

# Examining the Dividend Growth Model for Stock Valuation: Evidence from Selected Stock on the Ghana Stock Exchange.

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## Abstract

Gordon's growth model is one of the popular models in finance use to value or evaluate the fundamental values of stocks. This study investigated the actual price on the Ghana Stock Exchange with its predicted prices based on estimates using the Gordon's growth model for the selected banks. Monthly returns and stock prices from the Databank Stock Index (DSI) for five years were used for this study. T-test has been employed to test the significance of the mean differences for yearly market return for five years.

The findings of this study indicate that there are differences in the actual price series  $P_0$  and the estimated price series  $P_1$  based on estimates using the Gordon's growth model. In other words, the current market prices of these banks do not match up with the actual fundamental values of these banks. The results from the t-test for all the selected banks collectively rejected the null hypothesis that there are no differences in the actual price series  $P_0$ , and the estimated price series  $P_1$  based on estimates using the Gordon's growth model on the Ghana Stock Exchange.

The results also show that CAL banks' share prices over the years studied by this paper have been undervalued and even as at the end of 2010, it was still undervalued. It further shows that Ghana Commercial Bank (GCB) was undervalued over the last four years but as at the end of 2010, it was overvalued. Home Finance Company (HFC) however was overvalued over the last four years and it was as at 2010, overvalued. Standard Chartered Bank (SCB) on the other hand was undervalued in 2006 but was overvalued for three subsequent years and as at 2010, it was overvalued. Société Générale – Social Security Banks, (SG-SSB) has experience a mixed trend. It was undervalued in 2006, overvalued in 2007 and 2008, undervalued in 2009 and it was overvalued as at the end of 2010. The results further indicate that the Ghana Stock Exchange (GSE) bourse is inefficient.

**Key Words:** Stock Market, Stock Index, Gordon's Growth Model.

## 1. Introduction

The theoretical literature on corporate valuation is both extensive and publicly available. How corporate valuation is performed in practice is however often protected as a secret. Professional financial analysts use various techniques to calculate the value of a firm. The value that is derived is used to advice clients in their investment decisions. Without access and understanding of how the analyst reached a certain value it is difficult to determine the quality and the rationale behind the advice. Many observers are also concerned that many investors do not seem to recognize that the stock market is also risky. There is no guarantee that the market will continue to rise, and even in bull markets some stocks decline. While it is difficult to predict prices of stocks with precision, we are not completely in the dark when it comes to valuing stocks and determining those most appropriate for a given investor (Brigham & Ehrhardt, 2009). Valuation of stocks is the first step toward intelligent investing. When an investor attempts to determine the worth of her shares based on the fundamentals, it helps him or her make informed decisions about what stocks to buy or sell. Without fundamental value, one is set adrift in a sea of random short-term price movements and gut feelings. Companies buy shares in other companies for all sorts of reasons. Whether it's an outright takeover, in which a company buys all the shares, or a joint venture, in which the company typically buys enough of another company to earn a seat on the board of directors. The price of a stock translates into the price of the company and the stock is on sale on a stock market. It is this information that allows other companies, public or private, to make intelligent business decisions with clear and concise information about what another company's shares might cost them.

The Ghana Stock Exchange (GSE) is the principal stock exchange of Ghana. The exchange was incorporated in July 1989 with trading commencing in 1990. It currently has around 36 listed companies and 2 corporate bonds. All types of securities can be listed. Criteria for listing include capital adequacy, profitability, spread of shares, years of existence and management efficiency. In 1993, the GSE was the 6<sup>th</sup> best index performing emerging stock market, with a capital appreciation of 116%. In 1994 it was the best index performing stock market among all the emerging markets, gaining 124.3% in its index level. 1995's index growth was a disappointing 6.3%, partly because of high inflation and interest rates. Growth of the Index for 1997 was 42%, and at the end of 1998 it was 868.35. As of October 2006, the market capitalization of the Ghana Stock Exchange was about (\$11.5bil) 111,500bil cedis. As of December 31 2007, the GSE's market capitalization was 131,633.22bil cedis. As of 2<sup>nd</sup> July 2010, the GSE All-share index stood at 6591.101 down by -47.16 and the Year to date change is 17.44.

