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The Effects of Corporate Taxes on the level of Investment in Ghana

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Abstract
This study sought to find out whether corporate taxes are high in Ghana to influence the level of investment both in the shot-run and long-run. Annual data from 1970-2010 were used to estimate the model. Based on the features of time series data, an error-correction model was formulated to estimate the determinants of investment in Ghana. The results show that corporate tax influences investment behaviour in the long-run, albeit no significant short-run impact. The study recommends that, long-run measures that seek to stimulate investment in Ghana would have to be accompanied by measures aimed at reducing corporate taxes in Ghana to the degree that will trigger more private investments in Ghana.
Key words: Corporate Tax, Johansen Technique, Investment, Vector Error Correction Model.

1. Introduction

Investment is a necessary condition for the development of a nation. Hormats (2010) in alluding to how necessary investment is, indicated that "Investment also drives development". He further expounded on the Monterrey Consensus in March 2002, which outlined sound policies to attract international investment flows and adequate levels of productive investment as key factors in sustainable development. Investment apart from assisting in producing needs for man's survival, can also be used as a tool for transmitting technical change and product innovations. It is equally important for policy makers in developing countries to be able to assess how investment responds to changes in government policy, not only in designing long-term strategies but also in implementing short-term stabilization programmes.

Generally, the level of investment in Ghana is low, with the total investment in the 1970s standing at 12% of GDP on the average; in the 80s, it was 6% of GDP on the average. In the 1990s, however, the figure rose to 12% of GDP on the average (2000-2010). There is therefore the need to investigate the factors that inhibit rapid investment growth in Ghana. Political upheavals in the 70s and early 80s reduced the level of confidence in the economy (Asante, 2000). Though private domestic and foreign direct investment has shown a considerable improvement, peaking at 16.7 percent and 3.3 percent of GDP in 2001 and 2000 respectively (Ayeetey & Baah-Boateng, 2007), there is still much to be done to increase it further. According to the World Bank (1991), the level of domestic savings and investment is inadequate to fuel the growth needed to raise living standards and generate sufficient productive employment. The role of taxation cannot be overemphasized as a way of stimulating investment in Ghana. Investments in Ghana have been affected mainly by macroeconomic factors like inflation, interest rate and exchange rate volatilities. Also political instabilities in the 1970s and early 80s affected the levels of investment in Ghana (Asante, 2000). Although these situations have considerably been stabilized, there is still a problem of investment in Ghana. Ghana undoubtedly needs to raise her level of investment to create more employment opportunities. Ironically corporate taxes seem high. In the 60s, corporate tax was around 65%. This figure reduced to 60% in the 70s and later 55% and 35% in the 80s and 90s respectively. This figure was further reduced to 28% and 25% in 2005 and 2006 respectively Budget 2007. The 2012 Budget Statement saw an increase in corporate tax in the mining sector from 25% to 35%.The latter is still astronomical to investors but a revenue opportunity for government. There is the need to look at key issues retarding investment in Ghana, especially corporate taxes, hence the need to investigate variables that impede investment in Ghana. Generally, this paper seeks to investigate the short run and long run effects of corporate taxes on the level of investment in Ghana. Furthermore, the study seeks to identify other variables that may influence the level of investment in Ghana.

1.1 Literature review

Theoretical Literature

The theoretical foundations of this study follows the theoretical framework developed in Myles (2007) based on q-Tobin model (Tobin, 1969). The model suggests that investments decision should be based on the arbitrage between V and K. Where V is the market value of investment and K is replacement cost. The models rule of thumb for investment decisions for economic agents was based on the relationship between V and K. If V>K it suggests good investment can be carried out. However, if K>V it suggests bad investment and calls for suspension or abrogation of investment decision. According to q theory of investment, the investment function is given by:

$$I = I(q)K \quad \ldots\ldots(1)$$

where, $$q = \frac{V}{pK} \quad \ldots\ldots(2)$$

pK - the nominal value of the capital stock which satisfies the following conditions:

I' (1) =0 ……... (3)

I' (q) 0> if q >1……..….. (4)

