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The Impact of Corporate Tax Rates on Total Corporate Tax Revenue: The Case of Zimbabwe (1980-2013).

Amos Tendai Munzara
Lecturer, Faculty of Commerce and Law, Zimbabwe Open University, Harare, Zimbabwe Edwick Musina
Masters Student, Department of Economics, Great Zimbabwe University, Masvingo, Zimbabwe

Abstract: *The study investigates the impact of corporate tax rate on corporate tax revenue in Zimbabwe using annual data for the period 1980 to 2013. The corporate tax revenue is used as the dependent variable while corporate tax rate is the independent variable. Gross Domestic Product (GDP), Foreign Direct Investment, inflation and drought are used as control variables. The research employs the Error Correction Model (ECM). The results show that corporate tax rate and FDI do not significantly affect corporate tax revenue in Zimbabwe. GDP and drought are found to have a significant positive impact on corporate tax revenue while inflation has a highly significant negative effect.*
Key words*: corporate tax rate, corporate tax revenue, revenue productivity*

I. Introduction

Following the adoption a multicurrency regime in February 2009, Zimbabwe has been struggling to mobilise sufficient revenue for public expenditure. The adoption of the multicurrency regime meant not only that the country's central bank cannot print money to finance the country's budget but also a loss of seignorage revenue. The country has to rely heavily on tax revenue. Therefore, a study of factors that affect tax revenue in Zimbabwe is appropriate at this juncture. This study focuses on corporate tax revenue which is a component of income tax. Corporate tax revenue is defined as the total amount of money that the government receives from registered companies as tax. It is levied as a percentage of the reported profits. This percentage is called the statutory tax rate and it applies uniformly to all registered companies.

The statutory corporate tax rates were constantly revised during the period of study, from as low as 35% in 1980 to as high as 65% in 1999. Figure 1 shows the fluctuations in the corporate tax rates and associated movements in corporate tax revenues for the period 1980 to 2013. The current corporate tax rate is pegged at 25.7%.

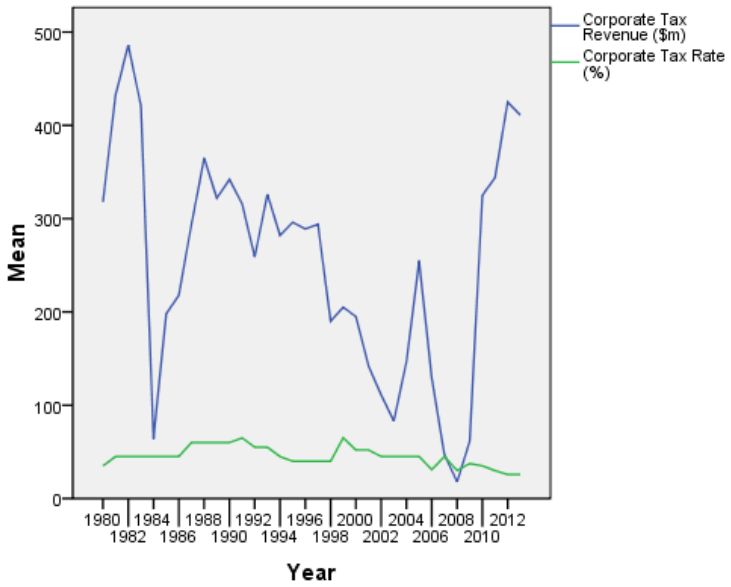

Figure 1: Variation in Corporate Tax Revenue and Corporate Tax Rates (1980-2013)

Theoretical literature shows no consensus on the impact of statutory corporate tax rate on corporate tax revenue. The standard Ramsey growth theories suggest that a revenue maximising corporate tax rate is zero

whilst the overlapping generations model purports a higher corporate tax rate to maximise corporate tax revenue. The two theories oppose each other in terms of how corporates need to be taxed.

The main theory on corporate tax revenue stems from the work of Laffer (1974). The Laffer curve, popularized by him, is a parabola that shows the relationship between tax rates and tax revenues. In its most basic form it shows that by having a tax rate of zero percent, the government is sure to receive zero dollars in tax revenue, and by having a one hundred percent tax rate the government is also sure to receive zero dollars in tax revenue since taxpayers will choose leisure instead of labour. Between these two values lies the parabolic curve, and its apex shows the revenue-maximizing rate (X). Figure 2 shows the Laffer curve.

