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Is the Burden Too Small? – Effective Tax Rates in Ghana

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David Nguyen-Thanh and Christoph Strupat[1]

Is the Burden Too Small? – Effective Tax Rates in Ghana

Abstract

This paper examines capital income taxation in Ghana. We calculate effective marginal tax rates (EMTR) and effective average tax rates (EATR) using an extended Devereux-Griffith methodology to accommodate for tax incentives – an exercise that has not been done so far for Ghana. We find that the wide range of tax incentives leads to a high variation of effective average tax rates in Ghana. Tax holidays and preferential income tax rates lower the effective tax burden to a significant extent and encourage individual tax avoidance strategies. Furthermore our results confirm previous findings that tax holidays, effectively reducing EATR, favor high-profit short-lived investment projects raising doubts about their rationale.

JEL Classification: H23, H25, H10

Keywords: Effective tax rates; tax holidays; Ghana

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1 *David Nguyen-Thanh, GIZ; Christoph Strupat, RWI and RGS Econ.* – *The views expressed in this paper are those of the authors, and do not necessarily reflect those of the GIZ.* *The authors would like to thank Christoph M. Schmidt for helpful comments. We also gratefully acknowledge the comments and suggestions of participants of the 2012 congress of the International Institute of Public Finance (IIPF).* – *All correspondence to Christoph Strupat, RWI, Hohenzollernstr. 1-3, 45128 Essen, Germany, E-Mail: christoph.strupat@rwi-essen.de.*

1. Introduction

In 2009 the administration in Ghana committed to an overhaul of both tax policy and tax administration with a view to establishing a sound tax environment. The authorities recognized the need to increase revenue in the medium term through various policy and tax administration measures. Against this backdrop, we assess the capital income tax system which is widely seen as key in allocating resources. Capital income taxation has not been studied well in Ghana so far. As tax incentives are most prevalent in the Ghanaian capital income tax system, the discussion often focuses on their extension such as granting longer periods of tax holidays and new preferential tax rates in order to attract internationally mobile capital. Often, this discussion does not consider the impacts of tax incentives on the effective tax rates in Ghana. This study aims to contribute to the closing of this gap by calculating the effective marginal tax rate (EMTR) and effective average tax rate (EATR) to examine the effective tax burden under the prevailing tax incentive regime.

Ghana's income tax regime is characterized by a wide range of tax exemptions and preferential tax rates. Corporate tax rates differ across regions and vary according to the company's activities and the economic sector of the company's business. Furthermore, the system provides different tax incentives to promote investment in selected industries and in rural areas. Agro processing businesses, rural banks, real estate developers and free zones are granted tax holidays up to ten years. As Ghanaian tax officials hope to attract private or foreign direct investments by granting these tax incentives, the evidence on such effect in the developing world is rather limited (ZEE et al. 2002). Although, tax incentives such as tax holidays, preferential tax rates and capital allowances are very common in developing countries, all studies suggest that the overall economic characteristics of a country

is more important for the business environment than any tax incentive scheme. Recent empirical studies also suggest that tax incentives are not effective in attracting investments in Africa (JAMES AND VAN PARYS 2010, KLEMM AND VAN PARYS 2012, ABBAS et al. 2012). The poor investment climate in many African countries seems to outweigh the effect of tax incentives and, consequently, the cost of tax incentives in terms of lost revenue is likely to be higher than the benefit in terms of additional investments.

In order to show to which extent tax incentives in Ghana affect the effective tax burden of corporations and might result in a loss of revenue, we calculate the EMTR and the EATR for the tax regimes between 2008 and 2012 and accommodate for the prevailing tax incentive regime by using an extended Devereux-Griffith methodology (BOTMAN AND KLEMM 2008, KLEMM 2008). We use this forward-looking approach of taxation because it summarizes all tax rules in two measures. Therefore we are able to calculate the effective tax burden for different taxpayers, make comparisons across them and show the full tax regime with all discretionary exemptions. In order to put the Ghanaian capital income tax regime into perspective, we use effective tax rates calculated for emerging and developing countries by ABBAS et al. (2012) and compare Ghana with seven countries from Sub-Saharan Africa.

The structure of this paper is as follows. The following section will give an overview of the capital income tax regime in Ghana. Section 3 deals with the theoretical model. In section 4 we establish the link between the model and the country-specific variables and present the results. Section 5 concludes with a summary of the main findings.

2. The capital income tax regime in Ghana

Ghana follows the classical system of corporate taxation. Corporate-source income is taxed at the corporate level at a rate of 25 percent, equal to the top personal rate, and again when dividends are distributed to the individual shareholder at a rate of 8 percent. The latter is a final withholding tax. Taxation of labor income differs from taxation of capital income. Capital gains realized on chargeable assets are taxed at a rate of 5 percent. Chargeable assets include buildings, business and business assets, land other than agricultural land and shares of resident companies. The Ghanaian tax law discriminates between interest incomes of persons and interest incomes of corporations. Whilst the interest income of individuals is not taxed at all, the interest income of non-exempt companies is charged a tax rate of 8 percent.