I' (q) 0< if q <1……...…… . (5)

Assuming a fraction of 'b' of new investment is financed by debt, the investment materialization would be possible if equation 6 is satisfied:

$$\left(\frac{V}{pK}\right) + b - 1 > 0 \quad \ldots\ldots(6)$$

From equation 6, one can assess the effects of taxation on investment decision. Considering a tax credit for say reinvested profit and full tax-deductible future depreciation allowances. Here again, the investment materialization would be possible if equation 7 is satisfied:

$$\left(\frac{V - B}{pK}\right) + b - 1 + ITC + Z > 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(7)$$

Where: B – the present value of tax savings on the existing capital stock; ITC – the tax credit for the reinvested profit; Z – the present value of future depreciation allowances related with the investment. If one considers a marginal tax rate for dividends τd and a marginal tax rate for income from capital τc the economic agent will reinvest that part of the profit that will endure an increase in the market $(1-\tau d)/(1-\tau c)$ In these conditions, the investment will be realized if the following inequality holds:

$$(V-B)(1-\tau c)/pK(1-\tau d)+b-1+ITC+Z>0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(8)$$

Having in mind that the investment cost is fully deductible from the taxable profit before the tax and the fact that profits are taxed at a rate τ, the q theory is described by the following function:

$$\frac{1}{K} = h(Q), \text{ with } h(0)=0 \text{ and } h' >0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(9) \text{ where:}$$

$$Q = \frac{(V-B)(1-\tau c)/pK(1-\tau d)+b-1+ITC+Z}{(1-\tau)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(10)$$

1.2 Theoretical Observations and Conclusions

To begin with, the presented model ten (10) shows that a change in profit tax rate τ could affect only the level of the investment rate (Q) but not its sign. Secondly, the other tax rates τd and τc could affect both the level and the sign of the investment rate. It could also be observed that an increase in the tax rate for income from capital could make the investment rate even negative, while an increase in the dividends tax rate has an opposite effect. Lastly, it could be observed that, allowing for an investment tax credit could yield a positive impact on the investment rate. These interesting theoretical results are confirmed by numerous empirical studies realized in the economic literature. For example, Goolsbee (1998) studied the impact of tax credits and found that a 10 percent investment tax credit raises the prices of investment goods by more than 6.5 percent, and therefore, much of the increase in investment is absorbed in an increase in price rather than an increase in quantity. More recently, Djankov, Ganser, McLiesh, Ramalho and Shleifer (2009) used data from a Pricewaterhouse Coopers enquiry for 85 countries and estimated a significant negative impact of the effective profit tax rates on investment and entrepreneurial activities.

1.3 Empirical Literature

Boadway (1978) investigated the most efficient scheme of investment tax incentives in the neoclassical theory of investment and concluded that investment allowances and tax credits on gross investment over and above regular depreciation are efficient investment incentives. Sandmo (1974) and Averbach (1981) independently analyzed the effects of corporate income tax on investment incentives. Sandmo (1974) used the neoclassical framework of investment and capital and found that corporate income tax changes relative prices in favour of either short term or long-term capital goods depending, however, on relative magnitudes of parameters involved. Averbach introduced personal income taxation and inflation in the model and found out that taxation had implications for risk taking and hence the type of investment undertaken. Corporate taxes reduce the return of equity holders and therefore tend to reduce risk taking. Earlier, Sandmo (1974) had concluded also that investment allowances and gross investment tax credit without basis adjustment favours short-term investment. However, Shah and Baffes (1991) concluded that investment incentives have not been effective in stimulating investment. The empirical findings, though mixed, are particularly relevant since they provide an explicit treatment of effects of taxation.