There are two distinct sections of the Laffer curve. The upward sloping portion, which is to the left of the revenue-maximizing rate, is referred to as the normal range. When a country is operating on the normal range of the Laffer curve, it can realise gains in corporate tax revenues by increasing the statutory tax rate, and experience losses in corporate tax revenues by decreasing the tax rate. The downward sloping portion which lies to the right of the revenue-maximizing rate is called the prohibitive range. When a nation finds itself on the prohibitive range of the Laffer curve, increasing tax rates will further decrease tax revenues while decreasing tax rates will yield an increase in tax revenues.

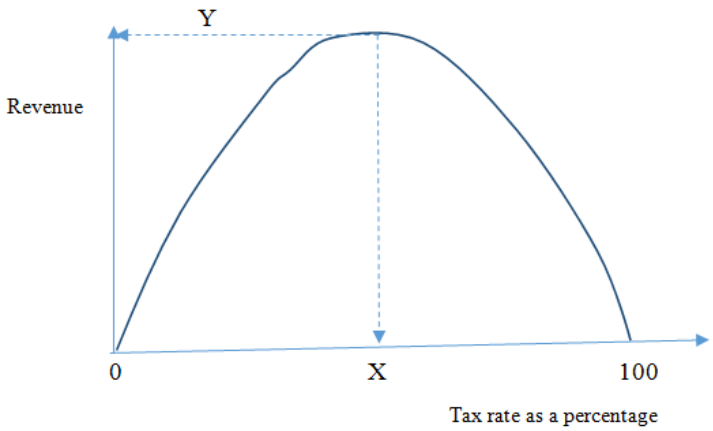

Figure 2: Laffer curve

The laffer curve suggest that a country can raise the corporate tax revenue by raising the corporate tax rate if it is operating to the left of the revenue maximising rate. Hence, using the Laffer curve, the relationship between corporate tax revenue and the corporate tax revenue is not clear since it depends on the side of the curve. On one side the relationship is negative and positive on the other side.

There are varying conclusions in empirical literature on the impact of statutory corporate tax rates on corporate tax revenue. A study by Brill and Hasset (2007) using panel data for the period 1981 to 2003 found a positive relationship between statutory corporate tax rate and corporate tax revenue in OECD countries. The results did not agree to those of a similar study conducted among 29 OECD countries by Clausing (2007). Using OLS regression, Clausing analysed variation in the size of corporate income tax revenues relative to GDP over the time period 1979–2002. He used the statutory tax rate, the breadth of the tax base, corporate profitability, and the share of the corporate sector in GDP as independent variables. The results showed a negative relationship between corporate tax rates and corporate tax revenue —that is, greater increases in revenues at low tax rates and larger reductions in revenues at high tax rates. Kawano and Slemrod (2012) re-examined the relationship between corporate tax rates and corporate tax revenues among OECD countries using a new compilation of changes in corporate tax base definitions for OECD countries between 1980 and 2004. Using simple regression analysis, they found a weak positive relationship between the corporate tax rate and corporate tax revenues which was statistically insignificant.

Pitrowska and Vanborren (2007) looked at the corporate income tax rate-revenue paradox in the EU using data from 1965 to 2005. They discovered that the reduction in corporate tax rates did not lead to changes in corporate tax revenue in the EU over the period studied. In a related study, Brandao et al. (2011) examined the economic determinants of corporate tax revenue across European Union members over the period 1998-2009 using the Feasible Generalized Least Squares (FGLS) regression. The regression results suggest that structural, cyclical, international and institutional factors such as GDP, government deficit, industry turnover and unemployment, number of enterprises, trade openness, FDI and corruption affect revenue performance of an economy. In particular, their findings show that unemployment rate and corruption have an adverse effect on tax collection, while the other factors such as GDP and number of enterprises has a positive impact on tax collection.

Studies carried out in Zimbabwe on this topic are few and those few studies did not look at the separate tax rates and separate tax heads. One such study by Macheka et al. (2013) examined the revenue productivity of the Zimbabwean tax system using annual time series data for the period 1975-2008. They found that corporate tax rates had no significant effect on the total revenue and only customs duty had a significant impact on revenue generation. There is little reason to expect that the different types of taxes available to government have the same impact on the economy and therefore can be examined at once. Instead of lumping the effects of the whole tax policy on the total tax revenue, our study seeks to analyse the impact of statutory corporate tax rates on total corporate tax revenue in Zimbabwe for the period 1980 -2013.

