks while at the same time shifting towards renewable energy sources to reduce dependency on oil.

Keywords: Domestic Debt, Sustainability, Cointegration, Present Value Budget Constraint, Rules of Thumb Ratios

1.0 Introduction

In April 2005, Zambia reached the completion point of the enhanced initiative of Highly Indebted Poor Countries (HIPC Initiative). This resulted in more than 80% of Zambia's external debt being forgiven (2000 – US $6.5 billion, 2004 – US $7.1 billion, 2006 US $0.7 billion). Further, given the prevailing conducive macroeconomic environment, domestic borrowing has been on the rise (Domestic Debt as a ratio to GDP: 1998 - 4.0%, 2000 - 8.2%, 2002 - 10.4%, 2004 - 17.2%, 2006 - 18.1%, 2008 - 14.6% and 2010 -12.8%)[1] hence threatening the sustainability of domestic debt. Government has in the recent past shifted its financing of deficits from external to domestic borrowing specifically through Government securities. Further, demand for Government securities has increased both from local and foreign investors owing to the stability in the financial markets. Therefore, this study aims to analyse in detail the sustainability of Zambia's domestic debt given the current macroeconomic status (Bank of Zambia, 2005, 2009; Muyatwa, 2008).

1.1 Evolution of Zambia's Domestic Debt

Zambia's independence in 1964 might have come too soon for most of its neighbours, who were still in power struggles. Hence, heavy expenditures were incurred in the first two decades after independence, supporting liberation struggles in neighbouring countries of Southern Africa. Nevertheless, during this period, Zambia's main source of revenue, copper,

[1]For 2008 and 2010, the Domestic Debt to GDP ratio carried the 2008 Financial Crisis Effects

was produced in relatively large quantities and was selling at high prices, which generated adequate revenue to finance these and other regular expenditures (Ng'andwe, 1980).

By the 1970s, some of Zambia's neighbours had attained independence. However, by the mid-1970s, the price of copper suffered a severe decline worldwide. On the other hand, oil prices soared, increasing the cost of imports. Moreover, being landlocked and still facing liberation struggles in some of its neighbouring countries, Zambia had to open its route for exports and imports through Tanzania at a very high cost – the Great North Road, Tanzania Zambia Railways (TAZARA) and Tanzania Zambia Mafuta pipeline (TAZAMA) (Situmbeko et al, 2004; UNCTAD, 2004; Muyatwa, 2008: Ng'andwe, 1980))

Zambia turned to international lenders (e.g. International Monetary Fund (IMF), World Bank and the Paris Club) for relief as the local market was not developed enough to lend substantial credit to the government. As copper prices remained depressed, it became increasingly difficult for Zambia to service its growing external debt. In 1983, the country was put on the IMF's Structural Adjustment programmes (SAPs). SAPs put emphasis on fiscal discipline in order to reduce budget deficits. But the then socialist government made up for falling revenue with abortive attempts at these SAPs (in 1985 and 1987), which ended after popular outcries from the public. During this period, domestic debt was basically government liabilities with parastatals. But most of it was not reported since government, mainly through monetary financing, did provide annual grants to the parastatals (Situmbeko et al, 2004; CYMA, 2006; Muyatwa, 2008).

After democratic multi-party elections in October 1991, the new Movement for Multiparty Democracy (MMD) government brought with it the capitalist economy. The new government introduced the Economic Reform Program (ERP) resulting in the privatisation of most of the parastatals, maintaining positive real interest rates, eliminating exchange controls, and the endorsement of free market principles. Domestic debt began to steadily grow as government began to accumulate domestic arrears and carried back-logs left by the privatised parastatals (see Figure 1). Retrenched workers were heavily owed by government.

In the year 2005, Zambia reached the HIPC completion point and accessed external debt forgiveness (see Figure 2). By then the banking sector had developed substantially and government was able, through the Bank of Zambia (BoZ), to raise substantial resources through the local market. Even though one of the IMF and World Bank conditionalities has been sustainable expenditure, budgetary discipline has remained a problem, especially during election periods.

1.2 The HIPC Era

Between 2004 and 2005, in an effort to reach the Highly Indebted Poor Countries (HIPC) completion point, the government drafted an austerity budget, freezing civil service salaries and increasing a number of taxes hence halting the expanding expenditure pattern. Eventually in April 2005, Zambia reached the HIPC completion point which resulted in more than 80% of its external debt being forgiven. This, in turn meant reduced domestic borrowing since there was relief on the interest payments on external debt. Zambia's policymakers and those from other HIPC countries have now shifted the deficit and project financing to domestic borrowing (MEFMI, 2001; Situmbeko et al, 2004; CYMA, 2006; Bank of Zambia, 2005, 2009).

This shift has also been boosted by the positive developments in the domestic financial markets; sustained low levels of inflation, stable exchange rates and increased public confidence in government securities. Therefore, there has now been a steady growth of government domestic debt from levels of about K4.5 trillion in 2004 to highs of about K10.0 trillion in 2010.

Fig 1: Central Government Securitised Domestic Debt in HIPCs

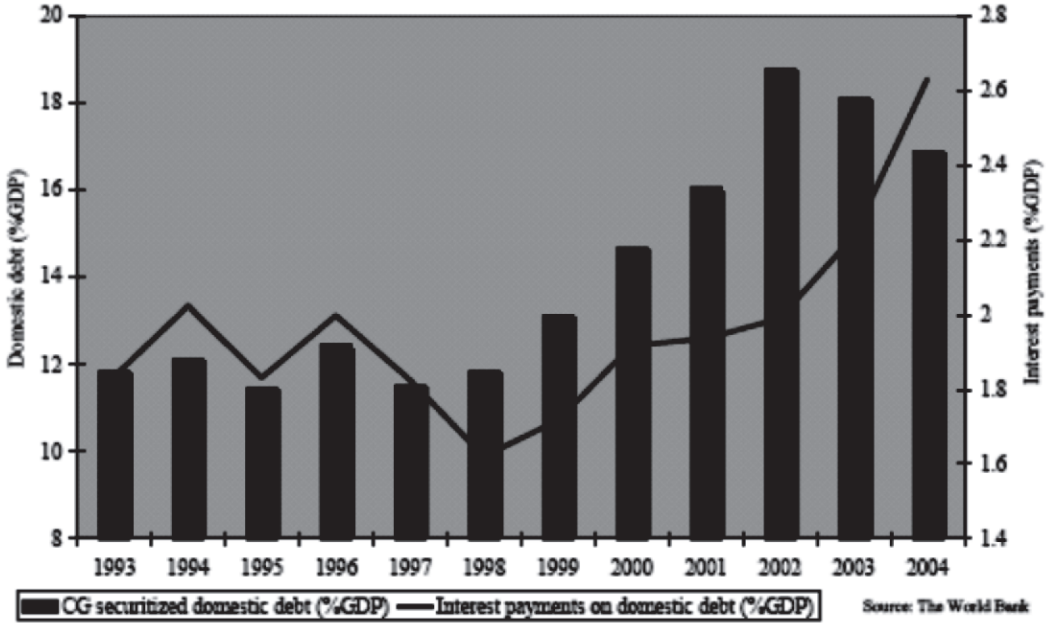
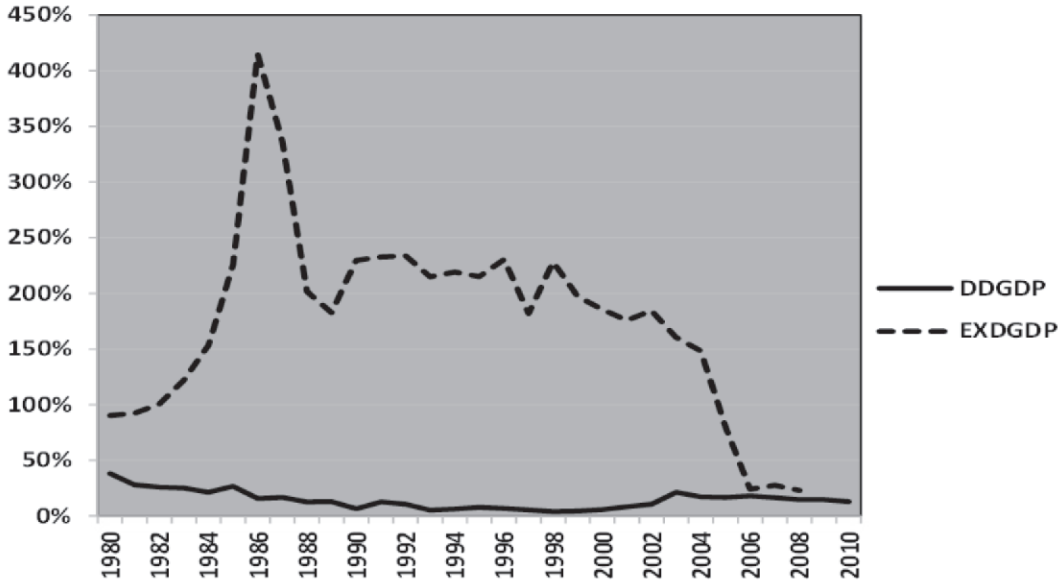


Figure 2: Domestic and External Debt to GDP



Source: Computation by Author

1.3 Justification and Objectives of the Study

The recent 2008/9 Global Financial and Economic Crisis saw a repeat of the 1970 problems – very high oil prices accompanied by huge declines in copper prices. The low copper prices further led to reduced copper production. These events have had severe consequences on the revenue-expenditure balance for the economy. During the crisis, the government

struggled with increasing expenditure, especially as regards wages for public service workers, pension arrears, and other current expenditures. Hence, with these developments, the Zambian government has embarked on an economic diversification programme to reduce the economy's reliance on the copper industry. But this implies heavy expenditures in infrastructure development and investments in the priority sectors for diversification. Even though the price of copper has recovered well after the financial crisis, the diversification programme requires huge resources and hence increased borrowing. (Bank of Zambia, 2005, 2009).

In addition, though it is healthy to borrow domestically, excessive borrowing is distortionary. If the government becomes heavily indebted domestically and inflation and interest rates rise, the government will have to pay high interest to service this domestic debt. Further, in most cases domestic debt cannot be defaulted or rescheduled unlike external debt. This is because domestic debt is mostly held by the banking sector and default may trigger a banking crisis.

The main objective of this study is to conduct domestic debt sustainability. Specific objectives include a study of the current trends as regards the Zambian government's domestic borrowing and further carry out an analysis to ascertain whether or not the accumulated domestic debt is within sustainable levels and whether or not, going forward there are risks of a domestic debt trap. The study will help measure progress made so far, vis-à-vis implementation of various recommendations from other studies or reports. Hence, given this scenario, the need for this research cannot be over-emphasised.

1.4 Structure of the Paper

The next section reviews the literature of previous studies done in the area of debt sustainability analysis and considers the strengths and weaknesses of each study in order to arrive at the best approach to perform the Domestic Debt Sustainability Analysis (DDSA) on Zambia. Section three outlines the estimation methodology employed in the study. Section four discusses the empirical results while conclusions and recommendations are in section five.

2.0 Literature Review

In this section, we consider previous work done in the area of debt sustainability analysis, especially in Least Developed Countries (LDCs). We begin by looking at studies that have performed descriptive studies of debt sustainability and conclude by considering research work in this area that has made use of theoretical and empirical procedures. Nevertheless, most debt sustainability analyses are ratio based owing to the lack of comprehensive data for empirical based studies and the ease with which such analyses are performed.

For purposes of clarity, we formulate and rely on a comprehensive definition of domestic debt. The Commonwealth Secretariat (1999) defines public domestic debt as the debt a government incurs through borrowing in its own currency from residents of its own country.

Many studies (e.g. MEFMI, 2001; CYMA, 2006; Johnson et al, 2004 etc.), including this research, have extended this definition to include government borrowing from central banks through bridge loans and overdraft windows and also local currency debt incurred by government through issuance of securities also held by foreigners. For conducting this research and for purposes of data availability, domestic debt is defined as the total stock of government securities and bridge loans denominated in local currency irrespective of residency of holder. This is so because financing of government budget deficits has been

mainly through the domestic money and capital markets, and also because data as regards government domestic arrears is unavailable and/or unreliable. The basic relationship between debt and growth is linear and negative. Irrespective of the definition of domestic debt sustainability, an increase in economic growth increases the level of sustainable debt. Hence, a large domestic debt could be a symptom of low growth, but also a cause of it (UNCTAD, 2004; Asogwa et al, undated).

CYMA (2006) in their study on Zambia's domestic debt reiterated the issue of Zambia's domestic debt being unsustainable. Using Debt Relief International (DRI) Assessment Ratios, the study found that Zambia's debt is unsustainable. According to this study, a country with a sustainable domestic debt level should have a ratio of net present value (NPV) of domestic debt to Government revenue below 88%, a liquidity ratio of total debt service to revenue (TDS/R) lower than 28% and interest payment to revenue of below 5%. This was not the case in Zambia over the study period where the NPV of domestic debt to revenue was above 88%. According to this study, a ratio of Net Present Value of domestic debt to budget revenue (NPV/R) below 88% meant that domestic debt was being serviced without difficulty and hence not accumulating any domestic arrears, signaling that the domestic debt might be sustainable. Zambia's NPV/R was above 88% during most of the period under study. Regarding the liquidity ratios (Total Debt Service to Revenues (TDS/R) and Interest Payments to Revenues (I/R)), the study indicated that if TDS/R is lower than 28% and I/R is below 5%, the country did not face liquidity difficulties.

The study further noted that although these ratios cannot be used to conclusively determine whether a country's domestic debt is sustainable, they can provide an early warning signal that the debt stock is becoming a burden. The study's analysis of the solvency ratios indicated that Zambia's domestic debt should become manageable since the ratio of debt to GDP was forecasted to decline from around 21% in 2004 to 10% in 2008 with the trend forecasted to reach low levels of about 6% by end 2015. The ratio of Net Present Value of domestic debt to Revenue was forecasted to follow the same trend, decreasing from 89% in 2005 to 32% in 2014. This is so because the growth rate of new borrowing is lower than the expected growth rate of the economy and budgeted revenues. More importantly, the results further indicate clearly the link between fiscal sustainability and domestic debt sustainability. Hence the study in particular, indicated that domestic debt will be and remain sustainable if three conditions are maintained:

i. Fiscal discipline, whereby no domestic arrears are accumulated;

ii. Macro-economic stability, whereby the structural reforms implied in the macroeconomic program are implemented as envisaged; and,

iii. Prudent fiscal policy so as to reduce the budget deficit to manageable levels as anticipated.

Since 2006, the Government has embarked on most of these recommendations and hence, our study will assess progress made since this domestic debt reduction strategy report.

UNCTAD (2004) in response to the international community's pledge to reduce by half world poverty by 2015 prepared a report that covered Africa's debt situation. The report stated that though it was contended by the donor community that the HIPC Initiative, and later its enhanced version, would ensure a permanent exit solution to Africa's debt, Africa's debt sustainability problems would continue. The report noted that debt sustainability is a relative concept and what should be determined is the level of debt that is sustainable for countries in which the majority of the population lives on less than US $1 a day per person. Hence, debt sustainability criteria should be based on internationally recognized benchmarks such as those of the MDGs, or on objectively and theoretically verifiable

criteria. The report emphasises the need to ask serious questions when conducting a DDSA for poor countries such as:

i. What is the relationship between total external debt stock and the actual amount of debt serviced?

ii. Is complete debt write-off a moral hazard or a "moral imperative"?

It argued that most HIPC countries will continue experiencing debt problems even after reaching the HIPC completion point. It states that assumptions were overly optimistic, especially as regards growth forecasts. Hence, the report proposed alternative modalities of delivering sustainable debt such as payment caps for HIPC debt service where the donor community limits the HIPCs debt service payments to 5% or 10% of internal revenue. The report further contends that a cap on debt service payments would protect HIPCs against deteriorations in the world economy, as their debt payment obligations would be adjusted to the lower levels of government revenues. The report emphasised that conducting debt sustainability for poor countries without incorporating social aspects would not be reasonable since the basic needs of these poor countries should come before the obligation to service debt. MDGs, for instance, should be met before sustainability ratios can be considered. The UNCTAD report incorporated the Human Development Index in debt sustainability.

Mahmood, Rauf and Ahmad (2009) in their analysis of Public and External Debt Sustainability in Pakistan (1970s – 2000s) employed both the traditional threshold debt ratios and the theoretical model to assess the necessary and sufficient conditions for public and external debt sustainability of Pakistan. The study stated that although the ratio of public debt stock to GDP is the most common measure of debt sustainability, a more useful indicator of debt sustainability is the ratio of public debt to government revenue. It reflects not only the true burden that a country has to manage its debt over time, but it also shows the impact of fiscal reforms on debt sustainability level. The study nevertheless noted that the traditional debt ratios approach is not free of limitations, outlining that these ratios may obscure information, they can be statistically manipulated and therefore misleading and they are unable to identify factors that are instrumental in determining the sustainable level of debt to GDP ratios.

Thus, the study emphasized the need to perform the theoretical approach to debt sustainability. The study adopted the accounting approach to test the necessary and sufficient conditions of debt sustainability given as revenue must be greater than expenditure over time and that the average primary surplus must be positive inclusive of seignorage revenue, respectively. Results were divided into domestic and external debt sustainability. Domestic sustainability debt ratios for Pakistan suggest an unsustainable debt stock. Similarly for external debt, the ratios suggest an unsustainable external debt save for periods after the year 2000. Using the necessary and sufficient condition framework, results are similar with those from the debt ratios; domestic debt was unsustainable whereas external debt was unsustainable until the year 2000, owing to external debt relief during that period.

El-Mahdy and Torayeh (2009) studied debt sustainability and economic growth in Egypt for the period 1981 - 2006. The study observed that domestic debt has been a burden in Egypt where 14% of total Government expenditure is channeled towards domestic debt interest payments. The changes in the debt/GDP ratio depend on the relationship between interest rates and the economic growth rate. The study used a cointegration model of the GDP growth rate and the domestic debt to GDP ratio. The results obtained from the cointegration model revealed that the public domestic debt in Egypt had a robust negative impact on

growth. Nevertheless, the results suggested that the path of debt followed in Egypt was sustainable. The regression results reveal a positive and highly significant relationship between economic growth and the size of the debt to GDP ratio, confirming the role of financial sector development in Egypt. The study stated that for debt to remain sustainable in future, substantial fiscal reforms are needed and policies should be adopted to maintain an increasing growth-interest rate differential.

MEFMI (2001) conducted a study on domestic debt sustainability on 9 MEFMI member countries (Botswana, Lesotho, Malawi, Namibia, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe). The countries, though all member states of MEFMI, are diverse in their levels of economic development and financial markets development. This was revealed by observing ratios such as domestic debt to GDP ratio, domestic debt to Government revenue ratio and domestic debt service to Government revenue ratio. Botswana had neither the ratios of domestic debt to GDP nor domestic debt to government revenue (figures were negligible on account of very high GDP and Government revenue). Other countries had ratios varying depending on the size of the GDP and the domestic debt.

Further, levels of inflation determined the domestic debt service levels in different countries. The study disputed one very prominent approach to debt sustainability analysis - that changes in domestic debt to GDP ratio should be equal to zero, as some earlier studies suggested (Hamilton et al, 1986; Trehan et al, 1988). Thus, they redefined domestic debt sustainability as the rate of growth of debt to GDP being lower than the rate of growth of real GDP. It used total government revenues and expenditures between 1980 and 1997, and indicated that the two variables move together and thus form a stationary linear combination with a long-run parameter. When cointegration test is performed, the parameter becomes an important cointegrating coefficient between revenues and expenditures. The study made use of the Present Value Budget Constraint (PVBC) approach and results placed Malawi, Zambia and Zimbabwe in the unsustainable category, Lesotho, Swaziland, Tanzania and Uganda in the weakly sustainable category and, Botswana and Namibia in the sustainable category. In the unsustainable category, the cointegration process had an explosive root, whereas in the weakly sustainable category expenditures and revenues were found not to be cointegrated and in the sustainable category expenditures and revenues were cointegrated. The major factor in determining the sustainability of domestic debt was mainly the level of revenue in relation to the expenditure burden (which includes external debt service). Hence, countries with low levels of domestic revenue relative to expenditure were in the weakly sustainable and unsustainable categories. The study gave short-run solutions to unsustainable domestic debt stock, which most MEFMI member states have embarked on to address the fiscal problems.

3.0 Analytical Framework and Methodology

In this section, we discuss the conceptual and empirical framework as well as the methodology followed by this study. We consider the two main sides to debt sustainability – borrower and lender based approaches. We then focus on the approach which has been adopted for our research – Present Value Budget Constraint (PVBC) approach. We also analyse the rules of thumb ratios widely used to give early warning signals as regards domestic debt sustainability analysis.

3.1 Conceptual and Empirical Framework

The majority of theoretical analyses on domestic debt sustainability such as debt sustainability ratios focus on the capacity of the government to service its domestic debt. The effects of debt and deficits on other economic variables and development objectives are

ignored. There exists a simple domestic debt capacity analysis (Fiscal Sustainability) and a more complex view that involves the assessment of some basic development targets (Economic Sustainability). Our study attempts to incorporate economic variables such as interest rates.

The basic approaches to debt sustainability are discussed next.

3.1.1 The Borrower-Based Approach

The main basic approach to domestic debt sustainability analysis is the "Accounting Approach", which states that fiscal deficit is sustainable if it generates a constant debt-to-GDP ratio (Johnson et al, 2004). This approach is at the root of DDSA and it measures the ability to meet current and future debt service obligations. Hence, the level of the primary surplus (or deficit) which stabilises the debt-to-GDP ratio is given by:

$$SURP_t = \frac{r_t - g_t}{1 + g_t} \qquad \text{.....Equation 1}$$

Where: r = real interest rate, g = rate of GDP growth and SURP are future surpluses.

Therefore, as long as the economy grows at a rate higher than the interest rate, it is possible to run a sustainable primary deficit. Government should have a capacity to raise revenues that could balance the expansion of the stock of domestic debt. But since in Zambia external grants represent a substantial fraction of revenue, we should take account of the grant element, so that primary surplus is equal to the right-hand side of Equation 1 minus the ratio of grants over revenue.

3.1.2 The Lender-Based Approach

This approach, also known as Present Value Constraint (PVC), states that a government is solvent if the flow of expected value of future resources is at least equal to the face value of the stock of domestic debt:

$$B_o = \sum_{t=1}^{\infty} \frac{SURP_t}{(1+r)_t} \qquad \text{.....Equation 2}$$

Where: B_o is the initial stock of domestic debt, r is the real interest rate and SURP are the future surpluses.

This approach differs from the accounting one, which imposes an upper bound to the debt-to-GDP ratio. Instead of GDP growth rate being greater than r, the approach requires that real growth rate of domestic debt be lower than real interest rate. If the debt growth rate is between r and GDP growth rate, then the budget constraint is satisfied, even though the debt-to-GDP ratio can grow over time. This approach does not require that the debt be fully repaid.

Both of the above approaches are rarely used in most LDCs mainly due to non-availability of long spanning reliable data as regards interest rates. In this study, we intend to make use of the MEFMI's Present Value Budget Constraint (PVBC) Approach.

3.1.3 The PVBC Approach

Whereas the PVBC guides the theoretical approach to debt sustainability, the empirical strategy is within the cointegration framework. Cointegration between revenues and

expenditures is a necessary condition for debt sustainability analysis. Sustainability requires that the cointegrating vector be (1,-1). If revenues and expenditures are both I(1) and they are cointegrated, then domestic debt is sustainable.

Under the PVBC, the Government's one-period budget constraint is given by:

$$D_t = G_t^* - R_t \quad \text{.....Equation 3}$$

Where: D_t is the conventional budget deficit, while $G_t^* = G_t - rB_{t-1}$ is government expenditure inclusive of interest payments (rB_{t-1}), and R_t denotes total revenue (including grants). The value of spending minus revenue is often referred to as the primary deficit. Excluding grants we get:

$$D*_t = G_t^* - T_t \quad \text{.....Equation 4}$$

Where: $D*_t$ is the domestic budget deficit, while T_t denotes domestic revenue (excluding grants).

To test for domestic debt sustainability, we test for stationarity of $G_t^* - R_t$ and $G_t^* - T_t$ to determine whether they are intergrated of the same order, with cointegrating vector (1,-1) imposed. It holds, therefore, that for domestic debt to remain constant, future deficits should be proportional to future surpluses. Hence, the inter-temporal budget balance or sustainability holds if the government runs future surpluses equal in expected present-value terms to the current market value of debt. An equivalent procedure is to test for cointegration in the regression equations below:

Cointegrating Regression Equations

$$R_t = \beta_1 + \beta_2 G_t^* + E^R{}_t \quad \text{.....Equation 5}$$

Where: $E^R{}_t$ is the error term, and

$$T_t = \alpha_1 + \alpha_2 G_t^* + E^T{}_t \quad \text{.....Equation 6}$$

Where: $E^T{}_t$ is the error term.