Asante (2000) studies on private Investment reveal that government policies are hindrances to private Investment. However his studies were up to 1992 and this research works at both private and public Investment and we have had new governments after that and policies have changed, tax regimes are looked at and this study zeros in on corporate taxes and its effect on Investment from 1970 to 2000. His work also suggests that variables like real exchange rate, inflation debt burden, and the black market premium must be addressed simultaneously. Se-Hark (1998) who had made studies on developing countries on investment planning reveals that investment and inflation are linked and also the size of government deficit. The linkage stems from the fact that government deficits were mainly contributed by the Implementation of ambitious Investment programs and predominantly financed by unrestrained credit expansion from the banking system, which is not able to take independent decisions on monetary policy also due to weak capital markets. Attitudes and policies toward foreign direct Investment is very important if more Investment is to be encouraged in a country. A research carried out in Central American business community towards direct foreign Investment in 1969 under the auspices of the organization of American states show that 77% of businessmen interviewed expressed that direct foreign Investment was desirable in general, but 80% of those interviewed favoured some type of government control or regulation of direct Investment flows. Representation from the private sector recognizes the possible benefits of private Investment, but nonetheless favors regulation because of the possibility that they themselves will be unable to compete with foreign owned enterprises.

A Research carried out by Schneider (1985) that there was direct empirical link between government policy variable and private capital formation. The results further prove that private Investment in developing countries is constrained by the availability of deficit financing and that of monetary policy also by varying the flow of credit from the Public Sector to the private Sector. This can change Investment decisions in the private sector. The frightening of monetary policy which is an element of stabilization Policy would be expected to have adverse effects on the level of private Investment and would lead to a reduction in economic growth. Furthermore the flow of foreign capital may be affected by in-appropriate exchange and interest rate polices and this may impact negatively on private investment. There is empirical finding which suggest that debt overhang and amortization can affect Investment. A research by Khan and Reinhart (1990) also confirms the assertion that debt burden has adverse effect on investment. Also Fitzgerald, Vos and Jansen (1994) looked at 22 developing countries from 1970 – 90 and found out that the ratio of external debt to GDP has negative impact on private Investment.

Jorgenson (1971) also confirmed this by saying uncertainty and instability as Investment deterrents after his research. He further found out that terms of trade and real exchange volatility are adversely related for private Investment. Patillo (1996) work at various, regimes and some kind of uncertainty it had on irreversible Investment decisions using Ghana as an example which has had several political regimes, some socialist, and others capitalist. She found out that firms that expect unfavorable political regimes are more hesitant to invest and would have only a small level of investment as response to favourable current response trends, since they become too cautious about the future. Ndikumana (2000) found out that when capital is imported and the government of the foreign investor taxes the profit of that particular investor and also taxes the country where it plans to invest, resulting in double taxation, and the Investor knows he can only have marginal profit, this many serve as a disincentive. They also looked at the rate of accelerated depreciation. That is if an asset is capital in nature and long-lived and depreciation allowances for tax purposes are accelerated, by preventing depreciation deductions during periods of peak profits will prevent a firm from Investing, during a tax holiday. He further said if effective rates and user cost of capital under tax holiday system allow depreciation allowances to be deferred until after the holiday would be very beneficial to the firm and can act as a good incentive for Investment. According to Oshikoya (1994) Reinvestment allowance can serve as an incentive for expanding businesses. It exempts from all income tax or part or corporate earnings that are retained and invested in approved projects. This is similar to a grant and lowers the risk element in business

and allows a business to recoup its capital quickly and can serve as a good incentive in attracting potential Investment into a country. Islam and Wetzel (1991) conducted a study on the Macroeconomics of Public Sector Deficits: The Case of Ghana. As part of their goals, the study also examined the link between real private investment and corporate tax revenues/GDP. The study adopted Ordinary Least Squares (OLS), and the findings established a positive relationship between corporate tax revenue and flow of credit to the private sector. Vergara (2004) assessed the correlation between corporate tax reform and private investment performance of Chile with annual data from 1975-2003. The results affirmed the theoretical underpinning of an inverse relationship between private investment and higher corporate tax rates.