II. Methodology

The study uses annual time series data covering the period 1980 - 2013. The data is obtained from Zimbabwe Statistics Agency (ZIMSTAT), International Monetary Fund (IMF), the World Bank, ZIMRA and the Reserve Bank of Zimbabwe (RBZ) annual reports.

The study employs the Error Correction Model (ECM) which takes into account both the long run and the short run relationships. The long run relationship is estimated using data at levels without any integration procedure being undertaken. However, since economic systems are rarely in equilibrium because of institutional and structural changes, it is important to consider short run adjustments. Hence the importance of the short run model which involves variables that are in disequilibrium. The error correction mechanism is adopted to solve the problem of estimating long run or short run model alone by incorporating both of the models. The residual of the long run equation is tested for unit root and cointegration before it is incorporated in the error correction model. Unit root tests will determine whether the residual is stationary or not while cointegration tests the long-run relationship between the variables.

Model Specification

The long-run equation is specified as follows:

$$\mathrm{LOGCTR} = \beta_1 + \beta_3 \mathrm{LOGTR} + \beta_2 \mathrm{LOGGDP} + \beta_4 \mathrm{LOGFDI} + \beta_5 \mathrm{LOGINF} + \beta_5 \mathrm{DU} + \varepsilon.$$

The Error Correction Model is run by including all the stationary series and the residual from the cointegration equation. The ECM is specified as follows:

$$\mathrm{DLOGCTR} = \beta_1 \mathrm{DLOGTR} + \beta_2 \mathrm{LOGGDP} + \beta_3 \mathrm{DLOGFDI} + \beta_4 \mathrm{DLOGINF} + \beta_5 \mathrm{DU} + \beta_6 \mathrm{RESIDUAL}(-1)$$

where,

LOGCTR = Log of corporate tax revenue
LOGTR= Log of statutory corporate tax rate
LOGDP = Log of Gross domestic product
LOGFDI= Log of Foreign Direct Investment
LOGINF = Log of inflation
DU = is a dummy variable for drought
ε is the error term.
RESIDUAL (-1) = the lagged residual of the long-run equation

D shows a differenced series

Corporate tax revenue (CTR) is the dependant variable while statutory corporate tax rates (TR), drought (DU), foreign direct investment (FDI), gross domestic product (GDP), and inflation (INF) are independent variables. Corporate tax revenue is measured as the annual total remittances made by registered corporations in a given fiscal year. The corporate tax rate is the annual statutory corporate tax rate. The expected impact of the statutory corporate tax rate on corporate tax revenue is positive. Gross Domestic Product (GDP) is measured as real annual GDP and is expected to have a positive sign. Foreign Direct Investment (FDI) is measured as the annual inflows of foreign investment capital into Zimbabwe and it is expected to have a positive impact on corporate tax revenue. Inflation, as represented by the consumer price index is expected to impact negatively on corporate tax revenue. The dummy for drought will take the value 1 if the year experienced drought and 0 otherwise. The expected relation is negative. The residual (RESIDUAL (-1)) is the lagged error term of the cointegration equation. It represents the long run equilibrium. During periods of disequilibrium, it measures the distance away from the equilibrium. The residual is treated as the equilibrium error that attempts to correct errors or movements out of equilibrium.

Unit Root Tests

The Philips Peron test (with trend and intercept) is used to test the time series data for the presence of unit roots. The null hypothesis is that there is a unit root. This stage is important since a regression that is run with non-stationary data produce spurious results and conclusions will be invalid (Gujarati, 2004). Table 1.1 shows the results of the unit root tests.

Table 1.1 Results of unit root tests at levels

Variable	Critical value 1%	Critical value 5%	Critical value10%	Philips Perron Test	Conclusion
LOGCTR	-4.2627	-3.5530	-3.2096	-2.1846	Non- stationary
LOGTR	-4.2627	-3.5530	-3.2096	-2.1055	Non- stationary
LOGGDP	-4.2627	-3.5530	-3.2096	-5.5603***	Stationary
LOGFDI	-4.2627	-3.5530	-3.2096	-3.0765	Non- stationary
LOGINF	-4.2627	-3.5530	-3.3219	-3.2096	Non-stationary

*(**)(***) Statistically significant at 10(5)(1)% level respectively

The variables were not stationary at levels except GDP. All the non-stationary series were differenced and become stationary as shown in Table 1.2.

