Equity Valuation Using Accounting Numbers

Valuation Models in the Banking Context: Empirical Performance and Analysis of Broker's Reports

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Abstract

This study investigates the performance of the Dividend Discount Model (DDM), the Residual Income Valuation Model (RIVM) and two multiples based valuation methods, Forward Price to Earnings (P/E) and Price to Book (P/B) ratios, when analysing bank equity. Additionally, the role of Other Comprehensive Income (OCI) in the difference between the outputs of the DDM and the RIVM is analysed as a possible cause of this difference. Although the sample is relatively small, OCI is not found to be the driver of the difference between the output of the aforementioned mentioned models. The analysis also concludes that the performance of Dividend Discount Model and the Residual Income Valuation Model is highly sensitive to the inputs used, especially growth rates.

The second part of this study investigates the valuation methods used by analysts in bank valuation, compares the findings with what literature proposes and analyses if the period of the most recent financial crisis had any impact on the methods used by analysts. It finds that in their majority, analysts conform to what literature proposes and that there was a noticeable change in valuation models used during the 2006-2011 period. Although many of the reports do not provide clear explanations as to why this happened, the analysis tries to fit in-report information with the theoretical framework.

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1. Introduction

Equity valuation can be achieved by utilizing different techniques. In literature and practise, two main types of techniques are used to do so: techniques which compute the present value of some type of income flow or techniques that compare the company in analysis to other relevant peers (relative valuation). In this study, the performance of two flow models, the Dividend Discount Model (DDM) and Residual Income Valuation Model (RIVM) and two relative valuation models, the forward Price to Earnings (P/E) and Price to Book (P/B) will be analysed.

Regarding the first two models, there is currently a debate among academics and their comparison creates room for further research. The first part of this study comprises the execution of these models, which according to the Clean Surplus Relationship (CSR) should lead to the same results. In prior research, RIVM models have been found to provide better estimates than DDM models by Francis et al. (2000), Courteau et al. (2000) and Penman and Sougiannis (1998). Lundholm et al. (2001) criticised these studies by identifying and controlling for several implementation errors of the models concerning the CSR.

Damodaran (2009) describes the difficulties of valuing bank equity, especially after the recent financial crisis. One of the main reasons for this is that a major part of the Comprehensive Income Statement of Banks is composed by Other Comprehensive Income (OCI). OCI accounts for different types of unrealized earnings which may lead to violations of the CSR.

The main goal of the first part of this text is to empirically test the superiority of the models by analysing bank equity forecasts (when not including OCI) and realized values (when including OCI). Next, the significance of the role of OCI in creating superior forecasts through one of the two flow models is analysed. Thirdly, this paper attempts to assess if OCI is the reason for potential differences between the outputs of the DDM and RIVM.

The second part of this text studies bank valuation methods from the perspective of practitioners. It analyses which methods analysts use to reach their recommendations and target prices in valuation of bank securities and studies how aligned they are with the models proposed in the financial literature. It also investigates the methods analysts have used along the years 2006 to 2011 in order to determine if there are any relevant changes in methodology during the financial crisis and, if yes, what changed. In order to this, 7 banks were selected and brokers' reports from two separate research houses per bank were analysed for the aforementioned time period.

2. Literature Review – Bank Valuation

2.1. Unique characteristics and implications for valuation

As the main analysis in this text concerns the valuation of a category of banks the following section reviews some relevant literature on the topic.

When compared to other types of firms, banks can be considered to have very unique characteristics. These aspects have been identified in valuation literature by several authors. In their textbooks, Antil and Lee (2008) and Damodaran (2009) identify some relevant differences that should be considered when valuing a firm of this type.

Firstly, accounting rules for banks are different than the ones applied to other firms (their assets are usually financial instruments with an active market, which allows the application of mark-to-market accounting and earnings are smoothed by the use of loss provisions that average out losses over time, under the logic that default rates on loans vary with the economic cycle). In theory (Penman, 2007), fair value accounting should make the reported book value of equity correspond to the intrinsic value of equity, which would make valuation models redundant. However, this hypothesis is only true if all asset markets can be considered perfectly efficient. Research by Barth (1994) provides evidence that bank share prices are better explained by estimation using fair value that historical cost accounting. In the same study the author identified that value estimation errors exist in the analysis of gains and losses of investments priced using fair value.