Ghana's income tax regime is characterized by a wide range of tax exemptions and preferential tax rates. Corporate tax rates differ across regions and vary according to the company's activities and the economic sector of the company's business. In structurally weak regions, highly reduced tax rates apply to agro-processing and manufacturing businesses with the goal to foster investment in these regions (see Table 1).

Table 1: Corporate income tax rates in different business sectors and regions

Nature of income / location	Rate of CIT
Companies exporting non traditional goods	8%
Hotel Industry	22%
Stock exchange listed companies (after 3 years tax holiday)	22%
Rural banks (after 10 years tax holiday)	8%
Free zone enterprise / developers (after 10 years of operation)	8%
Financial institutions deriving income from loan to farming enterprise	20%
Agro processing companies located in Accra and Tema	20%
Agro processing companies located in other regional capitals	10%
Manufacturing companies located in Accra and Tema	25%
Manufacturing companies located in all other regional capitals	18.75%
Manufacturing companies located outside other regional capitals	12.50%

Source: Ghana Tax Laws (2008)

Furthermore, the system provides different tax incentives to promote investment in selected industries and in rural areas. Agro processing businesses, rural banks, real estate developers, companies listed at the Stock Exchange and free zones are granted tax holidays or exemption periods (see Table 2). In some cases, these tax holidays are combined with tax rebates. For instance, companies, operating in areas demarcated as free zones, are provided a tax holiday of 10 years. Thereafter, the companies are taxed at a corporate tax rate not above 8 percent. A similar regime applies to companies listed on the Ghana Stock Exchange. After 3 years of tax holidays, the companies pay a reduced corporate tax rate of 22 percent.

Table 2: Tax holidays

Business sectors	**Exemption Period (Years)**
1. Farming	
i) Farming: Tree crop	10
ii) Farming: Cattle	10
iii) Farming: Livestock, fish and cash crop	5
2. Agro processing business	3
3. Agro processing business established after 2004	5
4. Companies producing cocoa by-products from cocoa waste	5
5. Waste processing companies	7
6. Rural banks	10
7. Real estates	5
8. Companies listed on the Stock Exchange	5
9. Free Zones	10

Source: Ghana Tax Laws (2008)

In addition, capital allowances are granted for depreciable assets in use for the production of income subject to taxation. The depreciation rates vary widely for different assets. The highest depreciation rates apply for assets used for mineral and petroleum exploration, while the lowest rates are granted for buildings (see Table 1 of the Appendix).

3. The Model – Effective tax rates

3.1 Effective Marginal Tax Rate (EMTR)

Calculating effective tax rates is based on a traditional investment decision approach, which was originally set out by KING (1974) and modified by DEVEREUX AND GRIFFITH (1999). The dynamic model assumes a profit maximizing company with risk neutral shareholders acting in small open economies taking the world rate of return as given. The model assumes that other taxes except for the capital income taxes, do not affect investment decisions. For simplification, the basic model focuses on measuring taxes on capital income only derived from the corporate sector.

The model examines a hypothetical domestic investment in period (t), which will be reversed after one period (t+1). Considering the statutory corporate tax rate and relevant personal tax rates, the pre-tax and post- tax income of the investment is calculated. The difference between the gross income and the net income determines the effective tax rate. The model incorporates three different sources of finance: Retained earnings, new equity and debt. This section will introduce the model with retained earnings financing, while debt and new equity financing are presented in the Appendix.

The initial point for the derivation of the effective tax rates is the first order condition for the optimal capital stock (DEVEREUX 2003):[3]

$$(1-\tau)\cdot(1+\pi\ )\cdot F'(K_t)=(1-A)\cdot\left[\rho+\delta\cdot(1+\pi\ )-\pi\right]. \qquad (1)$$

[3] The derivation of this equation is presented in Devereux (2003) and Devereux, Griffith (1999).

τ represents the statutory corporate tax rate, π shows the annual inflation rate and K_t is the current capital stock. ρ describes the tax adjusted nominal discount rate of the shareholders:

$$\rho = (1-m)\cdot i \quad . \tag{2}$$

i is the nominal interest rate, m represents the personal income tax rate on interest income and z is the personal tax rate on capital gains. The economic, linear depreciation rate is represented by δ, and A is the present value of depreciation allowances, which is mainly determined by the capital allowance rate ϕ (KING AND FULLERTON 1984):

$$A = \tau \cdot \phi \cdot \sum_{t=0}^{\infty} \left(\frac{1-\phi}{1+\rho} \right)^t = \frac{\tau \cdot \phi \cdot (1+\rho)}{\rho + \phi} \quad . \tag{3}$$

In the first period after the investment, the highest amount of tax depreciation, $\tau \cdot \phi$, is realized, whilst in subsequent periods the amount decreases according to $(1-\phi)^t$. In general, the higher the capital allowance rate ϕ, the higher the present value per unit of investment A.

