

An Empirical Analysis of the Incidence of Corporate Income Tax in Ghana (1997-2006)

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Abstract

The corporate income tax is levied on earnings at the corporate level and shareholders pay taxes again on these earnings when they are paid out as dividends. This double taxation has been a concern of policy makers and its effects on economies have been analyzed and discussed by researchers in many disciplines. This study uses a financial statement data from ten (10) manufacturing companies listed on the Ghana Stock Exchange over a ten year period spanning from 1997 to 2006. The simple ordinary least squares regression is used for models representing each of the three players over time. The results showed a negative relationship between returns to shareholders and the tax, indicating that returns decrease when the tax increases. The results also showed a negative relationship between the cost of labour and the tax, indicating that an increase in the tax will lead to a decrease in the cost of labour (wages). Finally, the results showed a significant positive relationship between the gross profit percentage and the tax; indicating that consumer prices may increase in relation to an increase in the tax rate.

Key words: Corporate Income Tax, Incidence of tax, Regression analysis, Ghana

1. Introduction

The incidence of corporate taxes has been the focal point of intense study since it was introduced in 1909. Many economists have analyzed the incidence of the corporate tax by using emerging regression techniques, but the findings of their studies yielded conflicting results. With the most prolific publication of Arnold Harberger's study in 1962, the general equilibrium model became the overriding method of analysis, and a consensus emerged that much of the burden of the corporate tax was borne by capital in a closed economy, where none of the economic sectors were involved in trade with other countries. As economies became globalized, concerns about whether such conclusion drawn by Harberger and others still holds within a large open economy has spurred new types of analysis in this area (Harberger, 1962).

Some countries of which Ghana is not exception, address their fiscal deficit by increasing tax revenues rather than reduction in government expenditures. Nevertheless, policy makers most often lose sight of the incidence of these new taxes (Younger, 1993). Studies in areas like public sector economics and taxation are yet to resolve the controversies surrounding the issue of who bears the burden of taxes on corporate income. Economists recognize that the incidence that is the distribution of the burden of such taxation falls ultimately on individuals and not on corporations (Rogers, 1996). However, some economists argue about who bears the largest burden. In determining the economic effects of the corporate income tax, it is crucial to understand the mechanisms by which tax burden are transferred. The incidence of the corporate tax is also an important factor in ascertaining the effects of tax proposals on different segments of the population. Economists are far from a consensus about the proportional distribution of the corporate income tax burden. It is therefore relevant to do an empirical analysis of the incidence of corporate income tax in Ghana.

2.1 Literature Review

A series of studies using econometric time series data to address the shifting of the corporate income tax were done in the mid-sixties to the early seventies. Those studies used aggregate measures from the manufacturing sector with predominantly corporate firms. These papers can basically be put into four groups based on the model used for the regression: a corporate returns model, a mark-up pricing model and production function model. A more recent model called the bargaining model has been developed and used to analyze the incidence of corporate tax by Arulampalam *et al.*, (2011); Alison and Hines (2009).

In 1963, Krzyzaniak and Musgrave started this line of research and reported in their findings that corporate capital owners shift more than 100% of the corporate tax. The mechanism of shifting, forward to consumers or backward to labour, was not addressed in their study. The purpose of their study was to determine the effect of the tax variable on corporate returns while holding all other factors constant. Different rate of return variables such as return on equity, return on total capital and the effective tax rate were used in the model and the theoretical reasons for their structure were discussed by the authors. “The analysis of this study takes an empirical approach, without a priori assumptions about the market structure” (Krzyzaniak and Musgrave, 1963, p.4). The additional variables included in the study were the change in consumption, expenditures lagged one year, the inventory to sales ratio for all manufacturing lagged one year, and other tax rates were defined as the ratio of yield from other taxes to GNP (Krzyzaniak and Musgrave 1964, 31).

The study reported results from the regression model for all manufacturing and various industries. The results of the study indicated that, in most samples, shifting of over 100% occurred. The results range from 157% shifting for a group of steel companies to 21% for a group of textile companies. Several other studies were written to criticize Krzyzaniak-Musgrave’s study such as (Slitor, 1966; Goode, 1966; and Cragg *et al.*, 1967). For instance Slitor praises Krzyzaniak and Musgrave for making an important new step in this area of public finance (Slitor, 1966, p.147). However, he warns that the results of the study cannot be accepted without extensive examination because the results collide with accepted theory in incidence, profit-maximizing, and barriers to sweeping price

changes (Slitor, 1966, p.146). In order to test the model, Slitor introduced another independent variable he calls an "economic pressure variable." The proxy chosen by Slitor to represent economic pressure is a capacity utilization variable.