Secondly, banks function under regulatory constraints. These limits usually include mandatory minimum capital ratios imposed to limit the amount of lending allowed, restraining the risk of depositors and other claimholders. Financial institutions are also usually restricted in where they can invest their funds. A good example of this is the Glass-Steagall Act in United States, which (until its repeal) regulated commercial banks from engaging in investment banking and from holding equity positions in non-financial firms. Entry (and merger of firms) into the industry is subject to the approval of regulatory authorities. The way regulation is structured has a large impact on the risk taking activities of banks. Laeven and Levine (2009) show that the effectiveness of regulations is largely dependent on the ownership structure, since banks with more concentrated ownership tend to be more risk taking. A key takeaway from this analysis is that the same regulation can have different impacts on banks with different ownership structures, adding another layer of risk to any analysis of a bank. All these factors have a significant weight for valuation purposes because valuation requires assumptions about reinvestment, which in this context are directly linked to changes in regulation, adding more risk to the analysis.

Thirdly, for banks, debt is more similar to raw material than to a source of capital, which puts into question the application of concepts such as the cost of capital and enterprise value. For instance, the Basel II directive required a minimum core capital (Tier 1) of 4%. This implies that under this directive, banks can lend up to twenty five times their amount of equity, making debt the main driver of the WACC, which leads to an unrealistic low cost of capital.

Lastly, the definition of reinvestment is not clear. Contrarily to firms that invest in property, plant and equipment, banks invest mainly in intangible assets (such as brand name and human capital). Devising accounting standards for intangible assets has proven to be a difficult task. The main conclusion that can be derived from the standard that deals with this topic (IAS 38), as analysed by Austin (2007), is that it rejects intangibles generated internally by rule and not by using its recognition and reliability tests on these assets. Therefore, growth investments are mostly classified as expenses and the cash flow statements report small sums of capital expenditures and depreciation. The other issue is working capital: fluctuations in the level of current assets and current liabilities (which encompass a big part of a bank's balance sheet) are significant and do not provide a clear indication on reinvesting for growth.

Due to these issues, only models that can be applied in the equity perspective of the firm are used in this research. This choice deals with the problems of determining the cost of capital (the cost of equity can be determined as usual for financial firms).

Even so, concerning flow based models, the application of the Discounted Cash Flow model (DCF) in the equity perspective can still be cumbersome. Damodaran (2009) stresses that to estimate Free Cash Flows to Equity (FCFE) one needs to compute Net Capital Expenditures and non-cash Working Capital. As mentioned before, these items are difficult to define for a banking institution, making it extremely difficult to use a DCFM in this perspective. The author suggests several solutions for this problem:

1. Utilizing Multiple Based Valuation. Specifically, one should use equity multiples due to the aforesaid characteristics of banks.
2. Using an excess return model (such as the RIVM) in the equity perspective

3. Performing asset-based valuation (estimating the value of existing assets, subtracting debt and other claims to obtain the value of equity)
4. Using Dividends as FCFE (which assumes that all FCFE are paid out as Dividends)
5. Adapting the FCFE method to the expected reinvestment pattern the firm is likely to make (i.e. if the firm wants to increase loans it needs more regulatory capital)

In the following section, valuation methods referred previously on points 1, 2 and 3 will be explained in further detail, as they are methods used in the research conducted in this paper.

2.2. Valuation Methods

2.2.1. Multiple Based Valuation

The concept of Multiples Based Valuation (MBV) methods relies on:

1. Identifying comparable firms (firms that have similar fundamental characteristics to the firm being valued).
2. Using accounting fundamentals of these firms (such as earnings, cash flows, book value, sales, EBIT, EBITDA, among others) to calculate multiples of these measures (for example, price/earnings or price/book value).
3. Taking the mean, median, harmonic mean or another measure of central tendency of the calculated multiples (benchmark multiple) and multiplying them by the corresponding measure of the target firm in order to obtain it's value

The following expression summarizes MBV:

$$Firm/Equity\ Value_t = Value\ Driver_t \times Benchmark\ Multiple$$

2.2.1.1. Selection of the Value Driver

As previously explained, choosing a value driver is a crucial part of MBV.

When selecting the value driver, one should obey a simple criterion: choosing a value driver that is as correlated with value/price as possible.

Regarding this issue, academic literature points to the use of earnings in favour of flow based drivers as the value driver. This is due to factors such as accruals reducing the problems of timing and value mismatching associated with cash flow measures and current earnings being better predictors of future cash flows than current cash flows.

Dechow (1994) provides evidence that, over small time periods, earnings are more correlated with stock returns than cash flows.