The left hand side of equation (1) shows the real net value added of $(1-\tau)\cdot(1+\pi)\cdot F'(K_t)$, which will be realized in period (t+1). We assume the investment to be reversed in the same period. The right hand side of equation (1) represents the capital cost of the marginal investment. The marginal investment has to generate, at least the tax- adjusted interest rate of the shareholders ρ, defined by the nominal market interest rate less the personal income tax on interest income. In addition, the return of the marginal investment has compensate for the decrease in the value of the asset over the period due to depreciation δ,

less any increase in the relative price of capital goods over the period. The present value of depreciation allowances A reduces the cost of capital. Rearranging equation (1) yields:

$$F'(K_t) = \frac{(1-A)}{(1-\tau)\cdot(1+\pi\ )} \cdot \left[\rho + \delta \cdot (1+\pi\ ) - \pi\ \right]. \tag{4}$$

The value added of a marginal investment $F'(K_t)$ has to equate the cost of capital on the right hand side. Therefore, all investments earning a return greater than this should be accepted; all those earning a rate of return less than this should be rejected. This required rate of return is defined in the literature as $F'(K_t) = p + \delta$ (DEVEREUX 2003). The pre-tax value of earnings p has to exceed the rate of depreciation δ and the capital cost of a marginal investment $F'(K_t)$. Substituting equation (4) and rearranging gives the minimum acceptable pre-tax value of earnings $\tilde{p}$ (KING AND FULLERTON 1984, SCHREIBER, SPENGEL AND LAMMERSEN, 2002):

$$\tilde{p} = \frac{(1-A)}{(1-\tau)\cdot(1+\pi\ )} \cdot \left[\rho + \delta \cdot (1+\pi\ ) - \pi\ \right] - \delta\,. \tag{5}$$

On the one hand, an increase in the present value of future tax savings due to a rise of the capital allowance rate ϕ, results in a fall of capital costs. On the other hand, an increase in the statutory corporate tax rate intuitively raises the cost of capital. The minimum acceptable pre-tax value of earnings is also affected by the personal income tax rates on interest income and capital gains. The real discount rate of the shareholders ρ^{real} determines the post- tax value of earnings from a marginal investment:

$$\rho^{real} = \frac{(1-m)\cdot i}{(1+\pi)} \quad . \tag{6}$$

The difference between pre-tax and post-tax value of a marginal investment yields the effective marginal tax rate (EMTR):

$$EMTR = \frac{\tilde{p} - \rho^{real}}{\tilde{p}} \quad . \tag{7}$$

In a perfect capital market without a tax system, both rates of return would be equal, $\tilde{p} = \rho^{real}$. An increase of the statutory corporate tax rate or a decrease of the capital allowance rate result in a rise of the marginal pre-tax value, which in the end raises the effective marginal tax rate. The investment will be realized if the rate of return exceeds or at least equalizes the cost of capital, otherwise an additional investment in the capital stock will not be made. In general, the higher the effective marginal tax rate, the smaller the incentive to undertake a marginal investment in the capital stock.

3.2 Effective Average Tax Rate (EATR)

By calculating effective marginal tax rates (EMTR), the capital stock is assumed to be continuously divisible. The corporation will invest until the point it becomes unprofitable. If we relax this assumption, the corporation has to choose between different kinds of investment possibilities. For example, a firm can choose between two production locations with different tax regimes. The effective average tax rates of both locations indicate the differences in terms of capital income taxation. Assuming a profit maximizing behavior, the corporation will select the location with the highest achievable rate of return.

Once the investment is made, the real gross present value of the capital stock in period t is (SCHREIBER, SPENGEL AND LAMMERSEN 2002):

$$R_t^* = F(K_t) = -1 + \frac{1}{1+i} \cdot \left[\left(1+\pi\right) \cdot \left(p+\delta\right) + \left(1+\pi\right) \cdot \left(1-\delta\right) \right]. \tag{8}$$

As we have indicated above, the investment is financed by retained earnings, which results in a fall of dividend distribution. Therefore the initial costs in period t are -1. The second term on the right hand side represents the present cash flow in period (t+1). The discounted value is determined by the rate of return *p*, the required revenue to finance the economic deprecation δ and the revenue from selling the investment less the economic depreciation (1-δ). The higher the rate of return *p*, the higher the pre-tax present value of the investment. The investment will be located according to the highest gross present value assuming there is no tax regime.

Introducing taxes the real net present value is (DEVEREUX 2003):

$$R_t = -1 \cdot \gamma \cdot \left(1-A\right) + \frac{\gamma}{1+\rho} \cdot \left[\left(1+\pi\right) \cdot \left(p+\delta\right) \cdot \left(1-\tau\right) + \left(1+\pi\right) \cdot \left(1-\delta\right) \cdot \left(1-A\right) \right]. \tag{9}$$

The parameter γ represents the tax discrimination variable:

$$\gamma = \frac{\left(1-d\right)}{\left(1-c\right) \cdot \left(1-z\right)}. \tag{10}$$

d is the personal tax rate on dividend income, *c* shows the rate of tax credit available in an imputation system on dividends paid, and *z* is the personal tax rate on capital gains. The discrimination variable measures the impact of taxes on capital income for two types of finance: new equity and retained earnings. An investment of 1 GHC financed by new equity comes at a cost of 1 GHC to the shareholders. However, if the investment is financed by retained earnings, cash

dividends paid by the firm are reduced by 1 GHC as well, but then the net cost to the shareholder depends on the personal tax which would have been paid had the cash dividend not been reduced.