Capacity utilization is a measure of actual production divided by production capacity. When this new variable is substituted for the consumption variable, shifting was reduced from 141 to 87 percent, but the new pressure variable and the inventory-sales ratio were insignificant. Slitor tried with various other regressions and in each case the shifting measured was reduced from Krzyzaniak and Musgrave's results, but not by as much as the replacement of the consumption variable. Slitor did not claim to have measured the shifting more accurately but his purpose was merely to establish that the research of Krzyzaniak and Musgrave is flawed. Goode (1966) critiques Krzyzaniak and Musgrave but did not provide empirical evidence to justify his objections to their study. He concluded that the theory, model, and data are seriously flawed and hence rejects Krzyzaniak and Musgrave conclusions.

Cragg *et al.*, (1967) also criticized Krzyzaniak and Musgrave's conclusions and made adjustments to the model to demonstrate its sensitivity. In their adjustment, they first added a variable to represent the cyclical nature of the economy which Cragg *et al.* believe is related to the tax effect. They explained that the increase in returns attributed to the tax variable by Krzyzaniak and Musgrave is in fact caused by the cyclical nature of the economy. The proxy chosen by Cragg *et al.* to represent the cycle of the economy is the unemployment rate. When the unemployment variable was added to Krzyzaniak and Musgrave model, the shifting coefficient drops from 151% to 102%. Notwithstanding this adjustment, Cragg *et al.* suggested that high profits and taxes caused by the war and mobilization years distorted the relationships in the regression and added a dummy variable to the model for these years. When this dummy variable was added to their extended model, the shifting coefficient of the tax variable dropped to 60% and became statistically insignificant. Based on the findings of their new model, Cragg *et al.*, (1967) concluded that shifting does not take place and capital bears the burden of the tax.

Another stream of research instigated by Hall (1964), he empirically examines the question of short-run incidence of the corporate income tax using a long-run production function model. The method Hall used in the study was to run regressions of different production functions based on no shifting, full shifting through wages, and full shifting through prices. Hall assumed that the technical gains experienced in the economy were neutral between labour and capital. In other words, labour and capital share an equal portion of the technical gains. Hall (1964, p. 265) concluded that there was no shifting because the no-shift regression with an R^2 of 0.9715 as compared to 0.9432 for consumer shifting and 0.9308 for labour shifting. The study did not offer any method of measuring partial shifting. Turek (1970) extended Hall's approach by allowing technical gains for labour and capital to vary separately. Turek used aggregate data from the manufacturing sector for the years 1935-1965. Her results corroborate those of Hall in finding evidence of no shifting. Oakland (1972) designed a production function model based on profit maximization behaviour to test for the fitness of the model to manufacturing time series data. He added a tax variable to test for tax shifting. The model used returns to capital as the dependent variable and measured the effects of marginal productivity and short-run fluctuations in output. Oakland

concluded that the model best explains the time path of manufacturing returns quite well, and all the variables are significant with the expected sign except the tax variable. This indicates that the corporate income tax is not shifted in the short run.

Dusansky (1972, p. 357) provided a sixteen equation model which included the nature of the corporate income tax burden, the return to capital, the level of inventories and sales, the determination of labour input, the payments to labour, and the price level, among other economic variables. Allowance is made for various firm behaviours to exist. The model allows firms to have a profit goal, an inventory goal, and or a sales effectiveness goal. The two stage least squares method was used to simultaneously estimate the relationships of the variables in the model. Finally, the model resulted in four statistically significant variables including the tax variable. This extensive model developed by Dusansky, which accounts for many aspects of the economic environment in a simultaneous manner, results in shifting estimates of about 100%.

Among the recent empirical studies on the incidence of the corporate income tax are two studies undertaken by Arulampalam *et al.*, (2011) and Alison and Hines (2009). These studies have taken a decidedly different approach. The studies adopted a bargaining model approach to determining tax incidence, assuming that bargaining between the firm and the employees determines wages. That approach suggests that corporate taxes could affect wages by a mechanism other than the general equilibrium forces on the demand and supply of labour and capital.