One of the most relevant studies concerning MBV is, perhaps, the one by Liu et al. (2002). They analyse the accuracy of MBV when it is specified across different value drivers, different sets of comparable firms and across different methods of estimating benchmark multiples. The authors find that forward earnings based multiples have a better explanatory power of firm price than trailing multiples, both per industry and in a cross sectional industry analysis. This point is further strengthened by Lie and Lie (2002) and Jing Liu et al. (2007). Ohlson Juettner-Nauroth (2005) also point that it is recommendable that one uses forecasted over historical numbers, as these include more information and, consequently, probably better represent market values than book values. Finally, a relevant consideration when choosing multiples is the equity vs. entity perspective. Penman (2007) warns that equity multiples are affected by leverage and must be adjusted to account for this. Therefore, the author points users to focus on entity perspective multiples.

Despite this, other studies have concluded that the choice of the relevant value driver, in practice, is not as straightforward as always choosing an earnings based driver, notwithstanding the advantages pointed out previously. For example, Tasker (1998) that in some cases, the choice of value driver is constrained to the industry being analysed and Fernandez (2002) makes a similar point, showing that analysts use different multiples depending on the industry under analysis.

2.2.1.2. Selection of Comparable Firms

Another central aspect of MBV is the choice of comparable firms (peer group) to the firm under analysis. As mentioned at the start of this section, the ideal peer group would be one composed of firms with fundamentals (broadly risk, performance and profitability) that match the target firm. Since in practice this is not possible, several methods of identifying comparable companies have been proposed. They include:

1. Using SIC codes to distinguish between industries
2. Looking at leverage ratios or firm size to assess riskiness
3. Comparing cash-flow, sales and earnings figures to evaluate performance
4. Looking for companies involved in comparable transactions (Kaplan and Ruback, 1995)

5. The “Warranted Multiple” method proposed by Bhojraj and Lee (2002)

Concerning the first three points, Alford (1992) has examined the P/E valuation multiple when the peer group choice is based on industry, risk (firm size) and earnings growth. The author concludes that the method of selecting firms by the first three SIC digits is relatively accurate. Although individually they do not perform well, a comparable level of accuracy is achieved when risk and earnings growth are used as a pair to build the peer group. Alford does not find evidence for controlling for differences in leverage across comparable firms. Actually, accuracy decreases when this is done. Lastly, the study concludes that accuracy increases with firm size and, when selecting firms based on industry, the efficacy of the P/E MBV is superior when the firms that constitute the peer group are larger.

The “Warranted Multiple” method by Bhojraj and Lee (2002) has proven to be a very effective way of selecting comparable companies. Using valuation theory as a guide to choose explanatory variables (profitability and forecast growth, for example) which most likely determine a firm’s valuation multiple, the authors use a multivariate regression model in order to compute the association between the valuation multiple and the explanatory variables for a large set of firms. So, the “Warranted Multiple” is derived from firm and industry specific characteristics. The adjusted R-squared statistics increase dramatically when these multiples are used in regression models. It should be noted that the authors use Enterprise Value/Sales and Price/Book multiples in the study in order to avoid negative denominators.

2.2.1.3. Calculating the Benchmark Multiple

The final element needed for MBV is calculating the Benchmark Multiple. In order to do this, one needs to obtain a value that represents the chosen value driver across the sample of selected comparable firms. Several approaches can be used, of which the most common are the following:

$$Arithmetic\ Average\ (Simple\ Mean) = \frac{1}{n} \times \sum_{i=1}^{n} Price_i / Value\ Driver_i \tag{1}$$

$$Weighted\ Average = \frac{\sum_{i=1}^{n} Price_i}{\sum_{i=1}^{n} Value\ Driver_i} \tag{2}$$

$$Harmonic\ Mean = \frac{1}{\sum_{i=1}^{n} \frac{Price_i}{Value\ Driver_i}} \tag{3}$$

$$Median = Quartile\ 2\ of\ the\ distribution \tag{4}$$

Some facts should be stressed regarding these methods: the arithmetic average is significantly affected by the presence of outliers. This has been stressed by Baker and Ruback (1999), who discuss that the arithmetic average is likely to overestimate the value of analysed firms. The use of the weighted average and median methods diminishes this problem, but the harmonic mean has been considered the best method to eliminate this problem. Beatty et al. (1999) and Baker and Ruback (1999) have argued in favour of the aforementioned point.

2.2.1.4. MBV in banking context

As Damodaran (2009) points out, the choice of multiples in these context has to be largely driven by the fact that estimating firm value and operating income is very difficult for banks and, therefore, equity multiples should be preferred.

Within the most used equity multiples – price to earnings, price to book and price to sales – the later should not be used as sales cannot be precisely estimated for this type of firm.