If $\gamma < 1$, then the net cost is lower with retained earnings and the distribution of dividends is discriminated, while equity finance becomes the preferred mode of finance if $\gamma > 1$. Under the assumption of a classical tax system with $c = 0$, both sources of finance are treated equally, if $m^d = z$ which results in $\gamma = 1$. The tax discrimination variable and the present value of future tax savings A weighs the initial cost (-1) in equation (9). In accordance to equation (7), the second term on the right hand side is the present cash flow reduced to period (t+1) including the statutory corporation tax rate and weighted by the tax discrimination variable γ. In addition, the revenue from selling the investment is reduced by unrealized tax savings $(1-\delta)\cdot A$ in period (t+1). In general, a rise in the statutory corporation tax rate leads to a fall in the real net present value. The corporation will choose the production location with the highest net present value of the investment.
The difference between gross and net income of the investment in relation to the gross income determines the effective average tax rate (DEVEREUX AND GRIFFITH 1999):

$$EATR = \frac{\left(R_t^* - R_t\right)}{p/(1+r)} \quad . \tag{11}$$

An increase in the statutory corporation tax rate or a decrease of the capital allowance rate results in a fall of the real net income R_t and hence an increase in the effective average tax rate.

To incorporate the effect of tax-free periods so-called tax holidays in the calculation of effective average tax rates we have to relax the assumption of a one-period perturbation of the capital stock. According to KLEMM (2008) we assume an investment that is never sold and the capital stock only changes due to depreciation. In order to adapt the EATR to an infinite horizon, we have to consider the profits of all future periods in equation (11). Therefore, the denominator needs to be changed, assuming that the rate of return p remains constant and the capital stock only decline yearly by the true economic depreciation rate (KLEMM 2008):

$$EATR_{\inf} = \frac{\left(R_t^* - R_t\right)}{p/(r+\delta)}. \tag{12}$$

The real gross present value of the capital stock also has to be adapted in the same way:

$$R_{\inf}^* = F(K_t) = -1 + \frac{1}{r+\delta} \cdot \left[\left(1+\pi\right) \cdot \left(p+\delta\right) + \left(1+\pi\right) \cdot \left(1-\delta\right)\right]. \tag{13}$$

In a second step we adjust the real net present value by leavening out the reduction of revenue from selling the investment due to unrealized tax savings $(1-\delta) \cdot A$ in period (t+1):

$$R_{\inf 1} = -1 \cdot \gamma \cdot \left(1-A\right) + \frac{\gamma}{\rho+\delta-\pi \cdot \left(1-\delta\right)} \cdot \left[\left(1+\pi\right) \cdot \left(p+\delta\right) \cdot \left(1-\tau\right)\right]. \tag{14}$$

Consequently, the second term on the right hand side becomes the infinite cash flow from the investment. Accordingly, the denominator needs to be replaced by

the gross economic deprecation rate. In order to include tax holidays, i.e. the period of Y years during which tax rates are set to zero, equation (14) has to be modified by weighing the tax rate with the present value of tax savings due to tax holidays (KLEMM 2008)[4]:

$$R_{\inf 2} = -1 \cdot \gamma \cdot (1 - A) + \frac{\gamma}{\rho + \delta - \pi \cdot (1 - \delta)} \cdot (p + \delta) \cdot (1 + \pi) \cdot \left[1 - \tau \cdot \left(\frac{(1 - \delta) \cdot (1 + \pi)}{1 + \rho} \right)^{Y} \right]. \quad (15)$$

4. Data and Results

4.1 Data

Table 3 presents the variables we used to calculate the effective tax rates for the years 2008 to 2012.

Table 3 – Variables of the model based on Ghanaian tax data

Variable Name	Variable	2008	2009	2010	2011	2012
Nominal rate of interest	i	27.30	32.80	27.30	26.00	25.00
Inflation rate	π	18.10	16.00	8.60	8.58	9.00
Real Economic Depreciation Rate	δ	12.50	12.50	12.50	12.50	12.50
Capital allowance rate	ϕ	30.00	30.00	30.00	30.00	30.00
Profit rate	p	20.00	20.00	20.00	20.00	20.00
Present value of allowances	A	0.666	0.634	0.666	0.675	0.689

All variables are shown in percent. Sources: Authors' calculations, Bank of Ghana (2012) and Kovanen (2011). Macroeconomic data for 2012 is preliminary.

We assume an investment in plant and machinery and an average depreciation range of eight years. This results in a linear deprecation rate δ of 12.5 percent for a marginal investment. The capital allowance rate ϕ for plant and machinery was 30 percent and based on the declining balance method in the time between 2008 and

[4] The derivation of this equation and the adaption of the present discounted value of depreciation allowances A are presented in detail in Klemm (2008) and Botman et al. (2008).

2012. In 2008 the calculated present value of depreciation allowances in Ghana is 0.666. As Ghana has open capital accounts and the provider of funds are partly foreign individuals or firms that are taxed differently compared to domestic investors, we follow the standard approach in the literature and do not consider personal income taxation in our calculations. For the calculation of the EATR, we assume a pre-tax profit rate of 20 percent and we used the annual average interest and inflation rate provided by the Bank of Ghana and KOVANEN (2011). The effective marginal tax rate (EMTR), financed by equity, is calculated by using the equations (5), (6) and (7) while the equations (8), (9) and (11) are used for the calculation of the effective average tax rate (EATR). The calculation of effective tax rates with debt is shown in the Appendix. For the calculations of the effective average tax rates with tax holidays we used the equations (12), (13) and (15).