When the stock market was reaching record new highs in 1999 and 2000 many stock valuation models indicated that the stock market was extremely overvalued. Many investors ignored this information, not considering the possibility that the market could turn against them.

The world has witnessed many casualties in the field of business where investors without any fault of theirs saw their investment go down the drain in a second. The downfall of *Enron Corporation* is one of the most infamous and shocking events in the financial world in the whole history of mankind, and its reverberations were felt on global scale. Prior to its collapse in 2001, *Enron* was one of the US leading companies and frequently considered among top 10 admired corporations and most desired places to work, and its board was often recognized among the best five US companies in accordance with the Fortune magazine. Its revenues made up US \$139(\$184) billion, assets equalled \$62(\$82) billion. Was these figures over valued? Why it was not detected considering the fact that the USA stock market is efficient? While *Enron Corporation* was so highly praised by the outside observers, internally it had highly decentralized financial control and decision-making structure, which made it practically impossible to get a coherent and clear view on the corporations' activities and operations. Ghana can account for the collapse of the Bank for housing and construction and the famous Pyram in which indigenous Ghanaians lost millions of cedis at the time. Now the Ghanaian stock market is picking up and the populace has started patronizing the market. How sure are investors investing in shares on the GSE of the selected companies that the value of their assets is overvalued or undervalued in order to make a wise investment decision, considering the inefficiency of the Ghanaian stock market?

### 2.0: Dividend Growth Model (DGM).

The key assumptions of the model are: dividends grow at a constant rate, companies use their cost of capital as a discount rate, and the growth rate of the company must exceed its cost of capital. It is given by:

$$P_0 = \frac{D_0(1+g)}{1+k} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \dots + \frac{D_0(1+g)^\infty}{(1+k)^\infty} \dots \dots \dots 1$$

Since  $g > k$  the above can be reduced to the following simple equation.

$$P_0 = \frac{D_0(1+g)}{k-g} = \frac{D_1}{k-g} \dots \dots \dots 2$$

Where:

- $P_0$  is the value of the stock in period zero;
- $D_1$  is the value and dividend in period 1;
- $g$  is the constant growth rate of the company; and
- $k$  is the cost of capital of the company

Major criticisms of DGM include the assumption of constant growth ( $g$ ) and the fact that the model does allow the cost of capital to exceed the growth rate. The latter is undoubtedly not true for companies with low growth. Another major criticism is that the model does not apply to companies who do not pay dividends. Most companies in the USA do not pay dividends (Keown et al., 2002). The majority of empirical work regarding DGM involves estimating the cost of capital ( $k$ ). Geykdajy (1981) examine the trend of the cost of equity for 28 U.S. multinational companies and 28 other domestic U.S. companies over the period of 1965-1978 using the DGM approach based on the anticipated ex-ante dividends.

Siegel (1985) derives a simple approximation to estimate the cost of capital using DGM with less restrictive assumptions. The assumptions were: growth rates are constant; dividend yield and growth must be calculated on a yearly basis to estimates yearly costs; and the price is based on ex-dividend quotations. The main results of this study indicated that the cost of capital is sensitive to the choice of data. Scott (1992) measured the real cost of equity capital from 1927-1987 using DGM. He found the real growth rate of dividends to be the dominant factor that affects the real cost of capital. Cost of capital was estimated to be 4-6% nominally and 1-2% in real terms. These estimates do not correspond to actual equity returns.

### 3.0. Empirical Methodology

The purpose of this paper is to investigate the stock price of the selected companies and evaluate it to empirically examine the selected companies using the Dividend growth model to establish whether share prices of these selected banks on the GSE follow the valuation model of the Gordon's model (DGM). Dividend policy in the country is secrete and therefore not available to the public. However, researches such as National Trust Holding Company (NTHC) annual research shows that most, if not all companies on the GSE have been paying constant dividends and in most cases the dividends paid showed an increased over the preceding year. Most of the companies increased dividends at the rate at which earning per share also increased. Geykdajy (1981) examine the trend of the cost of equity for 28 U.S. multinational companies and 28 other domestic U.S. companies over the period of 1965-1978 using the DGM approach based on the anticipated ex-ante dividends. A firm in this

study is classified as a dividend if it paid a cash dividend, regular or otherwise, during the previous twelve months. If the firm pays out greater cash dividend in the most recent twelve months compared to the prior twelve months then it is classified as having had a year of dividend growth. With the exception of Société Générale – Social Security Banks (SG-SSB), all the other banks for this study have had a year of dividend growth and therefore the application of the Dividend Growth Model (DGM) in valuing their stock prices is justifiable.