2.2.2. Dividend Discount Model

The dividend discount model (henceforth DDM) allows the user to compute the intrinsic value of a firm's equity in the current period (V_0^E) by discounting the expected dividends at an appropriate rate of return, resulting in the following model:

$$V_0^E = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \frac{Div_3}{(1+r_E)^3} + \frac{Div_4}{(1+r_E)^4} + \cdots = \sum_{t=1}^{\infty} \frac{Div_t}{(1+r_E)^t} \quad (5)$$

As it can be observed, the DDM as constructed above assumes that one can forecast dividends infinitely, which in reality is not practical.

In order to circumvent this limitation, literature has presented different forms of building this model. Some of the most relevant ways include:

- Using a finite forecast horizon and incorporating a terminal value representing the value of equity at the end of the forecast horizon (Penman, 2007):

$$V_0^E = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \frac{Div_3}{(1+r_E)^3} + \frac{Div_4}{(1+r_E)^4} + \cdots \frac{Div_t}{(1+r_E)^t} + \frac{P_t}{(1+r_E)^t} \quad (6)$$

- Or, if the firm under analysis is expected to grow in perpetuity, the DDM can be altered to include an assumed growth rate in perpetuity, as introduced in the Gordon (1962) Growth Model:

$$V_0^E = \sum_{t=1}^{n} \frac{Div_t}{(1+r_E)^t} + \frac{Div_n \times (1+g)}{(1+r_E)^n \times (r_E - g)} \quad (7)$$

Even when using the forms of the DDM's described above it still contains several limitations.

Firstly, one has to take into account that a large number of firms do not distribute dividends, which does not allow the application of the DDM.

Secondly, dividend are not a direct result of the operating part of a firm (and, therefore do not represent the creation of value). Dividends are a result of the value distribution policy of the company. This raises issues in terms of the ability to forecast them and their usefulness to firm valuation.

Lastly, the previous point can be reinforced by the fact that companies can borrow funds in order to increase distributed dividends, which is not considered by the model.

It has been argued that because the DDM does not take into account share repurchases and, hence, do not incorporate cash flows to investors, an alternative model should be used. This point is raised by Grullon and Michaely (2002) and Bathala (2002). Stowe et al. (2007) analyse this matter by comparing a Total Cash Flow Model (TCFM), which incorporates both dividends and share repurchases, and the DDM. They conclude that the DDM can be used to the same effect as the TCFM: since an increase in share repurchases logically means a reduction of cash available for reinvestment, if the growth rates are adjusted accordingly the DDM should yield the same valuation results and estimates of cost of equity as the TCFM.

2.2.3. Residual Income Valuation Model

The Residual Income Valuation Model (RIVM) to the intrinsic value of equity of a firm (although it can also be used from the entity perspective) by discounting the sum of forecasted Residual Income (RI) at an appropriate discount rate and adding the Book Value of Equity at the present time (B_0^E)

RI is defined as the expected accounting income in excess of the cost of capital on the beginning-of-the-period book value. In the equity perspective:

$$RI_t = NI_t - r_E \times B_{t-1}^E \quad (8)$$

When the return of equity exceeds its cost RI is positive. It is defined by Ohlson (2005) as the premium generated by the firm's activities over its book value.

The expression for the value of equity according to the RIVM is, therefore:

$$V_0^E = B_0^E + \sum_{t=1}^{n} \frac{RI_t}{(1+r_E)^t} \qquad (9)$$

The RIVM has been presented in many forms by different authors over the past century. Examples of this include Preinreich (1938), Edwards and Bell (1961) and Peasnell (1982). However, the model was popularised by Ohlson (1995) and it is now used extensively not only in an academic context but also by various management consultancy firms. It is known by different names in these contexts, such as Economic Value Added (EVA) or Abnormal Earnings (AE), for example.

The RIVM presents several advantages:

1. Dividend irrelevance (changes in dividend policy do not affect equity value).
2. The use of book values as an "anchor" reduces the importance of the valuation attributed to the terminal value and shifts it to existing accounting numbers. By reducing the weight of forecasted terms the model decreases the probability of forecasting errors in the valuation (Francis et al, 2000, and Courteau et al, 2006 find that the RIVM is more accurate when compared to the DDM and DCF. This result supports a precursor study by Penman and Sougiannis, 1997).
3. By using accrual accounting it recognizes value beyond what is recognized by predicting cash flows. This makes use of the matching property of accounting, allowing matching of value created and value lost. Also, contrarily to the DCF method, investment is considered as an asset instead of a cost. These properties lead to evener series of forecast flows.
4. RIVM is not affected by different accounting practices or policies. In fact, Francis et al. (2000) find that these differences do not produce a significant impact on the reliability of RIVM valuation estimates.
5. Validation: the forecasts of RI can be compared with actual RI in future audited financial statements.

