

The Effect of Embedding Volatility into DuPont Financial Model Results: A Comparison Study on Kuwaiti Banks

Musaed S. AlAli

Assistant Professor

College of Business Studies, Department of Insurance and Banking
The Public Authority for Applied Education and Training (PAAET)
Kuwait

Nour M. AlShamali

Assistant Professor

College of Business Studies, Department of Insurance and Banking
The Public Authority for Applied Education and Training (PAAET)
Kuwait

Abstract

This study aims to compare the financial performance of Kuwaiti banks based on their return on assets (ROA) and return on equity (ROE) using the modified DuPont model during the period 2012-2017 and the effect of embedding returns volatility on the model score. While DuPont model seems like a useful tool in evaluating banks financial performance, the model only take a snapshot of the current financial position which might not represent the accurate financial condition of the bank. Taking the effect of previous return volatility would result in a clearer picture to investors on the financial position of the bank. In this study Sharpe ratio and Sortino ratio are used to compare Kuwaiti banks. Results obtained from this study show that National bank of Kuwait had the highest return on equity (ROE) and Sortino ratio during the study period while Ahli United bank was the best performer when it came to Sharpe ratio. On the other side, Warba bank produced the lowest score in all three measuring ratios.

Key words: Modified DuPont model, Sharpe ratio, Sortino ratio, Return on equity, Return on Assets, Volatility, Kuwait stock exchange (KSE).

Introduction

The banking sector has always captured researchers' attention due to its huge effect on the economy of any country. A strong and healthy banking sector would result in stronger economy. There are ten bank listed at Kuwait stock exchange and they represent around 52% of the whole market capitalization. These ten banks are National bank of Kuwait (NBK), Gulf bank, Commercial bank, AlAhli bank, Burgan bank, Kuwait Finance House (KFH), Boubyan bank, Kuwait International bank (KIB), Ahli United bank (AUB), and Warba bank.

The DuPont model was created in 1918 when DuPont Corporation purchased 23% of General Motors. The model was based on financial ratios to determine the return on assets (ROA) which was the ultimate goal for DuPont at that time. The model was so successful that it became the go-to model for companies and investors alike. By the 1970's the concept of maximizing shareholders' equity became the main concern for financial managers and for that DuPont model was modified to have return on equity (ROE) as its main output.

The modified DuPont model is a model that is based on financial ratios, Burson (1998) stated that financial ratios are useful tools in determining the company's strength and weaknesses. Prendergast (2006) illustrates how a "modified DuPont approach to ratio analysis can be used to drill down to the true cause of financial performance problems". Husein and Pambekti (2014) conclude that financial ratios found in a company's financial statement are an efficient way of analysing the soundness of a company, and can be used to anticipate future financial difficulties. Subramanyam and Wild (2013) argue that financial analysis using financial ratios is a very useful tool that significantly assists business decision making and distinguishes the weak and the strong areas in a company. Almilia (2006) concludes that the results from his study demonstrated that financial ratios from a company's income statement, balance sheet and cash-flow statement have significant success in predicting financial distress.

Considerable amount of literature was done using the modified DuPont model, for example, Sheela and Karthikeyan (2012) used DuPont model in evaluating the financial performance for the top three pharmaceutical companies in India for the period 2002-2012. They found that the model set a common ground for comparing the company's performance. Their results showed that during their study period Cipla pharmaceutical had the highest return on assets (ROA) and return on equity (ROE) among the companies under study. Collier et al. (2010) applied DuPont model in evaluating the financial performance of AFFIN bank in Malaysia for the period 1999-2006 and the effect of rapid economic environment changes on its financial performance. They concluded that AFFIN bank needed a recovery period of four years (1999-2002) after the Asian financial crisis of 1997-1998. It was not until the year 2002 that the bank started having a steady financial performance. The financial performance for the Jordanian Arab bank was examined by Almazari (2012) for the period expanding from 2000 to 2009. He concluded that the Jordanian Arab bank had a relatively steady financial performance with return on equity (ROE) ratio of 12.01% over the period 2000-2008, but due to the global financial crisis the ratio went down to 6.58% in the year 2009.