3. Methodology

3.1 Model specification

Capacity Utilization: This variable was introduced by Slitor (1966) as another independent variable. He calls it an "economic pressure variable." The proxy chosen by Slitor to represent the economic pressure is a capacity utilization variable. Capacity utilization represents the value added in manufacturing measured as a percentage of gross domestic products (% of GDP). This is introduced to absorb the economic pressures exerted on the manufacturing firms. The **CAP** variable which is calculated as the ratio of fixed asset to total asset was used as a proxy for technological advancement. It is quite obvious that technology will play a key role when it comes to cost of production by corporate firms. This factor is difficult to measure and no consensus has been reached in the literature for a perfect variable to represent the effect. The CAP variable is included in the model as an imperfect proxy for these technological advances.

Gross Profit (GP %): The gross price is used as a dependent variable to measure the impact of the corporate income tax on the prices that consumers pay for a particular corporate good. If the tax burden is indeed shifted to consumers, then the **a priori** expectation for tax elasticity would be positively related to the gross price percentage. The **Corporate Returns (RET)** variable represents the return shareholders gain on their investment. Just as theory echoes and further emphasizes that the corporate income taxes are born by owners of capital, the impact of the burden would reflect on their investment through the returns they make at the end of the period.

If indeed the tax is born by capital owners, then the effect of the tax would have a negative relationship between the corporate tax and the returns on shareholders' investment as seconded by economic theory. **Labour (LAB)** is measured as the total labour force measure in year 2000 prices. The purpose is to control for the effect of firm growth or expansion. Thus, the change in labour costs produced by changes in tax burden will be independent of growth factors of the firm. **Unexpected Earnings (UE)** will be determined by the current earnings against prior year earnings and the simple change in earnings from the prior year to the current year. **Unemployment (UR)** as defined by the Bureau of Labour Statistics, are people who do not have a job, but have actively looked for one for the past four weeks, and are currently available for work. This variable was introduced by Cragg *et al.*, (1967) to represent the cyclical nature of the economy in the model. **Consumer Price Index (CPI)**, measures changes over time in the general price level of goods and services that households acquire for the purpose of consumption. This variable will be a good determinant of the actual impact of the corporate income tax on the lives of the average population. **Market Return (MKT)**: The market return variable is included in the model to hold constant the effects of overall market activity on returns. The variable is constructed by compounding the twelve monthly returns ending with the firm's fiscal year reported in the financial reports of the firms. The market return used in this study is an equally weighted average for dividend of all the ten companies combined.

3.2 Specification of the Financial Models

This section of the paper discusses the financial models used in the ordinary least square (OLS) regression. As emphatically stated in the literature above, the burden of the corporate income tax has been theorized to fall on owners of capital and to some extent on consumers, or labour. By measuring the magnitude or extent to which the tax burden is empirically shifted, models were constructed to be incorporated into statistical analysis using data from the targeted firms. Extensive studies on tax incidence using the corporate returns model are available to provide resourceful assistance in the construction of the model to measure the tax burden for owners of capital. Models for measuring the effects of the tax on consumers and labour are not readily available in the research literature. Therefore these models would be constructed using personal intuition and understanding of the variables that affect pricing of consumer goods and labour costs.

3.3 Tax Burden on Capital

Capital owners would suffer for the tax incidence through a reduction in returns on their investment. The model to represent the return is:

$$RET_t = f(TAX, MKT, UE)$$

$$RET_t = \beta_0 + \beta_1 TAX_t + \beta_2 MKT_t + \beta_3 UE_t + e_t \text{ ----- (3.1)}$$

Where: **RET_t** = The annual return on equity or stock market return for year t, measured as a change in the stock price divided by the stock price at the beginning of the year. **TAX_t** = Represents the corporate tax rate for year t and is measured as the actual tax paid divided by the proposed tax for year t. **MKT_t** = The market return for year t, measured as the annual dividend for year t. **UE_t** = The unexpected earnings for

year t , measured as the difference between the ratio of earnings before interest and tax (EBIT) to the number of shares issued in the current year and the previous year. And e_t = the stochastic error term.

As echoed earlier on in the study, the shareholders burden of the corporate tax will be reflected through lower returns on their investment. In an efficient market, the price of the stock must reflect all available information. An increase or decrease in the tax rate should cause a decrease or a corresponding increase in returns. If any of the tax burden is borne by capital owners, then estimation of the parameters of the models should result in a negative coefficient for the corporate tax variable in the returns model. Theory admits that some of the burden will be borne by shareholders. If that is the case, then the first hypothesis in the alternative form is: **H₁** The coefficient for the tax variable in the returns model is different from zero ($\beta_1 > 0$).

