# The Relationship between Appraised Company Valuesand Future Stock Prices in the International Banking Sector 

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#### Abstract

This study investigates how appraised (per share) company values can predict future stock prices in the international banking sector. Four regression models are designed in which share values based on different methods (net asset value, discounted cash flow, discounted earnings and economic value added) are used as independent variables and the average stock price realized one year later as a dependent variable. A sample of 60 company-years is examined, containing data of the 12 largest global banks for the period 2008-2012. In order to eliminate the effect of years 2008 and 2009, the peak of the global financial crisis, an alternative 'non-crisis' sample was created by excluding these two years. Results indicate that discounted earnings and the economic value added are reliable predictors of the future stock price, both in the original and in the non-crisis sample. The explanatory power of economic value added was $28 \%$ in both samples, whilst that of discounted earnings increased from $28 \%$ to $64 \%$ by ignoring the two crisis-years. Net asset value also emerged as a good predictor (but only in the non-crisis sample) whilst no significant relationship was found between the discounted cash flow-based value and the future stock price. The results obtained add new industry-specific findings to the current literature and can also serve as a guide for management in selecting the performance measures to be managed to improve the stock market position of the company.


Keywords: Financial Performance Measure, Net Asset Value, Discounted Cash Flow, Discounted Earnings, Economic Value Added, Explanatory Power, Banking Sector

## 1. Introduction

Before buying or selling stocks, investors like to provide themselves with a reliable basis for their decisions by valuing the companies concerned, seeking the intrinsic value of that investment. Company valuation is carried out in a way in which both fundamentals (published accounts figures) and investor expectations are considered. Among others, Damodaran (2006) is quite explicit that value differs from price: value represents the real benefits which an investor can obtain from his investment, whilst price is the amount of money one is willing to pay for the stock at a given point of time in a given market environment. Determining the value of a company can be done using different approaches. The most widely accepted methods are: net asset value, discounted cash flow, discounted earnings and value added- based methods (see i.e. Copeland, Murrin and Koller (2000), Damodaran (2002, 2006) or Fernandez (2002)). In a market with perfect information, stock prices should precisely equal intrinsic
value. However, market information is not - and will never be - perfect, and this inevitably results in prices deviating from their true value.

The relationship between different financial performance measures and stock prices has been the subject of considerable research since the 1990s. This research was intended to determine whether the most widely used accounting figures and ratios (earnings, earnings per share, dividend ratio etc.) have any effect on investor decisions as represented by stock prices. In most cases a significant relationship was proved (i.e. Easton, Harris and Ohlson (1992), Graham, Pope and Rees (1992), Harris, Lang and Möller (1993), Easton and Sommers (1999), Lewellen (2004), Ang and Bekaert (2006)).

However, no earlier research was found dealing with the relationship between appraised company values and stock prices. Another important factor is that the significance of this relationship may not be the same in different industries. Although some industry-specific research can be found such as those of Kim, Kim and An (2003), or Smith and Wright (2004) which examine the hotel and electronics industries respectively - their relevance from the viewpoint of this research is limited. They emphasise the relationship between non-financial performance measures and future financial performance rather than that between financial performance and stock prices. The current study addresses this research gap and examines the relation between company values computed using different methods and future stock prices, focusing especially on the international banking sector.

The remainder of the article is structured as follows: First, the relevant literature is reviewed. This is followed by the description of the methodology, where the author develops and tests four linear regression models using a panel database of 60 company-years built up based on information obtained from annual reports and from websites investing.com, yahoofinance.com, marketwatch.com, ycharts.com and fxtop.com. The empirical results are then presented and discussed. Finally, the author concludes with a discussion of the implications, limitations and directions for future research.