Frimpong and Marbuah (2010) did an empirical work on factors determining foreign direct investment in Ghana using the error correction technique within an ARDL framework. The findings show that in the short-run, private investment is determined by public investment, inflation, real interest rate, openness, real exchange rate and a regime of constitutional rule in the short-run. Again, real output, inflation, external debt, real interest rate, openness and real exchange rate significantly influenced private investment response in the long-run. Kotlikoff (2011) in a study on the topic: Is the Corporate Income Tax Regressive? revealed that, the U.S. corporate tax income is relatively high compared to many other countries. Again, statutory tax rate is 35%, but their effective rate is lower 28% due to subsidies and tax credits and other tax breaks that corporations receive on their investments. It came out that some countries like Portugal lower effective rates (19%). High corporate tax encourages U.S. corporations to invest overseas, and discourage foreigners from investing in the United States. This reduces demand for U.S. workers, compared to what it would be if U.S. tax rates were lower. As a result, American workers' wages are lower than they otherwise would be. Conversely, increased overseas investment raises the wages of workers abroad. The study concluded that US tax system is regressive and that if the United States cut its corporate income tax rate dramatically, the country would likely experience a huge rise in net domestic investment, which is now running at a postwar low of 4 percent. This would, potentially, raise U.S. workers' wages dramatically by as much as 10 percent. As part of the conclusions, the study recommended elimination of corporate income tax in the US.

1.4 Methodology

Model Specification

There are various methods used to assess the effects of corporate taxes on investments. These methods have their merits and demerits. One common model is the general accelerator model. However, for the purpose of this study, the flexible accelerator model is used. The flexible accelerator model to be used is expressed as

$$i^g = (\alpha / c) \prec \Delta Y + \partial k \quad \text{.....(11)}$$

Where: ι^g = net investment; $\delta\kappa$ = replacement investment; α/c = user cost of capital; ΔY = change in output. To capture all relevant variables from both Keynesian and Neoclassical traditions, the study adopted a general model whose functional form is expressed as:

$$GFCF = F(RER, RIR, RGDP, CT, INF, D) \quad \text{..... ..... (12)}$$

Where GFCF = Gross Fixed Capital Formation, RER = Real Exchange Rate, RIR = Real Rate of Interest, RGDP = Real GDP Growth Rate, CT = Corporate Tax, Z = Dummy for Political Instability. The econometric model is then specified as

$$GFCF_t = \beta 0 + \beta_1 RER_t + \beta_2 RIR_t + \beta_3 RGDP_t + \beta_4 CT_t + \beta_5 Z_t + \beta_6 INF_t + \xi_t \quad \text{.....(13)}$$

1.5 Data Type and Estimation Procedures

Secondary annual time data covering the period 1970-2010 is chosen to allow for enough relevant observations in various economic seasons. The data used in the study were obtained from Quarterly Digest of Statistics, the Ghana Statistical Service (various issues), World Tables, Bank of Ghana Annual Reports (various issues), Budget Statement (various issues) and the International Financial Statistics published by the IMF. The study uses the Johansen Co-integration Technique or Approach in order to investigate the existence of a long-run co-integrating relationship between Gross fixed capital formation and the explanatory variables. The estimation was done using Eviews 6 and it entails unit root tests, test for Co-integration in the context of Vector Autoregression Estimates (VAR), and Vector Error Correction Model. It is very important that the series used should be stationary since a non stationary time series would give spurious regression results. Time series analysis requires that stationarity be established through differencing or some other technique. The Dickey - Fuller test is employed in this study to formally test for the presence of a unit root. Dickey and Fuller (1979) considered three different regression equations that can be used to test for the presence of a unit root.

$$\Delta Y_t = \rho Y_{t-1} + \epsilon_t \quad (14.1)$$

$$\Delta Y_t = \alpha_0 + \rho Y_{t-1} + \epsilon_t \quad (14.2)$$

$$\Delta Y_t = \alpha_0 + \rho Y_{t-1} + \alpha_1 t + \epsilon_t \quad (14.3)$$

The difference between the three regressions concerns the presence of the deterministic elements α_0 and $\alpha_1 t$. The first is a pure random walk model, the second adds an intercept or drift term, and the third includes both a drift and linear time trend. To avoid autocorrelation which is normally present in the D-F models, the study adopts the sufficient Augmented Dickey-Fuller Specification of the above by introducing the lags of ΔY into the models.