4.2 Results

Before we turn to a detailed analysis of tax incentives, we calculate the effective marginal tax rates (see figure 1) and the effective average tax rates (see figure 2) for a manufacturing company, in order to analyse the changes in effective tax rates over the time. Across all years the statutory corporate tax rate is 25 percent.

Figure 1: Marginal tax rates on investment in plant and machinery

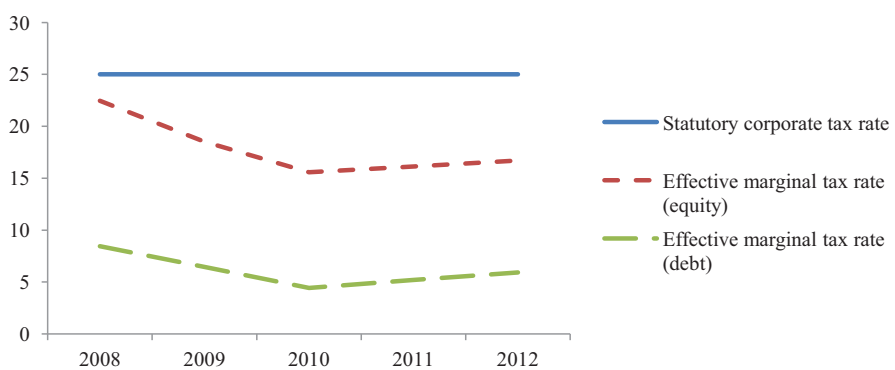
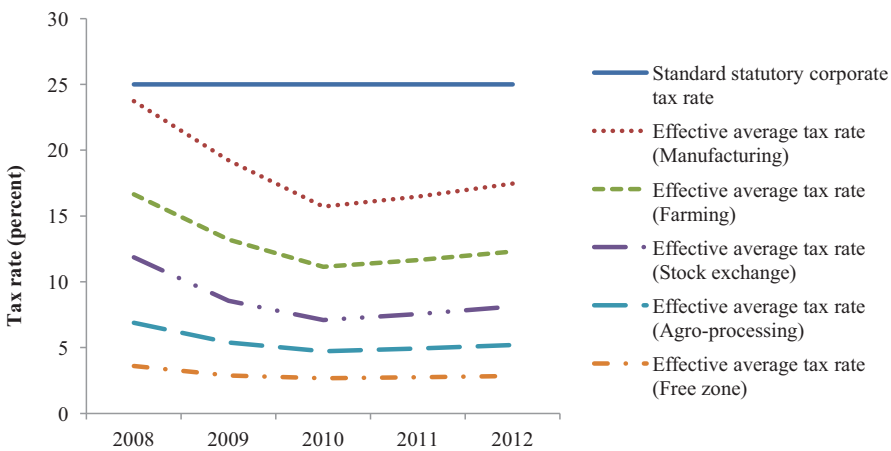


Figure 2: Average tax rates on investment in plant and machinery

As shown in both figures, the effective tax rates for equity financing are not significantly lower than the statutory corporate tax rate in 2008. High inflation and market interest rates offer a discouraging investment environment in this year and result in persistently high effective tax rates. Due to the interest deductibility, the debt-financed investments trigger lower effective tax rates. In the years 2009 - 2011 inflation decreases in total by nearly 50 percent. This reduction leads to a significant decline of effective tax rates. Effective marginal tax rates decrease by 6 percent, while effective average tax rates are reduced by 7 percent. In 2012 the effective tax rates increase moderately, which is also the result of a slightly higher inflation rate compared to 2011. As the nominal interest rate is the same for 2008 and 2010, we find that a one percent reduction of the inflation rate lowers effective average tax rates by 0.84 percent. Altogether, these findings highlight the importance of macroeconomic fundamentals in terms of effective taxation in Ghana. The significant decrease of inflation fairly produces low effective tax rates and makes a strong case for the government's public financial reform program that is aimed at improving public financial management, fiscal policy and bringing down the inflation rate in the medium to long term.

In order to show to which extent tax incentives in Ghana affect the effective tax burden of corporations, we present the calculated effective average tax rates with equity financing for companies from five representative business sectors (see figure 3). The highest level of effective tax rates have to pay companies that are operating in the manufacturing sector, because beside capital allowances they cannot claim any tax incentives and have to pay corporate income tax according to the standard rate of 25 percent.[5] Farming enterprises that plant cash crops like maize or yam also have to pay the standard rate, but can claim a tax holiday of five years. Companies that are listed at the Ghana Stock exchange pay a reduced corporate tax rate of 22 percent and additionally can claim 3 years of tax holiday. Agro-processing companies located in regional capitals and enterprises that are operating in demarcated free zones pay preferential corporate tax rates of 10 percent and 8 percent. In addition, they are exempted from any tax payments for 5 and 10 years and, therefore, have the lowest level of effective average tax rates over the time.