**3.1 Source of Data**

This paper used Secondary data. The data for the individual stock and the All-Share-Index were obtained from the Ghana Stock Exchange database. The TBR was compiled from various issues of the Monthly Statistical Bulletin published by the Central Bank (Bank of Ghana).

**3.2 Model Specification: The Gordon Model (DGM)**

In its basic form, stock’s price is the present value (PV) of expected future dividends. That is:

$$\widehat{P}_0 = \frac{D_0(1+g)}{1+k} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \dots + \frac{D_0(1+g)^\infty}{(1+k)^\infty} \dots \dots \dots 3$$

Constant growth stock is whereby dividends are expected to grow forever at a constant rate, g. If g is constant then,

$$\widehat{P}_0 = \frac{D_0(1+g)}{k_s - g} = \frac{D_1}{k_s - g} \dots \dots \dots 4$$

Where:

- $\widehat{P}_0$  or  $P_1$  = expected price of the stock;
- $D_0$  = company’s last dividend paid
- g = expected growth rate
- $k_s$  = required rate of return
- $D_1$  = expected dividend at year 1
- $D_t$  = expected dividend at year t
- $\widehat{k}_s$  = expected rate of return

Expected growth rates vary from company to company, but dividend growth on average is expected to continue in the foreseeable future at about the same rate as that of the nominal gross domestic product (real GDP) (Brigham and Ehrhardt, 2009). For this study, g (expected growth rate) is estimated to be 5.15% for all selected companies. This 5.15% is an average GDP of ten years real GDP for Ghana from 1999 to 2008 and it was used as g for this study’s analysis base year which was 2006.

For a constant growth stock,

$$D_1 = D_0 (1+g)^1 \dots \dots \dots 5$$

$$D_2 = D_0 (1+g)^2 \dots \dots \dots 6$$

$$D_t = D_0 (1+g)^t \dots \dots \dots 7$$

**3.2.1 Cost of Equity ( $k_s$ )**

Since the valuation method requires that certain assumptions be made to estimate the value of equity, the paper therefore needed to consider the quality of these estimates for these inputs and thus the legitimacy of any assumptions. The dividend and the share price value use in the fundamental valuation model were averages of the actual dividends the banks have paid and this was used as  $D_0$  upon which subsequent dividends was projected. According to this model, a company’s dividend which has just been paid should be used as  $D_0$  and its dividend in the future forecasted as  $D_t = D_0 (1+g)^t$  (Brigham & Ehrhardt, 2009). The cost of equity was estimated using CAPM. A monthly Databank Stock Index (DSI) market return coving a period of five years was used and monthly government of Ghana T-bill rate was also used as the risk free rate. This method provides estimates for the cost of equity based on historical information that would have been available to investors at a given point in time. The standard method of estimating beta is by regressing historical returns of a company’s stocks against the return on the market for the same period. Microsoft Excel was used in regressing each company’s monthly return against that of the market to obtain the company’s beta. The analysis covered the period from January, 2006 to December, 2010. It should be noted that the sample selection and the time frames were determined on the basis of data availability.

**3.3 Testing Hypothesis**

To conduct the required test, the following hypotheses were formulated.

- $H_0$ : there are no differences in the actual price series  $P_0$ , and the estimated price series  $P_1$  based on estimates using the Gordon’s growth model
- $H_1$ : there are differences in the actual price series  $P_0$ , and the estimated price series  $P_1$  based on estimates using the Gordon’s growth model