Table 1.2 Results of unit root tests for differenced series

Variable	Critical value 1%	Philips Perron Test	Conclusion
DLOGCTR	-4.2732	-8.8459	Stationary
DLOGTR	-4.2732	-6.6028	Stationary
DLOGFDI	-4.2732	-7.2315	Stationary
DLOGINF	-4.2732	-5.4032	Stationary

Cointegration Test

The cointegration test is performed for the residual of the long run equation using the Engel-Granger cointegration test. The hypothesis is that there is no cointegraion among variables. The decision criteria is to reject the hypothesis if the test statistic is less than the level of significance and conclude that there is cointegration among the variables.

Diagnostic tests of the ECM

The following diagnostic tests are performed on the residual of the error correction model:

Normality test

The Jarque- Bera test is used to test for normality of the residual of the ECM. The null hypothesis is H_0: the variable is normally distributed. The decision rule is, reject H_0 if p-value $\leq$ the level of significance.

Serial correlation test

The residuals should not be correlated for the regression results to be valid. We use Breush-Godfrey test to test for serial correlation. This can be tested using F or chi-squared distribution. The hypothesis is given as:

H_0: No auto-correlation and the decision criteria is to reject H_0 if the p-value $\leq$ the level of significance and conclude that there is serial auto-correlation among the residuals.

Heteroscedasticity test

We use White's test to ascertain whether the homogeneous variance assumption is violated.

Ramsey's RESET test

Ramsey's RESET test tests the stability of the ECM. One of the important assumptions of classical linear regression models is that the model should be correctly specified. The null hypothesis is that there is no misspecification. The decision rule is to reject the null hypothesis if p-value $\leq$ the level of significance and conclude that the model is correctly specified.

III. Results And Discussion

Table 1.3 below shows the correlation matrix used to test for multicollinearity.

Table 1.3 Correlation matrix

	LOGTR	LOGGDP	LOGFDI	LOGINF
LOGTR	1.0000			
LOGGDP	0.0058	1.0000		
LOGFDI	0.0123	0.0078	1.0000	
LOGINF	-0.0027	0.0005	-0.0005	1.0000

Variables are highly correlated if correlation coefficient values are greater than 0.8. As shown in the Table 1.3, there is no multicollinearity since the values are less than 0.8. Hence all the variables are included in the regression analysis.

Cointegration Equation

The estimated long run equation is obtained as:

$$\text{CTR} = 6.2471 + 0.6403\text{TR} + 0.1571\text{GDP} + 0.1329\text{FDI} - 0.1652\text{INF} + 0.0701\text{DU}$$

Drought has got an unexpected sign while all other variables have prior expected signs. The residuals from the long run equation are tested for stationary and the results are shown in Table 1.4

Table 1.4 Results of stationarity test on residuals of long run equation

Series	Model	Lags	PP	Critical Values
RESIDUAL	No constant, no trend	1	-5.45109	-1.610747 @ 10% -1.951332 @ 5% -2.636901 @ 1%

The residual is found to be stationary at 1% as shown in Table 1.4. The Engle-Granger cointegration test strongly confirm cointegration at 1% level. This strong long run relationship between the dependent and the independent variables justifies the adoption of the ECM.

The ECM

The ECM is run with all stationary series and the results obtained are presented in Table 1.5.

Table 1.5 Results of the ECM

Variable	Coefficient	T-Statistic	Probability
DLOGTR	-0.1305	-0.2	0.8221
LOGGDP	0.0096	2.0	0.0538
LOGFDI	0.0180	0.3	0.2702
DLOGINF	-0.0888	-4.1	0.0003
DUMMY	0.1706	2.1	0.041
RESIDUAL(-1)	-0.8900	-5.2	0.0000

R^2 = 0.62, DW = 1.7

The coefficient of determination ($R^2 = 0.62$) shows that about 62% of the total variation in corporate tax revenue is explained by variation in the selected independent variables. The Durbin Watson statistic (DW) is close to 2 showing that the model is a correct functional form of the relationship between the variables.