## 2. Literature Survey

Several earlier studies concentrated on the relationship between financial performance measures and stock prices. One of the most significant research works in this area is that of Easton, Harris and Ohlson (1992). Their pioneering notion was that the distorting effect of accounting adjustments can be reduced if the accumulated earnings of more years are examined. They designed models which used the accounting earnings of periods of varying lengths ( $1,2,5$ and 10 years) as an independent variable and market capitalisation (company value computed as the number of shares times the stock price) as a dependent variable. Using data from more than one thousand companies, they found that there is a significant positive relationship between earnings and stock prices, and the explanatory power increases together with the length of the accounting period examined. By using the accounting earnings of the last year as a dependent variable, an explanatory power of $6 \%$ is obtained. When using the accumulated earnings of 2,5 and 10 years, the R square increases to $15 \%, 30 \%$ and $63 \%$, respectively. Similar research was published by Harris, Lang and Möller (1993) which investigated the explanatory power of accounting earnings on stock prices and stock returns, focusing on the effects of differences in the German and US accounting systems. They found a significant positive relationship between the above variables, although their results indicate that, in the US sample, earnings can explain stock prices better than in the German sample, whilst the explanatory power of earnings on stock returns are about the same in the two samples. They also found that a higher R square is obtained if the level of consolidation increases. Graham, Pope and Rees (1992) also examined US and German companies and obtained similar results, indicating that earnings can explain stock prices better in the US than in the German market. The authors concluded that the reason for this is the higher-than-usual presence of the conservatism concept in the German accounting system and suggested some accounting adjustments to the figures of German companies in order to obtain data comparable to those of US companies. Some later studies, such as those of Easton and Sommers (1999) and Brown, Lo and Lys (1999), dealt with the value relevance of accounting figures such as book value and earnings. Kothari and Shanken (1997) as well as Pontiff and Schall (1998) found that the book-to-market and the dividend yield ratios
are strong predictors of stock returns. Lewellen (2004) used the same ratios as independent variables but improved the explanatory power by adding the earnings yield to the model. Ang and Bekaert (2006) examined the predictive power of dividend yields on excess returns, cash flows and interest rates. They found that dividend yield only explains stock returns in short horizons. Some recent studies investigated the relation between financial performance measures and stock prices in specific countries. Maditinos, Sevic, Chatzoglou and Theriou (2007) examined the predictive power of financial ratios on stock prices in Greece. Their results indicate that earnings per share (EPS) is a strong predictor of stock prices, while the results concerning the return on investment (ROI) and the return on equity (ROE) ratios were not significant. Chang, Chen, Su and Chang (2008) used Taiwan panel data to investigate how stock prices respond to EPS under different levels of growth in operating revenue. They found that the relation between EPS and stock price exists in the long run and, for firms with a higher growth rate, EPS has less power in explaining the stock price. Ebrahimi and Chadegani (2011) focused on Iranian companies and found that investors pay special attention to dividends in the Iranian market, as current as well as prior dividends are significant predictors of stock prices.

This study makes two contributions to the existing literature. First, appraised company values based on four different approaches are used as independent variables to explain stock prices, in contrast to earlier researches that used traditional accounting data or ratios (earnings, EPS, dividends etc.). Second, this research has a specific industrial focus, examining the predictive power of company values on future stock prices in the international banking sector. To the author's knowledge, no earlier studies investigate the same in this industry.

## 3. Methodology

### 3.1. Company Valuation Methods

The current research uses four of the most widely known company valuation methods for empirical testing, which are the net asset value, the discounted cash flow, the discounted earnings and the economic value added.