3.4 Tax Burden on Consumer

The effect of the tax burden on consumers would take the form of higher prices for the goods produced. Therefore the model below is used to represent the price effect on consumers:

$$GP\% = f(TAX, CPU, CPI)$$

$$GP\% = \beta_0 + \beta_1 TAX_t + \beta_2 CPU_t + \beta_3 CPI_t + e_t \quad \text{----- (3.2)}$$

Where:

GP t %_t = the gross profit divided by sales for year t ; **TAX_t** = the effective tax rate for year t as defined above in the corporate return model; **CPU_t** = firm's capacity utilization for year t ; used as a proxy for economic pressure. **CPI_t** = the consumer price index for year t , and e_t = Error term for year t .

If the firm shifts any of the tax burden to consumers, the sales price of the goods will be expected to increase when the tax is increased assuming there was no corresponding increase in the cost of the goods sold. Implying that, the gross profit percentage would increase to include the markup of the tax. Earlier empirical studies on shifting to consumers were criticized for not including the effect of business cycles in the model (Ballentine 1980, p.13-14). The capacity utilization and consumer price index variables will be assumed to hold constant the effects of all economic conditions. As explained earlier in the study, capacity utilization represents the actual production divided by production possible at full capacity for instance this study used the contribution of the manufacturing sector as a percentage of the gross domestic product (GDP) as a proxy for capacity utilization. If forward shifting of the corporate income tax to consumers occurs, a positive relationship should be observed between GP% and the corporate tax variable. Thus, supporting the alternative hypothesis (**H₁**) that the average coefficient of the corporate tax variable in the consumer model is greater than zero ($\beta_1 > 0$).

3.5 Tax Burden on Labour

The burden of the corporate income tax may be borne by labour through reduced wage rates or labour hours, resulting in a lower cost of labour to the firm. The model to represent the effect of the tax on labour is given as:

$LAB = f(TAX, CAP, CPU, UR)$

$$LAB_t = \beta_0 + \beta_1 TAX_t + \beta_2 CAP_t + \beta_3 CPU_t + \beta_4 UR_t + e_t \quad \text{-----} \quad (3.3)$$

Where:

LAB_t = the total labour force using the year 2000 as a constant rate t , TAX_t = the effective tax rate for year t as defined in the previous models above. CAP_t = Fixed Assets for year t divided by Total Assets for year t ; CPU_t = the capacity utilization, representing the contribution of the manufacturing sector as a percentage of gross domestic product (GDP). UR_t = the unemployment rate for year t ; and e_t = error term for year t .

The labour variable is used to control for the effect of firms' growth or expansion. The alternative hypothesis thus H_1 : the coefficient of the corporate tax variable in the labour model is less than zero, thus $\beta_1 < 0$.

$RET_t = [\text{Stock Price}_t - \text{Stock Price}_{t-1} + (\text{Dividend}/\text{No. of Shares})/SP_{t-1}$. $TAX_t = \text{Income Tax}/\text{EBIT}$
GROSS PROFIT% = (Sales – Cost Of Goods Sold)/Sales. **LABOUR** = National data **CAP** = Fixed Asset/Total Asset. **Capacity Utilization** = National data. $UE_t = \text{EBIT}_t/\text{No. of Shares for year } t - \text{EBIT}_{t-1}/\text{No. of Shares}_{t-1}$. **CPI** = Consumer Price Index. UR_t = Unemployment Rate for year t .

3.6 Method of Data Analysis

The early empirical studies measuring the incidence of corporate income tax used aggregated data for the manufacturing sector and run the analysis with the ordinary least squares (OLS) regression. This study uses several years of firm's specific financial data for ten firms in the manufacturing sector of Ghana. Regression analysis, correlation coefficients, multicollinearity tests were used to analyze the data. Statistical Package for Social Sciences (SPSS) software and Microsoft Excel were the ultimate software used for all the analysis.

4. Discussion of Results

4.1 Descriptive Statistics of Corporate Income Tax

The average rate for the corporate income tax variable is about 22.3% and seems fairly reasonable given the range of marginal tax rates that appeared in the sample. However the maximum observation for the corporate tax is 36.30% and the minimum is 7.9%. These figures make logical sense particularly in situations where there are occurrences of large profits or losses respectively. Since tax laws do not remain stagnant but dynamic and varies over time, the corporate tax rate is increased by 1% in order to observe the effect of this marginal change in the corporate tax rate on the three dependent variables. The mean value of corporate tax, increased slightly from 22.3% to 22.5% as result of the adjustment in the corporate income tax rate. There was a significant increase in the maximum observation from 36.30% to 36.70% and consequently, the minimum observation also increased from 7.9% to 8.0%. There was a clear indication that the average values of the corporate income tax varies proportionally to the tax rate (see Table 1).