#### 4.0 Empirical Results and Discussion

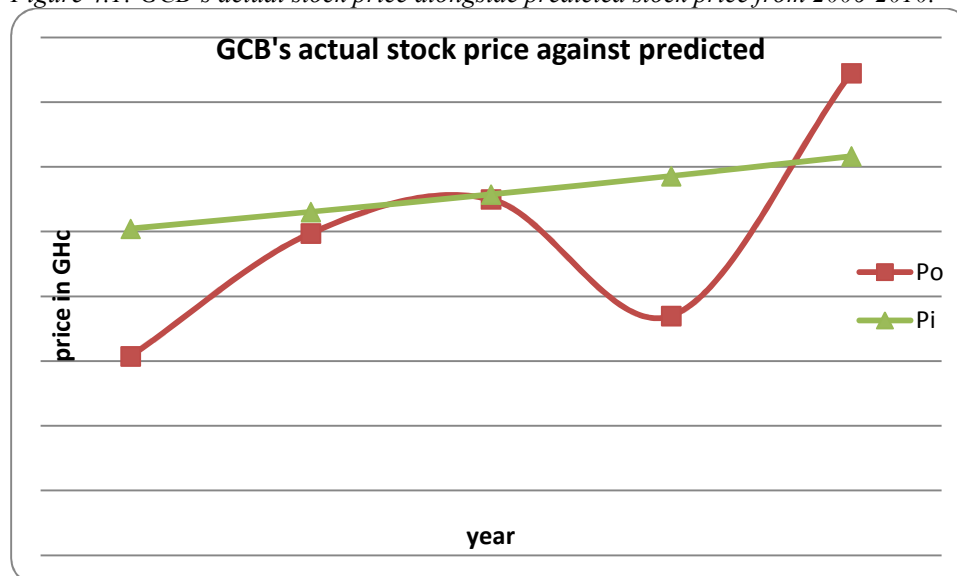
##### 4.1: Ghana Commercial Bank (GCB)

Table 4.1: GCB's actual stock price alongside predicted stock price from 2006-2010

Date	$P_o$ GH¢	$\hat{P}_o$ GH¢	$P_o - \hat{P}_o$	Pricing error %
2006	0.615	1.009	-0.394	-39.05
2007	0.995	1.061	-0.066	-6.22
2008	1.1	1.115	-0.015	-1.36
2009	0.74	1.172	-0.432	-36.86
2010	1.49	1.233	0.257	20.84

(Source: Authors' Construct, GSE Database).

Figure 4.1: GCB's actual stock price alongside predicted stock price from 2006-2010.



(Source: field survey, 2013)

From table 4.1 and figure 4.1, it could be observed that there is actually a difference in the value of the actual price series  $P_o$ , and the estimated price series based on the estimates using the Gordon's growth model. GCB's actual stock price over the period studied has been on average undervalued as compared with the predicted prices not different from its performance as captured in the financial results released for the 2009 operational year. In 2006, the predicted price was 39.05% higher than the actual price in that same year. In 2007, actual price was less than the predicted price by 6.22%. The actual price for the year 2008 almost matched up with predicted price but the predicted was about 1.36% higher than the actual price. The bank's actual stock price ended 2009 with 36.86% less than the predicted; similar to results by the NTHC research. The second quarter of 2010 showed that GCB's stock price is on the run with 20.84% higher than the predicted using the dividend growth model. Actual stock price in 2007 increased by 61.79% as compared to 2006 and an increase of 10.55% was realised in 2008 from 2007 stock price. The stock price however decreased from GH¢1.1 to GH¢0.74 in 2009 representing a 32.73% decrease. By the end of July, 2010, the stock price was going for GH¢1.49 an increase of about 101.35%.