### 3.1.1. Net Asset Value

According to this approach, the company's value is identical with the value of its assets after settling all liabilities. The value is determined from a static viewpoint, using only the items listed in the balance sheet. The best-known, net asset value-based model is book value, which is computed as the book value of assets minus the book value of liabilities. The greatest advantage of this model is its simplicity, as all the necessary data are available in the firm's balance sheet. However, as a result of the conservatism concept applied in accounting, the book value almost always underestimates the market value (Fernandez, 2002). To overcome this problem, the appraiser can use the adjusted book value model. In this case, assets and liabilities are re-valued to their actual market value and the company value is identified as the difference between the two. This may result in a value that is much closer to the market value, although the re-valuation of the items requires much additional information, whose reliability has a decisive impact on the result. For companies under liquidation, the appropriate net asset- based model is the liquidation value. This value assumes that the firm's assets are sold and its debts are fully paid; further, liquidation costs are paid and so the company value is the balance of these cash inflows and outflows. Finally, for asset-intensive companies, a widely used asset based method is substantial value, that is the amount of money that would be necessary to form a new company with the same features as the company being valued. Depending on the type of asset, the substantial value can be identified with the reconstruction value (i.e. buildings, specific machines), the repurchase value (i.e. universal machines, vehicles) or the book value (i.e. construction in progress, accounts receivable). The company's substantial value is then determined as the sum of the substantial values of each asset. Among the shortcomings of the net asset value based models it should be mentioned that they determine the company's value from a static viewpoint and so do not take into account the company's possible future evolution, the time value of money and some other important factors such as industry
situation, human resource or organisational problems which do not feature in accounting statements (Fernandez, 2002).

### 3.1.2. Discounted Cash Flow

The discounted cash flow models interpret a firm's value as the present value of cash flow generated by the firm in a specified future period. Future cash flows should be discounted at an appropriate discount rate. These methods require a very careful forecast of the flows for each future period. The basic valuation formula is:
$V_{0}=\frac{C F_{1}}{1+r}+\frac{C F_{2}}{(1+r)^{2}}+\ldots+\frac{C F_{n}}{(1+r)^{n}}=\sum_{i=1}^{n} \frac{C F_{i}}{(1+r)^{i}}$
where $V_{0}$ : value of the firm in period 0
$C F_{i}(i=1,2, \ldots, n)$ : estimated cash-flow for period i
$r$ : appropriate discount rate matched with the cash flows' risk
In respect of 'going concern', one of the most important accounting principles, it is clear that a company is established to operate for an indefinite period, and the methodologically correct way to determine the present value of cash flows over an indefinite future period is the growing annuity model. Assuming that cash flows will increase by a growth rate $r$ year by year, the current value can be determined by the following formula:

$$
V_{0}=\frac{C F_{0} \times(1+g)}{r-g}
$$

The relevant literature has elaborated many different discounted cash flow techniques, the most widely applied of which are the Free Cash Flow and the Equity Cash Flow models.

## The Free Cash Flow Model

Free Cash Flow (FCF) is the cash flow generated by the firm in the current period, without taking into account the effect of debt financing. It is the amount of cash available for both shareholders and creditors to satisfy their return requirements (dividends, interest). FCF can be calculated according to the following formula, which is based on Copeland, Murrin and Koller (2000) and on Fernandez (2002) and (Agar, 2005)):

Earnings before interest and tax (EBIT)

- Hypothetical tax on EBIT
= Earnings after tax without debt
+ Depreciation expense
- Increase in gross fixed assets
- Increase in working capital
= Free Cash Flow
Earnings Before Interest and Tax (EBIT) represents accounting earnings ignoring the effect of interest paid on debt. It can be calculated as the reported earnings before tax plus the interest expense as stated in the income statement. The EBIT should then be reduced by the hypothetical tax (computed as EBIT * tax rate) in order to obtain Earnings After Tax without the effect of debt financing. This number shows the accounting profit which would have been realized had the firm used no debt to finance its operations. To transform accounting earnings into cash flows, some adjustments must be considered. First, the depreciation expense recorded for the current period (and, therefore, contained in EBIT) should be added, as this is merely a theoretical expense expressing the physical deterioration or the obsolescence of assets which is matched by no actual cash outflow. Second, the increase in gross fixed assets, which represents the cash invested into new long-term assets, should be deducted. The reason for this adjustment is that these cash outflows are not part of the EBIT (that is, they were not recorded as an expense but as an increase in assets). Third, similarly to fixed assets, the increase in working capital (the difference between non-cash current assets and non-interest-bearing current liabilities) should also be deducted, since changes in working capital represent cash receipts and payments, although they do not affect the EBIT (that is, they are not recorded as revenues or expenses).