However, despite its numerous advantages, the RIVM is not free of drawbacks. These include:

1. Accounting complexity: it requires knowledge of how accrual accounting works.
2. Distorted accounting numbers due to suspect accounting practices: Healy and Palepu (2001) present the case that resulting valuation estimates, despite being relatively free from errors in the short term, are affected by in the long term.

3. According to Ohlson (2000), analysts in practice give more emphasis to forecasts of earnings than of book values

2.2.4. Abnormal Income Growth Model

The Abnormal Income Growth Model (AIGM), also known as the Ohlson Juettner-Nauroth (2005) model, is (like the RIVM) a derivation of the DDM. It arrives at the value of equity by using capitalized next period earnings as the anchor and adding the present value of capitalized Abnormal Earnings Growth (AEG).

AEG are defined as:

$$AEG_t = (Earnings_t - Earnings_{t-1}) - r_E(Earnings_{t-1} - Div_{t-1}) \quad (10)$$

And the value of equity computed by AIGM is as follows:

$$V_0^E = \frac{Earnings_1}{r_E} + \sum_{t=1}^{n} \frac{AEG_t}{(1+r_E)^t} \quad (11)$$

Academics have argued that several factors make the AIGM superior to the RIVM. Skogsvik and Juettner-Nauroth (2009) make the case for the AIGM by stating unlike the RIVM, the AIGM does not depend on the Clean Surplus Relationship. Ohlson (2005) discusses the role of the anchor of each model, stating that the focus on earnings makes the AIGM a better choice, as earnings are an element that is commonly used in valuation practice. However, Penman (2009) argues the reverse: not relying on balance sheet items discards important drivers of earning growth.

2.3 Clean Surplus Relationship

It should be noted that, from a theoretical point of view, if the Clean Surplus Relationship (CSR) holds (ending equity of a period is equal to the value of equity in the beginning of the period plus the changes in equity resulting from net income minus net distributions to equity holders), the RIVM can be derived from the DDM and it should yield the same valuation results. This point is defended by Lundholm and O'Keefe (2001a) against the conclusions of studies by Penman and Sougiannis (1997), Francis et al (2000), Courteau et al (2000). Penman (2001) argues against this saying that, in practice, one has to forecast over finite horizons and in this context different models present different results. Lundholm and O'Keefe (2001b) counter argue, stating that even in this context there are no differences between the models if no application inconsistencies are made.

In the context of this research, the analysis of the role of the CSR in the outputs of both the DDM and RIVM is of clear importance. As stated earlier, the RIVM can be algebraically derived from the DDM and, in theory, should yield the same valuation results if all inputs are estimated correctly. However, the occurrence of 'Dirty Surplus Accounting' (DSA) – gains and losses that are documented in the financial statements but are not considered in net income – breaks the CSR. In practise analysts' forecasts of net income, dividends and book value of equity do not respect the CSR. Also, in studies such as the one by Frankel and Lee (1999) of the application of RIVM in an international setting, the authors find that, in general, the deviations caused by DSA are of zero present value. As Dechow et al. (1999) show, the RIVM is supported by the assumptions that the value of equity is equal to the present value of expected dividends in accordance with the DDM and, more importantly, the CSR holds.

2.4 Other Comprehensive Income

The Other Comprehensive Income (OCI) statement is an integral part of the statement of Comprehensive Income (CI) reported by companies. It is a major component of a bank's statements because these institutions have a considerable proportion of assets and liabilities with gains and losses documented in the OCI statement (Papa and Peters, 2015).

Among other items, some of the most relevant that the OCI statement include:

- Unrealized gains and losses on securities available for sale
- Foreign currency translation gains and losses
- Gains and losses on derivative instruments
- Revaluation of property, plant and equipment
- Actuarial gains and losses on defined-benefit pension schemes
- Revaluation of intangible assets

Dhaliwal et al. (1999) find evidence that, for financial firms, use of the CI statement provides better prediction of returns, market values and future cash flows/income compared to net income. In a more recent study, Papa and Peters (2015) find that, for a sample of 44 global banks, OCI is a driver of economic information and that losses are more usual on the OCI statement than on income statement. Jones and Smith (2011), Kanagaretnam et al. (2009), Evans et al. (2014) and Campbell (2013), by analysing OCI line items, also provide indications that OCI can be value relevant and of predictive value.

Devalle and Magarini (2012), when analysing samples of European firms, do not find that the use of OCI increases value relevancy of accounting data. Devalle (2012), by examining a set of companies from the main European stock indexes reached the same conclusions. However, when considering the period that includes the financial crisis, the author found that the CI is more value relevant than net income, for France, Spain, Germany and Italy.