And therefore test that $0 < \beta_2 \leq 1$ or $0 < \alpha_2 \leq 1$, which is a necessary and sufficient condition for sustainability.

i. If $\alpha_2 = 1$ or $\beta_2 = 1$ and revenues and expenditures are cointegrated, then we obtain a strong form of sustainability;

ii. If $\alpha_2 = 1$ or $\beta_2 = 1$ and revenues and expenditures are not cointegrated, then we obtain a weak form of sustainability;

iii. If $\alpha_2 < 1$ or $\beta_2 < 1$ and thus $0 < \beta_2$ or $\alpha_2 < 1$, then the process has an explosive root and this signals an unsustainable fiscal position.

Quintos (1995) points out that the condition $0 < \beta_2$ or $\alpha_2 < 1$ has serious policy implications,

emphasizing that the government should not continue to spend more than it earns or else it would have to offer higher interest rates to service its debt.

In addition, basic rules of thumb, like the Commonwealth Secretariat rules that fiscal deficit should not be more than 3% of GDP and that public domestic debt should not be consistently higher than 200% of domestically generated government revenue have been used as early warning signals as regards DDSA. The DRI's rules have also been used for the same analysis. The ratios are good indicators of the state of domestic debt (MEFMI, 2001).

3.2 Data

Data collected are institutional secondary, collected and processed in different stages. It was a challenge to collect accurate and up-to-date data especially data that reveal flaws in Government debt management. Nevertheless, most data as regards stocks of government securities were readily available from the Bank of Zambia Statistics Fortnightly Bulletins and the website (www.boz.zm).

The variables that are most difficult to compile in LDCs like Zambia are total domestic debt stock (inclusive of domestic arrears, privatization liabilities and pension areas) and total Government expenditure (actual disbursement and not figures that are announced during the budget speeches). It turns out that most budgeted amounts are not expended fully as some funds are diverted to pressing needs as and when they occur. These figures were even more difficult to access, especially for the earlier years when Zambia was then a socialist state. Some data points needed to be supplemented and/or verified with data from international publications and IMF and World Bank data websites.

Data variables, spanning a period between 1980 and 2010, were collected and labeled as outlined in Table 2 of Appendix II.

3.2.1 Unit Root Tests

Given that our data are time series, fundamental time series procedures are undertaken prior to running data for the sustainability analysis. The most important of these is the unit root test (stationarity test). Observing the graphical outputs of plotted data also shows whether or not variables are trended (see Appendix II - Eviews 7.0 Graphical Outputs).

The data have been expressed as ratios of GDP which yield better results compared with converting variables into logarithmic form. Once the variables are all expressed as ratios of GDP, formal unit root tests (Augmented Dickey-Fuller) are then performed to determine whether the variables have a presence of a unit root or otherwise.

From this data set, Total Revenue and Grants (TREVGRTS), Domestic Revenue (DOMREV) and Total Expenditure (TOTEXP) are used to estimate cointegration regression Equation 5.

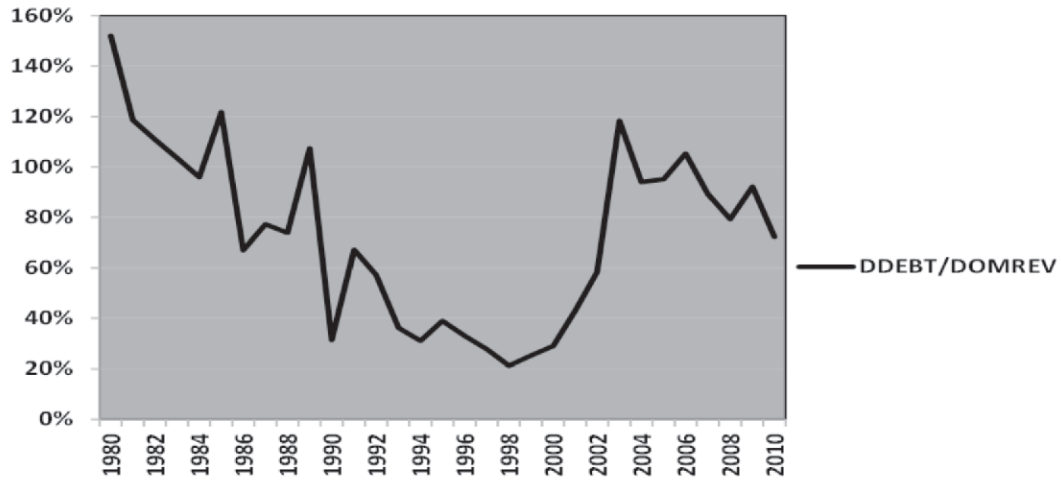
4.0 Results and Analysis

In this section, we analyse the results obtained from our tests for stationarity and for cointegration. We begin our analysis by considering rules of thumb. We then consider tests for stationarity by analysing graphical presentations of data before performing formal unit root tests using the Augmented Dickey-Fuller test. We conclude by considering results obtained from Johansen's cointegration tests.

4.1 Sustainability Indicators

Using the Commonwealth Secretariat rule of thumb that public domestic debt should not be consistently higher than 200% of domestically generated government revenue, one notices that it places Zambia's domestic debt in the sustainable category since it was never higher than 200% during the period 1980 to 2010 (see Appendix I Table 3). But for the same indicator (ratio) Debt Relief International's threshold of between 92% and 167%, indicates unsustainable domestic debt for Zambia, especially between 1990 and 2002 when the ratio was considerably low, averaging a meagre 38%. Nevertheless, this ratio was never above the threshold for the entire period 1980 - 2010. For the other Commonwealth rule of thumb that fiscal deficit should not be more than 3% of GDP, sustainability has now been reached for the past six years (2004 – 2010) where revenues include grants; but with grants excluded, the ratio is slightly breached (see Figure 3 and Appendix I Table 3).

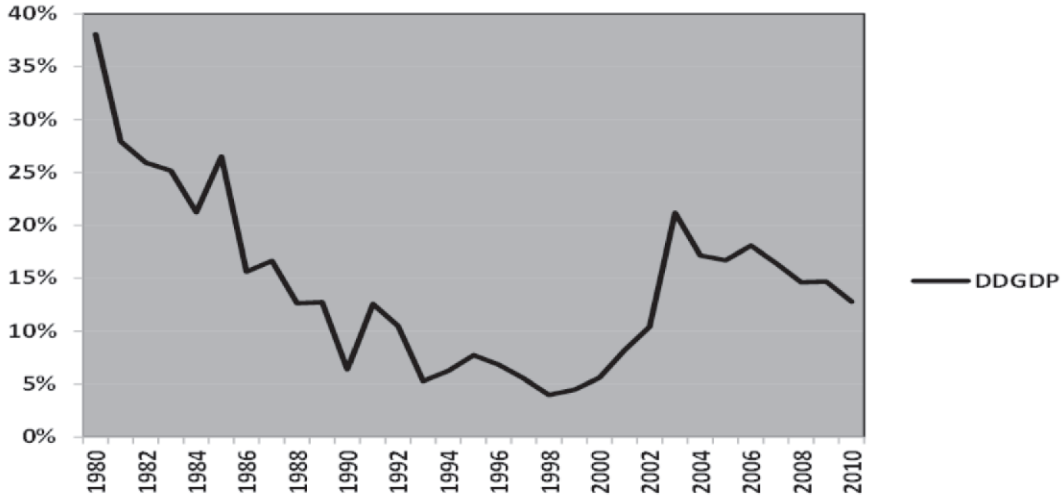
Figure 3: Domestic Debt to Domestic Revenue



Source: Computation by Author

For the other DRI rule of thumb that the debt to GDP ratio should be between 20% and 25%, the data indicate that from 1986 to 2010, Zambia has generally been below the sustainability threshold with an average ratio of 11% for the period, which is below the sustainability range. A consistently high ratio of debt to GDP would be a hindrance to development of the financial markets. Nevertheless as earlier stated, these rules of thumb are but just an early warning signal for fiscal sustainability. Empirical analysis needs to be performed before we can determine Zambia's DDSA status (see Figure 4 below and Appendix I Table 3).

Figure 4: Domestic Debt to GDP



Source: Computation by Author

4.2 Unit Root Tests

The data plots in Appendix II show that all the variables except for GRTS, trend upwards. But after expressing all variables as ratios of GDP, all the variables now seem to generally trend downwards. Graphical analysis is useful in that it gives the first impressions about the properties of the time series under study.

Similarly, unit root tests (Augmented Dickey-Fuller) reveal that at 5% significance level, all variables in nominal terms are level non-stationary save for GRTS, TOTEXP and TREVGRTS which are level stationary or I(0). Even in first differences, at 5% confidence level, the non-stationary variables continue to be non-stationary.

But when variables are expressed as ratios of GDP, in levels, the null hypothesis of presence of a unit root at 5% confidence level is rejected for all variables except for GRGDP and TEGDP. Hence, all variables as ratios of GDP, except for GRGDP and TEGDP are level stationary or I(0). Further, all variables as ratios of GDP are first difference stationary or I(1), at 1% significance level. From these results, we proceed to perform our cointegration test (see Tables 5 and 6 below for cointegration test results).

4.3 Cointegration Results

As earlier stated, if variables are integrated of the same order and are themselves cointegrated, it implies that there is a long-run equilibrium relationship among these variables. In performing our cointegration test, we considered the following variables:

i. Total Expenditure as a ratio of GDP (TEGDP);

ii. Total Revenues, including Grants, as a ratio of GDP (TRGDP); and,

iii. Domestic Revenues, excluding Grants, as a ratio of GDP (DRGDP).

Prior to performing cointegration and bearing in mind that cointegration analysis is equivalent in principle, to regression analysis, it is important to perform diagnostic tests on the model, i.e. test for Serial Correlation, Heteroskedasticity and Normality. Results from these diagnostic tests suggest that both our Cointegrating Equations (CEs) (i.e. TRGDP with

TEGDP and DRGDP with TEGDP) show that there is no evidence of Serial Correlation at all conventional significance levels. Similarly, in both our CEs, there is no evidence of presence of Heteroskedasticity. On the other hand, the residuals are multivariate normal only for the CE (DRGDP with TEGDP) and otherwise for the CE (TRGDP with TEGDP). Nevertheless, literature on diagnostic tests for CEs suggests that breaching the normality assumption is not a serious violation as would be the case for Serial Correlation or Heteroskedasticity (see Appendix II).

It is well known that cointegration is performed within a VAR framework (Vector autoregressive framework). One critical factor in VAR modeling is the choice of the optimal lag length. For our analysis, lag 1 was found to be optimal. This is important because it is argued that estimates of a VAR whose lag length is smaller than the true lag length (under-fitting) are inconsistent. Nevertheless estimates from over-fitting are argued to be consistent but inefficient. Note further that cointegration analysis is performed under different assumptions (models). Hence in our cointegration analysis, we settle for the model whose set of assumptions are most likely to occur given our data, and also that which yields sensible results. For instance, the assumption of no deterministic components in the data or in the CE is an unlikely occurrence, especially that the intercept is needed to account for adjustments in the units of measurements of the variables (Patterson, 2000).

For our analysis, we settled for model with the linear deterministic trend. We used Johansen Cointegration Test and the following data sets were included:

(a) Total Revenues, including Grants, as a ratio of DGP (TRGDP) with Total Expenditure as a ratio of GDP (TEGDP)

(b) Domestic Revenues, excluding Grants, as a ratio of DGP (DRGDP) with Total Expenditure as a ratio of GDP (TEGDP)

Cointegration test results are presented in Tables 5 and 6 below:

Table 5: Johansen's Cointegration test results – TRGDP TEGDP

Trend assumption: Linear deterministic trend (restricted)
Series: TRGDP TEGDP
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.548914	31.73085	25.87211	0.0083
At most 1	0.257751	8.644046	12.51798	0.2035

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max -Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.548914	23.08680	19.38704	0.0138
At most 1	0.257751	8.644046	12.51798	0.2035

Max -eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon -Haug -Michelis (1999) p -values

Table 6: Johansen's Cointegration test results – DRGDP TEGDP

Trend assumption: Linear deterministic trend (restricted)
Series: DRGDP TEGDP
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.533881	28.21556	25.87211	0.0251
At most 1	0.189121	6.079458	12.51798	0.4503

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max -Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.533881	22.13610	19.38704	0.0194
At most 1	0.189121	6.079458	12.51798	0.4503

Max -eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon -Haug -Michelis (1999) p -values

From the results obtained, it is clear that for the cointegration equations of TRGDP and TEGDP (i.e. Total Revenues with Grants and Total Expenditure) and DRGDP and TEGDP (i.e. Domestic Revenue without Grants and Total Expenditure) both the trace and maximum eigenvalues statistics suggest the existence of one cointegrating equation. This shows that there is presence of a stable long-run equilibrium relationship between Revenue (with or without Grants) and Expenditure. These results are in contrast with MEFMI (2001) and CYMA (2006). Both MEFMI (2001) and CYMA (2006) performed their studies before Zambia reached the HIPC completion point, and hence before the external debt relief. This relief eased Government expenditure and helped to make domestic debt sustainable. Nevertheless, the results are consistent with most of the rules of thumb ratios which put Zambia's domestic debt in the sustainable category as discussed above.

Further, as regards the normalised cointegrating regression coefficients, for TRGDP and TEGDP, the value b = 1.566 and for DRGDP and TEGDP, the value b = -0.981. This can lead us to conclude that we can only establish weak forms of sustainability for both scenarios. Therefore, it shows that revenue, with or without grants, leads us to conclude that Zambia is in the sustainable category for the both the trace statistic and the maximum eigenvalues statistic.

5.0 Conclusions

The paper investigated the sustainability of Zambia's domestic debt between 1980 and 2010. Domestic debt has been analysed using both debt sustainability threshold ratios and also the PVBC approach which uses cointegration framework – testing for cointegration between revenue and expenditure. This approach uses data variables that are readily

available in most LDCs. This study is important because it has been done at a time when domestic debt is fast growing after the cancellation of most of the external debt.

The results, from both the debt sustainability threshold ratios and the PVBC approach suggest that Zambia's domestic debt has become sustainable, owing to the past decade of positive developments – external debt cancellation, price and financial system stability as well as economic growth. These results have been similar for both revenues with and without grants.

The first reason explaining this result is the attainment of the HIPC completion point which led to cancellations of most of the external debt stock. Further, Zambia has embarked on and succeeded in bringing and keeping inflation in single digit levels since 2006, with an exception of 2008. GDP growth rate has also been consistently above 5% since 2003. Exchange rate stability has been achieved and maintained for relatively long periods.

Therefore, it is evident that Zambia has continued to make progress in fiscal management and economic development, and indeed performing an analysis of domestic debt sustainability, for quarterly data for the recent period of say 2000 to 2010 would yield more precise and convincing results. However, this study recommends that for Zambia to achieve and maintain a strong form of sustainability for both domestic and indeed external debt, a debt sustainability monitoring office needs to be permanently set up. This office should regularly carry out thorough analysis for sustainability of both domestic and external debt. Both sustainability threshold ratios and detailed empirical approaches such as the PVBC should be employed in analysing debt sustainability.

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DATA TABLES

Table 7. Domestic Debt, Total Revenue & Grants, Nominal GDP, Domestic Revenue, Tax Revenue, Grants and Total Expenditure, 1980-2010 (K'million)

Year	DDEBT	TREVGRTS	GDP	DOMREV	TAXES	GRTS	TOTEXP
1980	1,166.79	767.63	3,063.60	767.63	688.21	-	1,081.97
1981	973.89	820.40	3,485.40	820.40	742.44	-	1,230.53
1982	931.39	840.45	3,589.50	840.45	747.35	-	1,323.02
1983	1,052.89	1,016.18	4,181.20	1,016.18	945.61	-	1,150.47
1984	1,047.39	1,092.07	4,931.40	1,092.07	991.08	-	1,096.92
1985	1,874.93	1,560.50	7,071.90	1,540.90	1,427.00	19.60	2,647.70
1986	2,025.96	3,195.20	12,963.10	3,022.00	2,879.10	173.20	6,000.30
1987	3,294.00	4,355.30	19,778.90	4,263.90	3,981.80	91.40	6,907.10
1988	3,799.00	5,635.60	30,020.90	5,140.90	4,699.70	494.70	9,103.00
1989	7,034.68	7,883.30	55,181.20	6,551.80	6,275.90	1,331.50	10,641.60
1990	7,228.68	27,927.00	113,340.00	23,001.00	22,577.00	4,926.00	37,342.00
1991	27,423.68	71,906.00	218,275.80	40,814.00	39,954.00	31,092.00	87,828.00
1992	59,823.89	188,113.00	569,563.60	104,521.00	99,819.00	83,592.00	212,063.00
1993	85,314.43	390,342.00	1,613,738.20	235,256.00	227,248.00	155,086.00	530,795.00
1994	139,830.70	676,346.00	2,240,109.40	449,618.00	418,879.00	226,728.00	854,435.00
1995	232,153.56	870,808.00	3,005,059.23	595,911.00	545,911.00	274,897.00	1,000,169.00
1996	269,583.33	1,058,415.00	3,950,197.88	816,579.00	751,446.00	241,836.00	1,213,888.00
1997	284,373.72	1,282,895.00	5,140,181.18	1,022,656.00	966,923.00	260,239.00	1,406,848.00
1998	239,489.90	1,529,054.00	6,027,939.57	1,131,405.00	1,093,819.00	397,649.00	1,943,165.00
1999	333,802.23	1,921,000.00	7,477,664.47	1,324,000.00	1,290,000.00	597,000.00	2,220,000.00
2000	566,359.29	2,527,800.00	10,121,292.48	1,952,800.00	1,930,500.00	575,000.00	3,235,800.00
2001	1,079,287.98	3,263,900.00	13,193,716.31	2,509,900.00	2,450,100.00	754,000.00	4,211,700.00
2002	1,700,050.30	4,258,900.00	16,324,435.63	2,908,900.00	2,848,700.00	1,350,000.00	5,171,700.00
2003	4,355,286.02	5,104,000.00	20,551,112.25	3,680,000.00	3,548,000.00	1,424,000.00	6,336,000.00
2004	4,464,476.62	6,181,300.00	25,993,146.10	4,748,300.00	4,554,300.00	1,433,000.00	6,939,400.00
2005	5,355,707.30	7,728,300.00	32,041,509.97	5,627,800.00	5,502,900.00	2,100,500.00	8,845,800.00
2006	6,967,376.88	8,320,000.00	38,560,800.57	6,618,000.00	6,317,000.00	1,702,000.00	8,955,700.00
2007	7,595,283.27	10,626,000.00	46,194,799.07	8,522,100.00	8,183,600.00	2,103,900.00	11,209,500.00
2008	8,021,837.17	12,186,300.00	54,839,439.44	10,113,600.00	9,546,300.00	2,072,700.00	13,280,000.00
2009	9,502,057.72	12,182,400.00	64,615,577.85	10,315,200.00	9,660,900.00	1,867,200.00	13,847,500.00
2010	9,940,957.01	15,344,700.00	77,717,920.30	13,766,600.00	12,909,600.00	1,578,100.00	17,562,900.00

Table 8. Data Variables as Ratios to GDP, 1980-2010

PERIOD	TRGDP	DRGDP	TXGDP	TEGDP	DDGDP	GRGDP
1980	0.2506	0.2506	0.2246	0.3532	0.3809	-
1981	0.2354	0.2354	0.2130	0.3531	0.2794	-
1982	0.2341	0.2341	0.2082	0.3686	0.2595	-
1983	0.2430	0.2430	0.2262	0.2752	0.2518	-
1984	0.2215	0.2215	0.2010	0.2224	0.2124	-
1985	0.2207	0.2179	0.2018	0.3744	0.2651	0.0028
1986	0.2465	0.2331	0.2221	0.4629	0.1563	0.0134
1987	0.2202	0.2156	0.2013	0.3492	0.1665	0.0046
1988	0.1877	0.1712	0.1565	0.3032	0.1265	0.0165
1989	0.1429	0.1187	0.1137	0.1928	0.1275	0.0241
1990	0.2464	0.2029	0.1992	0.3295	0.0638	0.0435
1991	0.3294	0.1870	0.1830	0.4024	0.1256	0.1424
1992	0.3303	0.1835	0.1753	0.3723	0.1050	0.1468
1993	0.2419	0.1458	0.1408	0.3289	0.0529	0.0961
1994	0.3019	0.2007	0.1870	0.3814	0.0624	0.1012
1995	0.2898	0.1983	0.1817	0.3328	0.0773	0.0915
1996	0.2679	0.2067	0.1902	0.3073	0.0682	0.0612
1997	0.2496	0.1990	0.1881	0.2737	0.0553	0.0506
1998	0.2537	0.1877	0.1815	0.3224	0.0397	0.0660
1999	0.2569	0.1771	0.1725	0.2969	0.0446	0.0798
2000	0.2498	0.1929	0.1907	0.3197	0.0560	0.0568
2001	0.2474	0.1902	0.1857	0.3192	0.0818	0.0571
2002	0.2609	0.1782	0.1745	0.3168	0.1041	0.0827
2003	0.2484	0.1791	0.1726	0.3083	0.2119	0.0693
2004	0.2378	0.1827	0.1752	0.2670	0.1718	0.0551
2005	0.2412	0.1756	0.1717	0.2761	0.1671	0.0656
2006	0.2158	0.1716	0.1638	0.2322	0.1807	0.0441
2007	0.2300	0.1845	0.1772	0.2427	0.1644	0.0455
2008	0.2222	0.1844	0.1741	0.2422	0.1463	0.0378
2009	0.1885	0.1596	0.1495	0.2143	0.1471	0.0289
2010	0.1974	0.1771	0.1661	0.2260	0.1279	0.0203

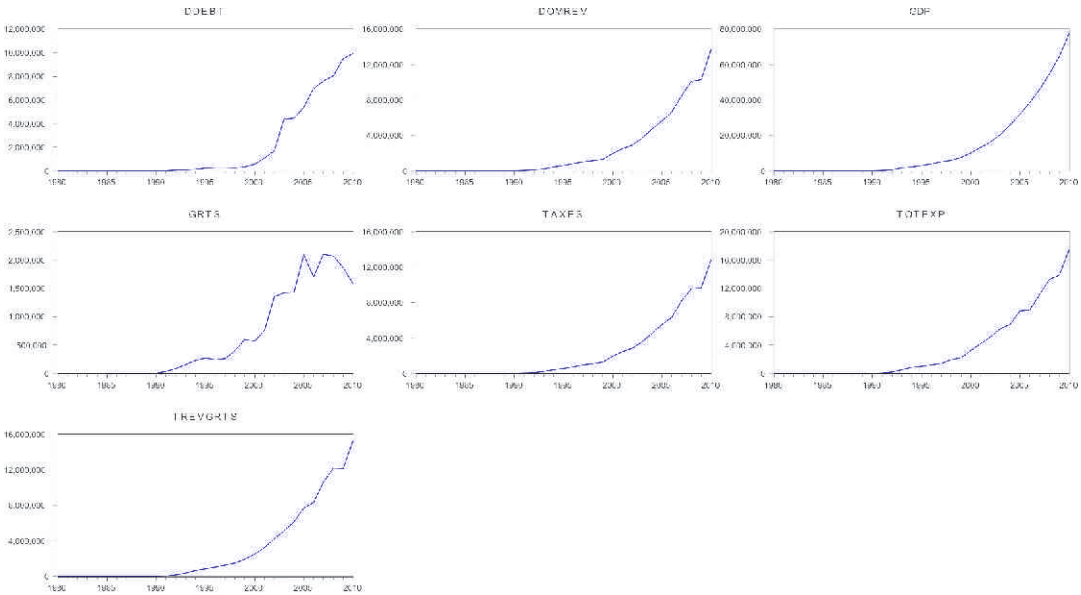
Table 9: Rules of Thumb

Year	1.DDEBT/ DOMREV	FISCAL DEFICIT (TREVGRTS)	2.FISCAL DEFICIT (TRGDP)	FISCAL DEFICIT (DOMREV)	3.FISCAL DEFICIT (DRGDP)	4.DDGDP
1980	152%	(314.33)	10%	(314.33)	10%	38%
1981	119%	(410.13)	12%	(410.13)	12%	28%
1982	111%	(482.58)	13%	(482.58)	13%	26%
1983	104%	(134.29)	3%	(134.29)	3%	25%
1984	96%	(4.85)	0%	(4.85)	0%	21%
1985	122%	(1,087.20)	15%	(1,106.80)	16%	27%
1986	67%	(2,805.10)	22%	(2,978.30)	23%	16%
1987	77%	(2,551.80)	13%	(2,643.20)	13%	17%
1988	74%	(3,467.40)	12%	(3,962.10)	13%	13%
1989	107%	(2,758.30)	5%	(4,089.80)	7%	13%
1990	31%	(9,415.00)	8%	(14,341.00)	13%	6%
1991	67%	(15,922.00)	7%	(47,014.00)	22%	13%
1992	57%	(23,950.00)	4%	(107,542.00)	19%	11%
1993	36%	(140,453.00)	9%	(295,539.00)	18%	5%
1994	31%	(178,089.00)	8%	(404,817.00)	18%	6%
1995	39%	(129,361.00)	4%	(404,258.00)	13%	8%
1996	33%	(155,473.00)	4%	(397,309.00)	10%	7%
1997	28%	(123,953.00)	2%	(384,192.00)	7%	6%
1998	21%	(414,111.00)	7%	(811,760.00)	13%	4%
1999	25%	(299,000.00)	4%	(896,000.00)	12%	4%
2000	29%	(708,000.00)	7%	(1,283,000.00)	13%	6%
2001	43%	(947,800.00)	7%	(1,701,800.00)	13%	8%
2002	58%	(912,800.00)	6%	(2,262,800.00)	14%	10%
2003	118%	(1,232,000.00)	6%	(2,656,000.00)	13%	21%
2004	94%	(758,100.00)	3%	(2,191,100.00)	8%	17%
2005	95%	(1,117,500.00)	3%	(3,218,000.00)	10%	17%
2006	105%	(635,700.00)	2%	(2,337,700.00)	6%	18%
2007	89%	(583,500.00)	1%	(2,687,400.00)	6%	16%
2008	79%	(1,093,700.00)	2%	(3,166,400.00)	6%	15%
2009	92%	(1,665,100.00)	3%	(3,532,300.00)	5%	15%
2010	72%	(2,218,200.00)	3%	(3,796,300.00)	5%	13%