The ECM is given as:

$$\text{DLOGCTR} = -0.131\text{DLOGTR} + 0.010\text{GDP} + 0.018\text{DLOGFDI} - 0.089\text{DLOGINF} + 0.171\text{DU} - 0.890\text{RESIDUAL}(-1).$$

Table 1.6 shows results of the diagnostic tests.

Table 1.6 Results of Diagnostic tests

Test	Condition tested	F- statistic	p-value	Conclusion
Jarque-Bera	Normality	11.062	0.00396	Normally distributed
ARCH LM	Serial autocorrelation	0.0963	0.759	No serial-autocorrelation
White	Heteroscedasticity	0.672	0.792	homoscedasticity
Ramsey RESET	Model specification	0.111	0.7417	No misspecification errors

As shown in Table 1.6, the model does not violate any of the assumption of the classical linear regression model.

The results in Table 1.5 show that statutory corporate tax rate does not significantly affect corporate tax revenue in Zimbabwe. The result confirms findings of an earlier study by Macheka et al. (2013) that corporate tax rate have no effect on total revenue in Zimbabwe. However, studies in other countries show that corporate tax rate normally have a significant positive impact on corporate tax revenue. The difference may be due to the effect of haphazard shifts in corporate tax rates and tax evasion which is rampant in Zimbabwe.

The results show that GDP has a positive impact on corporate tax revenue at 10% significance level. The coefficient of 0.01 imply that, holding other variables constant, a 10% increase in GDP will result in 1% increase in corporate tax revenue. This shows that the elasticity of corporate tax revenue to GDP is less than unit, hence is not very responsive to GDP. It is expected that as GDP increases the economy may realise more corporate tax revenue. This may be through the effect of increase in investment that can result from increase in GDP, the increase in investment would have a feedback effect of increasing the corporate tax receipts.

The impact of FDI on corporate tax revenue is positive but not statistically significant. This means that although FDI is positively related to corporate tax revenue it does not affect the total collections of corporate tax. This is also not consistent with the theoretical expectations. This may be because of many tax holidays and concessions that foreign firms received for locating in Zimbabwe. The tax holidays mean that for a certain period the firms will remit nothing to government. Otherwise, during the tax holiday periods the firms will be

making profits and after the tax holiday periods they may encounter less profits, even losses and sometimes tax evasion. These will render FDI not important.

The results show that inflation has a negative impact on corporate tax revenue which is highly significant at 1%. The negative sign of the coefficient on inflation shows that, holding other things constant, corporate tax revenue will decrease in an inflationary economy. This is because inflation discourage investment since it decrease the real future value of projects. Moreover, inflation may increase the cost of production and reduces the profits realised by firms.

Drought has an unexpected positive sign and is significant at 10% level of significance. Zimbabwe is an agro-based economy, hence drought is expected to affect company performance negatively. However, the coefficient suggests that firms may make more profits and remit more tax revenue as a result of drought. This may be due to increased imports of agricultural raw materials from other countries that will force the output to be sold at a higher price to recover the importation costs. As a result firms will report more revenue and remit more tax to the government.

After running the ECM, the residual is expected to have a negative coefficient. The sign of the residual coefficient is as expected and strongly significant at 1%. The residual represents the error correction mechanism and the coefficient value of -0.89 suggests that the system corrects quickly to its previous period's disequilibrium from long run elasticity by 89% a year. The strong significance of the residual suggests the existence of a long run equilibrium relationship between corporate tax revenue and the previously mentioned variables.

IV. Conclusions And Recommendations

The main aim of the study was to find the impact of statutory corporate tax rate on corporate tax revenue in Zimbabwe. The results show that statutory corporate tax rate and FDI do not affect corporate tax revenue while GDP, inflation and drought were found to be important in affecting the total corporate tax revenue. GDP have a positive impact on corporate tax revenue while inflation has a negative effect.

We recommend that the government should not heavily rely on corporate tax rates to generate additional revenue. Fiscal policy should be structured to target other tax heads such as personal income tax, VAT, customs duty, capital gains and other indirect taxes. The government may consider policies that seek to regulate other macroeconomic variables such as inflation to be at manageable levels to guard against hyperinflation and deflation as these may affect company performances negatively. The government may increase the tax base by incorporating the informal sector to operate as registered companies so that they remit corporate tax when they make profits.

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