	Corporate Tax Rate	Adjusted Tax Rate
Maximum	0.3630	0.3670
Minimum	0.079	0.080
Mean	0.2229	0.2252
Standard Deviation	0.09828	0.0993
1997	0.250	0.253
1998	0.275	0.278
1999	0.363	0.367
2000	0.204	0.206
2001	0.342	0.345
2002	0.289	0.292
2003	0.194	0.196
2004	0.079	0.080
2005	0.097	0.098
2006	0.136	0.137

Table 1: Descriptive Statistics of Corporate Tax Variable

Variables	Capital Model		Consumer Model		Labour Model	
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	Actual Data	Adjusted Data	Actual Data	Adjusted Data	Actual Data	Adjusted Data
Intercepts	1965.02	1966.88	-7.713	-7.712	19.970	20.032
P-Value	(0.098)	(0.098)	(0.009)	(0.009)	(0.381)	(0.379)
TAX	-6258.946 (0.072)	-6191.835 (0.073)	0.352 (0.574)	0.352 (0.570)	-14.935 (0.079)	-14.828 (0.078)
MKT	-0.083 (0.332)	-0.083 (0.331)	-	-	-	-
UE	5.150 (0.149)	5.140 (0.150)	-	-	-	-
CPU	-	-	0.750 (0.010)	0.750 (0.010)	9.771 (0.013)	9.768 (0.013)
CPI	-	-	0.002 (0.020)	0.002 (0.020)	-	-
CAP	-	-	-	-	-64.136 (0.018)	-64.164 (0.018)
UR	-	-	-	-	1.863 (0.000)	1.862 (0.000)
N	100	100	100	100	100	100
R-Square	0.609	0.608	0.756	0.757	0.991	0.991
Adjusted R ²	0.414	0.412	0.634	0.635	0.984	0.984
DW Test	1.530	1.528	1.526	1.530	2.405	2.408

Table 2: Parameters from the raw data and with 1% upwards adjustment in the corporate tax for the combined Models

TAX= Tax, MKT=Market Return, CPU =Capacity Utilization of the firm, UE=Unexpected Earning, CPI = Consumer Price Index, CAP =Proxy for Technological Advancement, UR =Unemployment Rate, DW =Durbin Watson D Statistics, N=Number of Observation

4.2 Empirical Results for the Financial Models of the paper

The ordinary least square (OLS) regressions are run at this point for each of the three financial models using financial data from ten (10) listed manufacturing companies in Ghana. A further modification in the corporate tax rate was incorporated. The intention of this action was to determine the impact of changes in tax policies on the various economic players, especially the manufacturing firms. The results of the regressions using the actual values of the corporate tax rate are compared to the results of the adjusted tax values in the analysis. The capital return model represents the corporate income tax burden on shareholders. The average coefficients for (MKT), the proxy for the market returns is (-0.083) from the regression but this is statistically not significant within the 1 to 10 percent level of confidence. The negativity of the market return in the return model violates the assumption underpinning this theory. The market return (dividend) would be expected to move in a similar direction as return on capital. In real cases these deviations occur, especially when firms decide to retain more profit in order to undertake other profitable investment projects in the near future, in which cases they negotiate with shareholders to pay small fraction of dividend for the period. Another possibility for the inverse relationship between the return on capital and the market return also exist when capital owners bear part of the corporate tax burden for instance in the case of this study.

The corporate tax variable however does make sense, it follows the expected direction. The average coefficient for corporate tax in the capital model is negatively (-6258.94) related to returns and statistically significant at 10 percent confidence level. The interpretation for the negative relationship means that an increase in taxes would result in a decrease in returns of capital owners. Notwithstanding the result above it does not provide adequate evidence that capital owners bear the entire tax burden. Krzyzaniak and Musgrave (1963) conducted a similar study; the coefficient for the tax variable was positively related to returns. They concluded that there was more than 100% shift of the tax backwards to labour or to consumers through higher prices. This conclusion invariably points out to imperfect competition, because theories under competitive markets predict that taxes on corporate rents cannot be shifted at all. Similarly Wilma (1998) conducted a similar study and concluded in line with Krzyzaniak and Musgrave. Since the inception of Krzyzaniak and Musgrave work many researchers have criticized their findings. The average coefficient for the unexpected earning (UE) is 5.15 but this is statistically insignificant within the 1 to 10 percent confidence level. The positive relationship between the earnings and return on capital makes economic sense because returns on capital would increase proportionally to an increase in earnings.