Appendix II

Eviews 7.0 Graphical Outputs

Graphs Nominal Figures



Graphs Figures as Ratios to GDP

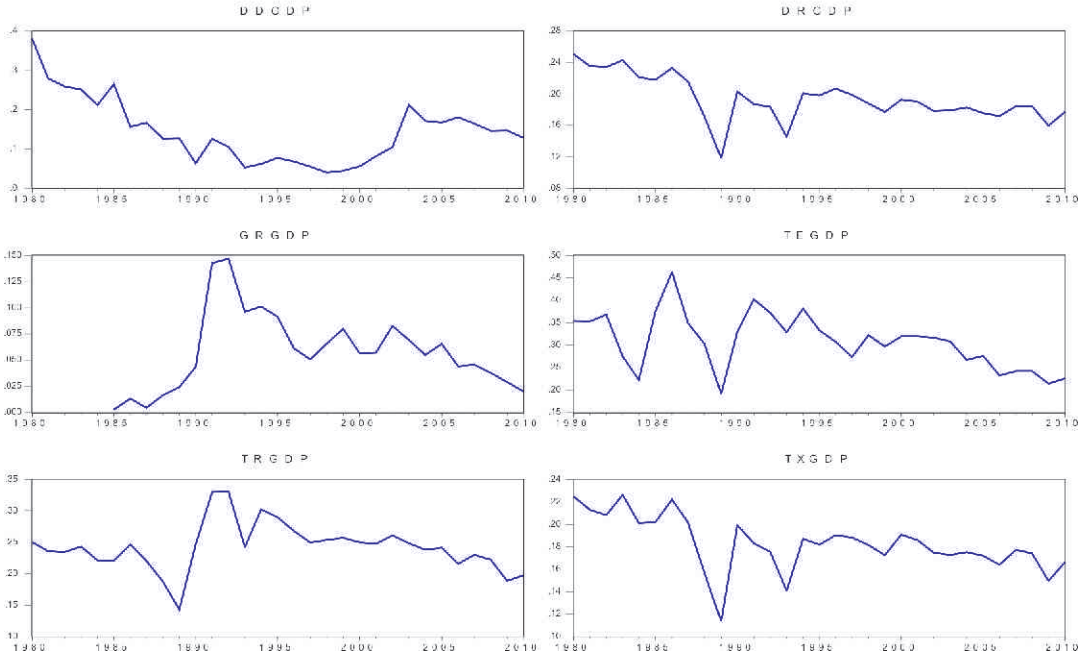


Table 1: Johansen's Cointegration Test – TRGDP and TEGDP

Date: 05/09/11 Time: 14:46
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: TRGDP TEGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.548914	31.73085	25.87211	0.0083
At most 1	0.257751	8.644046	12.51798	0.2035

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max - Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.548914	23.08680	19.38704	0.0138
At most 1	0.257751	8.644046	12.51798	0.2035

Max - eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon - Haug - Michelis (1999) p - values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

TRGDP	TEGDP	@TREND(81)
- 19.91624	31.18742	0.107403
37.36876	- 8.773988	- 0.013366

Unrestricted Adjustment Coefficients (alpha):

D(TRGDP)	- 0.013468	- 0.015288
D(TEGDP)	- 0.044111	- 0.006099

1 Cointegrating Equation(s): Log likelihood 116.4060

Normalized cointegrating coefficients (standard error in parentheses)

TRGDP	TEGDP	@TREND(81)
1.000000	- 1.565929	- 0.005393
	(0.21456)	(0.00129)

Adjustment coefficients (standard error in parentheses)

D(TRGDP)	0.268233
	(0.12943)
D(TEGDP)	0.878522
	(0.16631)

Table 2: Residuals Serial Correlation Test – TRGDP and TEGDP

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 05/09/11 Time: 17:51
Sample: 1980 2010
Included observations: 29

Lags	LM -Stat	Prob
1	0.645545	0.9579
2	1.723631	0.7864
3	1.259359	0.8682

Probs from chi square with 4 df. -

Table 3: Residuals Heteroskedasticity Test – TRGDP and TEGDP

VAR Residual Heteroskedasticity Tests: Includes Cross Terms
Date: 05/09/11 Time: 17:52
Sample: 1980 2010
Included observations: 29

Joint test:

Chi-sq	df	Prob.
59.29325	42	0.0403

Individual components:

Dependent	R-squared	F(14,14)	Prob.	Chi-sq(14)	Prob.
res1*res1	0.905805	9.616274	0.0001	26.26834	0.0239
res2*res2	0.624677	1.664374	0.1758	18.11564	0.2016
res2*res1	0.844389	5.426299	0.0016	24.48729	0.0400

Table 4: Residuals Normality Test – TRGDP and TEGDP

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 05/09/11 Time: 17:54
Sample: 1980 2010
Included observations: 29

Component	Skewness	Chi-sq	df	Prob.
1	0.669443	2.166074	1	0.1411
2	1.251205	7.566651	1	0.0059
Joint		9.732725	2	0.0077

Component	Kurtosis	Chi-sq	df	Prob.
1	3.973961	1.146226	1	0.2843
2	4.788601	3.865573	1	0.0493
Joint		5.011799	2	0.0816

Component	Jarque-Bera	df	Prob.
1	3.312300	2	0.1909
2	11.43222	2	0.0033
Joint	14.74452	4	0.0053

Table 5: Johansen's Cointegration Test – DRGDP and TEGDP

Date: 05/09/11 Time: 14:45
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: DRGDP TEGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.533881	28.21556	25.87211	0.0251
At most 1	0.189121	6.079458	12.51798	0.4503

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.533881	22.13610	19.38704	0.0194
At most 1	0.189121	6.079458	12.51798	0.4503

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

DRGDP	TEGDP	@TREND(81)
20.58377	20.19018	0.104931
47.21150	-11.97327	0.010555

Unrestricted Adjustment Coefficients (alpha):

D(DRGDP)	-0.011673	-0.008116
D(TEGDP)	-0.044596	0.002753

1 Cointegrating Equation(s): Log likelihood 122.8525

Normalized cointegrating coefficients (standard error in parentheses)

DRGDP	TEGDP	@TREND(81)
1.000000	0.980879	0.005098
	(0.21362)	(0.00129)

Adjustment coefficients (standard error in parentheses)

D(DRGDP)	-0.240267
	(0.08899)
D(TEGDP)	-0.917955
	(0.17351)

Table 6: Residuals Serial Correlation Test – DRGDP and TEGDP

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 05/09/11 Time: 17:35
Sample: 1980 2010
Included observations: 29

Lags	LM-Stat	Prob
1	4.637954	0.3265
2	8.093682	0.0882
3	2.003885	0.7350

Probs from chi-square with 4 df.

Table 7: Residuals Heteroskedasticity Test – DRGDP and TEGDP

VEC Residual Heteroskedasticity Tests: Includes Cross Terms
Date: 05/09/11 Time: 17:41
Sample: 1980 2010
Included observations: 29

Joint test:

Chi-sq	df	Prob.
39.06485	27	0.0625

Individual components:

Dependent	R-squared	F(9,19)	Prob.	Chi-sq(9)	Prob.
res1*res1	0.704000	5.021029	0.0015	20.41601	0.0155
res2*res2	0.383100	1.311016	0.2946	11.10989	0.2683
res2*res1	0.568950	2.786495	0.0287	16.49956	0.0572

Table 8: Residuals Normality Test – DRGDP and TEGDP

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 05/09/11 Time: 17:43
Sample: 1980 2010
Included observations: 29

Component	Skewness	Chi-sq	df	Prob.
1	-0.636797	1.959967	1	0.1615
2	0.015528	0.001165	1	0.9728
Joint		1.961132	2	0.3751

Component	Kurtosis	Chi-sq	df	Prob.
1	4.908234	4.399973	1	0.0359
2	3.311158	0.116990	1	0.7323
Joint		4.516963	2	0.1045

Component	Jarque-Bera	df	Prob.
1	6.359940	2	0.0416
2	0.118155	2	0.9426
Joint	6.478095	4	0.1662

Table 9: Data Variables

Variable Name	Variable Code	Variable Code as ratio to GDP
Domestic Debt	DDEBT	DDGDP
Total Revenue and Grants	TREVGRTS	TRGDP
Domestic Revenue	DOMREV	DRGDP
Tax Revenue	TAXES	TXGDP
Grants	GRTS	GRGDP
Total Expenditure	TOTEXP	TEGDP
Nominal GDP	GDP	N/A

See Appendix I for complete data tables.

Table 10: Augmented Dickey - Fuller test results - Nominal Figures

Unit-root tests for Nominal Figures in level			
Variables	*ADF statistic*	*Critical Values*	*K*
DDEBT (Domestic Debt)	*9.022*	*-2.998*	*7*
DOMREV (Domestic Revenue)	*1.338*	*-2.976*	*3*
GRTS (Grants)	*-3.028**	*-3.012*	*4*
GDP (Gross Domestic Product)	*2.648*	*-2.968*	*1*
TAXES (Tax Revenue)	*0.349*	*-2.968*	*3*
TOTEXP (Total Expenditure)	*-3.619**	*-2.998*	*7*
TREVGRTS (Total Revenue with Grants)	*-4.084**	*-2.998*	*7*

*Notes * Denotes significance at 5% level and the rejection of the null hypopaper of non-stationarity.*

The optimal lag lengths K were automatically chosen according to Schwarz Information Criterion

Unit-root tests for Nominal Figures in first difference			
Variables	*ADF statistic*	*Critical Values*	*K*
D(DDEBT) (Domestic Debt)	*7.232*	*-3.005*	*7*
D(DOMREV) (Domestic Revenue)	*5.581*	*-2.976*	*2*
D(GDP) (Gross Domestic Product)	*6.245*	*-2.968*	*0*
D(TAXES) (Tax Revenue)	*4.497*	*-2.976*	*2*

*Notes * Denotes significance at 5% level and the rejection of the null hypopaper of non-stationarity.*
The optimal lag lengths K were automatically chosen according to Schwarz Information Criterion

Table 11: Augmented Dickey - Fuller test results - Figures as ratios of GDP

Unit-root tests for Figures as ratios of GDP in level

Variables	*ADF statistic*	*Critical Values*	*K*
DDGDP (Domestic Debt/GDP)	*-3.327**	*-2.964*	*0*
DRGDP (Domestic Revenue/GDP)	*-3.206**	*-2.964*	*0*
GRGDP (Grants/GDP)	*-2.729*	*-3.005*	*3*
TXGDP (Tax Revenue/GDP)	*-2.980**	*-2.968*	*1*
TEGDP (Total Expenditure/GDP)	*-2.955*	*-2.964*	*0*
TRGDP (Total Revenue with Grants/GDP)	*-2.690**	*-2.964*	*0*

*Notes * Denotes significance at 5% level and the rejection of the null hypopaper of non-stationarity.*
The optimal lag lengths K were automatically chosen according to Schwarz Information Criterion

Unit-root tests for Figures as ratios of GDP in first difference

Variables	*ADF statistic*	*Critical Values*	*K*
D(DDGDP) (Domestic Debt/GDP)	*-7.372**	*-3.679*	*0*
D(DRGDP) (Domestic Revenue/GDP)	*-5.957**	*-3.700*	*2*
D(GRGDP) (Grants/GDP)	*-6.216**	*-3.832*	*5*
D(TXGDP) (Tax Revenue/GDP)	*-6.512**	*-3.700*	*2*
D(TEGDP) (Total Expenditure/GDP)	*-6.024**	*-3.700*	*2*
D(TRGDP) (Total Revenue with Grants/GDP)	*-5.504**	*-3.690*	*1*

*Notes * Denotes significance at 1% level and the rejection of the null hypopaper of non-stationarity.*
The optimal lag lengths K were automatically chosen according to Schwarz Information Criterion

CHAPTER THREE

The Incidence Analysis of the Value Added Tax in Zambia

Mumbi P. Chileshe

Abstract

The paper assesses the impact of the Value Added Tax (VAT) on equity in Zambia. In addition, the study assesses government spending towards the social sectors to show how tax revenue can be used to improve progressivity of commodity taxation. Using the data from the Living Conditions and Monitoring Surveys for 1996, 1998 and 2003/2004, the paper finds that the VAT effective rate has been increasing for all income groups. However, despite the increasing burden of VAT on the income groups the tax has remained progressive. The progressivity of the VAT system entirely depends on the shares of exempt goods and the share of in-kind goods. Further, we find that exemption of public goods such as education, health, public transport and water is based on the merit good argument as they are disproportionately consumed by the richer income groups compared to poor income households. On the other hand, the study also found that Government has been increasing expenditures towards the social sectors such as education and health. This presents an avenue for further improving the progressivity of VAT through increasing the poor's access to key social services which are mostly consumed by the rich households.

1.0 INTRODUCTION

1.1 Background

Developing countries, Zambia inclusive, are facing severe budgetary pressures with rising demands for expenditures and limited scope for raising extra government revenue. In addition, before major reforms of the 1990s, tax systems in most of these countries were impediments to economic efficiency, the expansion of the economy, growth of the tax base and achievement of development objectives (Stern et al., 1987). Further, these problems were compounded by the dwindling level of government revenue from trade taxes as a result of trade liberalisation. In view of this, it has become indispensable to continuously undertake tax reforms in order to improve revenue collection, make the tax system more equitable and efficient (Fjeldstad et al., 2003).

Broadly, tax reforms are mainly undertaken in order to achieve the tenets of a good tax system such as efficiency, equity, predictability, simplicity and flexibility. Osoro (1993) defines tax reform simply as the "the change to the status quo". This can range from simply changing tax rates, to introducing new taxes or removal of existing ones and change in administrative procedures. Generally, two reasons have warranted the need for tax reforms in developing countries over time; firstly, tax systems lack the tenets of a good tax system and secondly, there is an urgent need for development resources. In Zambia, the major focus has been the introduction of broad consumption taxes such as Value Added Tax (VAT) and the general sales tax.

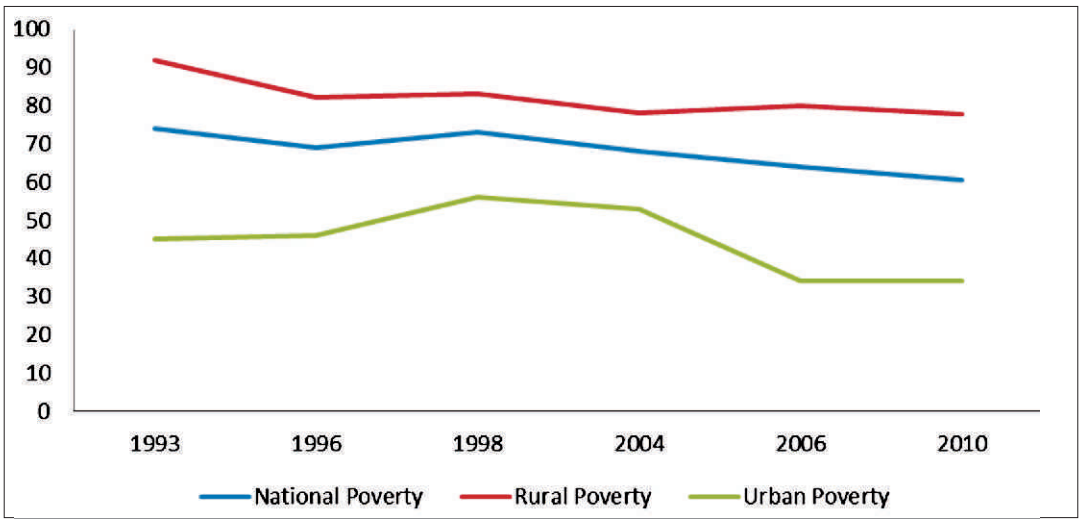
The primary focus of the paper is to analyse the social effects of indirect tax reforms with reference to VAT in Zambia. The rest of the paper is organized as follows: the next sub-sections discusses Poverty Trends in Zambia and outlines Value Added Tax in Zambia. Section II gives a survey of theoretical and empirical literature, section III outlines the methodology and section IV gives the results, conclusion and policy recommendations.

1.2 Incidence of Poverty in Zambia

Zambia has been registering positive economic growth since 1999 yet poverty levels remain high. This high prevalence of poverty has made it a key component in the policy making process. Thus, in order to mitigate the negative effects of Value Added Tax on poor households, Zambia's VAT system has incorporated exemptions of basic food commodities and merit goods such as education and health.

In 1991, it was estimated that approximately 70% of households lived below the poverty line rising to 73% in 1998, since then it has been steadily declining reaching 64% in 2006 (CSO, 2010). Poverty is higher in rural areas than in urban areas. In 2010, rural poverty stood at 80% compared to 34% in urban areas (Chapoto et al., 2011). Although the data suggests marginal declining trends over the last two decades, the poverty levels at national level still indicate that more than half of the population is still in abject poverty and thereby affecting policy making efforts.

Figure 1: Trends in Headcount Poverty in Zambia



Source: CSO Publications

1.3 Value Added Tax in Zambia

VAT is a consumption tax levied on designated local supply of goods and services and on imports. VAT was introduced in Zambia in 1995 to replace the sales tax. Initially, VAT was introduced at an upper rate of 20% in 1995. This rate was reduced downwards to 17.5% in 1997 and further to 16% in 2008 to mitigate the inflationary effects of indirect taxes on consumer goods. However, as the practice world over products for VAT purposes have been divided into three main categories such as Standard rated, Zero rated and exempt goods.

In Zambia's VAT system, registered suppliers of Zero rated and Standard rated products are allowed to claim VAT. Exempt goods mostly include food and agriculture products,

educational services, water and medical services. The rationale behind the exemption is that the state would want to cushion the vulnerable groups in society from high prices occasioned by the introduction of taxes on VAT (see Table 1 below).

Table 1: Structure of VAT in Zambia

Tax types	Definition
Domestic VAT	This is taxation on every value added to a taxable service or product. The tax is borne by the consumer. For VAT purposes, sale or disposal of goods or rendering of services is called supplies. Taxable supplies are taxed at either 16% (standard rate) or 0% (zero-rated). Zero-rated supplies include Exports, Energy Saving appliances, Equipment and machinery, medical supplies and schoolbooks. Exempt supplies are items specifically excluded by law from liability to VAT, (i.e., no VAT is charged) even if supplied by a registered business. Examples of exempt supplies include: Funeral services — Conveyance of domestic property Health supply services — Domestic Kerosene Educational services — Transport services Metals — Financial services[1] Water supply services — Insurance services[2] Only registered businesses can charge and claim VAT. There are two types of VAT registrations: Statutory registration – annual taxable turnover in excess of K200 million. Voluntary registration – where the turnover of a business is below K200 million per annum but the business has fulfilled all the requirements for VAT registration. A registered business charges and collects VAT on its supply of goods and services to customers. VAT so charged is called output tax. On the other hand, registered businesses claim the VAT that they pay on purchases of taxable goods and services for their businesses. The tax so claimed is referred to as input tax. The net of output and input tax is paid to ZRA or refunded to the taxpayer as the case may be. Therefore, a business dealing in taxable supplies can claim input tax, while a business dealing in exempt supplies will not be required to register for VAT and therefore cannot claim the input tax. For example, educational services from nursery to secondary school are exempt, therefore, a primary school will not register for VAT and will not claim any input tax. VAT payment is due before or on the 21st of the month following the month when the transaction was conducted.

Source: ZRA website

2.0 Literature Review

2.1 Theoretical literature

Public finance economists emphasize the principles of (microeconomic) efficiency and equity. The notion of microeconomic efficiency – otherwise known as economic, allocative or Pareto efficiency – is foundational to modern economics. This approach begins from the proposition that, in the presence of well-functioning markets, taxes are intrinsically distortionary: even if they fund public goods, they have to be viewed as a necessary evil. They divert resources to the public sector and distort market operations.

These distortions impose economic costs, which either are not appropriated by any economic agent or are appropriated by one agent to the detriment of others. Such costs are often referred to as deadweight, or welfare, losses. The efficiency principle enjoins policymakers to minimize such costs through the choice of an optimal level and structure of

[1]Financial services were standard rated in 2011
[2]Insurance services were standard rated in 2011

taxes, given certain revenue needs in an attempt to reform their tax systems. This principle has spawned a wide range of literature on optimal taxation.

One of the oldest strands of theories, to follow this approach was that by Frank Ramsey (1927) which sought to develop models that dealt with the ideal structure of commodity taxation, often referred to as optimal taxation theory (OTT). In this theory, the simple question to answer is whether uniform commodity taxes are optimal. The basic idea behind the OTT is the minimization of excess burden in the tax system in light of tax payers' decisions whether to pay or evade taxes. This literature concerns the attainment of optimal tax rates for indirect taxes and the optimal mix of component taxes in a system for a given level of tax revenue. The simplest version of the Ramsey model is the static model (a one period model without saving) with a representative consumer. The government's objective is to raise a given level of revenue while minimizing the distortions (excess burden) created by the tax system. This formulation ignores the fairness of the tax system and concludes that the feasible set of taxes on commodities includes a flat rate on different goods and services but excludes taxes on wage income. Uniform commodity taxes are desirable because they raise all prices by the same magnitude and thus not distorting the relative prices of different goods. This simple intuition has two problems; it ignores the fact that commodity taxes cannot directly tax one especially important good: tourism. Second, it implicitly assumes that the elasticity of supply is perfectly elastic such that consumers bear the full burden of taxation.

Some of the extensions of the Ramsey approach provide intuition about policy prescriptions. In the special case that the cross-price elasticity is zero (demand for goods is unrelated) the Ramsey rule simplifies to the 'Inverse Elasticity Rule.' The 'Inverse Elasticity Rule' states that tax rates should be inversely proportional to their elasticity of demand. For example, tax reforms based on the 'inverse elasticity rule' suggest that goods with inelastic demand attract high tax rates. One criticism of the Ramsey Rule, (especially the special case of Inverse Elasticty Rule) is that the solution may require higher tax rates on necessities and low tax rates on luxury goods since most often necessities tend to have relatively inelastic demands (Gentry, 2006). This approach brings out the efficiency-equity trade-off in commodity taxation.

Diamond et al., (1975) extends the Ramsey problem to allow for households with different tastes and incorporates concerns for fairness among the different types of households. In Diamond's model, the government's social welfare function is a weighted average of the utilities of individual consumers. The social welfare weights of the households depend on the wellbeing of that household, with higher weights for less advantaged households. Thus, by incorporating the fairness into the Ramsey problem modifies the basic result so that the percentage reduction in goods consumed heavily by the favored households by the government (usually the poor) is smaller than the percentage reduction in goods consumed by households with lower weights in the social welfare function. Thus, equity can be introduced into the optimal commodity tax system by having goods consumed by the rich being heavily taxed. Most reforms, especially those to do with commodity taxation, have had to exempt certain goods from VAT which are mostly consumed by the poor.

Another extension of the Ramsey rule is commonly referred to as the generalized Ramsey Rule for optimum taxation derived by Guesnerie (1979) and Dreze and Stern (1987). This is the general equilibrium extension of the classical Ramsey rule. The generalized Ramsey rule allows for a wide range of distortions in the economy, which are captured by a vector of 'shadow prices'. Many of the standard results continue to apply after replacing actual commodity taxes with shadow taxes. Conditional on the knowledge of shadow prices, the generalized Ramsey rule becomes a powerful tool for the analysis of commodity taxation in distorted economies. One important aspect of the generalized Ramsey rule is that it

integrates the three main concerns of public economics such as equity, efficiency and revenue adequacy.

There is also an emphasis in theory on the concept of neutrality in consumption taxes. Differential tax rates on final goods, promoted by some people on equity grounds, are a less efficient means to redistribute income than the use of direct payments to households (Atkison and Stiglitz 1980; Deaton and Stern 1986). Also, a zero rate on intermediate goods induces optimal consumption and production, implying that turnover taxes should be replaced by the Value Added Tax or final sales taxes. Moreover, applying the principle of neutrality to international trade, viewed as a type of productive activity, implies that rates on imports and exports should also be set to zero. Taxes on such goods would create disincentives for domestically produced and consumed goods (Diamond and Mirrlees, 1971).