Methodology

DuPont used one profitability ratio which is net profit margin (NPM) and an efficiency ratio which is total asset turnover (TAT) to calculate return on assets (ROA). The product of the net profit margin (NPM) and the total asset turnover (TAT) equals ROA, and that was the original DuPont model, as illustrated in Equation 1 below.

$$ROA = (NPM) \times (TAT) \quad (1)$$

Where;

$$\text{Net Profit margin (NPM)} = \text{Net Income} / \text{Total Revenues} \quad (2)$$

$$\text{Total Assets Turnover (TAT)} = \text{Total Revenues} / \text{Total Assets} \quad (3)$$

The modified DuPont modified model added equity multiplier (EM) to the formula to calculate return on equity (ROE) as shown in Equations 4 and 5 below.

$$ROE = (ROA) \times (EM) \quad (4)$$

$$\text{Or } ROE = (NPM) \times (TAT) \times (EM) \quad (5)$$

Where;

$$\text{Equity Multiplier (EM)} = \text{Total Assets} / \text{Equity} \quad (6)$$

Ignoring the effect of volatility might result in a misleading results and for that Sharpe ratio is used in this research in order to measure the effect of volatility on returns. The Sharpe ratio measures the effect of volatility on the return, Burnside et al. (2011) calculated the Sharpe ratio as;

$$SR = \frac{\bar{\pi}}{SD} \quad (7)$$

Where SR is the Sharpe ratio, $\bar{\pi}$ is the mean return and SD is the standard deviation. A modification is made to this formula by substituting the mean return with return on assets (\overline{ROA}) and return on equity ratio (\overline{ROE}), which would result in,

$$SR_{ROA} = \frac{\overline{ROA}}{SD} \quad (8)$$

$$SR_{ROE} = \frac{\overline{ROE}}{SD} \quad (9)$$

While standard deviation takes both favorable and unfavorable deviations into account, the downside semi standard deviation only takes unfavorable deviation into account which makes it more appropriate for calculating the Sharpe ratio. The downside semi standard deviation (DSSD) is calculated as in equation 10.

$$DSSD = \sqrt{\frac{1}{n} * \sum r_t^n (average - r_t)^2} \quad (10)$$

Were n is the total number of observations and r_t is the observed value. The Sortino ratio is then calculated as;

$$Sortino Ratio_{ROA} = \frac{\overline{ROA}}{DSSD} \quad (11)$$

$$Sortino Ratio_{ROE} = \frac{\overline{ROE}}{DSSD} \quad (12)$$

Data and Empirical Results

The data for this study expands for the period of six years (2012-2017), annual data were used and the data were obtained from the annual reports of the banks that were downloaded from the Kuwait stock exchange website.

The net profit margin ratio is an indicator to how effective a bank is in controlling its costs. The higher the ratio, the more effective the bank is at converting revenues into profit. The total assets turnover is the calculated by dividing total income on total assets. This ratio shows the assets utilization of the bank, which means how much revenue generated for every Kuwaiti dinar of assets the bank has. The higher the ratio the more efficient the bank is in utilizing his assets. The equity multiplier is a measure of how leverage the bank is. It can be calculated by looking at a bank's balance sheet and dividing the total assets by the total stockholder equity. One of the most important profitability metrics is return on equity (ROE). Return on equity reveals how much profit a company earned in comparison to the total