The parameter of concern here in any of the equations regressed, is ρ. If ρ=0, then $\{Y_t\}$ sequence contains a unit root. The test involves estimating one (or more) of the equations above using OLS in order to obtain the estimated value of ρ and the associated standard error. Comparing the resulting t-statistic with the appropriate value reported in the Dickey-Fuller tables allows the study to determine whether to accept or reject the null hypothesis ρ=0. The Dicker-Fuller test would help find out if series is stationary. If stationary, we test for co-integration relationship among the variables. To do this, the series must be integrated of the same order.

1.6 Test for Co-integration

The test stipulates that if variables are integrated of the same order, a linear combination of variables will also be integrated of the same order. The idea behind co-integration analysis is that although macro variables may tend to trend up and down over time, groups of variables may drift together. If there are some tendencies for some linear relationships to hold amongst a set of variables over long periods of time, then co-integration analysis helps to discover it. Individual series may be non-stationary but their linear combination may be stationary which can depict co-integration. Failure to establish co integration between non-stationary variables can lead to spurious regressions, which does not reflect long-run relationships but rather reflect common trends. To test for co-integration, we run a regression on the linear model of equation 13. Errors from this regression are generated and subject to a unit root test. After first differencing, the errors were found to be stationary and the variables are co-integrated. The existence of co-integration relationship among variables invoked the Engle-Granger Representation Theorem for the specification of an error-correction model. An error correction model is used to provide a useful link between the long-run equilibrium relationships and short-run disequilibria dynamics. When the model involves non-stationary variables, equilibrium is contained in the co-integration relations. This technique makes it possible to deal with non-stationary variables by first analyzing the long-run properties of the model, and including this information from long run into the dynamic short-run model explicitly.

1.7 Results and Discussion

This section presents the findings and analysis of the results from various estimation techniques. Both the short and long run GFCF model results are captured and discussed.

Table 2: Results of Co-integrating Equations

Sample (adjusted): 1973 2010, Included observations: 38 after adjustments, Trend assumption: No deterministic trend (restricted constant), Series: GFCF CT INF RER RGDP RLR Z , Lags interval (in first differences): 1 to 2

Table 2:1 Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.872320	218.1060	134.6780	0.0000
At most 1 *	0.649754	139.8933	103.8473	0.0000
At most 2 *	0.596401	100.0268	76.97277	0.0003
At most 3 *	0.571814	65.54809	54.07904	0.0034
At most 4	0.426638	33.31656	35.19275	0.0786
At most 5	0.229582	12.17952	20.26184	0.4329
At most 6	0.057945	2.268279	9.164546	0.7239

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

Table 2:2 Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.872320	78.21271	47.07897	0.0000
At most 1	0.649754	39.86656	40.95680	0.0660
At most 2	0.596401	34.47867	34.80587	0.0547
At most 3 *	0.571814	32.23153	28.58808	0.0163
At most 4	0.426638	21.13705	22.29962	0.0720
At most 5	0.229582	9.911240	15.89210	0.3425
At most 6	0.057945	2.268279	9.164546	0.7239

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

Table two shows the results of the co-nintegrating equations as generated by Eview 6. This can be represented for easy comprehension of analysis.

$$GFCF = 20.81503 - 0.355005CT + 0.163403INF + 2.872079RER - 0.640777RGDP + 0.358771RLR + 2.413238Z \quad \ldots\ldots(15)$$

From the co-integrating equations as presented in equation 15, the GFCF in Ghana and its influential factors have some stable long-run equilibrium relationship existing among the series which justifies the error correction representations (Engle and Granger, 1987). This rules out any possibility of the estimated relationship being spurious (Masih and Masih, 1998). The estimated long-run relationship based on normalization in respect of GFCF is presented in equation 15 (See appendix 3b) for standard errors, t-statistic and p-values). The relationship reveals that apart from the corporate tax, all the other variables were positive. One percent increase in CT was revealed as causing GFCF to fall by almost 0.36% in the long-run. The policy implication is revealed in the evidence that, CT exerts significant and negative long run influence on GFCF. This shows that, measures that seek to stimulate investment in Ghana would have to be accompanied by measures aimed at reducing CT in Ghana to the degree that will trigger more private investments in Ghana.