The consumer model as indicated in table 2 above resulted in a coefficient for TAX in the expected direction (0.352) but it does not fall within the accepted 1 to 10 percent levels of significance. The positive average coefficient for TAX in the Consumer model provides evidence (though weak) that increases or decreases in tax rates are related to similar increases or decreases in gross profit percentages. The positive relationship is evidence that some shifting in the corporate tax is taking place and is reflected in the prices that consumers pay for such products. The evidence indicates that about 35.2% of the tax is shifted to consumers. Though the magnitude of shifting is small, firms can only survive from the shifting when demand for their products is known to be inelastic and in the absence of perfect competition. Unlike earlier research done by Gravelle (1989), where he assumed that corporate and non corporate firms produce similar products, the case of Ghana is different because of differentiated products in both markets. CPU, capacity utilization which is a proxy for economic pressure, shows up as positive (0.750) and is significant at 1 percent confidence level. The evidence that return on corporate capital increases as the corporate tax rate increases implies that profit margins will increase with the associated tax rate and hence this will command growth in productivity. An increase in productivity will go with a corresponding increase in capacity in order to meet the rising demand in productivity. CPI, consumer price index is positively related to gross price the dependent variable is significant at 5 percent significant level. The positive relationship implies that as prices increase proportionately with corporate income tax in the consumer model, the cost of living measured as the price indices will increase accordingly.

The coefficient of the corporate income tax in the Labour model indicates the right direction (-14.935) thus ($\beta_1 < 0$) in the average regression and statistically insignificant at the 10 percent confidence level. A negative coefficient here suggests that an increase in the corporate tax rate would result in a decrease in the proportionate cost of labour. This would be the expected result for this model if the corporate tax is shifted to labour (backwards shifting). The evidence provided in the labour model indicates that an increase in corporate income tax by 1 percent would result in 14.9 percent reduction in the cost of labour. Hassett and Mathur (2006) estimated the elasticities of wages and found out that the wage coefficient dropped indicating that capital owners shift a proportion of the corporate tax backwards to labour. As emphasized earlier on in this study, most manufacturing firms are labour intensive due to the abundant supply of labour in Ghana, this enable firms to shift the greater portion of the corporate income tax to labour in the form of lower wages. Comparatively, it can be confirmed from both the consumer and labour models that labour bears a greater proportion of the corporate income tax than in the case of the consumer. This result is so because consumers can easily move from the corporate sector to the non-corporate sector that is assuming that both sectors produce similar goods (Gravelle 2010) unlike labour because of the limited nature of employment in Ghana.

The CAP variable (proxy for technological advancement) is negative (-64.136) and statistically significant at 5 percent confidence level. The negative coefficient here indicates that an increase in technology would lead to a decrease in the cost of labour that corporations expend. This makes sense in that new technology improves efficiency and reduces waste thereby reducing the cost of doing business. The coefficient of the unemployment rate (UR_t) is positive (1.863) and significant at 1 percent. A positive coefficient here implies that an increase in unemployment rate would lead to an increase in the cost of labour for corporations. This makes logical meaning

in the sense that an increase in the cost of labour would compel employers to lay off some labour. Hence an increase in the cost of labour would lead a proportionate increase in unemployment. The repercussion effect of high rates of unemployment would also make employers more powerful and would enable them to shift more of the corporate tax to labour.

Adjustment of the corporate tax variable by 1 percent had almost no much effect on the results especially the capital return model; this is because the signs (a priori) remain unchanged. Referring to Table 2, the coefficient of the corporate tax variable is slightly less negative (coefficient is -6191.835. which is 64.105 less than when using the actual tax rate) this implies with a 1 percent increase in corporate tax, capital owners were able to shift approximately 64 percent of the tax burden to other players. The MKT which is the market return remain statistically unchanged. The UE, representing earnings had its coefficient dropped from 5.150 to 5.14 due to the marginal increase in the corporate tax. This implies as corporations continue to bear part of the tax burden, their earnings will continue to drop; they do not have the ability to shift the proportion of the tax increment to other players.