Table 1. Modified DuPont Model Results

Net Profit Margin (NPM)											
	NBK	Gulf Bk	Commercial Bk	AlAhli Bk	Burgan Bk	KFH	Boubyan Bk	KIB	AUB	Warba Bk	Average
2017	25.52%	18.82%	29.10%	15.31%	17.03%	21.23%	27.79%	19.82%	27.10%	11.09%	21.28%
2016	25.57%	18.55%	28.69%	14.93%	17.06%	17.18%	30.05%	21.60%	24.25%	6.85%	20.47%
2015	34.15%	17.98%	28.60%	18.85%	24.76%	18.77%	31.01%	16.74%	30.01%	3.81%	22.47%
2014	35.31%	16.77%	29.07%	25.91%	22.39%	15.47%	29.73%	19.72%	35.52%	0.62%	23.05%
2013	34.56%	15.15%	15.39%	25.78%	8.94%	14.96%	16.46%	20.62%	36.39%	-978.63%	-79.04%
2012	40.15%	12.97%	0.76%	20.16%	23.94%	13.28%	13.42%	24.17%	33.73%	269.03%	45.16%
Average	32.54%	16.71%	21.94%	20.15%	19.02%	16.81%	24.74%	20.45%	31.17%	-114.54%	8.90%
Total Assets Turnover (TAT)											
	NBK	Gulf Bk	Commercial Bk	AlAhli Bk	Burgan Bk	KFH	Boubyan Bk	KIB	AUB	Warba Bk	Average
2017	5.15%	4.49%	4.34%	5.35%	5.47%	5.81%	4.32%	4.68%	4.48%	3.44%	4.75%
2016	5.04%	4.23%	4.26%	5.08%	5.38%	5.71%	3.95%	4.57%	4.20%	3.34%	4.58%
2015	3.68%	3.99%	4.00%	3.70%	5.20%	6.12%	3.62%	5.37%	3.65%	3.38%	4.27%
2014	3.56%	3.97%	4.01%	4.15%	4.19%	6.02%	3.62%	4.19%	3.68%	3.11%	4.05%
2013	3.91%	4.19%	3.92%	4.30%	5.01%	6.17%	3.53%	4.26%	3.73%	0.09%	3.91%
2012	4.66%	4.91%	4.13%	5.01%	4.39%	6.32%	3.77%	4.36%	4.28%	-0.31%	4.15%
Average	4.33%	4.30%	4.11%	4.60%	4.94%	6.03%	3.80%	4.57%	4.00%	2.18%	4.29%
Equity Multiplier (EM)											
	NBK	Gulf Bk	Commercial Bk	AlAhli Bk	Burgan Bk	KFH	Boubyan Bk	KIB	AUB	Warba Bk	Average
2017	7.31	9.45	6.71	7.62	8.55	8.20	8.78	7.26	7.84	10.11	8.18
2016	7.12	9.53	6.83	7.71	8.60	8.09	8.23	7.24	8.28	11.89	8.35
2015	7.39	10.10	7.00	7.83	8.16	8.04	9.77	7.22	10.82	8.41	8.48
2014	7.59	10.42	7.61	6.27	8.11	8.19	8.79	6.90	10.60	6.47	8.10
2013	6.86	10.48	6.98	5.90	11.54	7.82	8.13	6.61	9.79	4.47	7.86
2012	6.30	10.79	6.63	5.75	9.64	8.97	7.36	5.77	8.91	2.34	7.25