3. Large Sample Analysis

3.1. Research questions and hypothesis

Based on the discussion in the previous section, a large sample analysis on a set of hypothesis related to the topics raised is conducted in this section.

The main question that drive this research are:

1. Which models perform better in valuing banks?

2. Does the use of the Comprehensive Income Statement bring any advantages to bank valuation?

Firstly, following the studies by Penman and Sougiannis (1998), Courteau et al. (2000) and Francis et al. (2000) on the performance of the DDM and RIVM (and other valuation models), the question of which model better estimates intrinsic value is analysed. This analysis is performed for a sample of banking institutions in particular and is done by using ex ante data (consensus analyst forecasts of earnings and dividends) and assumes the violation of the CSR. Besides the aforementioned studies, another reason to expect that the RIVM performs better than the DDM comes from the discussion in previous sections that, in the banking context, the DDM is used as an alternative to the more complete Free Cash Flow to Equity model. Being a proxy for this model (due to the assumption that all free cash flows to equity are distributed as dividends) one may expect this model to performance worse in this context when compared to the RIVM. Also, the performance of the flow models is compared with multiples based models: price to forward earnings and price to book ratios. This leads to the following hypothesis being tested (assuming that the CSR is broken):

H1: The RIVM is superior to the DDM when using forecasted inputs for bank valuation

H2: Flow based models are superior to multiples based models

Secondly, as Dhaliwal et al. (1999) concluded, the usage of OCI together with the income statement provides better prediction of returns, market values and future cash flows/income for financial firms. Papa and Peters (2015) and other studies have stated that OCI can be value relevant and of predictive value. Despite this, other researchers such Devalle (2012) do not find strong evidence for this hypothesis.

In order to test this, the following hypothesis is stated:

H3: OCI is significant when used together with the value estimates of the DDM and the RIVM to explain bank's stock prices

Finally, since the CSR is expected to be broken by OCI, and this element has a considerable proportion of assets and liabilities with gains and losses documented in it, it is of interest to test whether the difference between the outputs of the RIVM and the DDM is explained by the presence of OCI.

The final hypothesis is, thus:

H4: The difference between the outputs of the RIVM and the DDM, using ex post data, is significantly related to the presence of OCI

3.2. Research Design

3.2.1. Data collection

The empirical analysis in this research is based on data collected in the database provided by Lancaster University's AcF 703 dissertation module. This database comprises information for a "(…) sample of U.S. public firms from different industries (including financial firms). The firm-level information consists of three broad categories: (i) general description of firms, such as firm name, industry classification, etc.; (ii) firm-level accounting data, such as sales, earnings, assets, common shareholders' equity, etc.; (iii) analyst forecasts, and (iv) market pricing data, such as stock price and beta. General firm-level descriptive information and financial statement data are collected from Compustat. The analyst forecasts data are from I/B/E/S; betas and stock price 4 months after the fiscal year end are provided by CRSP."[1] The database covers the period of 2005 to 2013.

Furthermore, since the aforementioned database does not include data regarding yearly comprehensive income, there was the need to download and include the maximum available data for this item from Compustat. The availability of this data and the implications for the sample will be explained in the next sections.

3.2.2 Sample selection

Due to the unavailability of Comprehensive Income data for the time period before 2009, the analysis is divided in two samples to circumvent this problem.

[1] Quoted from the "AcF 703: Equity Valuation Using Accounting Numbers: Datasets for the Large Sample Analysis"

Since hypothesis 1 to 3 are independent of hypothesis 4 and 5. “Sample A” covers hypothesis 1 to 3 and “Sample B covers hypothesis 4 and 5.

“Sample A” includes the time period between 2005 and 2013, while “Sample B” covers only the period between 2009 and 2013 due the availability of Comprehensive Income data.

The two samples were constructed with the following criteria[2]:

I. To take into account that banking institutions encompass many different activities, the banks chosen in the sample are selected based on the first three digits of the SIC code. Both samples A and B include only firms with SIC code started by 602 – Commercial Banks, meaning that their primary activity in each firm-year observation was commercial banking.

II. A forecast period of 2 years is used in the valuation models. This is due to the lack of available data as the forecast period increases.

III. “Sample A” excludes all observations with: negative values for net income (to avoid problems when calculating Residual Income in the RIVM), null values of dividends (which would make the DDM redundant) and non-existent values for net income, dividends, forecasts of net income and forecasts of dividends.

IV. “Sample B” also excludes all observations with negative values for net income and null values for dividends and non-existent values for net income, comprehensive income and dividends. There is no need to exclude any observation due to missing forecast data as the analysis in this sample is only concerned with realized values.