From the adjusted consumer model reported in table 2, there is no evidence of upward adjustment in consumer prices. The 1 percent increase in the corporate tax saw no change in the coefficient of the tax variable. The coefficient in both the actual model and the adjusted model remain at 0.352. All the other determining variables included in the model did not also change significantly. The TAX variable in the labour model continues to show the expected directional relationship thus ($\beta_1 < 0$). The negative relationship between the corporate tax rate and labour has decreased slightly from -14.935 to -14.828 but still significant at 10 percent confidence level. There is a continuous evidence that corporations reduce the cost of labour vi-a-vi an increase in the corporate tax rate. For instance Alison (2009) found out in a study that the corporate income tax is significantly and negatively correlated with wages and concluded that a 1 percentage point increase in the corporate income tax rate would decrease wages by between 0.14 and 0.36 percent. His results translated into a wage elasticity of -0.0094 to -0.024 and it implies that quite a large proportion of the tax burden is borne by labour. The result continues to show a positive relationship between the cost of labour (LAB) and the unemployment rate (UR) implying that as long as labour cost continues to increase in relation to the corporate tax, unemployment continue to increase proportionately. The other determining variables such as CAP and CPU did change marginally in relation to the slight 1 percent upwards adjustment in the corporate tax rate. The CAP continues to be negatively correlated with the cost of labour. The coefficient increased from -64.136 to -64.146 approximately 0.01 increase. The increment in the technology variable indicates that corporations will continue to reduce the cost of labour further to its minimal with a given level of technology at their disposal.

4.3 Findings

The Capital Return Model

The first model (model 3.1), determines the relationship between the corporate income tax and the returns on capital owners investment. The iteration of the model that includes adjustment on the tax rate by 1% confirms

that corporations still have the tendencies of shifting part of tax burden back to labour and forward to consumers through an increase prices. However, the findings of this study were contrary to that of Krzyzaniak, Musgrave and Dusanky's in the sixties (1960s). Krzyzaniak and Musgrave's study resulted in a positive coefficient for the tax variable in the return model indicating that more than 100% of the corporate tax is either shifted forward to consumers or backwards to labour or both. Contrary to these studies the tax coefficient in the return model was negative indicating that capital owners bear part of the burden of the corporate income tax. The average coefficient of the corporate tax variable in both the actual data and the adjusted data were -6258.94 and -6191.835 respectively. Statistically the elasticities of the tax variable indicate that as the tax was increased by 1%, corporations were able to shift over 67.11 or 671100% of the tax burden to other players. This results therefore supports the null hypothesis (H_0) that the coefficient of the corporate tax variable is statistically less than zero (0); thus $H_0, \beta_1 < 0$. The negative relationship between the returns on corporate capital and the average effective tax rate indicates that an increase in the corporate income tax rates would result in a decrease in shareholders returns on their investments. This analysis conforms to the underling theory in corporate tax incidence.

The Consumer Model

The results of the consumer model in both the actual and adjusted data concludes with evidence though weak that some of the burden of the corporate income tax is shifted forward to consumers through higher prices. The average coefficient of the actual corporate tax variable in the consumer model is 0.352 and remained unchanged even when the adjustment was made on the corporate tax. This coefficient was statistically insignificant within the 1 to 10 percent levels of significance and hence conforms to the alternative hypothesis which states that the coefficient of the corporate tax variable in the consumer model is greater than zero $\beta_1 > 0$. The positive relationship between the average tax rate and the gross profit percentage provides evidence that prices increase relative to increases in the corporate tax rate.

Labour Model

The results of the labour model provide evidence that part of the tax burden is shifted backwards to labour. Both the actual and adjusted data used in the labour model confirmed the alternative hypothesis, thus the hypothesis that 'the coefficient of the tax variable is less than zero'. The actual or raw tax showed a coefficient of -14.935 while the adjusted model showed a tax coefficient of -14.828 all attesting to the degree of shifting. Both tests indicate that the coefficients were significant at 10 percent. The results also demonstrated that a 1 percent increment in the corporate tax would result in 11 percent fall in the burden of the tax on labour. From the regression analysis the following observations were made, unlike the results obtained by Gravelle *et al.*, (1993), the results in this study indicates with strong evidence that labour bears part of the burden of corporate income tax. This is observed from the negative relationship between the tax variable and the labour variable. The adjustment in the corporate tax confirms that the degree of shifting continues even with an increase in the tax

rate. However the extent to which capital owners can shift the tax to labour decreases relative the tax increment as demonstrated in the adjusted model of labour. Contrary to the impact of the tax increment on labour, the coefficient of the tax variable remained unchanged in the consumer model even after the tax has been increased by 1 percent. This implies that an increase in the corporate tax has minimal or no impact on the prices that consumers pay for corporate goods. There was an indication of a shift in the corporate tax by corporations to other stakeholders like labour and consumers but contrary to the findings of Kryzaniak and Musgrave in 1963, there was a less than 100% shift in the tax, implying that capital owners bear part of the tax burden. There is evidence that an increase in corporate tax reduces the degree of the burden on capital owners. For instance when the tax was increased by 1 percent the coefficient of the tax dropped from -6258.94 to -6191.835, indicating more than 6700% reduction in the burden on owners.