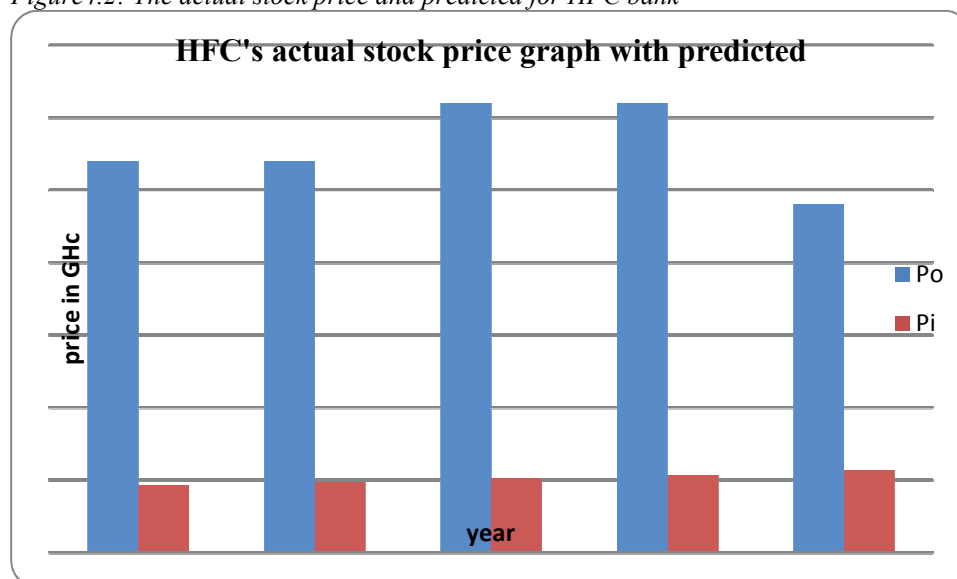
##### 4.2 Home Finance Company (HFC) Bank

Table 4.2: HFC's actual stock price alongside predicted stock price from 2006-2010

Date	$P_o$ GH¢	$\hat{P}_o$ GH¢	$P_o - \hat{P}_o$	Pricing error %
2006	0.54	0.092	0.448	486.95
2007	0.54	0.097	0.443	456.70
2008	0.62	0.1020	0.518	507.84
2009	0.62	0.1069	0.5131	479.98
2010	0.48	0.1127	0.3673	325.91

(Source: Authors' Construct, GSE Database).

Figure 4.2: The actual stock price and predicted for HFC bank



(Source: field survey, 2013)

In the case of HFC as shown both on the table and on the graph above, it could be observed again that there is actually a difference in value of the actual price series  $P_o$ , and the estimated price series based on the estimates using the Gordon's growth model. However, HFC's stock price unlike GCB has been overvalued according to the model used over the period studied. The percentage of actual price over predicted has been overwhelming. While in 2006 there was 486.95% increase of actual priced over predicted, 2007 though was a decreasing rate of 456.70%. The highest was in 2008 in which actual price was 507.84% higher than the predicted. The year 2009 saw an increase of 479.98% of actual price over predicted though at a decreasing rate. Currently at a decreasing rate, the difference is about 325.91%. Actual price for 2006 and 2007 recorded a 0% increase but in 2008, there was an increase of 14.8%. The year 2009 remain same as previous year, but currently it is down by 22.6%. Since the fundamental valuation relies on the assumptions to estimate the expected dividend stream and the cost of capital, these findings suggest that either the cost of equity used in this model is too low or high going into this period (it does not adequately reflect the increased risk that the market is facing) or actual dividends are higher or lower than would have been predicted at this time; so the dividend reflected in the actual price are either higher or lower.

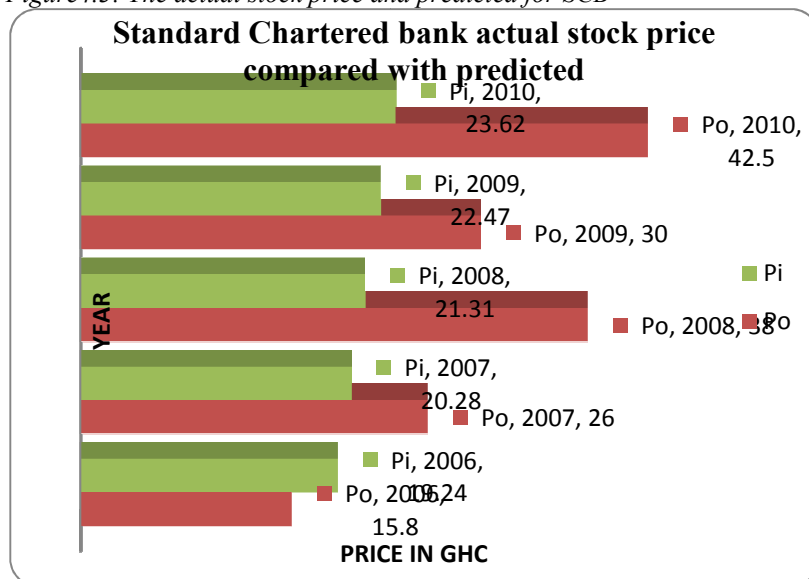
#### 4.3 Standard Chartered Bank (SCB)