In an attempt to develop a system for exemption of goods/services Newberry and Stern (1987) came up with the theory of marginal tax reforms in which they developed a measure called the distributional characteristic. The distributional characteristic is a measure used to show how consumption of each good is heavily concentrated on the poor households. The theory shows that the social welfare effect of a marginal price change is given by the weighted sum of each household's consumption of the good. This weight reflects the social marginal value of consumption by each household. Therefore, the social welfare impact of a price change depends on the total level of consumption of the good and (if the weights differ across households) the distribution of that consumption amongst the population. The distributional characteristic is a scale neutral measure, which makes it useful for identifying goods that are candidates for having reduced rates on equity grounds. This approach has drawn interest from researchers who sought to analyse the effect of small changes to the tax system on the welfare of households or to measure how indirect tax reforms affect the distribution of household income.

Borrowing from Newberry and Stern (1987), Munoz and Cho (2003) extend the concept of the distribution characteristic by introducing the concept of how money raised using the optimal taxes is spent by the government. They argue that ignoring the expenditure side of the equation result in labeling a tax reform package as being regressive when in fact the opposite is true.

2.2 Empirical Literature

Fletcher (2005) uses a tax incidence approach to analyse how tax reforms aimed at increasing public sector revenue affect equity and efficiency. He finds that commodity taxes on tobacco and alcohol are regressive in the Philippines because the poor spend a proportionally large amount of their income on these goods. He also concludes that increasing taxes on food items to increase Government revenue makes the tax system regressive. Tax on petroleum products were found to be progressive, except for taxes on kerosene which is regressive. Finally, he finds that progressivity of the taxes can be improved if pro-poor spending is not cut.

Using the distributional characteristic developed by Newberry and Stern (1987) in the theory of marginal tax reform, Gibson (1998) studies the effect of indirect tax reforms on the poor in Papua New Guinea (PNG). He finds that food tends to have very high distributional characteristic and hence likely to receive lower rates if equity is to be protected. Taxes on basic services were found to be regressive if they are exempted because their consumption concentrated on the rich. He also concludes that most goods exempted in PNG have been done on the basis of merit good and not any economic analysis.

Schroyen and Aaness (2000) use the theory of marginal indirect tax reform analysis with merit goods arguments to evaluate the tax reform proposal of Norway in the 2000 budget. They find that the marginal cost is high for increases in VAT on food items for poorer households and low for rich households. Private transport was found to have high marginal cost for rich people and low for the poor households. This implies that poorer households would approve a reduction in tax on food and they want an increase in tax on private transport. They also find that tobacco and alcohol are demerit goods and deserves higher taxes. Finally, they conclude that reforms passed by parliament for 2000 had clear redistributive profile, in that they proposed a lower food VAT rate and higher rates on goods enjoyed by the rich.

Nicita (2003) investigates the effect of a marginal tax reform on household welfare in Mexico. He estimates the extent to which Mexican households react to changes in prices and uses the estimates to simulate changes in social welfare resulting from marginal tax reform. The results from the micro-simulation suggest that since poorer households rely mostly on maize, legumes and vegetables to fulfill their daily caloric intake, any price change or reform that reduces their prices will have large welfare effects on the poor. That is reducing taxes on maize, legumes and vegetables would be both more equitable and more efficient in terms of welfare. At the same time, he finds that reducing tax on legumes, sugar and oils, while inefficient would contribute to reduce inequality in society thus showing existence of the trade-off.

3.0 Methodology

3.1 Data Sources

Secondary data was used in analyzing the social effects of introducing a VAT in Zambia. Specifically, the study utilizes data from the Living Conditions Monitoring Surveys (LCMS) conducted by the Central Statistical Office (CSO) for 1996, 1998 and 2003/2004. The LCMS data is a national-wide survey of households covering basic demographic and household income and expenditure. The Household expenditure items fall in the following categories;

Food
Beverages
Cigarettes and tobacco
Clothing
Rent, water, electricity
Household goods and operation
Health
Education
Transport and communication
Entertainment
Personal services
Miscellaneous goods and services

Since the survey measures out of pocket amounts, the VAT is imbedded in the household expenditures. We use household expenditure to calculate taxes paid by different household groups.

3.2 Estimation of VAT amounts

To calculate the indirect tax payments, we assume that the burden of taxes fall entirely on the consumers.

$$T_{ij} = \frac{t_{vat,j}}{1 + t_{vatrate,j}} e_j \qquad (1)$$

T_{ij} =Household i's VAT payment on good j
$t_{vat,j}$ =VAT rate for good j
e_{ij} =Post VAT expenditure on good j (observed expense)

It is important to note that the observed household expenditure includes VAT payments. Thus, we estimate the Value Added Tax applied to each item from the observed expense in order to make an analysis. However, it is important to note that an estimate of VAT obtained in this way might over estimate VAT paid as a result of non-compliance.

3.3 Incidence analysis

In this study, we assume that household expenditure represents its social welfare. This assumption is made on the premise that expenditure function represents the level of expenditure needed to achieve a desired family welfare. We also know that the expenditure function is increasing in prices, meaning that a rise in price of goods require an increase in expenditure for a family to maintain its welfare. Thus, we divide household expenditures into deciles of total expenditure to analyse the distributional impacts of VAT since its inception in 1994. After this, we calculate the effective tax rates for each decile and then examine the generalized Lorenz curve for expenditure in each of the years when data was available. We also plot the Concentration curve for the VAT in each year. The Lorenz curve plots the cumulative expenditure against cumulative population share, with population ordered by expenditure level. The Concentration curve is similar to the Lorenz Curve except that it plots cumulative tax expenditure against cumulative population. If the Concentration curve lies below the Lorenz curve, then the tax is progressive, otherwise it is regressive.

3.4 Analysis of exempt Goods

This study adopts the analytical approach developed by Newberry et al., (1995) in his theory of marginal tax reform. Newberry et al., (1995) defines the distributional characteristic of good i as;

$$d_i = \frac{\sum_h^H B^h q^h}{BQ_i} \qquad (2)$$

Where: B^h is the 'social weight,' defined as the social marginal utility of transferring one Kwacha to household h. We assume a constant elasticity of substitution of the social welfare function; the social weight is given by $B^h = (C^h)^{-v}$ where C^h is the consumption of household h and v is the inequality aversion parameter. The consumption of the $i'th$ good by household h is given by q_i^h, and Q_i and i are average of the social weights over all the

households and is the aggregate consumption of food , respectively. Using the Distributional Characteristic we rank goods and services using both the low inequality aversion and high inequality aversion parameter.

3.5 Trends in public social expenditures

Most studies have approached the analysis of indirect tax reforms by merely calculating the tax burdens and checking how it is distributed among the population. However, this approach neglects the expenditure of public finance. The money raised through taxation is used to fund various sectors in the economy such as health, education and infrastructure development. Thus, increased funding of the social sectors using the tax revenue collected would help improve the progressivity of the VAT system.

4.0 Results

4.1 Has the VAT been progressive?

Using the 1996 LCMS data, it was found that the national average effective VAT rate was 4.0% (see Table 2). The effective VAT rate for the lowest decile was 1.82% while for the highest it was 6.58%. Figure 2 shows that the generalized Lorenz curve is above the Concentration curve. This implies that the VAT policy was progressive in 1996.

Table 2: Distribution of Tax incidence by deciles in 1996

Deciles	Average Expenditure	Total Tax Paid	Effective Rate
1	17,261.7	370,222.40	1.82
2	33,787.6	956,053.60	2.40
3	48,151.6	1,725,959.40	3.05
4	64,517.5	2,644,574.00	3.48
5	83,319.3	3,721,475.33	3.79
6	105,485.2	5,257,913.40	4.24
7	133,360.3	7,152,898.00	4.56
8	171,847.2	9,777,848.80	4.83
9	238,583.4	14,252,198.40	5.19
10	581,974.1	45,117,196.20	6.58
Average	**147,828.78**	**9,097,633.95**	**4.00**

Using the 1998 LCMS data, it was found that the national average VAT effective rate rose to 4.45% as compared to 4.0% in 1996. This seems to indicate a number of things; improving compliance and enforcement with VAT, improving affluence in the populace and the reducing list of exemptions. Table 3 indicates that the lowest decile faced an effective VAT rate of 3.56% and the highest decile faced the highest effective VAT rate of 5.35%. Further, Figure 3 indicates that the generalized Lorenz curve was above the Concentration Curve thus indicating that the VAT rate was progressive in 1998.

Figure 2: Generalized Lorenz and Concentration curves for the year 1996

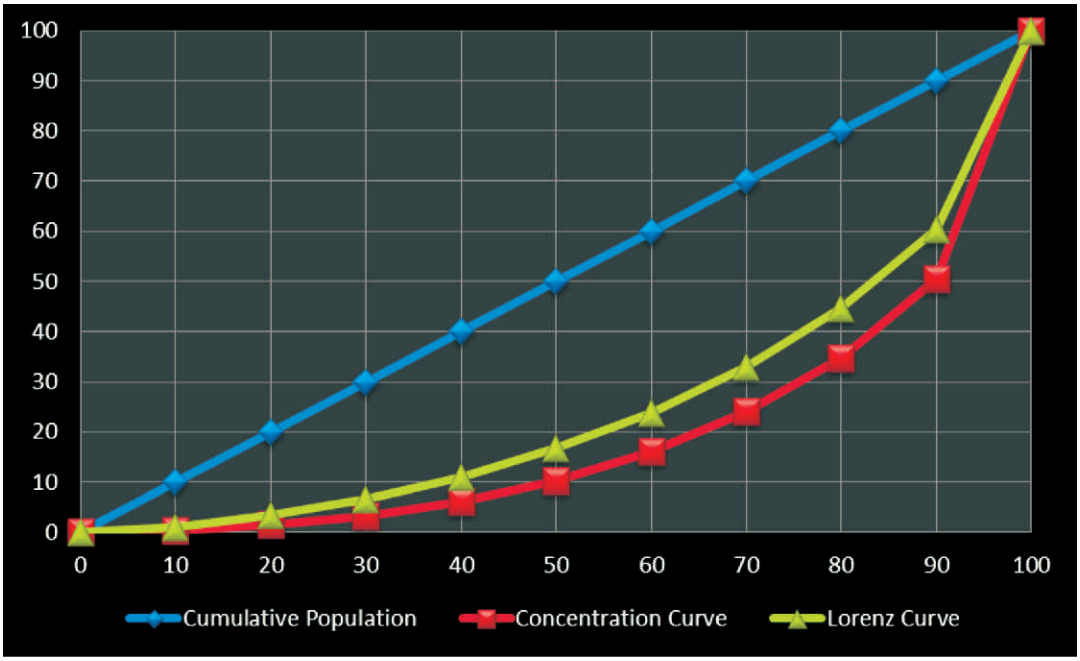
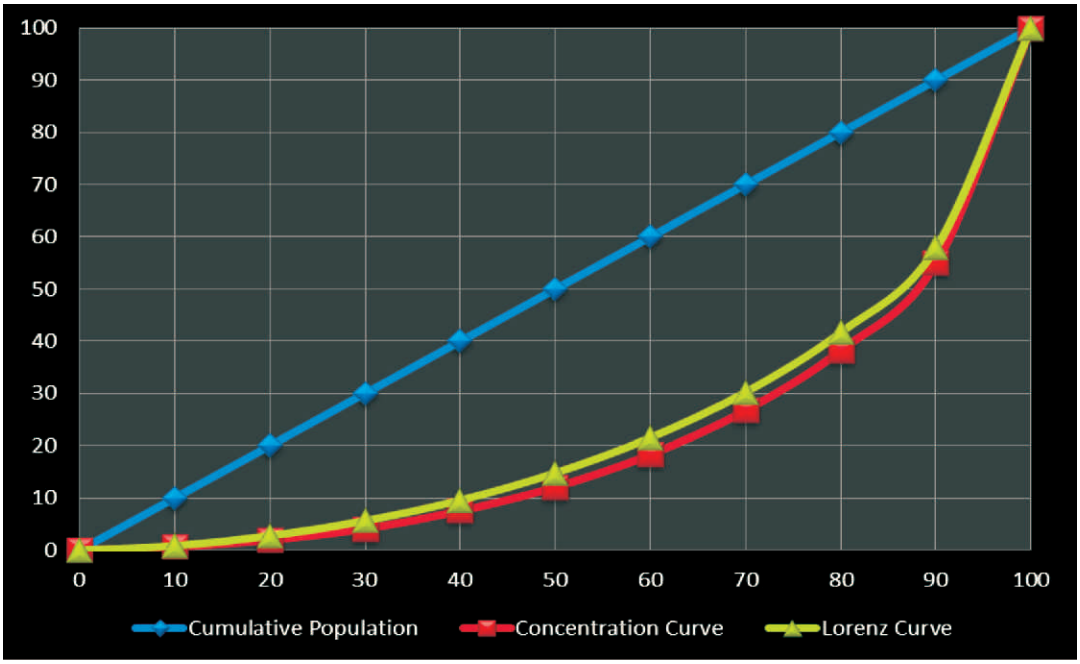


Table 3: Distribution of Tax incidence by deciles in 1998

Deciles	Average Expenditure	VAT Paid	Effective VAT rates
1	20,866.25	1,242,374.00	3.56
2	47,336.63	2,764,780.90	3.49
3	70,945.45	4,502,331.75	3.80
4	98,090.54	7,033,485.90	4.29
5	129,064.49	9,497,306.35	4.40
6	167,023.68	12,847,610.13	4.60
7	215,658.67	17,449,527.55	4.84
8	284,301.65	23,812,018.48	5.01
9	400,784.88	34,523,142.68	5.15
10	1,042,320.94	93,215,611.13	5.35
Average	**247,639.32**	**20,688,818.89**	**4.45**

Figure 3: Generalized Lorenz and Concentration curves for the year 1998



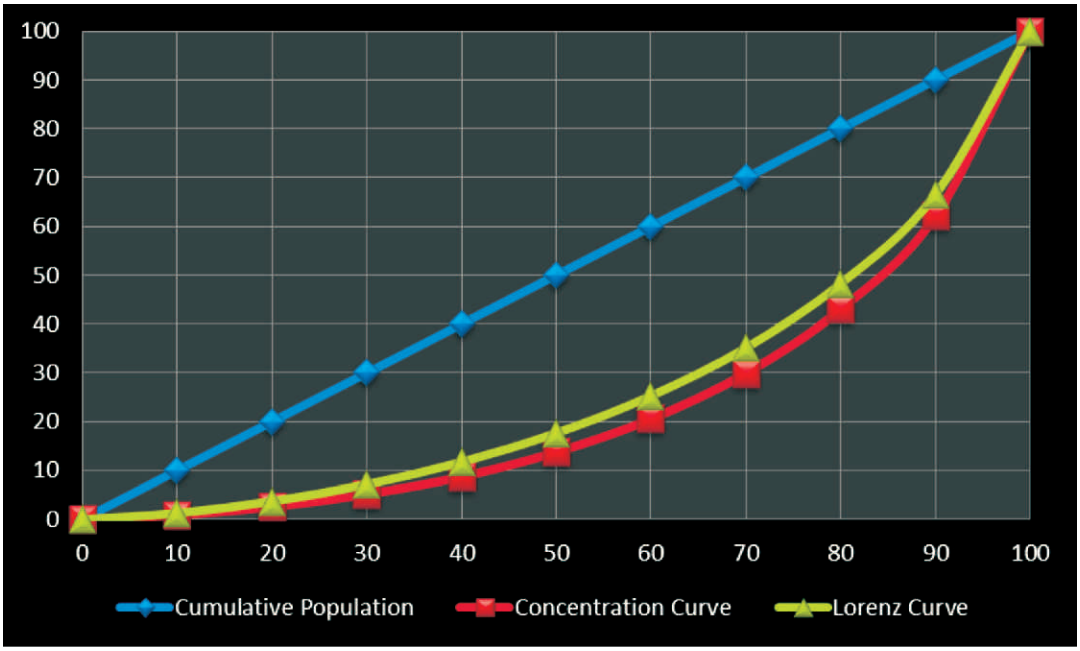
In 2004, the national average effective VAT rate was estimated at 7.19% compared to the 4.0% in 1996, and 4.45% in 1998. The lowest decile faced an effective rate of 5.46% and the highest decile faced a rate of 9.28%. Figure 4 also indicates that the Concentration Curve is below the Lorenz Curve indicating that the VAT regime is progressive.

Over the study period, the VAT effective rate has been increasing for all income groups. The effective VAT rate for the lowest decile in 1996 was 1.82% rising to 5.46% in 2004. At the same time the effective VAT rate for the high income group was 6.58% in 1996 and rose to 7.19% in 2004. The increasing effective rate could indicate increasing affluence among Zambians as well as improving capacity of Zambia's tax system to deal with issue of tax evasion and non-compliance. However, despite the increasing burden of VAT on the income groups the tax has remained progressive. The progressivity of the VAT entirely depends on the shares of exempt goods and the share of in-kind goods.

Table 4: Distribution of Tax incidence by deciles in 2004

Deciles	Average Expenditure	VAT Paid	Effective VAT Rates
1	81,989.63	8,065,611.45	5.46
2	155,234.91	16,125,213.06	5.77
3	219,652.78	24,264,766.70	6.13
4	293,009.08	33,873,594.42	6.42
5	380,514.00	47,575,718.52	6.94
6	488,019.69	64,353,096.79	7.32
7	631,767.51	88,715,775.58	7.80
8	840,243.97	123,707,119.84	8.17
9	1,169,702.55	180,712,941.51	8.58
10	2,143,896.09	358,363,388.04	9.28
Average	**640,403.02**	**94,575,722.59**	**7.19**

Figure 4: Generalized Lorenz and Concentration curves for the year 2004



4.2 The Distributional Characteristic of Exempt Goods

Tables 5, 6 and 7 in Appendix A shows the estimated Distributional Characteristic of goods and services for 1996, 1998 and 2004. The rankings reflect the degree to which goods and services are disproportionately consumed by the poor or the rich. In 1996, seven of the top 15 ranked goods using the low aversion parameter were not exempted from VAT. However, the number of the non-exempt goods on the 15 top ranked goods reduces to 6 using the high aversion index. This is despite the distributional characteristic indicating that these goods were disproportionately consumed by the poor. The goods are ranked using the low aversion parameter; Cooking oil (4), Firewood (3), Charcoal (8), Sugar (6), Cosmetics (14), Laundry services (12) and Grinding services (13). Water, Public Transport and health services were found to be lowly ranked despite them being exempt; they were ranked 43, 41 and 37, respectively. This probably reflects the distribution of these services in Zambia; these services are more concentrated in urban areas where high income groups are concentrated. Even in urban areas, these services especially water is supplied more to high class residential areas compared to peri-urban locations. In addition, it shows that the exemption of goods and services in Zambia's VAT system follows the merit good system without regard to any economic analysis.

In the 1998 survey, among the top 15 ranked goods only Butter (9), Charcoal (10), Bicycle maintenance (12) and Soap/detergents (14) were not on the list of exempt goods. However, comparing with 1996 the list of exempt goods on the top 15 ranked increased to 11 from 8. Other exempt goods such as public transport (27), water (35), health (41) and education (42) were found to be lowly ranked. These goods are disproportionately consumed by the rich and hence their exemption does not specifically support poverty alleviation efforts. Out of pocket expenditure on education and health is very low for the poor in that they utilize public facilities where the cost is almost negligible whereas the rich spend more on health and education which are consumed from private providers. Thus, exempting these services

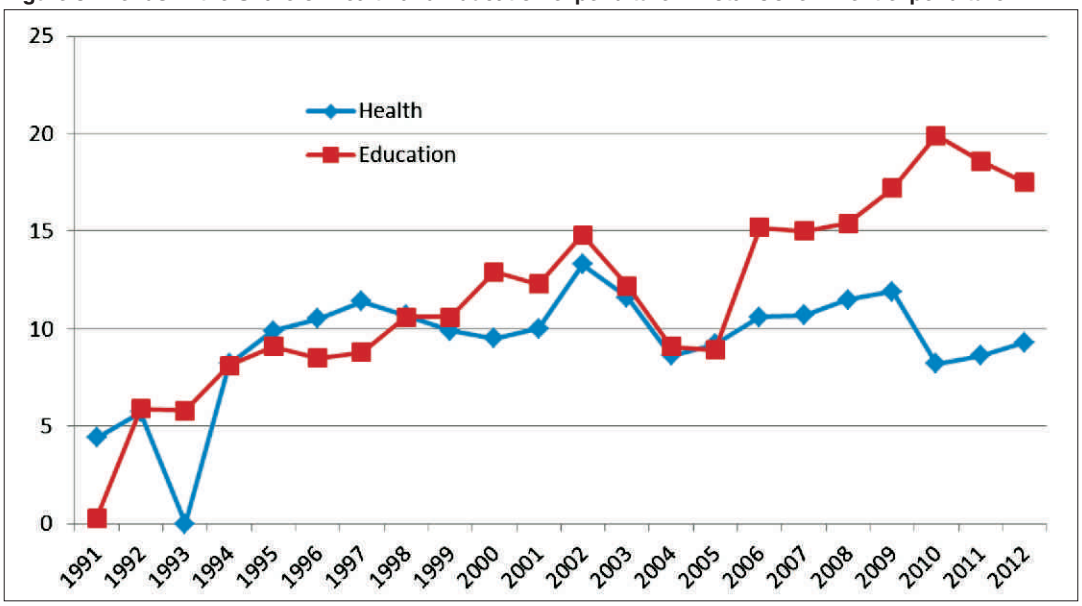
have only benefited the rich. However, because of the merit argument and the externality effects of health and education have contributed to their exemption from VAT.

Using the 2004 LCMS data, only powdered milk appeared on the list of 15 top ranked goods and services which is not exempt. This shows an improvement in the use of exemption system to alleviate poverty. However, social services were found to be lowly ranked despite being exempted from VAT. These include Water ranked 45, Health ranked 42, Public transport ranked 24 and education ranked 43.

4.3 Trends in Public Social Spending

Introduction of an indirect tax increases the budgets for households who consume that product. The effect of this is to reduce the number of people consuming such a good or service. If this disproportionately affects the poor, there are several ways in which policy makers can ensure that the poor have access to such goods. One such measure is to ensure that money raised from such a tax is spent in a manner that it helps the poor to consume such a service. Over the last fifteen years, the government has increased its share of the budget dedicated to the health and education sectors. The share of health in the national budget has risen from 4.4% in 1991 to over 10% in 2006. In 2009, the share of health spending in total government rose to 11.9% before falling to 8.2% in 2011. Similarly, the education sector has seen a rise in the share of the budget, rising from less than one percent in 1991 to over 15 percent of the national budget in 2006, reaching 19.9% in 2011. Among the major educational projects launched over the period includes the introduction of free universal primary education which has led to increased demand for primary education among the poor as well as building of new schools, especially in the rural areas to improve access to education by all. Other programs have included enhanced bursaries for higher education which have included all programs under TEVETA. In the health sector, one such program has been the abolishment of user fees at all government owned health institutions as well as increased infrastructure development which will result in improved access to health.

Figure 5: Trends in the Share of Health and Education expenditure in Total Government expenditure



5.0 Conclusion

The aim of the study was to investigate the effect of Zambia's VAT system on the equity. The study came up with following conclusions and recommendations;

Since its inception in 1995, Zambia's VAT system has generally been progressive over the years. The study has showed that the effective tax burden falls heavily on the rich compared to the poor. This result was confirmed by both the effective VAT rates approach and the Lorenz curve and the Concentration Curve methods. This result agrees with other studies done in other sub-Saharan Africa countries such as Munoz (2005) for Ethiopia and Sahn et al,.(1999) on a group of eight African countries.

Generally, the effective VAT rates have been rising for all income groups. This can be attributed to several factors including the improving effectiveness of the tax administration system in Zambia, increasing variety of taxable goods and improving affluence of the populace since the VAT was first introduced.

The paper further found education, health; public transport and water are heavily consumed by the rich people and hence their exemption benefit the rich more than the poor households. Except for 1996 when education was ranked in the top 15 goods heavily consumed by the lower income households, the rest of the data showed that these goods are disproportionately consumed by the rich. The results obtained in this paper are similar to those found by others such as Munoz (2005). However, it is important to note that the poor rarely spend in these sectors because they attend public institutions where cost is almost zero while higher income groups attend private facilities where economic fees are charged. Furthermore, the distribution of these services is concentrated in the urban areas where the well-off families reside. One way to improve the progressivity of VAT is to ensure that investment in health, education, transport and water sanitation is targeted at rural and peri-urban areas where the poor are concentrated.

We found that basic energy sources such as firewood and charcoal are mostly consumed by the poorer households. However, the impact of such energy sources on the environment is severe thus calling for other measures that help the poor to have access to cheaper alternative energy sources. Thus, to further improve the progressivity of the VAT system in Zambia there is a need to subsidise alternative sources of energy such as solar energy which is currently exempt from VAT. In addition, government should quickly expand the rural electrification projects and promote the construction of mini-hydroelectric power stations in rural areas. These measures will not only improve the progressivity of VAT, but also reduce the pressure on the environment.