Another important issue is to determine the appropriate discount rate for the present value calculation. To discount Free Cash Flows, the methodologically correct discount rate is the Weighted Average Cost of Capital (WACC), which is a linear combination of the return requirements stated by shareholders and the after-tax cost of debt:

$$
W A C C=w_{e} K_{e}+w_{d} K_{d}(1-T)
$$

In this equation, $\mathrm{w}_{\mathrm{e}}$ and $\mathrm{w}_{\mathrm{d}}$ stand for the weights of equity and debt in the financing structure. The $K_{e}$ and $K_{d}$ variables represent the returns required by shareholders and creditors respectively. In most cases, $K_{d}$ is identified with the average, before-tax interest rate payable on the debt, whilst the shareholders' return requirement $\left(K_{e}\right)$, based on the Capital Asset Pricing Model, is calculated as follows (Fernandez, 2005):

$$
K_{e}=R_{F}+\beta_{L}\left(R_{M}-R_{F}\right)
$$

where $R_{F}$ stands for the risk-free rate and $R_{M}$ for the market return, ( $R_{M}-R_{F}$, therefore, showing the market premium), while $\beta_{L}$ is the company-specific beta coefficient expressing the relationship between the (leveraged) company's return and the market return. It should be noted that, in the WACC formula $K_{d}$ is multiplied by $(1-T)$ which is due to the tax-shield resulting from the fact that interest expense decreases earnings before tax, so saving income tax. To summarise, in the FCF model, future Free Cash Flows are discounted to the present using the WACC formula, as a result of which the value of the entire company is obtained.

## The Equity Cash Flow Model

Equity Cash Flow (ECF) is the cash available in the company after covering the cash needs of fixed assets and working capital and after paying the capital instalments and interest due on debt. It is, therefore, the cash flow available for the company's shareholders to satisfy their return requirements. Equity Cash Flow can be originated from Free Cash Flow with the following equation:

Free Cash Flow

- Interest expense $\times(1-T)$
- Repayment of capital instalments
+ New debt
= Equity Cash Flow
Mathematically, the same result is obtained if the profit after tax is reduced by the change in non-cash assets and increased by the change in liabilities. As ECF represents the cash flow available for shareholders, the correct discount rate to be matched with it is the required return on equity $\left(\mathrm{K}_{\mathrm{e}}\right)$.

Equity Cash Flow is the appropriate measure to value financial institutions. The reason for this is that debt has a different role for banks compared to companies in other industries (Copeland, Murrin and Koller, 2000). Damodaran (2002) states that debt for a financial services company is a raw material rather than a source of capital. Hence, capital in financial services firms is more narrowly defined as including only equity capital. This is why, when valuing financial institutions (banks), it is the value of shareholders' equity to be determined by discounting future Equity Cash Flows by the $K_{e}$ rate.

### 3.1.3. Discounted Earnings

Although the literature of company valuation is strongly cash flow oriented, some researchers such as Dechow, Kothari and Watts (1998) and Landsman and Maydew (2012) report that earnings have a higher value relevance and information content than cash flows. Therefore, in this empirical research, company value based on discounted future earnings will also be used. The accounting category which expresses the earnings available for both shareholders and creditors is earnings before interest and tax, reduced by the calculated tax, that is, EBITx $(1-T)$. By discounting the estimated future values of this by the WACC, the earnings-based value of the entire company is obtained. In the case of financial institutions, as with the Equity Cash Flow model, the value of shareholders' equity should be determined, and this is the present value of future earnings after tax, discounted by the return requirements of shareholders (the $K_{e}$ rate).