Table 4. 3: SCB's actual stock price alongside predicted stock price from 2006-2010

Date	$P_o$ GH¢	$\hat{P}_o$ GH¢	$P_o - \hat{P}_o$	Pricing error %
2006	15.8	19.24	-3.44	-17.88
2007	26	20.28	5.72	28.21
2008	38	21.31	16.69	78.32
2009	30	22.47	7.53	33.51
2010	42.50	23.62	18.88	79.93

(Source: Authors' Construct, GSE Database).

Figure 4.3: The actual stock price and predicted for SCB



(Source: field survey, 2013)

SCB's actual stock price for 2006 was 17.88% less than the predicted price for the same year. Again this bank has also added to the previous two that there is indeed a major difference between value of the actual price series  $P_o$ , and the estimated price series based on the estimates using the Gordon's growth model. Whilst there was 28.21% increase in actual price over predicted in 2007, there was about 78.32% in 2008, 33.51% in 2009, and currently at the end of July 2010 79.93%. Actual price of GH¢ 15.8 in 2006 ended the year 2007 at GH¢ 26, an increase of 64.56%. In the year 2008, there was 46.15% increase over the previous year's figure and 2009 ended on a decrease of 21.05%. By 2010, there was an increase of 41.67% over the preceding year. There is a general perception that the GSE is inefficient and as such a hard working person can outperform the market. Again when the market is inefficient, there is the possibility that stocks prices may be overvalued or undervalued. Figure 4.3 shows clearly that stock price for this bank has been overvalued over these time series with the exception of the year 2006 which was undervalued.

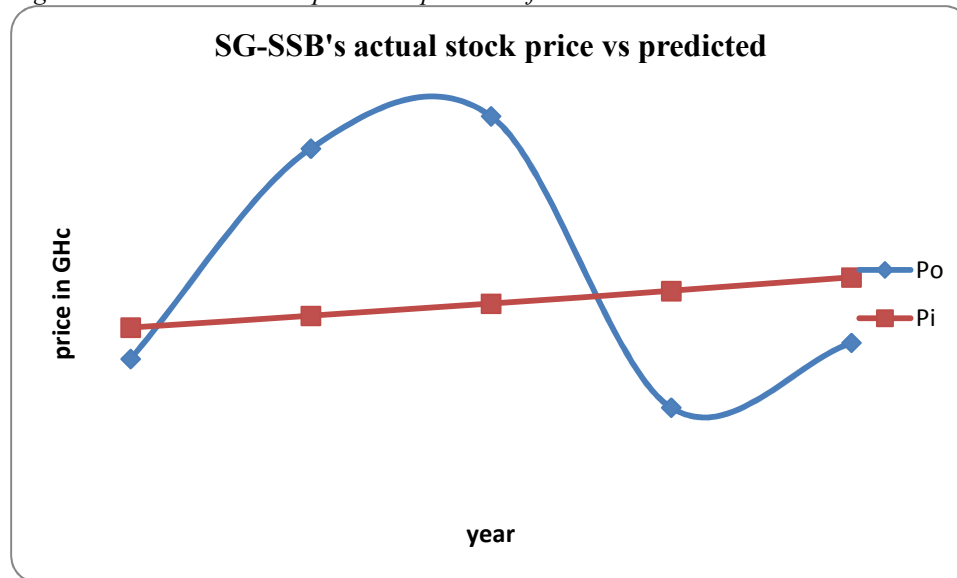
#### 4.4 Société Générale- Social Security Bank (SG-SSB)

Table 4.4: SG-SSB's actual stock price alongside predicted stock price from 2006-2010

Date	$P_o$ GH¢	$\hat{P}_o$ GH¢	$P_o - \hat{P}_o$	Pricing error %
2006	0.60	0.6969	-0.0969	-13.90
2007	1.25	0.7332	0.5168	70.49
2008	1.35	0.7709	0.5791	75.12
2009	0.45	0.8101	-0.3601	-44.45
2010	0.65	0.8520	-0.202	-23.71

(Source: Authors' Construct, GSE Database).