V. In “Sample B”, time-series variables for two periods (periods 1 and 2) were created. These correspond to the realized values for net income, dividends and OCI for 1 and 2 periods ahead of the base year.

VI. The DDM and RIVM were used in both samples, while the P/E and P/B multiples were only used in “Sample B”, according to the requirements of each hypothesis.

VII. Signed and Absolute prediction errors were calculated for every model in each sample using the following formulas:

$$Signed\ Valuation\ Error = \frac{Value\ Estimate - Share\ Price}{Share\ Price} \tag{12}$$

[2] Details of the sample selection process can be seen in tables xx and xx

$$Absolute\ Valuation\ Error = \frac{|Value\ Estimate - Share\ Price|}{Share\ Price} \quad (13)$$

Where "*Value Estimate*" is the share value estimate calculated by the valuation model and "*Stock Price"* is the actual share price 4 months after the fiscal year-end (collected from Compustat).

The following tables summarize the sample selection process:

Sample A			
Stage	**Stage Description**	**Lost Values**	**Total Value**
1	AcF 703 Database		33552
2	Eliminating Duplicates	0	33552
4	Keeping firms with SIC code "602"	31461	2091
5	Keeping firms with positive Net Income	266	1825
6	Keeping firms with positive non zero Dividends	273	1552
7	Net Income non missing	129	1423
8	Dividends non missing	10	1413
9	Consensus EPS_1 forecast non missing	0	1413
10	Consensus EPS_1 forecast positive	29	1384
11	Consensus EPS_2 forecast non missing	23	1361
12	Consensus DPS_1 forecast non missing	267	1094
13	Consensus DPS_2 forecast non missing	31	1063
14	Deleting 1st and 100th percentile of input variables	76	987
15	Deleting 1st and 100th percentile of all signed errors	32	955
16	Deleting 1st and 100th percentile of all absolute errors	73	882
	Total Sample		882

Table 1 - Sample Selection Process for "Sample A" of the Large Sample Analysis

Sample B			
Stage	**Stage Description**	**Lost Values**	**Total Value**
1	AcF 703 Database		33552
2	CI Compustat Full Database		101471
	Total Merged		101471
3	Eliminating Duplicates	37834	63637
4	Filter by SIC code "602"	61520	2117
5	Keeping firms with positive Price	55	2062
6	Keeping firms with positive Net Income	261	1801
7	Non zero Dividends	262	1539
8	Net Income non missing	128	1411
9	Dividends non missing	11	1400
10	Comprehensive Income non missing	909	491
11	1-Period Forward Net Income non missing	236	255
12	2-Period Forward Net Income non missing	121	134
13	1-Period Forward Dividends non missing	0	134
14	2-Period Forward Dividends non missing	0	134
15	1-Period Forward OCI non missing	0	134
16	2-Period Forward OCI non missing	0	134
17	Deleting 1st and 100th percentile of input variables	17	117
	Total Sample		117

Table 2 - Sample Selection Process for "Sample B" of the Large Sample Analysis

3.3. Theoretical Models

The Large Sample Analysis performed in this text uses four different valuation models. These include two flow-based models and two multiple-based models. The two flow-based models used are the DDM and the RIVM, in accordance to the previous discussion on adequate models for the valuation of banks. In the same discussion, it was argued that equity based multiples are more suitable to this type of firm. As such, the forward Price to Earnings multiple was chosen due to the superiority of forward earnings as a driver (Liu et al, 2002). The Price to Book multiple is used in order to obtain a comparison between a book value multiple and an earnings based one.

3.3.1. Choice of Peer Group and Benchmark Multiple Computation

Since the sample is restricted to firms with the same 3 digit SIC code, they were used as each other's comparable companies. As mentioned earlier, using firms with the same 3 digit SIC code has been considered relatively accurate for the selection of comparable firms in multiple based valuation by Alford (1992).

Both multiple-based valuations are done using the harmonic mean to calculate benchmark multiples, which has been argued to be the least biased method by Beatty et al. (1999) and Baker and Ruback (1999).

3.3.2. Cost of Equity

The cost of equity was computed using the Capital Asset Pricing Model equation:

$$r_E = Risk\ Free\ Rate + Beta * (Market\ Risk\ Premium) \quad (14)$$

The risk free rate used is the 10-Year Treasury Constant Maturity rate for each analysed year, as provided by the Board of Governors of the Federal Reserve System.

The Beta for each company is the annual stock beta computed using CRSP data on monthly firm returns and the value-weighted return for the aggregate market. These individual betas were used to calculate the industry beta for the two-digit SIC industry in each year, similarly to Francis et al. (2000) with the exception that monthly returns are utilized at the expense of daily returns and the industry beta is the median of the individual stock betas.