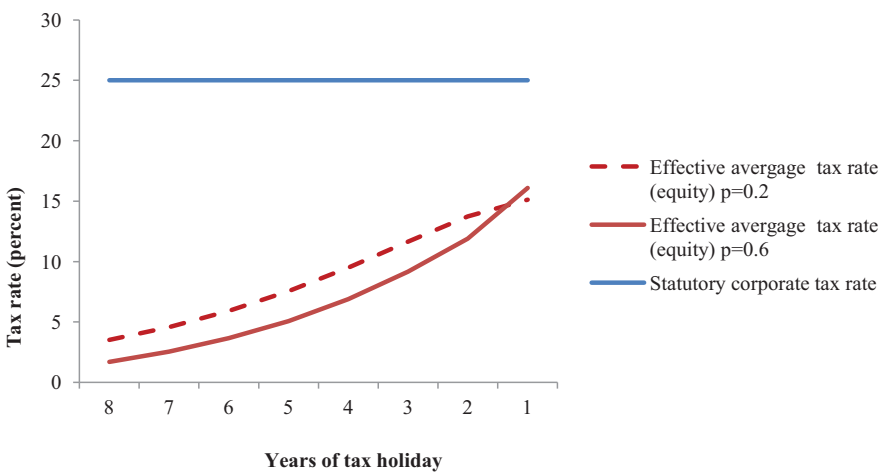
Figure 3: Average tax rates on investment in plant and machinery for different sectors



[5] This applies only to companies that are operating in Accra or Tema.

Altogether, the range of tax incentives leads to a high variation of effective average tax rates, which reveals the discretionary design of the capital income tax regime in Ghana. Beside capital allowances, the difference in the effective tax burden between companies with and without tax incentives amount to 17 percent. Manufacturing companies at the top have to pay on average 20 percent effective income taxes, while companies operating in free zones have an effective tax burden of 3 percent. In addition, we illustrate in figure 4 that the most profitable investment projects will gain most from tax holidays and this even more if the holiday is extended.

Figure 4: Effective average tax rates for different tax holiday regimes

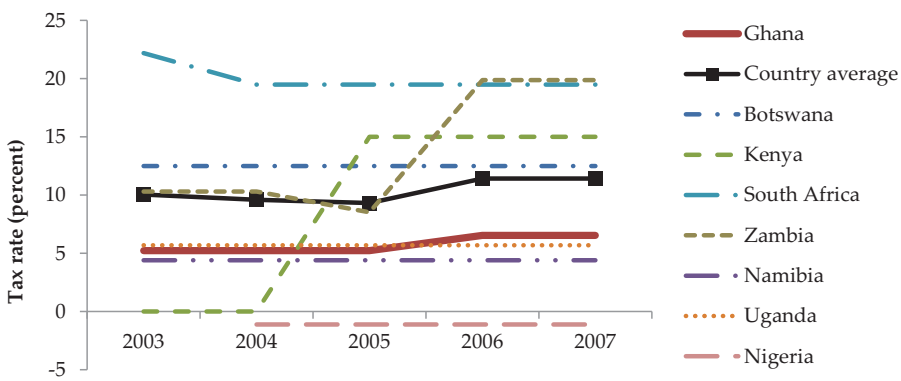


Therefore especially tax holidays in Ghana are not cost-effective because exemptions may be offered to highly profitable firms that would have invested without them as well. Most benefits from tax holidays are generated in the first years, thus effective average tax rates will increase as the holiday expires. This supports one important criticism that footloose industry benefits most from such kind of tax exemptions (McLure 1999). Firms have the incentive to make all

investments during the holidays and are encouraged to stop investments thereafter.

In order to put the discretionary design of the Ghanaian tax regime into perspective, we use effective tax rates calculated for emerging and developing countries by ABBAS et al. (2012) and compare Ghana with seven countries from Sub-Saharan Africa. Figure 5 shows the changes of effective average tax rates that capture the most generous tax regimes (including tax holidays, preferential tax rates etc) for Ghana, Nigeria, Botswana, South Africa, Kenya, Namibia, Zambia and Uganda. As we are interested in the most recent development and the calculated effective tax rates only cover the years 1997 – 2007, we use the last five years (2003 – 2007) in our analysis.[6] In order to focus on the capital income tax regime and abstract from the effects of macroeconomic policy, the effective average tax rates are calculated with a uniform inflation and nominal interest rate for all countries.[7] As in most of the countries the statutory corporate income tax rate remains constant over the time (see figure 1 in the Appendix), all changes in the effective tax rates in figure 5 reflect changes in the design of the tax regime.

Figure 5: Effective average tax rates under most generous tax regime



[6] In figure 2 of the Appendix we present the data covering all years.

[7] The assumed rate of inflation is 3.5% and the nominal interest rate is 13.85%. Personal income taxation is not considered in the calculations.

Companies that fall under the most generous tax regime in Ghana have an effective average tax rate of 5 percent, which is significantly lower than the average among all countries in our analysis. Only Namibia and Nigeria offer more generous tax regimes to their companies and claim effective tax rates below 5 percent in all years. In contrast, South Africa's most generous tax regime has an effective average tax rate of 20 percent, which is the result of the abolition of the tax holiday scheme in 1997. In the recent past, Kenya and Zambia also change their special tax regimes and experience a significant increase of effective average tax rates in 2005 and 2006.