Figure4.4: The actual stock price and predicted for SG-SSB



(Source: field survey 2013)

It could be observed from the above table4.4 and figure4.4 that SG-SSB's stock price compared with the predicted has been a mixed one from the other banks in this study. It was undervalued in 2006, overvalued in 2007 and 2008 and undervalued again in 2009 and currently as of July 2010. In all situations, it is still clear that there is indeed a major difference between value of the actual price series  $P_o$  and the estimated price series based on the estimates using the Gordon's Growth Model. There was about 13.90% decreased of actual price over predicted in 2006. In the year 2007, actual price scale by 70.49% over predicted price for the same year and 75.12% in 2008, the highest over the time frame studied for the bank. However, there was a decrease of about 44.45% in actual price over predicted and currently (July, 2010) a decrease of about 23.71% in actual price as compared to predicted price. Actual price in 2006 increased by 108.3% in 2007, by the year ending December 2008, it had increased by 8% over 2007 but at a decreasing rate. However actual price decreased by 66.7% by the year ending 2009 and it is currently (by the end of second quarter) an increase of approximately 44.4%. The high price in 2007 and 2008 could mean that this firm was actively pursuing growth strategies and therefore was re-investing more funds as opposed to paying them to shareholders in the form of dividend. It does appear that the predicted price using the DGM have been performing creditably better than the actual prices over the period for this particular bank.

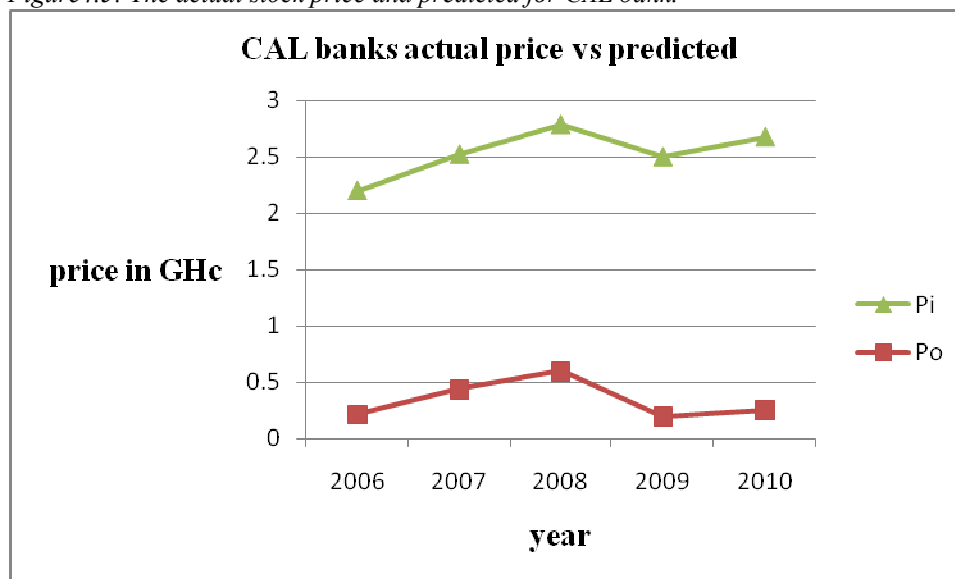
#### 4.5 CAL Bank

Table4.5: CAL bank's actual stock price alongside predicted stock price from 2006-2010

Date	$P_o$ GH¢	$\hat{P}_o$ GH¢	$P_o - \hat{P}_o$	Pricing error %
2006	0.2205	1.9802	-1.7597	-88.86
2007	0.442	2.0823	-1.6403	-78.77
2008	0.60	2.1895	-1.5895	-72.60
2009	0.20	2.3013	-2.1013	-91.31
2010	0.26	2.4200	-2.16	-89.26

(Source: Authors' Construct, GSE Database).

Figure4.5: The actual stock price and predicted for CAL bank.