Apart from RER and Z which were not significant the long run, the other explanatory variables such as INF, RLR and RGDP were significant at 5% significance level. It implies that RER and Z may not explain GFCF in the long run regarding the period under consideration but INF, RLR and RGDP do.

TABLE 3.0 ESTIMATED VECTOR ERROR CORRECTION MODEL

Error Correction:	D(GFCF)	D(CT)	D(INF)	D(RER)	D(RLR)	D(RGDP)	D(Z)
ECM	-0.780309***	0.054248	2.098648	-0.004138	-1.075609	0.686075	-0.029132
	0.17152)	(0.18886)	(1.67344)	(0.00910)	(0.87629)	(0.35324)	(0.01787)
	[-4.54925]	[0.28724]	[1.25409]	[-0.45451]	[-1.22746]	[1.94222]	[-1.63017]
D(CT(-1))	-0.225034	-0.125109	-1.861724	-0.001542	0.612010	-0.397716	0.081320
	(0.22588)	(0.24871)	(2.20376)	(0.01199)	(1.15399)	(0.46519)	(0.02353)
	[-0.99624]	[-0.50303]	[-0.84479]	[-0.12863]	[0.53034]	[-0.85496]	[3.45538]
D(CT(-2))	0.246463	0.075858	1.441152	-0.007200	0.004718	-0.637670	0.032983
	(0.24259)	(0.26710)	(2.36673)	(0.01288)	(1.23933)	(0.49959)	(0.02527)
	[1.01598]	[0.28401]	[0.60892]	[-0.55917]	[0.00381]	[-1.27639]	[1.30499]

D(INF(-1))	-0.110594**	-0.071579	-1.157145	0.000542	0.314981	0.118177	0.007145
	(0.04660)	(0.05131)	(0.45465)	(0.00247)	(0.23807)	(0.09597)	(0.00486)
	[-2.37322]	[-1.39503]	[-2.54514]	[0.21919]	[1.32304]	[1.23139]	[1.47168]
D(RER(-2))	-14.75081***	2.275999	11.00077	-0.168476	-13.32372	10.18673	-0.292778
	(4.41755)	(4.86396)	(43.0987)	(0.23447)	(22.5685)	(9.09763)	(0.46026)
	[-3.33914]	[0.46793]	[0.25525]	[-0.71855]	[-0.59037]	[1.11971]	[-0.63612]
D(RLR(-1))	-0.279603**	-0.144673	-1.117872	0.001800	0.087762	0.235491	0.006328
	(0.10158)	(0.11185)	(0.99104)	(0.00539)	(0.51895)	(0.20920)	(0.01058)
	[-2.75254]	[-1.29351]	[-1.12798]	[0.33382]	[0.16911]	[1.12569]	[0.59790]
D(RGDP(-1))	-0.347205***	-0.072200	-0.424296	0.002277	0.159427	-0.191917	-0.002885
	(0.11282)	(0.12422)	(1.10068)	(0.00599)	(0.57637)	(0.23234)	(0.01175)
	[-3.07755]	[-0.58123]	[-0.38548]	[0.38027]	[0.27661]	[-0.82601]	[-0.24546]
D(RGDP(-2))	-0.295218***	0.039864	-2.404567	0.001522	0.948100	-0.362610	-0.006629
	(0.09610)	(0.10581)	(0.93756)	(0.00510)	(0.49095)	(0.19791)	(0.01001)
	[-3.07202]	[0.37675]	[-2.56470]	[0.29848]	[1.93115]	[-1.83221]	[-0.66204]
C	0.567588	-0.339612	0.220861	0.001498	0.573458	-0.169643	0.009256
	0.39755)	(0.43773)	(3.87863)	(0.02110)	(2.03103)	(0.81873)	(0.04142)
	[1.42770]	[-0.77585]	[0.05694]	[0.07097]	[0.28235]	[-0.20720]	[0.22346]
R-squared	0.732427	0.176820	0.704771	0.329403	0.600421	0.635419	0.580908
Adj. R-squared	0.549991	-0.384440	0.503479	-0.127822	0.327981	0.386841	0.295164