### 3.1.4. Economic Value Added (EVA)

The core of the economic value added (EVA) concept, first published by Stewart (1991), is that accounting-based methods cannot measure value creation for a variety of reasons:

- Accounting profit is determined as the difference between revenues and expenses, and these are not necessarily connected with cash receipts/payments,
- Accounting profit does not contain the total cost of capital, as the cost of shareholders' equity (dividends paid to shareholders) is not recorded as an expense,
- Accounting profit can be easily manipulated in order to show a higher profit for shareholders or to avoid taxes.
To resolve this problems of accounting profit, the EVA-concept focuses on economic profit, which takes the total cost of capital into account and cannot be manipulated by the firm's management. Generally, EVA is the difference between the Net Operating Profit After Tax (NOPAT) and the total cost of capital (total capital times the average cost of capital). A positive EVA means that the company's management has created value for the shareholders in the current year, as the after-tax profit exceeded the total cost of the capital (including both shareholders' equity and debt). In the opposite case (negative EVA), the management has reduced shareholder value. Some authors (i.e. Dierks and Patel, 1997) suggest several adjustments to be made to accounting profit in order to make the data of companies operating in different accounting systems comparable. The most widely known are:
- FIFO-LIFO difference: if the company applies the LIFO method for inventory costing, its material expenses as well as its inventories should be reinstated to the level that would have been obtained with the FIFO method,
- Depreciation of goodwill: if, according to the applied accounting system, goodwill is depreciated, then, when calculating EVA, its balance sheet value should be reinstated to the gross value,
- Capitalising $R \& D$ : if $\mathrm{R} \& \mathrm{D}$ expenditure is presented as an expense of the current year, then the accounting profit should be adjusted as if it had been capitalised,
- Operating leases: assets used under operating lease contracts should be handled in the same way as the company's own assets, meaning that they should be added to total assets and excluded from expenses (in accounting, operating leases do not appear in the balance sheet, however, they generate expenses in the income statement).
Considering that the current study concentrates on the international banking sector, the above adjustments have little relevance, due to the following reasons: First, from the viewpoint of banks' operations, inventories have a very low significance, thus it is practically indifferent whether they use the FIFO or the LIFO method. Furthermore, accounting systems (i.e. IFRS) usually prefer the FIFO method, which leads to the absence of this problem. Second, the adjustment related to goodwill has lost its relevance during the last decade as, in contrast with the earlier practice, both of the leading accounting systems (US GAAP, IFRS) have prohibited the depreciation of goodwill. Third, R\&D activities are not typical at all in the banking sector, banks almost never have such an item in their financial statements. Fourth, there is no detailed information available in the annual reports about operating lease contracts, meaning that, for an outsider, the possibility of making this adjustment is very limited. Based on these reasons, it can be stated that, especially in the banking sector, ignoring the adjustments listed above will not result in any significant distortion. This is also supported by Damodaran (2002) who suggests that only those adjustments should be made that are relevant for the firm being valued and for which public information is available. Furthermore, the general equation used to calculate EVA (NOPAT minus total capital times WACC) should be modified in case of financial institutions, based on the following two specialities of this industry:
- The category of operating profit is not used at all in the income statements of banks, its equivalent is the net income,
- As previously stated, the function of debt in the case of banks is different from that of companies in other industries, and this mans that, when valuing banks, only shareholders' equity should be considered.

Based on these arguments, the economic value added of a financial institution can be determined according to the following simplified equation:

## Net income

$=\frac{\text { Shareholders'equity } \times \mathrm{K}_{\mathrm{e}}}{=\text { Economic value added }(E V A)}$
To summarize, the main difference between EVA and accounting earnings is that EVA takes the cost of own capital (dividends) into account against revenues, in contrast to the accounting practice where it is not recorded as an expense. When using EVA for company valuation purposes, the expected future EVA values should first be forecast and then discounted to their present value using the appropriate discount rate (generally the WACC, although, in the case of valuing a bank, the $K_{e}$ rate).

### 3.2. Sampling and Data Collection

This study examines the international banking industry, and for this purpose the author built up an own database. The sample selection was started by selecting the leading financial institutions which may well represent the entire sector. The basis for this was Millward Brown's ranking about the top 100 global brands in 2012 (Millward Brown, 2012). Among the top 100 brands, 20 companies were found in the category "Financial". In the next step, 8 companies not quoted on the New York Stock Exchange (NYSE) were excluded. This was necessary to ensure the comparability of stock prices. Then, for the remaining 12 companies, the company value per share was appraised with the four different methods earlier discussed (net asset value, discounted cash flow, discounted earnings, economic value added) for each year of the period 2008-2012. As a result, a final sample of 60 company-years was obtained. The necessary figures for estimating the per share company values were taken from the companies' financial statements available on investing.com and yahoofinance.com. The figures of companies that use a reporting currency different from US\$ were converted to US\$ with the annual average exchange rates taken from fxtop.com. The number of shares for each company-year was determined based on information provided by ycharts.com.