The study also showed that the government has been increasing its funding to the social sectors, especially education and health. However, there is need to refocus the spending patterns in the health and education sectors by moving away from general allocations to targeting the rural and peri-urban areas where the poor are concentrated.

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APPENDIX A

Table 1: Distributional Characteristic of Goods and Services in 1996

Low Aversion			High Aversion	
Expenditure Item	Distributional Characteristic	Rank	Expenditure Item	Distributional Characteristic
Roller Meal	0.85	1	Roller Meal	0.6305
Breakfast Meal	0.83	2	Cooking Oil	0.6069
Firewood	0.83	3	Sugar	0.5162
Cooking Oil	0.8	4	Education	0.4762
Education	0.79	5	Cosmetics	0.4722
Sugar	0.78	6	laundry	0.459
Tomatoes	0.77	7	Tomatoes	0.439
Charcoal	0.75	8	Charcoal	0.4305
Vegetables	0.74	9	Kapenta	0.3896
Kapenta	0.74	10	Vegetables	0.3882
Maize Grain	0.74	11	Alcohol	0.3843
laundry	0.74	12	Breakfast Meal	0.3672
Milling Services	0.74	13	Maize Grain	0.2733
Cosmetics	0.73	14	Irish potatoes	0.2708
Chicken	0.7	15	Groundnuts	0.2383
Beans	0.7	16	Sweet potatoes	0.2154
Fish	0.68	17	Eggs	0.2016
Eggs	0.67	18	Maintenance House	0.1964
Alcohol	0.66	19	Onions	0.1931
Sweet potatoes	0.65	20	Parafin	0.1872
Irish potatoes	0.65	21	Cassava	0.1132
Onions	0.65	22	Millet	0.1014
Maintenance House	0.65	23	Firewood	0.0994
Millet	0.65	24	Fuel	0.081
Rice	0.64	25	Tobacco	0.0721
Groundnuts	0.64	26	Grinding Cost	0.0377
Meat	0.62	27	Cleaning Mat	0.0273
Entertainment	0.61	28	Personal Services	0.0124
Milk	0.6	29	Milk	0.0112
Paraffin	0.6	30	Entertainment	0.0072
Rent	0.51	31	Rice	0.0057
Cassava	0.51	32	Beans	0.0041
Tobacco	0.5	33	Electricity	0.004
Fuel	0.49	34	Clothing	0.0039
Personal\Services	0.49	35	Rent	0.0035
Sorghum	0.43	36	Fish	0.0014
Public Transport	0.39	37	Candles	0.0008
Electricity	0.37	38	Meat	0.0006
Cleaning Mat	0.35	39	Water	0.0004
Candles	0.32	40	Public Transport	0.0004
Medical	0.3	41	Sorghum	0.0003
Clothing	0.29	42	Chicken	0.0002
Water	0.14	43	Medical	0.0002

Table 2: Distributional Characteristic of Goods and Services in 1998

Low Aversion			High Aversion		
Expenditure Item	Distributional Characteristic	Rank	Expenditure Item	Distributional Characteristic	Rank
Kapenta	1.087	1	Onion	1.0411	1
Sorghum	1.027	2	Kapenta	1.0053	2
Sweet potatoes	1.023	3	Cassava	0.5233	3
Cassava	0.93	4	Groundnuts	0.4626	4
Roller meal	0.813	5	Vegetables	0.4031	5
Groundnuts	0.772	6	Butter	0.3837	6
Onion	0.769	7	Salt	0.3178	7
chicken	0.727	8	Health	0.2962	8
Butter	0.718	9	beans	0.2929	9
Charcoal/Firewood	0.681	10	chicken	0.2846	10
Fish	0.646	11	Soap	0.2508	11
maintenance Bike	0.642	12	Beef	0.2435	12
Beef	0.639	13	Irish potatoes	0.2112	13
Irish potatoes	0.623	14	Sweet potatoes	0.201	14
Soap	0.621	15	Fish	0.1961	15
Eggs	0.621	16	Candles/parafin	0.1806	16
Vegetables	0.597	17	Rice	0.1785	17
Candles/Paraffin	0.597	18	Sorghum	0.177	18
Salt	0.585	19	Charcoal/Firewood	0.1633	19
Sugar	0.581	20	Milk	0.1466	20
Bread	0.573	21	Eggs	0.1459	21
Other Food	0.564	22	Roller meal	0.1302	22
Electricity	0.563	23	Tea	0.1162	23
Milk	0.561	24	Sugar	0.1036	24
Cooking oil	0.536	25	Other Food	0.0972	25
Rice	0.516	26	maintenance Bike	0.0914	26
Public Transport	0.512	27	Fruits	0.0789	27
Fruits	0.5	28	Cooking oil	0.075	28
Beverages	0.482	29	Game Meat	0.0747	29
Clothing	0.475	30	Public Transport	0.0745	30
Telephone	0.446	31	Bread	0.068	31
Fuel	0.442	32	Cigarette	0.057	32
Beans	0.424	33	Beverages	0.0552	33
Tea	0.414	34	Tomatoes	0.0536	34
Water	0.405	35	Pork	0.052	35
Rent	0.396	36	Clothing	0.0447	36
Cigarette	0.361	37	Goat	0.0406	37
Alcohol	0.335	38	Alcohol	0.0379	38
Game Meat	0.333	39	Sheep	0.0373	39
Tomatoes	0.305	40	Other Milk	0.0361	40
Health	0.296	41	Maintenance Vehicle	0.0119	41
Education	0.283	42	Education	0.0108	42
Maintenance Vehicle	0.261	43	Telephone	0.0058	43
Pork	0.253	44	Water	0.0057	44
Communication	0.221	45	Fuel	0.0037	45
Sheep	0.22	46	Communication	0.0037	46
Goat	0.211	47	Electricity	0.0003	47
Other Milk	0.18	48	Rent	0.0002	48

Table 3: Distributional Characteristic of Goods and Services in 2004

Low Aversion			High Aversion		
Expenditure Item	Distributional Characteristic	Rank	Expenditure Items	Distributional Characteristic	Rank
Sweet Potatoes	1.3	1	Beans	1.125	1
Cassava	1.26	2	Vegetables	0.985	2
salt	1.15	3	Onion	0.792	3
Kapenta	1.08	4	Kapenta	0.773	4
Sweet potatoes	1.06	5	salt	0.746	5
Millet	1	6	Sweet	0.408	6
Beans	0.94	7	Goat Meat	0.325	7
Onion	0.92	8	Chicken	0.262	8
Groundnuts	0.86	9	Sweet potatoes	0.213	9
Vegetables	0.83	10	Millet	0.203	10
Mealie Meal	0.82	11	Groundnuts	0.196	11
Chicken	0.71	12	Rice	0.187	12
Eggs	0.68	13	Other Poultry	0.186	13
Powdered Milk	0.67	14	Irish potatoes	0.186	14
Sheep	0.66	15	Paraffin/Candles	0.186	15
Irish Potatoes	0.66	16	Personal	0.175	16
Other Poultry	0.64	17	Beef	0.171	17
Butter	0.64	18	Eggs	0.165	18
Beef	0.64	19	Sheep	0.158	19
Cooking Oil	0.63	20	Cassava	0.157	20
Baby food	0.62	21	Baby food	0.147	21
Beverages	0.62	22	Powdered Milk	0.138	22
Tomatoes	0.62	23	Fresh Milk	0.12	23
Public Transport	0.59	24	Honey	0.093	24
Fresh Milk	0.59	25	Fruit	0.086	25
Goat Meat	0.58	26	Cigarette	0.082	26
Fruit	0.57	27	Beverages	0.082	27
Rice	0.57	28	Telephone	0.079	28
Paraffin/Candles	0.57	29	Electricity	0.076	29
Fish	0.57	30	Butter	0.071	30
Personal	0.56	31	Tomatoes	0.07	31
Bread	0.54	32	Game Meat	0.069	32
Sugar	0.52	33	Bread	0.061	33
Game Meat	0.49	34	Alcohol	0.061	34
Cigarette	0.47	35	Mealie Meal	0.057	35
Honey	0.47	36	Cooking Oil	0.053	36
Alcohol	0.45	37	Rent	0.047	37
Electricity	0.45	38	Sugar	0.044	38
Clothing	0.43	39	Public Transport	0.036	39
Rent	0.37	40	Health	0.036	40
Telephone	0.36	41	Fish	0.02	41
Health	0.29	42	Sorghum	0.018	42
Education	0.24	43	Fuel	0.006	43
Sorghum	0.24	44	Education	0.005	44
Water	0.23	45	Water	0.004	45
Fuel	0.22	46	Clothing	0.004	46

APPENDIX B

Statistical Tests for Dominance

In order to show that VAT is progressive or regressive, we use procedures used by Yitzhaki and Slemrod (1991) and Sahn and Younger (1999, 2000) of 'Welfare Dominance Testing'. Welfare Dominance Testing is done by comparing the concentration curve with the Generalised Lorenz curve and 45-degree line. If the concentration curve is below the Lorenz curve then the VAT is progressive, meaning that poorer households pay less VAT compared to richer households in relation to their expenditure and the opposite implies that it is regressive. Dominance tests use statistical tests to confirm this result. In this study, we use the T-test to show that there is a difference between the ordinates of the two curves. To implement the test, we measure the difference of the ordinates of the two curves at equally spaced abscissa of the x-axis to see if the difference of the ordinates of two curves is significantly larger than zero and of the same sign. Since the two curves need not be independent, we follow the method presented in Davidson and Duclos (1997) to derive distribution-free standard errors to test for the significance of the differences between the two curves. If so, we conclude that the progressivity of one of the curves with the smaller ordinates is significantly greater than the other - that is, it "dominates" the other.

Table 7 below presents the final results from the Welfare Dominance Testing.

Table 4: Dominance Test Results

Year	Hypothesis	P-Value	Result	Conclusion
1996	Non-Dominance (Lorenz=Concentration)	Pr(T > t) = 0.0008	Reject Null Hypothesis at 1% significance	Dominance exists
1998	Non-Dominance (Lorenz=Concentration	Pr(T > t) = 0.046	Reject Null hypothesis at 5%	Dominance exists
2004	Non-Dominance (Lorenz=Concentration	Pr(T>t) = 0.0016	Reject Null Hypothesis at 1% significance	Dominance exists

CHAPTER FOUR

Day-of-The-Week Effect in Returns and Volatility of the Kwacha /US Dollar Exchange Rate

*Jonathan M. Chipili**

Abstract

Average daily time series data from January 1994 to March 2010 are used to investigate the existence of the day-of-the-week effect in the logarithmic first difference of the spot ZMK/USD exchange rate. An EGARCH specification that takes account of the distributional features of the exchange rate typically associated with financial time series is employed under different error distributional assumptions. The results reveal strong evidence of the presence of the day-of-the-week effect in volatility of returns in the ZMK/USD exchange rate but weak support for calendar anomalies in returns. Further, a weak risk-return relationship is established. Thus, policy makers could use the information in volatility patterns to guide intervention strategies in the foreign exchange market.

1. Introduction

Empirical work on calendar anomalies on financial asset returns and volatility is well documented. The bulk of the empirical work has mainly focused on stock markets and dates back to the work of Cross (1973), French (1980), Keim and Stambaugh (1984). For detailed empirical studies refer to Berument and Kiymaz (2001), Brooks and Persand (2001), Kiymaz and Breument (2003), Högholm and Knif (2009), Charles (2010) and Ndako (2010). Nonetheless, empirical work on other markets such as futures, treasury bills, bonds and foreign exchange is growing with returns exhibiting behaviour similar to stocks/equities (see Berument and Kiymaz, 2001). For instance, the existence of the day-of-the-week effect in volatility of the British pound, Canadian dollar, Deutsche Mark, Japanese yen, Swiss franc, Turkish lira and Taiwan dollar exchange rates against the US dollar is reported (see McFarland et al., 1982; Hilliard and Tucker, 1992; Cornett et al., 1995; Berument and Kiymaz, 2001; Aydogan and Booth, 2003; Yamori and Mourdoukow, 2003; Yamori and Kurihara, 2004; Saadi et al., 2006; Berument et al., 2007; Ke et al., 2007).

The presence of the day-of-the-week effect implies that investors can devise profitable trading strategies such that stocks are bought on days when returns are low and sold on days when returns are abnormally high (Basher and Sadorsky, 2006). Knowledge and evidence of the existence of calendar anomalies in volatility series is useful for hedging, speculation, risk management, portfolio optimisation and asset valuation (i.e. index options) purposes. In addition, investment decisions are underpinned by risk-return analysis. This entails that

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assets with higher volatility may influence asset allocation depending on the risk-averseness of agents (Berument and Kiymaz, 2001; Kiymaz and Breument, 2003). Further, high volatility may affect trading volumes as liquidity traders are unwilling to trade during periods of high uncertainty (Kiymaz and Breument, 2003).

While evidence regarding variation in the distribution of returns and volatility in returns in the week is mixed (often referred to as day-of-the-week effect puzzle), by and large, average returns and volatility in stock markets tend to be significantly higher on Mondays and Fridays than on other weekdays, respectively. Some of the underlying reasons for calendar anomalies include delays between trading and settlement, risk-return trade-off, speculative short sales and measurement errors (see Berument and Kiymaz, 2001; Berument et al., 2007; Charles, 2010). The tendency for volatility to be higher on Friday is explained by the fact that much economic news is released towards the end of the week (Thursday and Friday), thereby increasing uncertainty. Moreover, even when such news is not released as expected, the market expectations of it happening is factored in the Friday trading as investors can not react to such news over the weekend (see Berument and Kiymaz, 2001). Wednesday is associated with low volatility due to the fact that investors have time to digest the information during the first two trading days of the week and the forecast of what might happen in the last two days of the week. Brooks and Persand (2001) cite market risk (though not sufficiently), unanticipated inflation, changes in exchange rates, the term structure and default risk premium as possible factors underlying calendar anomalies in stock market returns.

It is postulated that the existence of calendar anomalies contradict the efficient market hypothesis as investors can devise trading strategies to exploit predictable patterns in returns. However, Brooks and Persand (2001) caution against making such conclusions and argue that transaction costs and time-varying stock market risk premium should be considered in determining the net gains investors make in such trading strategies. It is possible that the reported small excess returns in the literature may be offset by transaction costs. In addition, the excess return could be a reflection of the risk investors assume.

This study extends the investigation of the day-of- the-week effect to the foreign exchange market in Zambia where empirical work is scarce. Thus, post-liberalisation period (1994 to 2010) is studied. A sub-period 2003 to 2010 corresponding to the launch of the interbank foreign exchange market (IFEM) is examined to establish whether the pattern in returns and volatility are sensitive to changes in sample periods. Moreover, the determination of the official Kwacha exchange rate during the sub-period is underpinned by activities in the interbank market as opposed to the pre-IFEM period when there was an interchange of exchange rate determination mechanisms (see Chipili, 2004). Further, sub-samples corresponding to different exchange rate determination mechanisms pre-IFEM period are too short to warrant a meaningful use of the GARCH[1] model. Thus, average daily data from April 1994 to March 2010 are employed in examining the existence of calendar anomalies in the spot Zambian Kwacha/US dollar exchange rate (ZMK/USD) in the EGARCH specification under different error distributional assumptions. Saadi et al. (2006) posit that detection of calendar anomalies is sensitive to the error distributional assumption. They establish that the degree of leptokurtosis in the error distribution affects the extent of statistical significance of the week day dummy effect such that the day-of-the-week hypothesis is rejected under fat tail distributions. Thus, it is imperative to take account of the non-normality and volatility clustering behaviour typical of financial time series in the estimation procedure to validate the existence of calendar anomalies. Accordingly, this

[1]Generalised Autoregressive conditional heteroskedasticity

study adopts the Saadi et al. (2006) strategy and employs the EGARCH[2] (1,1) method under three error distributional assumptions namely, normal, student's t and generalised error distribution (GED) to determine the robustness of the day-of-the-week effect in both returns and volatility of the ZMK/USD exchange rate over the 1994-2010 period.

The results reveal strong evidence of the presence of day-of-the-week effect in volatility of the ZMK/USD exchange rate during the entire sample and the sub-period. Despite weak support for the day-of-the-week effect in returns hypothesis, returns are highest on Monday while volatility is lowest on Wednesday. Hence, a weak risk-return relationship exists as days with high (low) returns do not correspond to days with high (low) volatility.

The rest of the paper proceeds as follows. Section 2 specifies the estimated model and briefly discusses the estimation procedure. Empirical results are reported in Section 3 while Section 4 concludes and offers policy recommendations.

2. Model Specification, Data and Methodology

Similar to Saadi et al. (2006), the day-of-the-week effect in returns and volatility of the spot ZMK/USD exchange rate is investigated in the EGARCH framework. Average daily ZMK/USD exchange rate spanning from 3 January 1994 to 31 March 2010 (4,238 observations) obtained from DataStream are used. The sub-period (23 July 2003 - 31 March 2010) has a total of 1,746 observations. Returns are calculated as the logarithmic first difference in the ZMK/USD exchange rate while volatility is measured as conditional variance according to the EGARCH model. Notwithstanding the argument that detection of the day-of-the-week effect can be influenced by the choice of the volatility model (see Charles, 2010), the EGARCH model is used on the strength of the existence of asymmetric evidence in the ZMK/USD exchange rate (see Chipili, 2010). Berument et al. (2007) employ the EGARCH model in the Turkish lira/US dollar exchange rate day-of-the-week effect study as well.

In line with Berument and Kiymaz (2001), Kiymaz and Breument (2003), Saadi et al. (2006) and Berument et al. (2007), detection of the presence of day-of-the-week effect in returns and volatility of the ZMK/USD exchange rate proceeds in three steps. Firstly, the day-of-the-week dummies are introduced only in the mean equation (equation 1) to determine whether the day-of-the-week effect is only present in returns. Secondly, the day-of-the-week dummies are only incorporated in the conditional variance equation (equation 2) to determine whether the day-of-the-week effect is only present in volatility. Finally, the day-of-the-week dummies are simultaneously incorporated in the mean and conditional variance equations (equation 3) to determine whether detection of day-of-the-week is sensitive to this type of specification. Previous studies only test day-of-the-week firstly with dummies in the mean equation and then jointly in the mean and volatility equations. The three empirical equations are

$$R_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i R_{t-i} + \phi D + \alpha_M D_{Mt} + \alpha_T D_{Tt} + \alpha_{TH} D_{THt} + \alpha_F D_{Ft} + \varepsilon_t \qquad (1)$$

$$\log(h_t) = \alpha_0 + \alpha \left[\frac{|\varepsilon_{t-1}|}{\sqrt{h_{t-1}}} \right] + \gamma \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta \log(h_{t-1}) + \phi D + \upsilon_t$$

[2]Extended GARCH

$$R_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i R_{t-i} + \phi D + \varepsilon_t \tag{2}$$

$$\log(h_t) = \alpha_0 + \alpha\left[\frac{|\varepsilon_{t-1}|}{\sqrt{h_{t-1}}}\right] + \gamma\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta\log(h_{t-1}) + \phi D + v_M D_{Mt} + v_T D_{Tt} + v_{TH} D_{THt} + v_F D_{Ft} + \upsilon_t$$

$$R_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i R_{t-i} + \phi D + \alpha_M D_{Mt} + \alpha_T D_{Tt} + \alpha_{TH} D_{THt} + \alpha_F D_{Ft} + \varepsilon_t \tag{3}$$

$$\log(h_t) = \alpha_0 + \alpha\left[\frac{|\varepsilon_{t-1}|}{\sqrt{h_{t-1}}}\right] + \gamma\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta\log(h_{t-1}) + \phi D + v_M D_{Mt} + v_T D_{Tt} + v_{TH} D_{THt} + v_F D_{Ft} + \upsilon_t$$

$$\varepsilon_t | I_{t-1} \sim (0, h_t)$$

where R_t is returns in the ZMK/USD exchange rate such that ε_t is residuals used to compute h_t; h_t is conditional variance (volatility) of R_t derived from EGARCH (1,1) model υ_t; is standardized residuals; I_{t-1} is the information set at time $t-1$; q is the lag length; D_{Mt}, D_{Tt}, D_{THt}, and D_{Ft} are respectively dummy variables representing Monday, Tuesday, Thursday and Friday (such that $D_{Mt} = 1$ if the day is Monday and 0 otherwise and so on). Thus, Wednesday is used a base level for comparison with other days in the week. Wednesday is excluded in the specification to avoid the dummy variable trap. D represents outliers that are included in the specification to remove the effects of extraordinary events so that ARCH/GARCH effects are appropriately captured (see Fang and Miller, 2009). Statistically significant $\alpha_M, \ldots. \alpha_F$, and $v_M, \ldots, v_F$ coefficients support the day-of-the-week effect hypothesis in returns and volatility of the ZMK/USD exchange rate, respectively.

Often times, the assumption made about the distribution of ε_t is that it is normal. Since the assumption of normal error distribution is strongly rejected in the literature with regard to the behaviour of financial time series (see Saadi et al., 2006), alternative distributional assumptions namely GED student's t and double exponential (fat-tailed error distributional assumptions) are considered in order to obtain robust results in support of the existence of the day-of-the-week effect hypothesis. Moreover, these three assumptions are commonly used for estimating GARCH models as they appropriately describe the behaviour of most financial time series as opposed to the normal distribution assumption. Consequently, this study tests the day-of-the-week effect under three error distributional assumptions namely, normal, GED and student's t. Saadi et al. (2006) consider the double exponential error distribution in addition to normal GED and student's t assumptions.

3. Empirical Results

The results for empirical equations 1-3 are reported in Tables 1-6. The EGARCH model results in Tables 2-6 are robust as there is no evidence of serial correlation, heteroskedasticity and remaining ARCH effects in residuals. These results remain valid despite the residuals being non-normal based on the J-B test at 1 percent significance level (see Fang and Miller, 2009). Optimal lags of 8 and 7 are chosen according to Tsay (2002) in order to eliminate autocorrelation in standardized residuals. The GED parameters are significantly lower than two, thus confirming that the density has thicker tails than the normal distribution. The same result applies to the student's t parameter. However, Table 1 results reveal evidence of autocorrelation, thus suggesting spurious day-of-the-week effect evidence for the full sample period under the normal error distribution assumption.

The model selection criteria (i.e. Log-likelihood, AIC and SBC) favours the EGARCH GED model followed by EGARCH student's t model. The EGARCH normal model is ranked last, thus justifying the use of fat-tailed error distributions that characteristically capture features underlying the ZMK/USD exchange rate. Further, the log-likelihood model selection criterion favours results from equation 3 than the other two equations.

The results reveal that detection of the day-of-the-week effect in the returns of the ZMK/USD exchange rate is sensitive to the sample studied and assumptions made about the error distribution. The evidence of the day-of-the-week effect in returns for both the entire sample (1994-2010) and sub-sample (2003-2010) periods under normal and student's t error distributional assumptions is confirmed (with the exception of full sample under EGARCH student's t model). However, the GED assumption rejects the existence of the day-of-the-week effect hypothesis for both periods. Conversely, support for the day-of-the-week effect is found for volatility in returns consistently across the three error distributional assumptions and sample periods under study.

It is noteworthy that the evidence in support of the day-of-the-week effect in returns is relatively weak in the EGARCH student's t model at 10 percent significance level. However, strong evidence is found in the EGARCH normal model (equation 3) at 1 percent significance level in the sub-period sample.

Nonetheless, disregarding the EGARCH normal model results in Table 1, average returns in the ZMK/USD exchange rate are consistently and significantly higher on Monday than other days of the week in line with evidence in the literature. Thus, all else being equal, agents may buy US dollars on any of the other days in the week and sell them for Kwacha on Monday at a profit.

With regard to the volatility in returns of the ZMK/USD exchange rate, evidence of variation in volatility across the week is found under the three error distributional assumptions, sample periods and model specifications (i.e. equations 2 and 3). By and large, volatility in returns of the ZMK/USD exchange rate is lowest on Wednesday. The statistical significance of the other week day dummies varies, especially in the case of equation 2. The results from equation 3 reveal that Tuesday is associated with the highest volatility (the same applies to equation 2 wherever the coefficient on Tuesday is statistically significant). Generally, Thursday's volatility is not statistically different from Wednesday's; and this evidence is robust to alternative error distributions.

Finally, shocks to the conditional variance of the ZMK/USD exchange rate tend to persist over future horizons. In addition, price shocks raise conditional volatility in the ZMK/USD exchange. Evidence of negative asymmetry in the ZMK/USD exchange rate is found: negative shocks tend to raise conditional volatility in the ZMK/USD exchange rate more than positive shocks reduce volatility.