Table 3.0 provides the short run factors that may influence GFCF which includes CT which is the main variable under investigation. These factors are the short run components of the VECM. Examination of the F-statistics and the adjusted R^2 suggests that the variables in the VECM significantly explained the short run changes in GFCF under the review period. An R^2 of about 73% and an adjusted R^2 of about 55% imply that the explanatory variables in the equation account for about 73% of the variation in the observed values of investment and 55% if the loss in degree of freedom is considered.

Three main tests were conducted on the model. These include the serial correlation, heteroscedasticity and model specification tests. The LM statistics is the main tool used in this study to perform the serial correlation tests. The LM test shows the absence of first order autocorrelation in the model hence the study concludes that the problem of serial correlation is absent in the model. The probability value of about 0.41 (see appendix 4) indicates the acceptance of the null hypothesis that the residuals are not serially correlated. It is therefore, believed that the disturbance of the selected model is not serially correlated. The study again performed the Heteroscedasticity test. Its purpose is to determine the structure of the residuals. The non-cross white Heteroscedasticity test statistics based on the probability values indicate that the residuals are equally structured or homoscedastic. For instance, the cross white Hereoscedasticity prob.-value 0.1665 is enough grounds to accept the null hypothesis that "residuals are homoscedastic or equally structured." For a model to be used for forecasting and projecting purposes, it must pass the stability test of its dependent variable. The Jarque-Bera statistic used showed a probability value of approximately 0.26.This leads to the acceptance of the null hypothesis of a well specified model because of the stability of the dependent variable. Furthermore, VEC Residual Normality Tests jointly confirmed that the residuals are multivariate normal with a probability value of 0.9969% hence accepting the null hypothesis that the model is normally distributed. By this outcome, it suggests that the model is good enough for forecasting and thus could also be replicated in further studies for forecasting purposes. The Error Correction term (ECM) in the model is associated with the desirable negative sign and it is statistically significant at 1%

significance level. This shows how the model adjusts significantly to shocks to its equilibrium relationship with its determinants which include past values of corporate tax.

From the model, the main variable understudy which is corporate tax, was considered from the perspective of a year and two lags respectively. In the case of the former, it carries the expected negative sign however not significant. The negative sign may imply that the higher corporate tax the lower the level of investment and vice-versa. In the case of the latter, it failed both the sign expectation as well as the significance level. The wald- test results confirmed that the short-run impacts of past values of CT on GFCF are not significant. This could mean that in the short-run, other variables explain investment correlation rather than past values of CT in this model. The lag of one inflation variable is negative conforming to theory and significant at 5% level. This suggest that lower rates of inflation in the immediate past years particularly if it is induced from the cost of production or cost of doing business in Ghana will influence investment activities in Ghana. Moreover, a test of the lag of two inflation variables is also negative however insignificant. It could imply that the reduction rate in inflation for the past two years was not so substantial to influence future investments. This suggests that lower rates of inflation in the immediate past year better explains current investments than past years beyond one year.