Finally, to each element of the sample the weighted average stock price realized in the following year (2009-2013) was attached. The data source of the stock price information was yahoofinance.com. In respect of year 2013, the average stock prices were determined based on the figures of the first half-year.

### 3.3. Model Development

To analyze the impact of appraised company values per share on future stock prices, four linear regression models were designed:

## Net Asset Value Model (M1)

The net asset value model uses the book value per share to explain the future share price:

$$
\text { M1: } P_{j t+1}=\alpha_{j}+\beta \times B V_{j t}+u_{j t}
$$

where $B V_{j t}$ expresses the book value (total assets minus total liabilities) divided by the number of shares for company $j$ in year $t$, while $P_{j t+1}$ stands for the annual average share price of company $j$ in year $t+1$.
Discounted Cash Flow Model (M2)
In the second model, the independent variable is the discounted cash flow based value per share:
M2: $P_{j t+1}=\alpha_{j}+\beta \times D C F_{j t}+u_{j t}$
Considering that the sample contains financial institutions, the $D C F_{j t}$ variable is based on the Equity Cash Flow approach, using the growing annuity model:

$$
D C F_{j t}=\left(\frac{E C F_{j t} \times\left(1+g_{j}\right)}{r-g_{j}}\right) / S_{j t}
$$

where $E C F_{j t}$ is the Equity Cash Flow realized by company $j$ in year $t$. The $g_{j}$ variable expresses the company-specific growth rate, identified with the 5-year average growth in earnings per share, obtained from investing.com. As a discount rate $(r)$, the average required return on equity of the financial services sector was used, obtained from Aswath Damodaran's database, available on damodaran.com. Finally, $S_{j t}$ stands for the number of shares of company $j$ in year $t$, obtained from ycharts.com.

## Discounted Earnings Model (M3)

This model uses the discounted earnings per share ( $D E_{j t}$ ) to explain the future stock price. The calculation of the independent variable is similar to that in M2 with the difference that, instead of the Equity Cash Flow, the present value of future net income ( $N I_{j t}$ ) is determined with the same discount and growth rates:

$$
\begin{aligned}
& \text { M3: } P_{j t+1}=\alpha_{j}+\beta \times D E_{j t}+u_{j t} \\
& \text { where } D E_{j t}=\left(\frac{N I_{j t} \times\left(1+g_{j}\right)}{r-g_{j}}\right) / S_{j t}
\end{aligned}
$$

## EVA Model (M4)

In the fourth regression model, the future share price is explained by the present value of future EVA, computed for one unit of shares:

M4: $P_{j t+1}=\alpha_{j}+\beta \times E V A_{j t}+u_{j t}$
The $E V A_{j t}$ variable is calculated with the earlier discussed simplified formula: net income ( $N I_{j t}$ ) minus shareholders' equity ( $S H E_{j t}$ ) times the required return on equity ( $r$ ), still using the same company-specific growth rates as in M2 and M3 $\left(g_{j}\right)$ :

$$
E V A_{j t}=\left(\frac{\left(N I_{j t}-S H E_{j t} \times r\right) \times\left(1+g_{j}\right)}{r-g_{j}}\right) / S_{j t}
$$

## Transformation of the Models

A problem to be handled with all models is that the observations in the sample may not be independent, as more observations are related to each company. Such models are termed fixed effect models, where the eventual interdependence between the observed (non-random) values of the explanatory variable might change the outcome. The methodologically correct solution to this problem is to demean the variables using the within transformation (Christensen, 2002), where the models are transformed into the following form:

M1: $P_{j t+1}-\bar{P}_{j}=\left(\alpha_{j}-\overline{\alpha_{j}}\right)+\beta \times\left(B V_{j t}-\overline{B V_{j}}\right)+\left(u_{j t}-\bar{u}_{j}\right) \rightarrow \ddot{P}_{j t+1}=\beta \times \dot{B} \dot{V}_{j t}+\ddot{u}_{j t}$
M2: $P_{j t+1}-\bar{P}_{j}=\left(\alpha_{j}-\overline{\alpha_{j}}\right)+\beta \times\left(D C F_{j t}-\overline{D C F_{j}}\right)+\left(u_{j t}-\bar{u}_{j}\right) \rightarrow \ddot{P}_{j t+1}=\beta \times D \ddot{C} F_{j t}+\ddot{u}_{j t}$
M3: $P_{j t+1}-\bar{P}_{j}=\left(\alpha_{j}-\overline{\alpha_{j}}\right)+\beta \times\left(D E_{j t}-\overline{D E_{j}}\right)+\left(u_{j t}-\overline{u_{j}}\right) \rightarrow \ddot{P}_{j t+1}=\beta \times \dot{D} \dot{E}_{j t}+\ddot{u}_{j t}$
M4: $P_{j t+1}-\bar{P}_{j}=\left(\alpha_{j}-\overline{\alpha_{j}}\right)+\beta \times\left(E V A_{j t}-\overline{E V A_{j}}\right)+\left(u_{j t}-\bar{u}_{j}\right) \rightarrow \ddot{P}_{j t+1}=\beta \times E \ddot{V} A_{j t}+\ddot{u}_{j t}$
After this transformation the relationship between the variables can be determined with an ordinary least squares regression, with reliable results and so the four transformed models were used for empirical testing.

## 4. Results

The regression results of the transformed models are presented in Table 1.

Table 1: Testing results for the period 2008-2012

| Period: 2008-2012 |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Model | Dependent <br> variable | Independent <br> variable | Significance <br> (p value) | $\beta$ | R square |  |
| Net Asset Value model (M1) | $\ddot{P}_{j t+1}$ | $\dot{B} \dot{V}_{j t}$ | 0,485 | 0,167 | 0,008 |  |
| Discounted Cash Flow model (M2) | $\ddot{P}_{j t+1}$ | $D \ddot{C} F_{j t}$ | 0,120 | $-0,017$ | 0,041 |  |
| Discounted Earnings model (M3) | $\ddot{P}_{j t+1}$ | $\dot{D} \dot{E}_{j t}$ | 0,000 | 0,005 | 0,281 |  |
| EVA model (M4) | $\ddot{P}_{j t+1}$ | $E \ddot{V} A_{j t}$ | 0,000 | 0,005 | 0,279 |  |

The results indicate that the discounted earnings per share (M3) and the economic value added (M4) are in a significant positive relationship with the future stock price, both with an explanatory power of $28 \%$, while the net asset value (M1) and the DCF (M2) variables are unable to explain it. Based on this, it can be stated that, in the global banking industry, the level of profitability and value creation are good predictors of stock market performance.

However, it is important to recognize that the period examined in this sample (2008-2012) embraces the worst years of the global financial crisis, 2008 and 2009. The average net result in 2008 of the 12 companies observed was a loss of some 21 billion US\$. Although this had improved to a slightly positive number by 2009 , it was still much lower compared to the level of earlier years, with some companies still reporting losses. The general situation of the industry was normalized by 2010, shown by the fact that all of the companies examined achieved profit in the period 2010-2012, most of them with an increasing trend. To eliminate the possible effects of the crisis on the predictive power of the examined variables, an alternative 'non-crisis' sample was created by excluding the company-years related to 2008 and 2009 from the sample. All models were tested again with this 'non-crisis' sample, the results of which are presented in Table 2.