Table 1: Empirical Results: Full Sample (3 January 1994-31 March 2010): EGARCH Normal Model

	Equation (1)	Equation (2)	Equation (3)
Mean Equation			
α_0	9.32e-05(0.62)	0.00(11.12)***	6.92e-05(0.38)
α_1	-0.19(-13.62)***	-0.18(-12.36)***	-0.19(-12.53)***
ϕ	-0.03(-4.50)***	-0.03(-3.92)***	-0.03(-3.90)*
α_M	0.00(4.45)***		0.00(4.03)***
α_T	0.00(2.99)***		0.00(2.86)***
α_{TH}	6.04e-05(0.22)		0.00(0.37)
α_F	0.00(1.21)		0.00(1.17)
Variance Equation			
α_0	-0.50(-27.88)***	-0.47(-23.86)***	-0.47(-20.50)***
α	0.26(42.87)***	0.27(43.63)***	0.27(40.81)*
γ	0.01(1.86)*	0.01(2.37)**	0.01(1.52)
β	0.96(543.62)***	0.96(553.78)***	0.96(473.07)***
ϕ	1.96(13.61)***	1.92(12.36)***	1.94(12.07)***
v_M		-0.01(-0.15)	-0.00(-0.04)
v_T		0.20(6.23)***	0.18(5.50)***
v_{TH}		-0.35(-12.45)***	-0.35(-12.23)***
v_F		-0.08(-2.58)***	-0.08(-2.62)***
Diagnostic Tests			
$\upsilon_t Q(8)$	36.24[0.00]	28.97[0.00]	33.30[0.00]
$\upsilon_t^2 Q(8)$	9.96[0.27]	8.81[0.27]	9.81[0.28]
J-B	26588.68[0.00]	25273.33[0.00]	24958.63[0.00]
ARCH LM	5.94[0.01]	5.82[0.02]	5.92[0.02]
Log L	13982.58	13995.80	14007.80
AIC	-6.59	-6.60	-6.60
SBC	-6.58	-6.58	-6.58

Notes: z-statistics are reported in parenthesis while p-values are in square brackets. ***,** and * indicate coefficient significance at the 1%, 5% and 10% probability level, respectively. $\upsilon_t Q(8)$ and $\upsilon_t^2 Q(8)$ are tests for serial correlation and heteroskedasticity based on the Ljung-Box Q-statistic conducted on standardised (υ_t) and squared standardised (υ_t^2) residuals, respectively; J-B is test for normality of residuals; LogL=log-likelihood value; AIC=Akaike information criteria; and SBC=Shwartz information criteria. The optimal lag length of 8 (Q(8)) is determined according to Tsay (2002) $k = \ln(T)$ where k is lag length and T is the number of observations.

Table 2: Empirical Results: Sub-period (23 July 2003-31 March 2010): EGARCH Normal Model

	Equation (1)	Equation (2)	Equation (3)
Mean Equation			
α_0	-0.00(-0.70)	-7.08e-05(-0.39)	-0.000(-0.70)
α_1	-0.08(-3.07)***	-0.09(-3.58)***	-0.09(-3.43)***
ϕ	-0.07(-2.90)***	-0.07(-3.14)***	-0.08(-3.05)***
α_M	0.00(2.09)**		0.001(2.21)***
α_T	0.00(1.39)		0.001(1.15)
α_{TH}	-0.00(-1.08)		-0.001(-1.11)
α_F	-0.00(-0.66)		-0.000(-0.67)
Variance Equation			
α_0	-0.56(-9.65)***	-0.69(-7.95)***	-0.70(-8.03)***
α	0.27(13.92)***	0.27(13.48)***	0.29(13.01)***
γ	-0.02(-2.37)**	-0.03(-2.52)**	-0.03(-2.48)**
β	0.96(176.48)***	0.96(161.97)***	0.96(157.89)***
ϕ	1.72(4.72)***	1.79(5.21)***	1.82(5.10)***
v_M		-0.19(-1.95)*	-0.18(-1.87)*
v_T		0.46(4.50)***	0.47(4.34)***
v_{TH}		0.10(0.84)	0.10(0.81)
v_F		-0.15(1.69)*	0.16(1.78)*
Diagnostic Tests			
$\upsilon_t Q(7)$	4.50[0.72]	4.97[0.66]	5.71[0.64]
$\upsilon_t^2 Q(7)$	11.04[0.14]	11.52[0.12]	11.75[0.11]
J-B	993.03[0.00]	897.04[0.00]	851.27[0.00]
ARCH LM	3.51[0.06]	4.32[0.04]	4.19[0.04]
Log L	5624.16	5625.86	5631.71
AIC	-6.43	-6.43	-6.43
SBC	-6.39	-6.41	-6.38

Notes: z-statistics are reported in parenthesis while p-values are in square brackets. ***,** and * indicate coefficient significance at the 1%, 5% and 10% probability level, respectively. $\upsilon_t Q(7)$ and $\upsilon_t^2 Q(7)$ are tests for serial correlation and heteroskedasticity based on the Ljung-Box Q-statistic conducted on standardised (υ_t) and squared standardised (υ_t^2) residuals, respectively; J-B is test for normality of residuals; LogL = log-likelihood value; AIC= Akaike information criteria; and SBC=Shwartz information criteria. The optimal lag length of 7 (Q(7)) is determined according to Tsay (2002): $k = \ln(T)$ where k is lag length and T is the number of observations.

Table 3: Empirical Results: 3 January 1994-31 March 2010: EGARCH GED Model

	Equation (1)	Equation (2)	Equation (3)
Mean Equation			
α_0	-1.29e-05(-1.45)	1.56e-06(0.02)	-2.69e-08(-0.00)
α_1	-2.63e-05(-0.01)	9.04e-05(0.01)	-0.00(-0.05)
ϕ	-0.08(-51.55)***	-0.08(-71.08)***	-0.08(-50.05)***
α_M	2.15e-05(0.21)		2.43e-06(0.01)
α_T	1.34e-05(0.09)		2.28e-06(0.01)
α_{TH}	1.42e-05(0.10)		4.84e-07(0.00)
α_F	1.33e-05(0.09)		2.12e-07(0.00)
Variance Equation			
α_0	-0.80(-9.97)***	-2.23(-18.61)***	-0.31(-7.85)***
α	0.26(13.81)***	0.39(25.01)***	0.20(15.62)***
γ	-0.12(-7.33)***	-0.08(-5.59)***	-0.11(-9.34)***
β	0.93(116.12)***	0.79(78.34)***	0.97(295.58)***
ϕ	-3.55(-23.81)***	-2.81(-28.56)***	-3.66(-23.60)***
v_M		0.003(0.04)	0.12(1.14)
v_T		0.14(1.62)	0.16(1.69)*
v_{TH}		-0.28(-3.92)***	-0.41(-5.92)***
v_F		-0.27(-3.42)***	-0.14(-1.38)
GED parameter	0.62(49.45)***	0.86(66.52)***	0.64(44.92)***
Diagnostic Tests			
$\upsilon_t Q(8)$	5.80[0.67]	8.79[0.36]	7.46[0.49]
$\upsilon_t^2 Q(8)$	0.01[1.00]	0.02[1.00]	0.01[1.00]
J-B	3.34e+08[0.00]	1.03e+08[0.00]	2.70e+08[0.00]
ARCH LM	0.001[0.97]	0.002[0.97]	0.001[0.97]
Log L	15261.1	14841.3	15352.6
AIC	-7.20	-7.00	-7.24
SBC	-7.18	-6.98	-7.21

Notes: z-statistics are reported in parenthesis while p-values are in square brackets. ***,** and * indicate coefficient significance at the 1%, 5% and 10% probability level, respectively. $\upsilon_t Q(8)$ and $\upsilon_t^2 Q(8)$ are tests for serial correlation and heteroskedasticity based on the Ljung-Box Q-statistic conducted on standardised (υ_t) and squared standardised (υ_t^2) residuals, respectively; J-B is test for normality of residuals; LogL=log-likelihood value; AIC=Akaike information criteria; and SBC=Shwartz information criteria. The optimal lag length of 8 (Q(8)) is determined according to Tsay (2002): $k = \ln(T)$ where k is lag length and T is the number of observations.

Table 4: Empirical Results: 23 July 2003-31 March 2010: EGARCH GED Model

	Equation (1)	Equation (2)	Equation (3)
Mean Equation			
α_0	7.44e-07(0.00)	-5.59e-08(-0.00)	-9.73e-09(-0.00)
α_1	-0.00(-0.08)	-0.00(-0.05)	-0.00(-0.05)
ϕ	-0.09(-7.99)***	-0.09(-5.15)***	-0.09(-15.56)***
α_M	-1.42e-06(-0.00)		8.93e-06(0.02)
α_T	1.37e-05(0.03)		4.34e-07(0.00)
α_{TH}	-2.21e-05(-0.05)		-1.47e-05(-0.03)
α_F	-1.69e-05(-0.04)		-5.46e-06(-0.01)
Variance Equation			
α_0	-0.42(-4.18)***	-0.60(-3.13)***	-1.63(-5.84)***
α	0.24(6.76)***	0.27(6.63)***	0.42(7.00)***
γ	-0.03(-1.41)	-0.03(-1.21)	-0.00(-0.05)
β	0.97(101.56)***	0.96(84.60)***	0.88(34.21)***
ϕ	-0.55(-2.20)**	0.47(1.45)	0.54(1.85)*
v_M		-0.07(-0.30)	0.05(0.23)
v_T		0.41(1.52)	0.57(2.21)**
v_{TH}		0.05(0.19)	0.20(0.81)
v_F		-0.00(-0.00)	0.10(0.48)
GED parameter	0.89(22.67)***	0.88(23.35)***	0.86(22.97)***
Diagnostic Tests			
$\upsilon_t Q(7)$	5.75[0.57]	4.20[0.76]	3.11[0.88]
$\upsilon_t^2 Q(7)$	2.01[0.96]	5.86[0.56]	7.24[0.40]
J-B	26282.4[0.00]	1990.0[0.00]	2296.85[0.00]
ARCH LM	0.02[0.86]	1.16[0.28]	0.03[0.86]
Log L	5784.0	5784.4	5787.00
AIC	-6.61	-6.62	-6.61
SBC	-6.57	-6.58	-6.57

Notes: z-statistics are reported in parenthesis while p-values are in square brackets. ***,** and * indicate coefficient significance at the 1%, 5% and 10% probability level, respectively. $\upsilon_t Q(7)$ and $\upsilon_t^2 Q(7)$ are tests for serial correlation and heteroskedasticity based on the Ljung-Box Q-statistic conducted on standardised (υ_t) and squared standardised (υ_t^2) residuals, respectively; J-B is test for normality of residuals; LogL=log-likelihood value; AIC=Akaike information criteria; and SBC=Shwartz information criteria. The optimal lag length of 7 (Q(7)) is determined according to Tsay (2002): $k = \ln(T)$ where k is lag length and T is the number of observations.

Table 5: Empirical Results: 3 January 1994-31 March 2010: EGARCH Student's t Model

	Equation (1)	Equation (2)	Equation (3)
Mean Equation			
α_0	2.66e-06(0.03)	5.04e-05(2.34)**	1.67e-05(0.19)
α_1	-0.09(-7.12)***	-0.07(-6.11)***	-0.09(-6.99)***
ϕ	-0.09(-5.21)***	-0.09(-6.59)***	-0.09(-5.20)***
α_M	0.00(0.70)		8.87e-05(0.64)
α_T	3.95e-06(0.02)		-1.82e-06(-0.01)
α_{TH}	-8.99e-07(-0.01)		-1.46e-05(-0.09)
α_F	3.34e-06(0.02)		-1.67e-05(-0.12)
Variance Equation			
α_0	-0.63(-13.35)***	-0.28(-6.90)***	-0.57(-9.68)***
α	0.88(3.75)***	1.93(2.01)**	0.94(3.20)***
γ	-0.15(-3.02)***	-0.47(-1.98)**	-0.17(-2.73)***
β	0.96(213.19)***	0.98(324.36)***	0.97(233.85)***
ϕ	2.06(4.79)***	1.15(3.15)***	1.82(4.26)***
v_M		0.36(3.87)***	0.35(3.75)***
v_T		0.08(0.86)	0.19(2.03)**
v_{TH}		-0.22(-2.53)**	-0.20(-2.13)**
v_F		-0.39(-4.34)***	-0.29(-3.17)***
$T-DIST$ *parameter*	2.13(27.86)***	2.01(140.01)***	2.10(30.83)***
Diagnostic Tests			
$\upsilon_t Q(8)$	7.87[0.45]	8.55[0.38]	7.74[0.46]
$\upsilon_t^2 Q(8)$	0.94[1.00]	0.11[1.00]	0.48[1.00]
J-B	1031166[0.00]	12686897[0.00]	2146931
ARCH LM	0.13[0.71]	0.01[0.91]	0.06[0.81]
Log L	15027.1	15061.4	15051.2
AIC	-7.09	-7.10	-7.09
SBC	-7.07	-7.08	-7.07

Notes: z-statistics are reported in parenthesis while p-values are in square brackets. ***,** and * indicate coefficient significance at the 1%, 5% and 10% probability level, respectively. $\upsilon_t Q(8)$ and $\upsilon_t^2 Q(8)$ are tests for serial correlation and heteroskedasticity based on the Ljung-Box Q-statistic conducted on standardised (υ_t) and squared standardised (υ_t^2) residuals, respectively; J-B is test for normality of residuals; LogL=log-likelihood value; AIC=Akaike information criteria; and SBC=Shwartz information criteria. The optimal lag length of 8 (Q(8)) is determined according to Tsay (2002): $k = \ln(T)$ where k is lag length and T is the number of observations.

Table 6: Empirical Results: 23 July 2003-31 March 2010: EGARCH Student's t Model

	Equation (1)	Equation (2)	Equation (3)
Mean Equation			
α_0	-0.00(-1.39)	-0.000(-1.48)	-0.000(-1.5)
α_1	-0.09(-3.92)***	-0.09(-4.12)***	-0.09(-4.07)***
ϕ	-0.09(-3.24)***	-0.09(-3.51)***	-0.09(-3.54)***
α_M	0.001(1.66)*		0.001(1.70)*
α_T	0.000(0.95)		0.00(0.96)
α_{TH}	-0.000(-0.29)		-0.00(-0.29)
α_F	-1.14e-05(-0.02)		-1.65e-05(-0.03)
Variance Equation			
α_0	-1.05(-6.38)***	-1.08(-5.36)***	-1.04(-5.24)***
α	0.45(6.7)***	0.44(6.58)***	0.44(6.69)***
γ	-0.01(-0.29)	-0.01(-0.34)	-0.01(-0.40)
β	0.91(55.45)***	0.92(58.36)***	0.92(60.11)***
ϕ	1.87(3.07)***	1.75(2.97)***	1.74(2.98)***
v_M		-0.03(-0.14)	-0.05(-0.27)
v_T		0.41(1.78)*	0.40(1.73)*
v_{TH}		0.07(0.29)	0.04(0.18)
v_F		-0.04(-0.23)	-0.05(-0.29)
$T-DIST$ *parameter*	2.93(10.09)***	2.88(10.00)***	2.91(9.94)***
Diagnostic Tests			
$\upsilon_t Q(7)$	6.63[0.47]	6.64[0.47]	6.56[0.48]
$\upsilon_t^2 Q(7)$	8.49[0.29]	8.27[0.31]	8.64[0.28]
J-B	1335.1	1129.6	1102.0
ARCH LM	0.06[0.81]	0.17[0.68]	0.26[0.61]
Log L	5762.3	5763.4	5766.4
AIC	-6.56	-6.59	-6.59
SBC	-6.55	-6.55	-6.53

Notes: z-statistics are reported in parenthesis while p-values are in square brackets. ***,** and * indicate coefficient significance at the 1%, 5% and 10% probability level, respectively. $\upsilon_t Q(7)$ and $\upsilon_t^2 Q(7)$ are tests for serial correlation and heteroskedasticity based on the Ljung-Box Q-statistic conducted on standardised (υ_t) and squared standardised (υ_t^2) residuals, respectively; J-B is test for normality of residuals; LogL=log-likelihood value; AIC=Akaike information criteria; and SBC=Shwartz information criteria. The optimal lag length of 7 (Q(7)) is determined according to Tsay (2002): $k = \ln(T)$ where k is lag length and T is the number of observations.

4. Concluding Remarks

The day-of-the-week effect in the returns and volatility of the ZMK/USD exchange rate was investigated over the period 3 January 1994-31 March 2010 using daily data. The EGRACH(1,1) specification was employed in line with the literature. The results reveal overwhelming support for variation in volatility in the ZMK/USD exchange rate across the three error distributional assumptions and sample periods. However, evidence in support of the day-of-the-week effect for returns in the ZMK/USD exchange rate appears weak, thus suggesting limited scope for agents to exploit profitable strategies in returns of the

ZMK/USD exchange rate. Returns in the ZMK/USD tend to be high on Monday while volatility in returns of the ZMK/USD exchange rate is lowest on Wednesday. Generally, Thursday's volatility is not statistically different from Wednesday's. The results indicate a weak risk-return relationship similar to Saadi et al. (2006) as days with high (low) returns do not correspond to days with high (low) volatility. Thus, policy makers could use the information in volatility patterns to guide intervention strategies in the foreign exchange market.

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CHAPTER SIX

An Estimation of the VAT gap: A Quantification and Analysis of the VAT gap in Zambia[α]

Michael Alexeev and Mumbi P. Chileshe

Abstract

The paper estimates the VAT gap in Zambia for the period 2009-2012 and compares its performance to that of other countries. Using an aggregated top down approach we find that the VAT gap in Zambia in 2009-2011 ranged from 6.30% of GDP in 2009 to 4.34% of GDP in 2010, 4.91% in 2011, and 4.94% in 2012. Furthermore, the paper indicates that despite some improvements in the VAT revenue performance, comparisons with other countries using regression analysis show that Zambia still exhibits lower VAT efficiency in some important respects. The results also suggest that there is still scope for improving VAT performance in Zambia and consequently improving the country's revenues which are greatly needed for social and infrastructure development.

1. Introduction

The aim of this paper was to estimate the Value Added Tax (VAT) for the period 2009-2012 as well as comparing the VAT performance to that of other comparable countries. The VAT gap is defined as the difference between the theoretical net VAT liability (or VAT that should have been collected given the country's VAT base and VAT law) and the actual collections (Reckon et al., 2009). In most cases, the VAT gap is measured relative to the VAT base estimated from official economic data.

There are several reasons to which the VAT gap can be attributed to. One major factor that could make the VAT collections to be less than theoretical liability is tax evasion. Tax evasion can take various forms such as undeclared cash sales by registered taxpayers or sales by taxpayers who are not registered despite being required to do so[1]; fly-by-night firms that accumulate VAT within the VAT chain and then disappear without remitting VAT to the government; and through fraudulent activities such as false claims of credits (false invoicing) or even refunds for transactions that did not take place. In many countries, claiming refunds for fake exports is a particularly popular scheme.

However, it is important to note that the VAT gap does not only reflect fraud but also other losses due to legitimate tax avoidance, bankruptcies, timing differences, etc. These revenue losses are usually minor compared to revenue losses caused by tax evasion. In this regard, a large VAT gap would imply that the VAT system is not working well. On the other hand, a small VAT gap may not necessarily reflect efficient performance of tax administration. VAT

[α]This paper is an extension of the earlier work conducted on behalf of IGC/ZRA by the author(s). The extensions were done by P. Chileshe for the year 2012as well as re-alignment of the paper including the literature review.

[1]This tax evasion would be part of the VAT gap as long as the undeclared sales were nonetheless included in the official GDP.

revenue can be relatively large due to the failure of the tax service to make refunds or allow credits in a timely fashion even when these refunds and credit claims are legitimate.

It is also important to keep in mind that conventional measures of the VAT gap are made relative to the size of the official VAT base. That is, transactions that occur entirely in the unofficial economy and are not taken into account in GDP calculations would not enter into the conventional VAT gap estimates either. Note that the unregistered sales referred to above as part of VAT fraud component of the VAT gap were supposed to be included in GDP. Some sales, however, may escape notice by statistical authorities altogether. In this case, they would not be counted as part of a conventional VAT gap.

The VAT gap may be difficult to interpret without comparisons to other countries at a comparable stage of economic development. After all, it is unreasonable to expect a developing country to obtain efficiency of tax administration similar to that of developed countries with substantial experience in government administration in general and tax administration in particular. Therefore, it makes sense to supplement VAT gap estimates with comparative analysis of VAT revenue performance (so-called VAT efficiency) controlling for some basic country characteristics and the main parameters of the VAT system such as VAT rate. This comparison is done based on regression analysis and is supposed to compensate for the unavoidable crudeness of VAT gap estimates.

Using the top down approach, we find that the VAT gap in Zambia in 2009-2012 ranged from 6.28% of GDP in 2009 to 4.34% of GDP in 2010, with 2011 and 2012 gap being larger than in 2010. Although these results demonstrate some improvement in VAT revenue performance, comparisons with other countries using regression analysis show that at least in some specifications, Zambia still exhibits lower VAT efficiency than other countries that are comparable in some important respects.

This paper is organized as follows. The following section presents the literature review on the subject. Section 3 presents the methodology and description of data sources. Section 4 presents the results while Section 5 concludes.

2.0 Literature Review

Empirical and theoretical literature on VAT gap estimation is scarce, especially in developing countries where data constraints are prominent. Few studies that have been undertaken are mostly from developed countries were data constraints are minimal. In this section, a few empirical studies will be presented to espouse the various methods that have been used to estimate the VAT gap. In addition, literature on the comparison of VAT performance across countries will be presented.

A CBP and CASE study report of 2013 entitled "Study to quantify and analyse the VAT Gap in the EU-27 Member States" uses the a top-down approach to estimate VAT gap in 27 member states. Furthermore, the study made an attempt to compare the performance of the VAT among EU countries. The report estimates that the total VAT Gap for the 26 EU countries amounted to approximately Euro 193 billion in 2011, or about 1.5 percent of the GDP of the EU-26, an increase from the 1.1 percent of EU-26 GDP recorded in 2006. Italy, France, Germany and the United Kingdom contributed over half of the total VAT Gap in absolute terms, although in terms of their own GDP the countries with the largest gaps are Romania, Latvia, Greece and Lithuania. Econometric estimates of the determinants of the VAT Gap show that VAT compliance appears to fall when tax rates are increased, at least in countries with weaker tax enforcement. In addition, VAT compliance appears to fall during recessions. The report concludes that estimates of the VAT gaps show the importance of enforcement and compliance in the performance of VAT.

Reckon (2009) uses a top down approach to quantify the VAT gap in 25 EU member states for the period 2000-2006. The results of the study indicates that the total VAT gap in absolute terms has been increasing over the years rising from Euro 90.9 million in 2000 reaching Euro 113.3 million in 2005, then declining to Euro 106.1 million in 2006. As a percentage of the VAT theoretical liability the VAT gap was 13% in 2000, 14% in 2003 and 12% in 2006. The study uses an econometric approach to understand the nature and causes of VAT gap. The study finds that the performance of VAT is strongly correlated with the level of corruption in a country. An increase in the level of corruption increases the VAT gap. Further, the VAT standard rate was found to positively affect the VAT performance across countries.

Kleven et al. (2010) uses a bottom up econometric method using randomised tax audit data to estimate the extent of tax evasion in Denmark. They find that the tax evasion rate is very small (0.3%) for income subject to third-party reporting, but substantial (37%) for self-reported income. They attribute this to the fact that 95% of all income is third-party reported in Denmark. Further, find that marginal tax rates have a positive impact on tax evasion, but that this effect is small in comparison to avoidance responses while tax audits tend to increase the level of compliance among taxpayers. Finally, the threat-of-audit letters also have a significant effect on self-reported income, and the size of this effect depends positively on the audit probability expressed in the letter. Other studies which have used the bottom-up method include Minnesota Revenue (2004) which estimated a direct tax gap of 10.6% in 1999 while the New York Department of Taxation and Finance (2005) estimates at 13.9% using 2002 data. Using a top-down approach, Her Majesty's Revenue Service (HRMS) estimates a VAT gap of 30% of total VAT theoretical liability.

Literature outlined above clearly indicates that tax gaps are estimated using two broad methods; the bottom-up and top-down approaches. The bottom-up approach requires the presence of randomised tax audits which are very difficult to obtain in developing countries as resources are scarce to conduct such kind of audits. On the other hand, the top-down approach is less data intensive and uses national accounts data to estimate the tax gap. Another important feature of the literature is that it is drawn from developed economies with no single study from the developing world. Hence, this paper presents one of the earliest VAT gap estimation in the developing world known to the authors.

3.0 Methodology[2]

3.1 Data

Tax collection data came from Zambia Revenue Authority (ZRA) annual reports while GDP, import and export figures are from various Central Statistical Office (CSO) reports. The rest of the data, except for countries' latitudes come from three sources: World Bank's WDI database, USAID Collecting Taxes database, and World Governance Indicators database. In the cases where USAID data contradicted World Bank's data, we used World Bank's data. Latitude data are mostly from the dataset for La Porta et al., (1998) (http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta/publications.html), supplemented by our own calculations for the countries that are missing from the above dataset.

The VAT gap is estimated on an annual basis using annual time series data while regression analysis uses panel data of countries for the years 2009-2010.

[2]For detailed discussion of the methodology and procedures readers can ask for it from the researchers.

3.2 Method for Estimating the VAT base and VAT gap

Borrowing from Reckon (2009); CBP and Case (2013); and HRMS report (2012), we use the top-down approach based on national accounts data to estimate the VAT gap in Zambia with minor adjustments to take account of data challenges encountered.