Average	7.10	10.13	6.96	6.85	9.10	8.22	8.51	6.83	9.38	7.28	8.04
Return on Assets (ROA)											
	NBK	Gulf Bk	Commercial Bk	AlAhli Bk	Burgan Bk	KFH	Boubyan Bk	KIB	AUB	Warba Bk	Average
2017	1.31%	0.84%	1.26%	0.82%	0.93%	1.23%	1.20%	0.93%	1.21%	0.38%	1.01%
2016	1.29%	0.79%	1.22%	0.76%	0.92%	0.98%	1.19%	0.99%	1.02%	0.23%	0.94%
2015	1.26%	0.72%	1.14%	0.70%	1.29%	1.15%	1.12%	0.90%	1.10%	0.13%	0.95%
2014	1.26%	0.67%	1.17%	1.07%	0.94%	0.93%	1.08%	0.83%	1.31%	0.02%	0.93%
2013	1.35%	0.63%	0.60%	1.11%	0.45%	0.92%	0.58%	0.88%	1.36%	-0.91%	0.70%
2012	1.87%	0.64%	0.03%	1.01%	1.05%	0.84%	0.51%	1.05%	1.44%	-0.83%	0.76%
Average	1.39%	0.71%	0.90%	0.91%	0.93%	1.01%	0.95%	0.93%	1.24%	-0.16%	0.88%
SD	0.24%	0.09%	0.49%	0.18%	0.27%	0.15%	0.32%	0.08%	0.16%	0.56%	0.12%
SR	5.82	8.33	1.84	5.21	3.39	6.72	2.99	11.43	7.71	-0.29	7.16
DSSD	0.04%	0.06%	0.40%	0.06%	0.33%	0.06%	0.05%	0.04%	0.10%	0.06%	
DSSR	33.97	11.20	2.24	14.82	2.80	17.04	17.99	21.57	12.73	-2.82	
Return on Equity (ROE)											
	NBK	Gulf Bk	Commercial Bk	AlAhli Bk	Burgan Bk	KFH	Boubyan Bk	KIB	AUB	Warba Bk	Average
2017	9.61%	7.99%	8.47%	6.24%	7.96%	10.12%	10.54%	6.74%	9.51%	3.86%	8.10%
2016	9.17%	7.49%	8.35%	5.85%	7.89%	7.94%	9.76%	7.15%	8.45%	2.72%	7.48%
2015	9.29%	7.25%	8.00%	5.46%	10.51%	9.23%	10.97%	6.49%	11.86%	1.08%	8.01%
2014	9.53%	6.93%	8.88%	6.73%	7.61%	7.63%	9.47%	5.70%	13.85%	0.13%	7.65%
2013	9.28%	6.66%	4.21%	6.55%	5.17%	7.22%	4.72%	5.81%	13.28%	-4.09%	5.88%
2012	11.80%	6.88%	0.21%	5.81%	10.12%	7.52%	3.72%	6.08%	12.86%	-1.95%	6.31%
Average	9.78%	7.20%	6.35%	6.11%	8.21%	8.28%	8.20%	6.33%	11.64%	0.29%	7.24%
SD	1.00%	0.48%	3.46%	0.49%	1.94%	1.14%	3.14%	0.56%	2.19%	2.95%	0.93%
SR	9.76	14.85	1.84	12.57	4.24	7.25	2.61	11.21	5.32	0.10	7.81
DSSD	0.19%	0.15%	2.83%	0.22%	1.33%	0.30%	0.71%	0.19%	0.75%	2.11%	
DSSR	52.11	49.16	2.25	28.25	6.16	27.65	11.62	32.85	15.49	0.14	