Table 2: Testing results for the 'non-crisis' sample (2010-2012)

| Period: 2010-2012 |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| Model | Dependent <br> variable | Independent <br> variable | Significance <br> (p value) | $\beta$ | R square |  |
| Net Asset Value model (M1) | $\ddot{P}_{j t+1}$ | $\dot{B} \dot{V}_{j t}$ | 0,000 | 7,305 | 0,488 |  |
| Discounted Cash Flow model (M2) | $\ddot{P}_{j t+1}$ | $D \ddot{C} F_{j t}$ | 0,994 | 0,000 | 0,000 |  |
| Discounted Earnings model (M3) | $\ddot{P}_{j t+1}$ | $\dot{D} \dot{E}_{j t}$ | 0,000 | 1,204 | 0,642 |  |
| EVA model (M4) | $\ddot{P}_{j t+1}$ | $E \ddot{V} A_{j t}$ | 0,001 | 0,995 | 0,270 |  |

Based on these results, the first point to be made is that, as with the original sample, the discounted earnings (M3) and the EVA (M4) models are significant. The R square of the M3 model increased to $64 \%$, while that of the M4 model remained about the same. An important difference (compared to the original results) is that the net asset value model (M1) became significant in the noncrisis sample, reaching an R square of $49 \%$, while the DCF model (M2) is still insignificant. There are four important conclusions to be drawn from the regression results:

1. The discounted earnings per share and the discounted EVA per share are reliable predictors of the stock price, both in the original and in the non-crisis sample.
2. The explanatory power of discounted earnings per share on stock prices is higher in the non-crisis sample.
3. The net asset value per share is significantly related to the future stock price, but only in the non-crisis sample.
4. There is no significant relationship between DCF per share and the future stock price.

## 5. Discussion and Conclusion

This study investigates whether appraised company values, based on different approaches, have any predictive power on future stock prices in the international banking industry. A sample of 60 companyyears was built up based on publicly available sources such as annual reports and relevant financial websites. This original sample included data of the 12 largest global banks in the period 2008-2012. In order to examine the eventual effect of years 2008 and 2009 (when the global financial crisis reached its peak) on the results, an alternative 'non-crisis' sample was created by excluding these two years. Four linear regression models (with independent variables of net asset value, discounted cash flow, discounted earnings and economic value added) were designed an tested on both samples, each of them using the average stock price realized one year later as dependent variable.

The results indicate that the (per share) discounted earnings and the economic value added can reliably predict the future stock price in both samples, meaning that profitability and shareholder value creation are important signs for investors in the stock market, in crisis as well as in non-crisis periods. The relevance of discounted earnings is higher under normal market conditions, represented by the fact that the explanatory power of this variable increased from $28 \%$ to $64 \%$ by ignoring the crisis-years, while the R square for the EVA model was about $28 \%$ in both samples. Based on the testing results, it can also be stated that the net asset value (that is, the shareholders' equity) is a good predictor of future stock prices in non-crisis periods, although it loses its significance for investors during crisis periods. Finally, the share value computed with the discounted cash flow method, the most preferred approach for company valuation in the literature, has absolutely no predictive power on the future stock price.

The results obtained in this research are similar to those of Easton, Harris and Ohlson (1992), Graham, Pope and Rees (1992) and Harris, Lang and Möller (1993). The last also reported that earnings is a significant predictor of stock prices, although their research did not deal with other possible drivers of the stock price such as net asset value or value creation. The main contribution of this study to current literature is its special approach to working out the independent variables. Instead of traditional accounting data and ratios, as in earlier research, appraised company values per share are used as independent variables to explain future stock prices. To the best of the author's knowledge, no earlier studies have used models designed in this way. Further, new industry-specific findings for the international banking sector are presented, examining both crisis and non-crisis periods.

There are, however, two important limitations to this research. First, it is limited to one industry and to the period of 2008-2012, and so the results presented and the conclusions drawn might not be valid for other industries or in another period in the same industry. This might be a useful subject for future research. Second, the sample used for the empirical analysis is relatively small compared to earlier research (as cited above). Due to this relatively small sample size, the significance of the results obtained may be lower.

Despite these limitations, however, the study may be useful for management, in that it may serve as a guide for banks in selecting the financial performance measures to be utilised with beneficial results for all.

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