The top-down approach used starts with a GDP estimate and adjusts it to obtain the VAT base. Under this approach, the aggregate VAT base (with no exemptions) is computed as follows:

$$Aggregate\ VAT\ Base = GDP - Exports + Imports - GCF + NRC - PGEXA - WAGES - IMPUTED\ RENT \quad 1$$

Where GDP is Gross Domestic Product, GCF is Gross Capital Formation, NRC is New Residential Construction, PGEXA is Private and Government Expenditures Abroad, Wages is the Wages and Salaries paid to Public Employees, Imputed Rent is for owner occupied Housing.

Further, the effective VAT base is computed by reducing the aggregate VAT base by zero-rated domestic consumption and by value added that is exempt from VAT, including value added by businesses below the VAT threshold and value added by businesses in the exempt sectors.

3.3. Econometric methods

3.3.1 Regression Analysis

The aggregate top-down approaches for estimating the VAT base outlined in section 3.2 can capture some of the informal transactions if the downstream transactions are performed in the formal sector. For example, a purchase by a VAT taxpayer of an input from an unregistered informal supplier may eventually attract VAT and be accounted for in the top-down VAT gap estimation methods, because the VAT taxpayer would not be able to credit VAT due (but not paid) on the informal purchase. Also, the final demand estimate and, therefore, the VAT gap estimate, would not be affected in this case. Some of the transaction chains, however, take place entirely (or at least starting at some point and until the final sale) in the informal sector. Depending on how national accounts data are generated, these transactions might not be taken into account by any of the top-down methods from Section 3.2. If so, at least a part of the informal economy would not be reflected in the conventional VAT gap calculations. Meanwhile, the unofficial economy in Zambia has been estimated at around 50% of GDP (see Schneider et al. 2010, Kabaso et al. 2011).[3]

Therefore given the foregoing, it is useful to compare the VAT performance in Zambia relative to that in other comparable countries. In this study, this comparison was done by using econometric analysis (regressions), controlling for the relevant features of Zambia's economy. Following Reckon (2009), Aizenman and Jinjarak (2005), Chelliar (1971) and Teera (2001), for our analysis we estimate the following model;

$$VATGCR = f(Tradegdp, AgrGDP, Governance, SSA, latitude) \quad 2$$

[3]As explained above, this does not mean that 50% of the tax base would be missing in the above approaches, because the chain of transactions may include both official and unofficial transactions, in which case at least some of the VAT may be collected even on consumption of goods and services the production of which included unofficial activities.

Where VATGCR is the VAT Gross Compliance Ratio, Tradegdp is the ratio of Trade to GDP, AgrGDP is the share of agriculture in GDP, Governance is the corruption index reported by Transparency International, and Latitude is a measure of population's heterogeneity.

3.3.2 Definition of Variables in the Regression

Dependent Variable

VAT Gross Compliance Ratio (VATGCR) - This is the dependent variable that we use in our VAT performance comparison regression. It is a conventional VAT efficiency measure used in the literature (Reckon, 2009; Teera, 2001). The VAT Gross Compliance Ratio is constructed as;

$$VATGCR = \frac{Vat\ Collections}{VAT\ rate * Private\ Consumption} \qquad 3$$

Independent Variables

Share of Trade in GDP - This is a measure of the degree of openness of the economy. The relative size of the trade sector reflects the degree of exposure of an economy to external economic influences. A fall in global economic activities negatively affects the tax base and vice versa. Furthermore, the administrative ease with which trade taxes can be collected makes them an attractive source of government revenue when administrative capabilities are scarce (Linn and Weitzel, 1990).

Share of Agriculture in GDP - Agriculture is considered to be a salient feature regarding the structure of the economy and as Tanzi (1992) asserts, a country's economic structure is one of the factors that could be expected to influence the level of taxation. For developing countries, the share of agriculture may be an important influence on the tax share, from both the demand and supply point of view (Tanzi, 1992). On the supply side, it is very difficult to tax the agricultural sector "explicitly", though it is often very heavily taxed in many implicit ways such as; import quotas, tariffs, controlled prices for output, or overvalued exchange rates (Bird, 1974; Ahmad and Stern, 1991; Tanzi, 1992). On the other hand, small farmers are notoriously difficult to tax and a large share of agriculture is normally subsistence, which does not generate large taxable surpluses, as many countries are unwilling to tax the main foods that are used for subsistence (Stotsky and WoldeMariam, 1997). On the demand side, since many public sector activities are largely city-oriented, it may be assumed that the more agricultural is a country, the less it will have to spend for governmental activities and services. Hence, as the share of agriculture in GDP rises, the need for total public spending and so for tax revenue may fall.

Sub-Saharan Africa dummy - This is a dummy included to see the effect that a country's location in SSA has on its VAT performance. The dummy variable that has a value of 1 for Sub-Saharan African countries and a value of 0 otherwise.

Governance (proxies by the country's Corruption Index) - This is a measure of institutional quality. We expect that countries with very high levels of corruption are likely to have low institutional quality which is cardinal in ensuring high levels of tax compliance. Hence, there is a negative relationship between the corruption index and VAT Gross Compliance Ratio.

Latitude - This is a measure of ethnic fragmentation or fractionalisation in a country or locality. Studies have shown that there is a negative relationship between ethnic fragmentation and institutional development (Canning et al., 1993; Mauro, 1997; La Porta et al., 1999). Furthermore, ethnic fragmentation has a negative impact on economic growth and corollary in tax collection efforts (Easterly and Levine, 1997). Thus, it is increasingly becoming a standard to include a variable for the measure ethnic fragmentation in a regression.

Finally, it is important to note that the econometric approach does not produce an estimate of the VAT gap, but simply compares the degree of VAT compliance across countries. Nonetheless, it can be a very useful benchmark against which to evaluate the degree of VAT revenue performance in Zambia relative to other similar countries.

4.0 Results

4.1 An estimate of the VAT base and VAT gap for Zambia

Table 1 presents estimates of the VAT base, VAT gap, and VAT efficiency for 2009-2012.

The results show that VAT gap as a percentage of VAT liability was 62.2% in 2009, falling to 51.5% in 2010 before increasing to 53.8% in 2011. In 2012, it marginally increased to 55.6%. Although there are no known estimates of the VAT gap in comparable countries (especially in Africa), Zambia's estimates are high compared to those estimated for EU countries where the VAT gap as a share of the VAT theoretical liability was 12% to 14% (see Reckon, 2009).

The VAT gap as a share of GDP declined to 4.34% in 2010 from 6.28% in 2011. However, it remained stable between 2011 and 2012. The drop between 2009 and 2010 appears to be partly due to the increase in exports as a share of GDP from about 31.5% in 2009 to over 42.3%, 44.7% and 43.4% of GDP in 2010, 2011 and 2012, respectively. Although exports are part of GDP, they are not part of the VAT base as all exports are Zero rated. Further, producers of exportable goods are allowed to claim VAT on their inputs. This implies that even if VAT collections as a share of VAT base where to remain exactly the same, VAT gap as a share of GDP decreases as exports increases if the increase in exports does not translate into higher final domestic consumption. This reason for the VAT gap change between 2009 and 2010-2012 can be further illustrated by noticing that if exports constituted the same share of GDP in 2009 as they did on average in 2010-2012 (i.e., about 43.49% instead of 31.45%), the VAT gap as a share of GDP in 2009 would have been about 4.38% instead of 6.30%, or about two percentage point lower. In other words, the change in exports accounts for approximately two percentage point difference or about half of the shrinkage of the VAT gap as a share of GDP between 2009 and 2010-2012.

Table 1: Estimation of the VAT gap, 2009-2012

	2009	2010	2011	2012
GDP	64,615.60	77,666.60	93,963.80	111,049.40
Exports	20,324.35	32,876.10	42,035.96	48,191.21
Imports	19,123.92	25,507.49	34,952.22	45,264.56
Exempt and Zero rated imports	2,928.34	3,923.71	7,368.99	13,839.46
GCF	14,309.65	17,404.39	19,843.31	23,305.86
New housing	4,052.57	3,222.26	7,835.80	7,119.18
Wages and Salaries of public service employees	4,582.61	5,618.04	6,989.90	9388.89
Exempt Local Supplies	193.8	233.0	281.9	333.1
Water supply services	64.62	77.67	93.96	111.05
Passenger transportation services	129.23	155.33	187.93	222.10
Conveyance of real property and certain financial and insurance services	988.62	1,188.30	1,437.65	5,074.96
Funeral Services	51.69	62.13	75.17	88.84
Food and agriculture	4,800.94	5,770.63	6,981.51	8,250.97
Zero-rated supplies (Domestic)	120.08	145.80	176.39	208.46
Medical supplies	73.66	88.54	107.12	126.60
Agricultural equipment and accessories				
Supplies by licensed tour operators of all-inclusive	26.49	31.84	38.53	45.53
tours	19.92	25.41	30.75	36.34
Adjustment for businesses below VAT threshold	550.87	618.80	830.37	912.75
VAT Base	40,918.34	40,932.05	53,605.97	63,988.52
VAT Rate	16.00	16.00	16.00	16.00
VAT Liability	6,546.94	6,549.13	8,576.96	10,238.16
VAT Liability as % of GDP	10.13	8.43	9.13	9.22
VAT collection as % of GDP	3.83	4.09	4.22	4.28
VAT gap as % of GDP	6.30	4.34	4.91	4.94
VAT gap as % of VAT LIABILITY	62.20	51.50	53.77	53.58

Source: Computation by Authors

On the other hand, the improvement appears to be due to increased imports as a share of the VAT base. Import share matters because it is easier to collect VAT on imports than on domestic value added. The share of imports (net of exempt imports of capital goods) in non-export part of GDP increased from under 29.30% in 2009 to over 32% in 2010 and over 40% in 2012. VAT collected on imports went from 33.2% of VAT liability calculated in the above table for 2009 to 40.5% in 2010 and 46.8% in 2011[4]. Lack of data on the relative effectiveness of VAT collections on imports and on domestic value added makes it hard to determine the part of VAT gap reduction accounted for by the increased share of VAT on imports. Whatever the reasons, however, it remains the case that according to the calculations in this paper, collections as a share of non-export part of GDP went from 5.6% in 2009 to over 7% in 2010 and over 7.5% in 2011 and 2012.

4.2. Regression Analysis of VAT efficiency

In this section, we present results on relative performance of the VAT in Zambia to that of other countries. This analysis is complementary to the estimation of the VAT gap presented in section 4.1 above. This analysis is very useful in the absence of VAT gap estimates for

[4]The data on VAT collected on imports came from Revenue Reports (ZRA). These VAT collections were (in billion ZMK): 2,168.4 in 2009; 2,644.6 in 2010, 3,997.3 in 2011, and 5030.76 in 2012.

most comparable countries in the developing world while VAT efficiency measures are available for most countries.

We estimate between effects regressions. The between effects specification is preferable to fixed effects regressions because the latter reflect mostly the trends in the countries' revenue performance over time while the differences among countries are hidden in the fixed effects coefficients.

We run two different specifications of regressions. The independent variables common to both specifications are trade openness (exports plus imports as a share of GDP), share of agriculture in GDP, and control of corruption. In addition, in one specification we control for absolute values of countries' latitudes while in another specification we control for a dummy variable that has a value of 1 for sub-Saharan African countries and a value of 0 otherwise. Note that we do not include VAT rate as a regressor, because it is already included in the denominator of the VAT efficiency measure. Also, when we do include the VAT rate, it is not statistically significant and its inclusion does not affect the qualitative results.

Generally, we have tried to use parsimonious specifications at this time and with the exception of the latitude variable and corruption control measure that are of special interest, we included only the regressors that were statistically significant at least at 10% level in most specifications. Incidentally, for this reason we did not include year fixed effects. These fixed effects were not statistically significant, but they were rather large, resulting in large but apparently random impact on the results.

We recognize that the specifications we use may suffer from endogeneity (for example, between VAT efficiency and corruption control measure) and perhaps missing variable biases. In the future, however, it will be useful to try to alleviate these problems, for example by using settler mortality as an instrument for corruption control (see Acemoglu et al. 2001). At the same time, we note that our specifications are similar to specifications used by other authors in estimating VAT revenue performance. Moreover, we use more comprehensive and more recent data than any other study of this issue in the literature.[5]

We exclude countries in the bottom 5% (***VATGCR < 15.55%***) and top 5% (***VATGCR > 98.17%***) of VAT efficiency indicator, because those countries clearly had some special circumstances. These exclusions do not, however, affect the qualitative results.

Our between effects regression results are shown in the table below.

Table 2: Between Effects regressions for 2007-2010; Dependent variable: *VATPGCR*

Independent Variable	(1)	(2)	(3)	(4)
Agriculture/GDP (%)	-.788***	-.861***	-.603**	-.766***
	(.203)	(.209)	(.241)	(.232)
Trade Openness	.091**	.096**	.085**	.091**
	(.039)	(.040)	(.039)	(.040)
Latitude		10.630		8.051
	-	(10.513)	-	(10.858)
Sub-Saharan Africa	-9.907*		-10.670**	
	(5.229)	-	(5.235)	-
Control of corruption			3.089	2.199
	-	-	(2.204)	(2.299)
R-squared	0.287	0.271	0.300	0.277
Countries	116	116	116	116
Observations	388	388	388	388

Source: Computations by the author
Notes: Standard errors are in parentheses; ***, **, * denote statistical significance at 1%, 5%, and 10% level, respectively; constant not shown.

[5]For example Aizenman and Jinjarak(2005) use data on only 44 countries.

Note that neither the latitude variable nor the corruption control measures are statistically significant although they have expected signs. We included regressions with these variables mainly to show that the inclusion of these variables can change the comparisons between predicted and Zambia's values of (***VATGCR***) measure (see Tables 3-6 below). The regressions that include sub-Saharan Africa dummy variable are more favourable to Zambia than those that include latitude measure.[6] The "sub-Saharan" regressions also have a slightly better fit as measured by R-squared. We view these regressions as more reliable than those that use latitude as a control variable.

Based on the above regressions we obtain the following comparisons between predicted values of the dependent variables and actual values of these variables for Zambia:

Table 3: Comparisons for regression specification (1)

Year	Predicted VATGCR	Zambia's actual VATGCR
2007	45.499	46.342
2008	47.061	37.699
2009	44.854	39.055
2010	46.800	46.043

Table 4: Comparisons for regression specification (2)

Year	Predicted VATGCR	Zambia's actual VATGCR
2007	50.948	46.342
2008	52.682	37.699
2009	50.275	39.055
2010	52.350	46.043

Table 5: Comparisons for regression specification (3)

Year	Predicted GCR	Zambia's actual VATGCR
2007	44.837	46.342
2008	46.233	37.699
2009	44.306	39.055
2010	45.907	46.043

Table 6: Comparisons for regression specification (4)

Year	Predicted VATGCR	Zambia's actual VATGCR
2007	50.940	46.342
2008	52.650	37.699
2009	50.358	39.055
2010	52.227	46.043

Source: Computations by the Author

Note that VAT efficiency in Zambia was close to that predicted by our "sub-Saharan" regressions in 2007, but in 2008-2009 Zambian VAT efficiency measure lagged the regression predictions. In 2010, however, the VAT efficiency measure for Zambia improved (which is consistent with our VAT gap calculations) and again moved close to the other countries.

One may ask why Zambia appears to have lower VAT efficiency than the other countries on average, particularly in the "latitude" regressions. One answer may be that there are too

[6]We do not show the results with both of these geographic variables included, because in those regressions the statistical significance of both of them declines considerably, although the signs remain the same.

many exemptions and zero-rating in Zambian VAT law. Note that the only factor related to the VAT law that the above regressions take into account is the VAT rate. Therefore, if a country exempts a large portion of its imports and zero rates much of its agriculture, as Zambia does, this would reduce the country's VAT efficiency. Another reason may be that for the purposes of VAT collections, Zambia is actually a more agricultural country than it looks. Its agriculture/GDP ratio is close to the average for the sub-Saharan countries that contribute to the regression estimates. But a big part of Zambia's GDP is exports (over 40% of GDP relative to the average of about 23% for the other sub-Saharan countries). Exports inflate Zambian GDP, making its agricultural sector look relatively small. If Zambian exports suddenly dropped and became about 23% of GDP without any other changes, its agriculture/GDP ratio would have been just over 30%, making its predicted VAT efficiency much lower that what is suggested by the above tables. Of course, export revenue also is supposed to benefit Zambia and its institutions, but as Alexeev and Conrad (2009) argued, natural resource wealth by itself does not improve institutions very much and presumably this goes for tax administration as well.

5. Conclusions

The results of this study show that the VAT gap in Zambia is relatively larger compared to EU countries where this kind of estimation has been conducted before. However, the results indicate that there has been a reduction in the VAT gap as a share of GDP in 2010, 2011, 2012 relative to 2009, but most of this reduction appears to have taken place due to changes in exports and imports rather than because of the improved efficiency of VAT collections. Moreover, despite the smaller VAT gap in 2010, comparisons with other countries demonstrate that Zambia's VAT revenue performance in 2008-2010 was behind the average for other countries controlling for some basic economic and geographic characteristics. This suggests that there is significant room for improvements in VAT administration in Zambia.

To help improve VAT performance in Zambia, we recommend that there is need to enhance the VAT administration system to reduce the incidence of fly-by-night firms. These are firms which register for a one-off business transaction in which case they trade, collect VAT and then fold. This can be done in several administrative steps, including ensuring that firms intending to register for VAT are legitimate and intend to operate permanently; developing transfer pricing rules for VAT between related parties as these would reduce revenue losses; enhancing the investigations unit of the ZRA; or introducing the “white list” of taxpayers which is a published list of firms that comply with VAT (Brondolo and Silvani, 1996). In addition, the tax authorities need to develop a system to deal with false invoicing through verification of invoices; development of audit indicators (specific to particular industries) where averages are used to determine the proportion of input credit to sales; enhance standard audits; and cross-checking of invoices. Finally, on an economy-wide basis, there is need for the country as a whole to develop non-cash payments systems such as point-of-sale machines, mobile payments and encourage use of cheques. In the interim, the Tax Authorities can use the following methods to combat abuse cash sales; developing audit standards (including ratios) specific to particular industries, and use of selective site audits.

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CHAPTER SEVEN

If Japan Can...Why Can't We?": Why Zambia should put Total Quality Management at the centre of its Development Agenda

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Abstract

Total quality management (TQM) has achieved notable success as a philosophy of management in addressing competitiveness and productivity improvement of any organisation. This paper examines the connection between TQM and productivity improvement to identify the factors that natures this relationship. A literature review on productivity improvement and quality transformation was conducted, and this revealed that embracing the tenets of the Deming's Chain Reaction has acted as a catalyst for continuous improvement in quality and productivity. Deming's Chain Reaction is based on the theory that 'improvements in quality leads to lower costs because they result in less or no reworks, eliminates errors, fewer delays and snags, thus increasing productivity. With better quality products at lower prices, a firm can achieve a higher market share and stay in business, thus securing jobs. By examining approaches used in Japan and other successful economies in the application of the Deming's Chain Reaction principles, a three-point strategy to address the prevailing quality and productivity challenges Zambia is currently facing is proposed.

Keywords: Competitiveness, Productivity, Total Quality Management, Quality, Zambia.

1.0 Background

The quest to achieve high value added to locally available raw materials and productivity improvement are two topical issues in relation to growing the Zambian economy. We are constantly being reminded that Zambia cannot be developed by foreign investors, but by the Zambians themselves. To this end, Zambian entrepreneurs and industrialists have been urged to take advantage of the Multi-Facility Economic Zones (MFEZs) which are designated as vehicles for revamping the nation's industries, in particular the manufacturing sector. However, there have been serious concerns about labour productivity in the local industry. These issues are complicated by the 21st Century environment where economic globalisation is getting deeply rooted as a result of the growth of transnational corporations (TNCs)-led integrated global production systems, global markets and global finance aided by free flows of capital and trade. International organisations such as the International Monetary Fund (IMF), World Bank and World Trade Organisation (WTO) have all played a major role in the globalisation process. In addition, countries' promotion of Foreign Direct Investment (FDI) has led to internationalisation of investment flows. This integration has been greatly facilitated by technological changes

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responsible for the shrinking world – in information technology, communications and transport. All these have meant that businesses, whether local or international, have to contend with a very competitive global marketplace.

The tightening of competition in both local and international markets has forced organisations to implement strategies that improve their overall competitiveness. The two most important aspects of this overall competitiveness strategy are quality leadership and price competitiveness. Quality is obviously an important and indispensable item to competitiveness in global markets. However, when customers are faced with a choice of products of comparable quality, they usually go for the cheapest. It is important to remember that cost and price are two different things, and their amounts and characters are different. While cost is determined only by factors concerning the supplier of the product or service, price is susceptible to outside influences, such as customer preferences and demands, and market conditions (Kondo, 1997). The price competitiveness is improved by persistent productivity improvements (Hannula and Suomala, 1997). Therefore, to hold prices steady and at the same time remain profitable requires remarkable productivity gains, achieved by everyone.

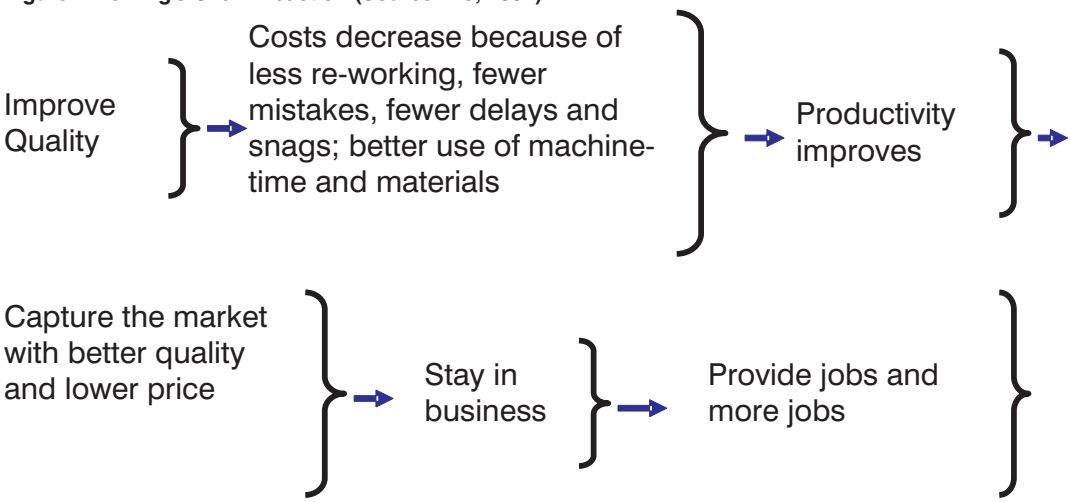
Productivity is one of the key factors affecting profitability and overall competitiveness of any organisation. Changes in productivity have been recognised to be the major influence on many social and economic phenomena not only at firm level but also at national level, like rapid economic growth, higher standard of living, better wage levels, and inflation control (Hannula and Suomala, 1997). It is this 'non-market variable' that has led to productivity being grossly misunderstood as an asset to product saleability. For example, when firms in the West were faced with Japanese quality and cheap products, they responded by subcontracting almost all their labour-intensive manufacture to countries in Asia where labour was still very cheap. This was because the West was lacking in price and not quality competition. On the other hand the Japanese managed to maintain their price and quality competitive edge even after sharp increase in labour cost simply because they oriented their quality improvement initiatives to productivity and cost (Juran, 1981).

Producing higher quality products at a steadily lower cost is therefore no longer an option but a must. The price competitiveness of a product can be improved by persistent productivity improvements, which lead to better overall competitiveness and better market positions for concerned companies. When aiming to improve productivity, it is important to understand what contributing factors that would lead to significant positive results. Higher productivity is achieved through the implementation of improved structures, systems, procedures, processes and working methods. Ultimately, improved productivity is delivered by people – by the way they work, their attitude to their work and to innovation, their response to change, etc. This 'human factor' is the most important in any change process, and thus is the key to any productivity improvement.

The human factor of productivity is natured by the application of Total Quality Management (TQM) tools and techniques to bring about cultural change and process improvement within an organisation. TQM is defined as the management approach of an organisation, centred on quality, based on the participation of all its members and aiming at long-term success through the customer satisfaction, and benefits to all members of the organisation and to society (Muthiah and Huang, 2006). The role of quality in productivity improvement is well known, as evidenced by the popularity of the TQM movement and the success it has brought to a number of organisations (Lakshman, 2006). Successful Japanese companies regard TQM as essential to their survival. Today, quality is synonymous with 'Made in Japan'. How did Japan's reputation for high-quality products come about? According to the Japanese themselves, W. Edwards Deming is the primary reason (Cross, 2000).