When it comes to the volatility in the return on equity ratio for the banks, it can be seen from table (1), that commercial bank had the highest standard deviation among all Kuwaiti banks. Having a high standard deviation would imply that the bank is not consistent in providing the shareholders with steady returns. While return on equity (ROE) is seen as the ultimate ratio to look at by many researchers, this ratio might be misleading since it does not take standard deviation into consideration.

Table (2) shows the ratings of the banks based on both methods, when taking return on equity as measure it can be seen that Ahli united bank came at the top followed by National bank of Kuwait. But, when taking the volatility of the return on equity ratio into consideration, Gulf bank came at the top followed by Ahli bank.

Table 2. Ratios Comparison

Return on Assets (ROA) Ratios Comparison							Return on Equity (ROE) Ratios Comparison						
	ROA	Rank	Sharpe Ratio	Rank	Sortino Ratio	Rank		ROE	Rank	Sharpe Ratio	Rank	Sortino Ratio	Rank
NBK	1.39%	1	5.82	5	33.97	1	NBK	9.78%	2	9.76	4	52.11	1
Gulf Bk	0.71%	9	8.33	2	11.20	7	Gulf Bk	7.20%	6	14.85	1	49.16	2
Commercial Bk	0.90%	8	1.84	9	2.24	9	Commercial Bk	6.35%	7	1.84	9	2.25	9
AlAhi Bk	0.91%	7	5.21	6	14.82	5	AlAhi Bk	6.11%	9	12.57	2	28.25	4
Burgan Bk	0.93%	5	3.39	7	2.80	8	Burgan Bk	8.21%	4	4.24	7	6.16	8
KFH	1.01%	3	6.72	4	17.04	4	KFH	8.28%	3	7.25	5	27.65	5
Boubyan Bk	0.95%	4	2.99	8	17.99	3	Boubyan Bk	8.20%	5	2.61	8	11.62	7
KIB	0.93%	5	11.43	1	21.57	2	KIB	6.33%	8	11.21	3	32.85	3
AUB	1.24%	2	7.71	3	12.73	6	AUB	11.64%	1	5.32	6	15.49	6
Warba Bk	-0.16%	10	-0.29	10	-2.82	10	Warba Bk	0.29%	10	0.10	10	0.14	10

Conclusion

The aim of this study is to compare the financial performance of Kuwaiti banks over the period 2012 to 2017 using DuPont modified model and the effect on these ratings when volatility is embedded into the model. In the model original form, Ahli United bank came as the top bank in Kuwait in terms of return on equity (ROE) but when taking the volatility into account, using the Sharpe ratio, the bank rating went down to sixth due its high volatility in return on equity (ROE) and Gulf bank became the top bank in Kuwait in that ratio. While upward deviation is a sign of growth, downside deviation indicates a drawback to the bank profitability. Taking only the downside deviation into account using Sortino ratio, National bank of Kuwait came as the top performing bank in Kuwait in terms of that ratio. While modified DuPont model is a popular model among researchers and practitioners, the model does not take previous fluctuations into consideration and as a result it might give a false indication to the true financial position of the bank. This paper recommends the use of improved modified DuPont financial model that takes volatility into consideration.

References

- Almazari, A. (2012) Financial Performance Analysis of the Jordanian Arab Bank by Using the DuPont System of Financial Analysis, *International Journal of Economics and Finance*, 4 (4), 86-94.
- Almilia, LS (2006) *Prediction of Corporate Financial Distress by multinomial logit analysis*, Economic Institute of Perbanas, Surabaya.
- Burnside, C., Eichenbaum, M., Kleshchelski, I. and Rebelo, S. (2011) Do Peso Problems Explain the Returns to the Carry Trade?, *Review of Financial Studies*, 24, 853-891.
- Burson, R. (1998) Tools you can use for improved ratio analysis, *San Diego Business Journal*, 19 (49), 19-23.
- Collier, H., McGowan, C. and Muhammad, J. (2010) Evaluating the Impact of a Rapidly Changing Economic Environment on Bank Financial Performance Using the DuPont System of Financial Analysis, *Asia Pacific Journal of Finance and Banking Research*, 4 (4), 25-35.
- Husein, M & Pambekti, G (2014) Precision of models of Altman, Springate, Zmijewski, and Grover for predicting the financial distress, *Journal of Economics, Business, and Accounting Ventura*, 17 (3), 405-416.
- Prendergast, P. (2006) Financial analysis: how a "modified DuPont approach" to ratio analysis can be used to drill down to the true cause of financial performance problems, *Financial Management*, Paper P8, May, 48-49.
- Sheela, C. Christina and Kerthikeyan, K. (2012) Financial Performance of Pharmaceutical Industry in India using DuPont Analysis, *European Journal of Business and Management*, 4 (14), 84-91.
- Subramanyam, KR & Wild, J (2013) *Financial Statement Analysis*, 11th ed., McGraw-Hill/Irwin, New York.