5. Conclusion

Corporate income tax is levied on corporate earnings. Political and economic debates frequently arise over the fairness and the effect of the corporate income tax. Even though the tax is levied on corporations but we must not lose sight of the fact that corporations are not people. Therefore individuals must ultimately bear the burden of the corporate tax either directly or indirectly. The distributional equity and effect of the corporate tax depend on which individuals ultimately bear the burden of the tax. If the incidence of the tax falls on shareholders, the tax will be more progressive because these owners tend to be wealthier. A progressive tax is usually considered more equitable than a regressive tax. If the shareholders bear the tax burden, then the tax could be considered as a tax on capital and as such may discourage investment. However, if the burden of the tax falls on consumers or labour, the corporate income tax may have a regressive effect. It is therefore important for policy makers and researchers to be able to know which players of the economy bear the actual incidence of the corporate income tax. The intention of this work is to provide empirical evidence on the incidence of corporate income tax in the manufacturing sector of Ghana. The results demonstrated some degree of shifting in the tax burden but the magnitude of the shift still leaves the question of who really bears the tax incidence unabated and at such more works must be done to answer this question. This study provides a step towards answering the question of who bears the burden of corporate income tax.

6. Recommendations

As stated earlier on at the introductory part of this paper, there are controversies as to who really bears the incidence of the corporate income tax. This paper intended to reveal the actual incidence of this tax but as it stands, it leaves this question unabated; therefore we make the following recommendations.

1. The result of this paper indicate evidences of shifting in the corporate tax but these evidences are weak to predict the actual incidence, we therefore entreat future researchers to expand this knowledge base to encompass other sectors of the economy in order to determine the actual incidence of this tax.
2. Policy makers ought to be informed by this paper that corporations are not people and therefore the incidence of the corporate tax fall ultimately on individuals. If it is the intention of policy makers to think that corporations

bear the tax burden then it is a fallacy, hence they must put mechanisms such as auditors to ensure that these taxes are not shifted to others in order to avoid the problem of double taxation.

3. Policy makers must be aware that the tax influences inversely on the incentive to invest in a particular portfolio. Hence they must ensure that these taxes are convenient, fair and certain and finally exhibits the benefit principle to the tax payer.

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APPENDIX:

Data	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Items										
No. of Shares	19.42 5	19.42 5	21.41 4	32.05 3	34.832	43.147	43.147	52.564	70.464	73.964
Sales (S)	40,28 4	46,93 0	52,90 8	90,48 1	129,39 3	155,06 9	193,93 6	225,851	251,827	276,218
Fixed Asset	17,36 7	21,33 2	25,03 5	40,44 0	48,503	53,671	69,429	78,390	81,317	88,588
SP	539	845	742	785	1,059	1,447	2,619	6,107	5,697	5,658
IT	1043. 7	1288. 6	1298. 2	2213. 2	6949.1	6788.6	5330.7	1644.4225	2284.2254	3496.4054
EBIT	4167. 7	4685. 1	3573. 6	10842 .7	20341	23471. 9	27458. 7	20945.681 6	23537.145 1	25703.649 1
COGS	34253 .7	39250 .4	44889 .7	75909 .7	103535 .6	125629 .6	133094 .6	156977.24 39	167468.27 73	183744.23 32
Total Asset	31639 .8	39888 .9	45921 .4	73174 .8	96683. 1	111632 .9	150470 .4	161139.82 16	179876.68 25	170901.60 09
Dividend (D)	1,629	1856. 2	1983. 9	3238. 4	6276.5	8177	9429.6	12504.6	9842.75	9453.4673
Total Equity	19,07 1	23,22 1	26,49 8	46,06 4	55,929	60,419	71,971	87,661	93,679	105,266

Source: Ghana stock exchange/Ghana statistical service, 2012

Table 3 Raw Data as Reported in the Financial Reports of the Target Firms (*Amount in million cedis*)

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