W. Edwards Deming was an American quality and systems expert who was invited to Japan in 1950 by the Union of Japanese Scientists and Engineers (JUSE) to teach statistical process control (SPC) and concepts of quality. Deming preached economic redemption based on a renewed commitment to the quality of manufactured goods (Tsutsui, 1996). Deming's message to Japan's chief executives, managers and engineers was that improving quality reduced expenses while increasing productivity and market share. He depicted this message in form of a 'Chain Reaction' diagram shown in Figure 1. He emphasised that the chain reaction only occurs when one becomes totally focused on continuous quality improvement. As quality improves, there are less rework, scrap and waste of all kinds which do not add value other than unnecessary cost of production. Consequently, as products become more attuned to customers' needs, there is less effort spent producing items people do not want. Therefore, productivity will improve while costs go down. You enter the market with better quality and lower cost, and capture the market. Deming thus encouraged the Japanese to use quality as the primary competitive strategy. The adoption of the philosophy in the Deming's Chain Reaction diagram is considered to be the underlying reason for the astonishing success of Japanese products on the world market (Neave, 2000). A number of Japanese manufacturers applied Deming's techniques widely and experienced high levels of quality and productivity. The improved quality combined with the lowered cost created new international demand for Japanese products.

Figure 1:Deming's Chain Reaction (Source: Ho, 1994)



The Deming's Chain Reaction offers one benefit after another on quality improvement. This chain reaction is not new to the Japanese and has been adopted in many firms since the 1950s. Japan's marvellous economic achievement provides the undeniably solid evidence that improving quality can improve productivity, as depicted in the chain reaction. This chain reaction thus establishes a fact that productivity is a function of quality. Productivity without quality is subject to variable results, for example the production of lots and lots of junk. The chain reaction tells us that the way to get productivity up is to raise quality. When quality goes up, productivity goes up, and costs come down. For the Chain Reaction to be actualised the people must have the right attitude in whatever they do (this is the human factor of productivity).

The use of quality as a key factor for economic success has not only worked in Japan but in other countries as well. Starting in Japan and extending through the nations of the Five Tigers of South-East Asia, the “quality movement” gained an unstoppable momentum. This

"quality movement" swept over the USA in the 1980s when American companies such as Ford, Hewlett-Packard, Proctor & Gamble and many others re-discovered Deming and began applying his proven quality methods, heralding a rebirth in American quality, productivity, and profitability (Cross, 2000). "If Japan Can... Why Can't We?" broadcast by NBC on June 24, 1980, is considered as the primary catalyst for many leading American and international businesses to adopt the Deming quality approach; focus on continuous quality improvement, use statistical quality control, top management must take personal responsibility for the quality of the product, quality must begin with the customer, treat a supplier as a partner, and quality is everyone's business.

Achieving quality and excellence by firms would enhance their competitiveness in both domestic and in international markets (Mersha, 2000), and in turn contribute to economic growth. Therefore, any country or industry that embarks on a quality improvement journey would become competitive in the global economy and begin to gain share in the markets in which it does business. This is why the global quality movement is ever growing as evidenced by the prominence and influence of international quality organisations such as the American Society for Quality (ASQ) in North America, the European Organisation for Quality (EOQ) in Europe, and the Asia Pacific Quality Organisation (APQO) in the Asia Pacific regions.

From the foregoing, it is clear that for Zambia to address the issues of value addition and productivity, a "quality movement" is a prerequisite. The literature review presented in this paper provides the answer to the following research question: How can the "quality movement" take root in Zambia?

The paper, therefore, presents findings on how other nations achieved quality transformations, and based on these findings a proposal on how Zambia can develop a quality culture.

The rest of the paper is arranged as follows: firstly, an overview of quality management in Zambia is presented, and then productivity improvement through TQM is discussed, followed by an identification of the key components of productivity improvement. A brief look at quality movements in selected industrialised countries is presented next. Finally the paper concludes with a proposal on what need to be done to initiate a sustainable quality movement in Zambia.

2.0 TQM in Zambia and the National Quality Policy

Despite the pervasive recognition of the importance of quality improvement, as exemplified by the number of advertisements extolling the quality of their products, the Zambian industry is yet to give the quality movement the attention it deserves. This seemingly lack of impetus in quality movement is as a result of a protected economy that was in place prior to 1991 and, as such, the concern with quality management did not exist. However, since 1991 when Zambia transitioned to a market economy and the desire to participate in the global market place, there has been a growing interest in quality standards and quality management. In a study conducted by Munakaampe (2000), it was found that in all the companies surveyed only one had implemented total quality management (TQM) while the rest indicated that they had intensions of doing so in order to address the poor quality of their products[2]. The lack of embracing TQM as a management philosophy in order for organisations to achieve world-class status is not only evident in the Zambian manufacturing sector but also the service sector as indicated by Kasongo and Moono (2010). In this study, the authors found that not much had been done in the Zambian tourism

[2]35 companies were surveyed from a population of 100 engineering based companies registered with the Ministry of Commerce and Industry

industry in relation to TQM. In general, Zambian industries are not using TQM as a key way of achieving competitive advantages in the today's global markets. Ironically, they do acknowledge that TQM is essential for improving quality and other performance related outcomes (personal communication).

The Zambian Government has realised that one of the major obstacles in accessing global markets for Zambian manufactured products has been the lack of adherence to systematic and internationally acceptable quality standards and the use of associated technology (The National Quality Policy, 2011). To address this challenge, the Government of the Republic of Zambia (GRZ), through the Ministry of Commerce, Trade and Industry, launched the first National Quality Policy (NQP) in February 2011, with an accompanying implementation plan for the period 2011 to 2015. The Ministry of Commerce, Trade and Industry was designated as the lead implementer of the NQP, whose objectives are as follows (The National Quality Policy, 2011):

- To ensure that goods and services produced and supplied in Zambia meet local and international quality requirements;
- To ensure that quality consciousness is raised amongst both the suppliers and the consumers;
- To develop the human resource necessary to support the various standardisations, quality and technical regulation programmes;
- To promote and maintain a quality culture in public life and throughout society; and,
- To develop and implement a National Quality Infrastructure and Technical Framework aligned to and consistent with international best practices.

Clearly, the implementation of the NQP would be a perfect precursor to the Zambian quality movement. This must be supported by a system that would encourage and recognise the development of effective TQM and Quality Management System (QMS) by the Zambian industries, and create a positive atmosphere of competitiveness and benchmarking among the leading companies in the country for the continuous quality improvement of their products and services. These efforts are necessary if Zambian industries are to integrate in the global supply chains as active players.

It is, however, important to note that, although there is no visible 'quality revolution' in Zambia, employees in some companies have had training in quality principles and practices. For example, Zambians have participated on a program supported by the Germany Technical Cooperation (GIZ) to train personnel from SADC in quality management in Germany. Participants in this program undertake both theoretical and practical aspects of quality management. The quality experts in Zambia share their knowledge and experiences through the Quality Management Network Association of Zambia (QMNAZ), which is a member of a regional network of quality experts from Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe.

3.0 Achieving Productivity Improvement Through TQM

The classic definition of productivity is the ratio of output achieved over the level of effort required to achieve that output (Ashburn et al., 1981). Productivity, simply put, is the ratio of output to input resources. As productivity improves then either a higher level of output is achieved for the same or less input resources, or the same output level is achieved using less input resources. Also, achieving the same output level in a shorter time period with the same input resources indicates improved productivity (Hoffman and Meshra, 1999). Time must always be considered as a key resource in productivity improvement. Productivity

improvement programmes that result in higher output levels while ignoring increased time consumption cannot be considered successful programmes.

Productivity is an indication of the efficiency with which an entity produces its products. Efficiency is a measure of how well the entity uses its input resources to achieve outputs (the measure is between 0 and 1 where 1 is efficient). To improve productivity, the entity must be both efficient (do things right) and effective (do the right things). Clearly, to remain competitive and improve profitability, there have to be a process of continuous performance monitoring and benchmarking.

3.1 Productivity Improvement Impetus

In the present globally competitive marketplace, quality is a fundamental way of managing any business anywhere for market growth and profitability. In today's business environment the three main performance indicators include quality, cost and productivity. Amongst these, quality is the only one that is a matter of common concern to both manufacturers and customers. In fact, an appeal to improve quality is more likely to elicit the sympathy of employees and less likely to be refused than a call to cut cost or raise productivity (Kondo, 1997), mainly because employees regard quality as an essential attribute that can attract customers, and in turn secure their employment. Since productivity improvement is not achieved simply by motivating employees to work harder, how is its improvement stimulated? The answer lies in Deming's famous dictum: 'Productivity goes up as quality goes up'. The dependency of productivity on quality implies that a quality program must precede a productivity program. It is, therefore, imperative for the correct focusing of management's efforts for it to understand and utilise the appropriate quality program. Mackowski (1994) identifies three levels of quality that are critical in determining what quality program is appropriate. These are Quality Control (QC), Quality Assurance (QA) and Total Quality Management (TQM). An understanding of the difference among these quality levels is cardinal to addressing the productivity problem.

3.1.1 Quality Control (QC)

Quality Control is concerned with the past (Mackowski, 1994). It deals with defect data obtained from previous production to enable reactive action to be taken to stop further defect production. This is a management of the product with the involvement of the technical staff to ensure that product specifications are met.

3.1.2 Quality Assurance (QA)

Quality Assurance is concerned with the present (Mackowski, 1994). It deals with having in place proactive systems to prevent defects from occurring and having corrective mechanisms to prevent future defects from occurring. This involves management of the systems with all staff involvement to satisfy customer needs. ISO certification is one way of assuring customers that an organisation has credible systems and processes in place to meet the quality requirements.

3.1.3 Total Quality Management (TQM)

Total Quality Management (TQM) is concerned with the future (Mackowski, 1994). It deals with management of employees to improve continuously the products and services offered by an organisation and to improve the efficiency of the processes involved in the production of those products and services. TQM involves the planning, installation and evaluation of

all quality systems at each step of a manufacturing or service business (Pulat, 1994). This encapsulates the shift from the classic descriptors of quality to a holistic approach driven by focus on customer needs. TQM is management of the future with total employee involvement to continuously meet and exceed customer needs.

Since productivity enhancement is a strategically planned continuous change effort requiring participation and cooperation of the entire workforce, TQM is therefore the quality level appropriate for productivity improvement. Total Quality Management is thus necessary in activating the Deming's Chain Reaction shown in Figure 1. A TQM program when properly implemented can direct productivity projects towards achieving the competitive strategies of higher customer service and better quality in both product and process (Hoffman and Mehra, 1999). Since TQM stresses continuous improvement, creativity and innovation are not lost. Therefore, productivity improvement that flows from a continuous improvement environment emphasises creative ways of improving the efficient use of resources (materials, equipment, human resources, facilities).

4.0 Key Components of Productivity Improvement

Total Quality Management comprises the quantitative or 'hard' side and the non-quantitative or 'soft' side (Schmidt and Nüssler, 1998; Glenn, 1992). The former consists of TQM's 'key concepts' and is reflected by the quality improvement tools, reliance on data, and statistical process control. Productivity is normally considered to be part of this side (Glenn, 1992). The latter, where trust, integrity and ethics are a requisite, is embodied in obsession with the customer, empowerment, and leadership. This consists of the cultural aspects of TQM or the development of a common 'quality culture'. As a result of this duality, it is evident that TQM is neither a technique nor a system that one can simply implement. Consequently, to think of productivity as being part of the quantitative part of TQM only is misleading because quality culture is a prerequisite for the optimal use of the hard side of TQM (Schmidt and Nüssler, 1998). Nonetheless, employee involvement, equipment/technology and supportive organisational environment are considered essential elements for productivity improvement.

4.1 Employee Involvement

Employees are valuable assets in any organisation, and when this asset develops problems, it affects both quality and the resulting productivity. Employees form an integral part of the production system and must therefore be equipped with the relevant skills required to carry out a job. If employees lack proper training, then they become part of the productivity problem. Training employees in accurately understanding productivity problems is extremely critical if these same employees have to design programs to solve the problem (Hoffman and Mehra, 1999). It is imperative that organisations allocate resources to train their employees properly; otherwise chances for improving productivity become a mere dream.

It is erroneous to assume that every employee has an inherent interest in achieving continuous improvement (in productivity/quality). However, it is correct to assume that employees would want to achieve continuous improvement if they believe that they will be personally better off as a result. Employee involvement could be encouraged through techniques such as job enlargement, job enrichment, job training, job rotation, quality circles, workstation optimisation, and participative management (Siaminwe, 1998). The employee benefits through increased responsibility, leadership opportunities, personal growth and career enhancement, while the organisation benefits through increased productivity, improved quality, and reduction in costs (Brower, 1995).

Incentive systems, recognition and reward are another way of encouraging employee involvement. Productivity improvement is greatly enhanced through hardworking and innovative employees. A management system that recognises and encourages excellence and continuous improvement efforts must be developed and implemented. In rewarding success, emphasis should be placed on accomplishments of teams, as well as individuals. This is because employee involvement also implies effective teamwork.

4.2 Equipment/Technology

Poor production methods and lack of know-how (technology) are detrimental to productivity improvement initiatives. A critical component of successful competition is for companies to increase the value-added percentages of their products and services (Jha et al, 1996). To add value in a profitable way, the organisation must transform the inputs – people, materials, machines and methods – such that customers would be willing to pay more than the producer spent to generate the increased value. Two ways of achieving profitable value-added increases are through process simplification and refinement, and adoption of new/advanced technology.

Process simplification and refinement must be continuous with the sole purpose of making the process simpler, easier, more nearly perfect, and therefore, more efficient. This ongoing analysis, review and study of production methods, and monitoring and evaluation of production process improve the organisation's ability to achieve productivity improvement.

Technology has a fundamental role to play in improving productivity. For example, a Computer Numerical Controlled (CNC) machine is more productive than conventional machines, partly because it is more productive per hour and partly because it is almost certain to be run as nearly continuous as possible. The usefulness of existing and emerging technologies should be continually analysed for improvement. The technological-improvement process should focus on both the hardware and software aspects of technology and their capabilities to make work easier, more productive, and safer. Therefore, resources need to be made available for capital investments.

It must be made clear, though, that it is not just investment that makes for productivity improvement. It is finding the right equipment/technology for each task and integrating it successfully into the system. Too often technology is seen as an end in itself. This has normally resulted in companies spending huge amounts of money on equipment based on new technology without analysing how the new systems would fit with the existing technology and product design specifications (Jha et al, 1996). Frequently the results have been disappointing and the new systems have ended up performing worse than the technology they replaced.

4.3 Organisational Environment

Although it may be equipped with the state-of-art equipment and staffed with hardworking employees, an organisation that cannot organise its working functions is doomed at least to mediocrity and quite possibly to outright failure. To function productively, the assets of a firm and the employees have to operate in an environment that minimises obstacles (Ashburn et al, 1981). The organisational environment is therefore a critical key element to achieving productivity improvement.

The organisational environment conducive to productivity growth stems from a quality culture. It is manifested through top leadership that is committed to:

- Satisfying the customer while increasing the organisation's ability to respond to changes in markets, technologies and other environmental conditions;

- Encouraging creativity and involvement among all employees;
- Communicating to all employees a constant commitment to customer satisfaction and a long-term vision of the company's competitive stance, resulting in valid, consistent priorities throughout the organisation; and,
- Providing necessary resources, training of employees and development of systems.

Though intangible, a supportive climate conducive to productive improvement is absolutely essential to bringing together the labour and equipment and all the other necessary elements for improved productivity.

5.0 Quality Improvement Through National Quality Movements

It is now a proven fact that an emphasis on quality improves overall productivity and reduces costs. Countries now focus on quality to sustain their competitiveness in global markets. Total Quality Management is regarded as modern quality management approach (Evans and Lindsay, 2011; Oakland, 2000). There is a lot of literature about TQM, and more scholarly analyses have identified four fundamental orientations of TQM: systems, customers, learning and change. It is from this perspective that TQM is seen as a dynamic economic effort by firms to adapt and survive in dynamic environments. The widespread adoption of quality with a national character has its roots in Japan.

After the Second World War, Western companies were the quality leaders, and they continually improved their products, but at a gradual, evolutionary rate (Juran, 1981). Japanese companies started investing in quality since the 1950's and only began to get results in the mid-1960's. However, they undertook to improve their quality at a revolutionary rate, enabling them to overtake the West during the mid-1970s (Juran, 1981). Japan initiated a quality revolution in the 1970s and has received worldwide recognition for its achievements. The United States responded and joined the quality race in mid-1980s and quickly made rapid advances. The Europeans launched their cooperative efforts to improve quality towards the close of the 1980s. The strategies adopted by these countries have extensive commonality. The author is of the opinion that these core strategies deserve careful study so as to become essential inputs to the strategy for the Zambian environment. The following are the common features of the quality movements.

5.1 Education and Training to Develop Human Capital

Japanese companies acted collectively through the Japanese Federation of Economic Organisations (Keidanren) and the Union of Japanese Scientists and Engineers (JUSE) (Juran, 1981) to improve their quality reputation. The first step was to use education and training. They sent teams abroad to visit foreign companies and study their approaches to managing for quality. Selected foreign literature on quality was translated into Japanese. In addition, they invited renowned foreign lecturers to go to Japan and conduct training courses. These lectures, Deming's 1950 lectures on statistical methods and Juran's 1954 lectures on managing for quality, provided seed courses that became influential inputs to the quality revolution that followed (Juran, 1981). Building on these and other inputs, the Japanese explored new ways of thinking about quality and adopted some unprecedented strategies for creating their quality revolution. Japan still leads in resource investment in employees' education and training (Dahigaard et al, 1998).

Education and training are fundamental to quality improvement initiatives because they represent the best way to improve people on a continual basis. In fact, quality begins with education and ends with education. Western countries also embarked on human resources

development, because one of the most important factors in fielding a competitive company is having the best possible employees. The more knowledgeable, skilled, motivated, and able to learn members of the labour pool are, the easier for them to accept and adopt new ways of doing business. An enlightened workforce facilitates the quality transformation to take root.

5.2 National Quality Improvement Initiatives

Literature shows that, without exception, all the countries that achieved quality competitiveness created a culture of "Total Quality Management" with their respective governments playing a key role. These nations and individual organisations within them focused their policies, systems, and resources in a coordinated way on continually improving both quality and competitiveness. The business and government worked together in a positive, constructive partnership to enact policies that encouraged long-term commitment to continual quality improvement. They embarked on a quality movement at national level. This way, the public was made aware of quality issues more than ever before.

The Japanese "quality revolution" was spearheaded by the Union of Japanese Scientists and Engineers (JUSE) at national level (Tsutsui, 1996). JUSE organised lectures on statistical quality control for executives, managers, engineers, and researchers throughout the country. Japan established the Deming prize to award companies who achieved distinctive performance improvements through applications of TQM and individuals who made significant contribution to the study of TQM. In the United States, as business and industry began to focus on quality, the government recognised how critical quality was to the nation's economic health and, in order to facilitate the growth of the emerging quality, the U.S. government designated October as National Quality Month form 1984 (Evans and Lindsay, 2011). In 1987, the Malcolm Baldrige National Quality Award (MBNQA), a statement of national intent to provide quality leadership, was established by an act of Congress.

5.3 Quality Award System to Motivate and Stimulate Quality Improvements

This remarkable quality transformation the Japanese achieved was due to their ability to encourage commitment to continual improvement. To encourage the widespread adoption of TQM, and instil a culture of continual improvement, a quality award was introduced. The Board of Directors of the JUSE established the quality award in 1951 and called it the Deming prize, in recognition of Deming's contribution to the quality revolution. The award was an avenue for disseminating knowledge of successful methods for quality improvement. This award proved to be an effective instrument for spreading quality methods throughout the Japanese industry.

The success of the Deming Prize as a catalyst for spreading quality methods in Japan, together with the importance of quality as a significant contributor to competitive superiority and the essential contribution of benchmarking and self-assessment techniques to improving performance, encouraged many Western countries to introduce local, national, or transnational quality awards (Ghobadian and Woo, 1996). Each award is based on a perceived model of total quality management. The broad aims of these awards are to (Ghobadian and Woo, 1996):

- Increase awareness of the importance of the "quality of offerings" and interest in "quality management" because of their important contribution to superior competitiveness;
- Encourage systematic self-assessment against established criteria and market awareness simultaneously;

- Prompt co-operation between organisations on a wide range of non-commercially sensitive issues;
- Stimulate sharing and dissemination of information on successfully deployed quality strategies and on benefits derived from implementing these strategies;
- Promote understanding of the requirements for the attainment of "quality excellence" and successful deployment of "quality management"; and
- Stimulate organisations to introduce "quality management" improvement process.

The best known quality awards world-wide are the Malcolm Baldrige National Quality Award (MBNQA) and the European Foundation for Quality Management Excellence Model (EFQM EM), and have both served as benchmarks for most national quality awards (Alonso-Almeida, 2011; Asian Productivity Organization, 2002). The MBNQA and the EFQM EM are TQM tools that enable companies making the necessary effort to meet the requirements of and implement TQM (Alonso-Almeida, 2011). The European Quality Award (EQA) was launched in 1991 by the European Foundation for Quality Management (EFQM), established in 1988. The Malcolm National Quality Award Improvement Act was signed into law (Public Law 100-197) on August 20, 1987 in order to address the declining productivity of the U.S. (Evans and Lindsay, 2011). The Malcolm Baldrige National Quality Award (MBNQA) fuelled in part the unprecedented growth of interest in quality in the U.S. from the late 1980s and through the mid-1990s (Evans and Lindsay, 2011).

The African continent presently has four quality awards and excellence models in place, namely in Egypt, Kenya, Mauritania and South Africa (Alonso-Almeida, 2011). The national quality award program missions are mostly recognition of excellence, communication of best practices and facilitating business excellence (helping applicant organizations on their journey to performance excellence), and spur national quality culture.

5.4 Leveraging Technology to Improve Quality

Quality of Japanese products, and the reputation it developed, made it possible to spread to world markets. Japan did not get to that position without elaborative effort. The "culture of quality" that permeated certain sectors of Japanese manufacturing in the post-war period resulted from a technology-based push stemming from the engineering requirements of military procurements and modern electronics manufacturing (Leitner, 1999). For example, the electronics industry, the hallmark of Japan's post-war industrial triumph and quality reputation, used production and processing equipment of high quality, highly automated, and consistently produced superior output. Innovation was also emphasised in order to sustain the competitive edge.

6.0 Proposal for a Quality Movement in Zambia

The strategies that made the Japanese leaders in quality are essentially the same as those the Western countries adopted in an effort to narrow and eliminate the gap between Japanese and the West quality. In the view of the author, Zambia can revive its manufacturing sector, and grow the economy, by following similar strategies to improve its competitiveness. The industrial fabric and the factory system in Zambia originated in Europe and were brought by the colonial masters. These systems were rooted in craftsmanship and in the associated regulations by the monopolistic guilds and political authorities. While the Europeans have moved on, we are still hanging onto the old system. The trend is clear. Quality has become a global concern, with its interest expanding from goods to information, services, and the non-profit sector. Without quality as a prime directive in our industry, our industrial base

will continue to shrink. Clearly, no nation can have a sustainable economy, let alone compete globally, without adopting quality principles and practices. Therefore, for Zambia to improve the quality of life of its citizens, it has to focus on quality improvement. This could be achieved by adopting and implementing a three-point strategy, which includes education and training, quality award system, and government and industry collaboration.

6.1 Education and Training

For the Zambian industry to be at par with the best in the world from a quality perspective, quality has to become part of culture. It has to be emphasized by each and every level of an organization, by each and every level of the private and public firms, by each and every level of the government. This can only happen by embarking on national wide education and training programs in quality. We can benefit from the experiences and training programs of organisations such as the Union of Japanese Scientists and Engineers (JUSE), which is responsible for TQM promotion in Japan and the world over.

6.2 Quality Award System

The experiences of industrial nations indicate that the creation of an award and recognition program can serve as a strong catalyst to the quality improvement effort. A number of quality awards and excellence models are in place around the world, all designed to raise business performance and profitability (Alonso-Almeida, 2011). There is every reason to believe that the pursuit of quality and business excellence awards will be an enduring characteristic of the productivity and quality improvement programs of well industrialised countries in the world. It is absolutely necessary that Zambia establishes national prestigious quality awards directly by central government. An integral part of any award established must be sharing of information on successful performance strategies and the benefits derived from implementation of these strategies. Awarding of the quality awards must be made public, preferably broadcast live on national television to maximize the public awareness of TQM and these awards. This process would develop a culture in the society to demand for high quality products.

6.3 Government and Industry Collaboration

In the current competitive struggle for larger share of the global market and foreign direct investment (FDI), governments are playing an increasingly prominent role to facilitate the quality improvement effort in their respective countries. In Africa, where the relative influence of the state in economic activity is particularly strong, aggressive sponsorship and commitment of government leaders in the quality improvement campaign is even more crucial (Mersha, 2000). The Zambian government should, therefore, develop awareness of the critical role of quality for competitiveness and national development, and should strive to create appropriate mechanisms for initiating, supporting and sustaining the quality improvement effort. Government can help by adopting policies that are supportive of quality improvement and sustainable development, leading to reduction in the cost of production and making investments in new technologies and quality programmes highly possible.

In addition, Government and Industry must collaborate to continuously improve industry competitiveness through innovation. Government should play a key role in helping industry by promoting innovation and funding applied research. Developing research and science parks must be encouraged and supported to reach this goal. The development of Research and Development (R&D) focused "Research and Science Parks" must be sponsored

principally by the government and also by public institutions and private industry, in order to enable rapid interchange of workable strategies, suitable technologies and technology transfer.

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