(Source: field survey 2013)

From the above table and figure, it could be observed that there are differences in the actual price series  $P_o$  and the estimated price series based on the estimates using the Gordon's Growth Model. CAL banks' actual stock prices over the period studied have all been overvalued and does not match up with the predicted, based on the GGM's estimates over the same period. In 2006, predicted price was 88.86% higher than actual price, 78.77% above in 2007, 72.60% in 2008, 91.31% climbed in 2009 and 89.26% as of 2010. December 2006 share price of GH¢ 0.2205 ended 2007 at GH¢ 0.442 up by 100.45%. It further increased to GH¢ 0.60 in 2008 representing an increase of 35.75%. It however ended on a decline note in 2009 to GH¢ 0.2 representing a decrease of 66.67%. As of July 2010, it was up from 2009 to GH¢ 0.26, an increase of 30%. These findings could also be as a result of the inefficiency of the Ghanaian bourse.

#### 4.6 Hypothesis Testing

A paired *t*-test were performed for all the selected banks to determine if there are difference between actual price series  $P_o$  and the predicted price series  $P_i$  based on estimates using the Gordon's Growth Model. The mean differences for the banks were:

Table4. 6: Summary of Statistics

Bank	Mean	SD	t Stat	two-tail P	N	C.I
SG-SSB	0.087	0.431	0.453	0.674	5	-0.448, 0.674
HFC	0.458	0.062	16.615	7.67E-05	5	0.382, 0.534
SCB	9.076	9.005	2.254	0.087	5	-2.106, 20.258
CAL	-1.850	0.226	-15.65	9.72E-05	5	-2.178, -1.522
GCB	-0.13	0.286	-1.015	0.367	5	-0.486, 0.226

The above figures for the various banks were significantly greater than zero for the respective banks furthermore, their respective *t* Stat and two-tail Ps provided evidence that there are differences in time series price of actual price  $P_o$  and the predicted price  $P_i$  series based on the estimates using the Gordon's growth model. Given the variability of the sample, the mean difference could have been as low as an average of -0.448 and as high as an average of 0.674 with a 95% confidence level for SG-SSB, as low as an average of -2.106 and as high as an average of 20.258 for SCB with the same 95% confidence level. It could have also been as low as an average of -2.178 and as high as -1.522 for CAL bank, and lastly as low as an average of 0.382 and as high as an average of 0.534 on a 95% confidence level for HFC bank and as low as an average of -0.486 and as high as an average of 0.226 with 95% confidence level for GCB. Although the lowest of -0.486 for GCB and -0.448 for SG-SSB, -2.106 for SCB and -2.178 for CAL bank were all smaller than zero, it still indicated that it is not equal to zero and therefore signifies a difference between the outputs, i.e. actual prices and the predicted prices for the period. The results from the *t*-test for all the selected banks unanimously rejected the null hypothesis that there are no differences in the actual price series  $P_o$ , and the estimated price series  $P_i$  based on estimates using the Gordon's Growth Model on the Ghana Stock Exchange.



### 5.0: Conclusion

No method for stock valuation can be said to be either right or wrong. What is done in this paper is only one possible forecast for a company and hopefully it gives an indication of the future but in time it could be proven to be wrong. This study has found out that there are indeed differences in the actual price series and predicted price series based on estimates using the Gordon's Growth Model. It is also clear and supported by previous work carried out by Frimpong and Oteng (2007), that stock prices could be undervalued and overvalued. It is however expected that investors would take advantage of the information provided by this study to make capital gains and avoid a possible capital loss when the market becomes efficient. However, Frimpong and Oteng, (2007), observed that Ghanaians left on their own are themselves not making any momentous effort to exploit the predominant opportunities on the young Ghana Stock Market to enrich themselves. Possible reasons the study observed were the degree of ignorance, conservatism and/or indifference on corporate financial matters; which are so high to defy the usefulness of theoretical postulation such as the implications of the findings of this study.

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### Appendix

#### Past dividends

Year	2005 GH¢	2006 GH¢	2007 GH¢	2008 GH¢	2009 GH¢
HFC	0.0045	0.0055	0.0100	0.0100	0.0150
SG-SSB	0.045	0.045	0.06	0.045	0.040
SCB	-	1.15	1.30	1.45	2.47
CAL bank	0.0055	0.0075	0.0105	0.0145	0.0120
GCB	0.0210	0.0550	0.0550	0.060	0.18

Source: NTHC research.

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