Authors like Asante (2000) also found real exchange rate having a positive relation with investment, hence this study just confirms what was found earlier in Ghana. However, from the literature, real exchange rate can also be negatively correlated with investment, when most of the industries are import-substituting industries and depend mostly on imported raw materials for their production; this is also found in this model. This is depicted in having the past two year RER variable being negative with quite a substantial magnitude relative to other variables under investigation and it is also significant at 1% level. These results may be due to a 'wait and see' attitude of people and depreciation of the cedi leading to high cost of production. Also it could be a measure of inertia, meaning that the impact does not happen almost immediately and that there is time lag for it to have real impact. The RLR was expected to have a positive relationship with Investment. According to Mehrara and Karsalari (2011) bank loans do not have close substitute in developing countries and that a restriction in lending negatively affects investments. However, the study reports an inverse relationship between a one year lag of RLR and investment at 5% level of significance. The inverse relationship could be due to redirection of credit facilities into other activities that are not investment oriented. Again, it means that investment activities in Ghana could be driven more by foreign direct investment which does not necessarily depend on domestic credit or lending. This could also mean that apart from the fact that most of the industries are foreign owned and depended on other sources of finance that were cheaper than domestically. It could also be that the government crowds out the private sector when it comes to borrowing in the country. Furthermore, the two-year lag of RER also affirmed the negative relationship. However it was not significant. Generally, an increase in a country's RGDP should attract other investors into the active economy to realize good output or income for any possible investment. This therefore predicts a positive relationship between RGDP and investment as it exists in theory. However, the results were contrary to theory in the sense that, both one and two- year lags of RGDP were negative and also significant at even 1% significance level. It implies that anytime there is an increase in Ghana's past RGDP because investors are skeptical and uncertain about the future they cut down or withdraw their investments. This could be attributed to lack of confidence in the sustainability of the growth and uncertainty of our political atmosphere knowing African countries are prone to political instability. It is important that for policy purposes, government will work to maintain investor's confidence in the economic and political environment of the country. The past values of RGDP are very significant in explaining short-run investments in Ghana. Political instability had the expected right sign in the short-run which is negative in both lag one and two respectively. The signs of the variables coefficients suggest that past political unrest in Ghana and past political occurrences are really discouraging factors for future investments in Ghana and beyond. This was not significant probably due to the fact that Ghana has enjoyed stability for over three decades now and political instability is not considered as significant in explaining the model.

1.8 Conclusion

Ghana's success stories in her economic growth rate since 2007 has been attributed to expansion in investment in the economy as a result of favourable macroeconomic environment. Various governments have wished to sustain higher investment growth rates yet the short-run and long-run correlation of corporate tax and Investment has little empirical evidence since 2007. In the light of these considerations the study sought to examine the effects of corporate tax on the level of investments from 1970 to 2010. The co-integrating equations were used to determine the long-run relationship investment and corporate tax. Again, the Vector Error Correction model was also used to determine the short-run relationship and the level of adjustment in equilibrium.

A number of important results were obtained which are relevant to policy makers. Among these is the fact that an increase in CT significantly depreciates investment in the long-run. This is because CT exerts significantly negative long run

influence on GFCF and that a one percent increase in CT was revealed as causing GFCF to fall by almost 0.36% in the long-run. In the short-run, the results show how the model adjusts significantly to shocks to its equilibrium relationship with its determinants which include past values of corporate tax. Again, the Wald-test results confirmed that the short-run impacts of past values of CT on GFCF are not significant. This suggests that in the short-run, other variables explain investment correlation rather than past values of CT in this model. More so, the study revealed that lower rates of inflation in the immediate past year better explain current investments than past years beyond one year. This variable was significantly negative in explain the dependent variable.

Furthermore, the positive relationship between RER and GFCF as established in the literature was confirmed by the study. However, the ambiguity in RER and GFCF signs came to bear as the lag two RER was found to be negative. This is normally the case when most of the industries are import-substituting industries and depend mostly on imported raw materials for their production. This is depicted in having the past two year RER variable being negative with quite a substantial magnitude relative to other variables under investigation and it is also very significant. The study gain revealed a significantly negative relationship between RLR and GFCF which is also explained by the redirection of funds lent to customers into other things other than an economic activity that could trigger increase in investment. This was also supported by empirical findings by Mehrara and Karsalari (2011). Moreover, the findings of this study did not deviate from the expected a priori positive relationship between RGDP and investment as exist in theory. This was also significant. The democratic environment and political stability being enjoyed by the nation for at least the twenty years made D have no significant impact in determining investment in Ghana.

The study recommends to policy makers that long-run measures that seek to stimulate investment in Ghana would have to be accompanied by measures aimed at reducing CT in Ghana to the degree that will trigger more private investments in Ghana. Again, corporate taxes in the short-run do not determine the level of investment in Ghana. However, from this study, there are other macroeconomic variables such as RGDP, RER, RLR, and INF that best explain variations in investment in Ghana.

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