Altogether, as South Africa and Botswana convinced with moderate tax regimes and Zambia and Kenya scaled down their tax incentives, Ghana continues to offer generous tax incentives that result in an effective average tax rate of 5 percent. As to the best of our knowledge no significant changes in the Ghanaian tax policy have occurred after 2007, the Ghanaian tax regime still shows its discretionary design in comparison to other African countries.

Our findings suggest that the discretionary design of the Ghanaian capital income tax system cause economic distortions and may result in a less efficient allocation of production factors. The presence of tax holidays and several preferential corporate income tax rates encourage individual tax avoidance strategies. Ghana's local firms are confronted with profitable footloose companies that successfully circumvent taxes by claiming tax holidays. A simplification of the tax system including the abolition or at least the limitation of tax holidays and the reduction of the large number of preferential tax rates, might reduce administrative costs and should increase tax revenue. Additional revenue can be used to improve broad economic fundamentals like inflation- and exchange rate stability. As we have already seen, some of these macroeconomic factors will improve investment

conditions and importantly reduce the effective tax rates in Ghana. Generally, South Africa can serve as a positive example, because after the abolition of tax holidays in 1997 effective tax rates and tax revenue increase significantly (see figure 2 in the Appendix).

5. Conclusion

Effective tax rates can provide important insights for researchers when assessing tax policy and inform policy-makers about the likely effect of tax incentives. In this paper we examine to which extent tax incentives in Ghana affect the effective tax burden of corporations. Against this backdrop, we analyse the Ghanaian capital income tax system by calculating both marginal and average effective tax rates using the well-known Devereux-Griffith approach and its extension – an exercise that has not been done so far for the case of Ghana.

We find that the Ghanaian capital income tax regime reveals its discretionary design, as the wide range of tax incentives leads to a high variation of effective average tax rates. Beside capital allowances, the difference in the effective tax burden between companies with and without tax incentives amount to 17 percent. Manufacturing companies that cannot claim preferential corporate tax rates or tax holidays have to pay on average 20 percent effective income taxes, while companies operating in free zones have an effective tax burden of 3 percent. Furthermore, we show that the most beneficial investment projects will gain most from tax holidays. In addition highest profits of an investment are generated in the first periods of the tax holiday granted, thus setting incentives to undertake short-lived investments at the beginning of the tax holiday. Under this tax regime, footloose industries benefit most, while in contrast long-lived assets profit least in Ghana. These findings seem to confirm results of previous studies about the cost

effectiveness of tax holidays and suggest that the Ghanaian capital income tax may result in a less efficient allocation of production factors.

Comparing the effective average tax rate with other countries from Sub-Saharan Africa reveals that the effective tax burden in Ghana is significantly lower than the average among all countries. Only Namibia and Nigeria offer more generous tax regimes to their companies. In contrast, South Africa convinces with a moderate income tax regime that grants no tax holidays and might serve for Ghana as a positive example for an effective tax policy.

The Ghanaian capital income tax regime with many preferential corporate income tax rates, special capital allowances for specific assets and tax holidays reveals its discretionary and complex design. The current complexity of capital income taxation poses a significant burden on tax administrators, obscures the real effects of tax burden, and comes at a sizable tax revenue forgone (AMEGASHI 2010). In our view, tax incentives like tax holidays produce tax avoidance strategies and substantially lower compliance across taxpayers. Therefore, simplifying the tax system with a view to disposing tax holidays and the large number of preferential corporate tax rates can add transparency to the tax system as a whole, save resources within the administration, and most likely will improve tax revenue. Moreover, additional revenue will be conducive to improving sustainability of public finances, thereby contributing to the improvement of the macroeconomic environment. This in turn has the potential to reduce effective tax rates significantly, as our findings highlight the importance of macroeconomic variables such as the inflation rate in terms of effective taxation in Ghana.

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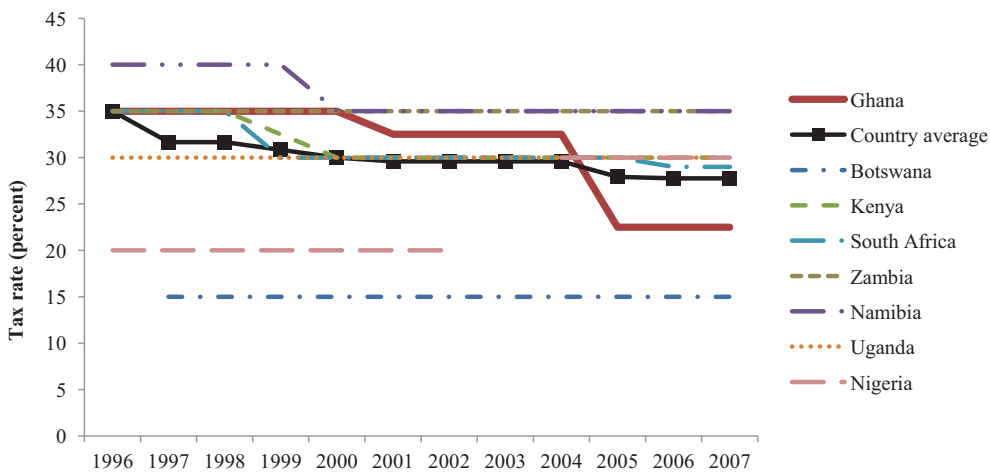
Appendix

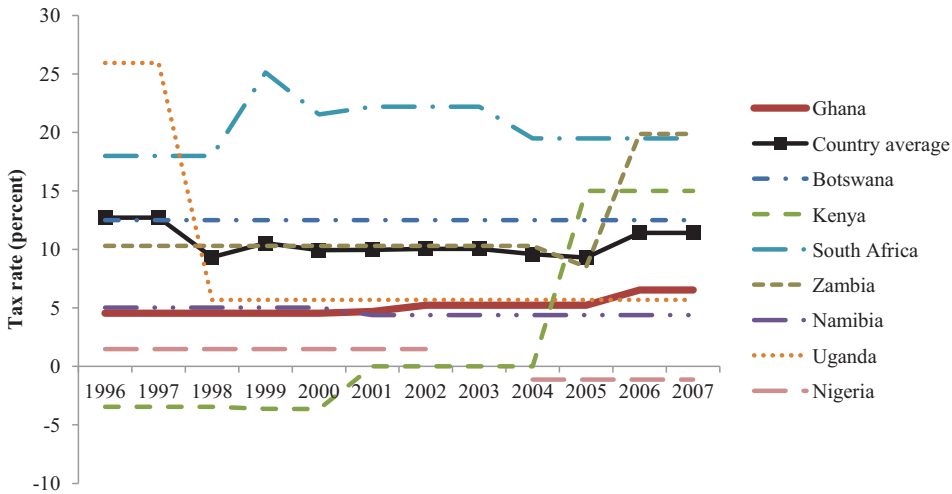
Appendix Table 1: **Depreciation rates**

Class	Assets	Rate
1	Computer and data handling equipment	40%
2	Vehicles; construction and earth moving equipment; trailers, plant and machinery used in manufacturing	30%
3	Mineral and petroleum exploration and production rights; assets, buildings, structures and plant and machinery used for mineral and petroleum prospecting, exploration and development	80% for the year of purchase, 50% for the following years
4	Railroad cars; vessels; aircraft; specialized public utility plant and equipment; office furniture, fixture and equipment; depreciable assets not included in another class	20%
5	Buildings, structures and works of a permanent nature other than those of class 3	10%
6	Intangible assets, other than those of class 3	Dependant on duration of use

Appendix Figure 1: **Statutory corporate income tax rate**



Appendix Figure 2: **Effective average tax rates under most generous tax regime**



A2. Calculation of effective tax rates with new equity or debt

To incorporate new equity and debt financing in the model, the additional cost of these sources of finance must be defined. In the case of new equity finance, the company increases the amount of shareholders' equity by $1 - \phi\ \tau$. A physical investment of 1 is financed while an immediate tax allowance worth $\phi\ \tau$ can be claimed in period t. In period (t+1), the firm will repurchase the shares at the same price. To finance the investment with debt, the company loans $1 - \phi \cdot \tau$ in period t and amortizes it in period (t+1). Thus, interest payments have to be considered. Summing up the additional cost of new equity financing yields:

$$F^{NE}{}_{t} = \frac{-\rho^{real} \cdot (1-\gamma)}{1+\rho} \cdot (1-\phi \cdot \tau) \qquad \text{(A1)}$$

.

The investment of 1 is reduced by the immediate tax allowance and is multiplied with the tax adjusted discounted post- tax value of earnings of the investment which the new shareholders will earn less the discrimination of new equity financing due to personal income taxation. The additional cost of debt financing is:

$$F^{D}{}_{t} = \frac{\left(\rho^{real} - \rho^{real} \cdot (1-\tau)\right)}{1+\rho} \cdot (1 - \phi \cdot \tau) \cdot \gamma \ . \qquad \text{(A2)}$$

Like new equity financing, the investment of 1 is reduced by the immediate tax allowance. The discounted post-tax value of earnings equals the real interests which the firm has to pay to the financier less interest subsidy.

The additional costs of these sources of finance will be implemented in equation (5) and equation (9) to calculate the effective tax rates in the case of new equity and debt financing. Therefore the cost of capital of a marginal investment is defined as:

$$\tilde{p} = \frac{(1-A)}{(1-\tau)} \cdot \left[\rho^{real} + \delta\right] - \frac{F^{x}{}_{t} \cdot \left(1+\rho^{real}\right)}{\gamma \cdot (1-\tau)} - \delta \ . \qquad \text{(A3)}$$

The additional costs are added to the real net present value of a long term investment:

$$R_{t} = -1 \cdot \gamma \cdot (1-A) + \frac{\gamma}{1+\rho} \cdot \left[\left(1+\pi^{k}\right) \cdot (p+\delta) \cdot (1-\tau) + \left(1+\pi^{k}\right) \cdot (1-\delta) \cdot (1-A)\right] + F^{x}{}_{t} \, . \qquad \text{(A4)}$$

The modified cost of capital and real net present value will be used in the calculation of the effective tax rates.