The market risk premium is assumed to be 6% for each year in analysis, consistent with the assumptions recommended by Copeland, Koller and Murrin (1994).

3.3.3. Terminal Value Growth Rate

Two growth rates, 0% and 4% were used in order to test the sensitivity of the DDM and RIVM to this variable. This was done in the manner of Francis et al. (2000) and previous studies by Kaplan and Ruback (1995) and Penman and Sougiannis (1998).

3.3.4. Dividend Pay-out Ratio

The Dividend Pay-out Ratio used in this analysis is defined as dividends divided by earnings. Whenever this ratio is above 1 (or 100%), it is set to 1 due to the unsustainability of the ratio for the operations of a firm in the long term if more dividends are payed than earnings are available.

3.3.5. Other Comprehensive Income Computation

Other Comprehensive Income is calculated for "Sample B" in the manner of studies such as the ones by Dhaliwal et al. (1999), Biddle and Choi (2002) and Chen et al. (2004) using the following expression:

$$OCI_t = CI_t - NI_t \tag{15}$$

Where OCI_t represents Other Comprehensive Income for year t, CI_t is Comprehensive Income for year t and NI_t is Net Income for year t. Comprehensive and Net Income items were downloaded from the Compustat database.

3.4. Empirical Findings

3.4.1. Sample A

3.4.1.1. Descriptive Statistics

In this section a summary of the descriptive statistics for the variables used in the analysis of "Sample A" is provided.

The first table in this section contains the statistical properties for the input variables used in the valuation models. These include: net income, dividends, forecasts of earnings and dividends, book and market value of shares, dividend pay-out ratio and cost of equity.[3]

The second and third tables include the descriptive statistics of the output errors for the valuation models (signed and absolute errors) and provide information needed to discuss hypothesis 1 and 2.[4]

[3] In table 3, EPS_1 and EPS_2 represent the consensus analyst forecast for 1 and 2 periods ahead of the base year for earnings. DPS_1 and DPS_2 represent the same for dividends

[4] In tables 4 and 5 (and in following tables where relevant), "DDM" is the Dividend Discount Model with a 0% growth rate of the terminal value, "DDM_g" the Dividend Discount Model with a 4% percent growth rate, "RIVM" the Residual Income Valuation Model with a 0% growth rate, "RIVM_g" the Residual Income

It should be noted that in order to eliminate possible outliers, the 1st and 99th percentile of the input variables and the prediction errors of the models were eliminated.

Variable	Observations	Mean	Median	Standard Deviation	Minimum	Maximum
Net Income	881	545.07	41.95	1600.72	1.95	12816.45
Dividends	881	199.87	14.47	642.99	0.38	5115.05
EPS_1	881	1.99	1.61	1.70	0.18	14.20
EPS_2	881	2.24	1.78	1.88	0.44	15.09
DPS_1	881	0.76	0.62	0.68	0.04	5.41
DPS_2	881	0.80	0.63	0.72	0.04	5.88
Price	881	28.12	23.23	20.79	2.95	153.55
Book Value per Share	881	17.96	15.25	12.12	2.61	107.96
Dividend Payout Ratio	881	0.39	0.37	0.23	0.02	1.00
Cost of Equity	881	0.08	0.07	0.01	0.06	0.09

Table 3 - Sample A Model Input Variables - Descriptive Statistics

Signed Errors (Bias) by Model							
Year	**Model**	**Observations**	**Mean**	**Median**	**Standard Deviation**	**Minimum**	**Maximum**
Total	**DDM**	881	-60%	-64%	24%	-97%	128%
	DDM_g	881	-14%	-27%	60%	-94%	410%
	RIVM	881	7%	1%	51%	-82%	417%
	RIVM_g	881	46%	29%	96%	-103%	831%
	P/E	881	-19%	-23%	42%	-91%	271%
	P/B	881	-21%	-27%	43%	-92%	199%

Table 4 - Signed Error (Bias) by Model - Descriptive Statistics

Absolute Errors (Accuracy) by Model							
Year	**Model**	**Observations**	**Mean**	**Median**	**Standard Deviation**	**Minimum**	**Maximum**
Total	**DDM**	881	62%	64%	19%	4%	128%
	DDM_g	881	46%	40%	40%	1%	410%
	RIVM	881	29%	18%	43%	0%	417%
	RIVM_g	881	63%	41%	85%	1%	831%
	P/E	881	35%	30%	30%	1%	271%
	P/B	881	38%	35%	28%	1%	199%

Table 5 - Absolute Error (Accuracy) by Model - Descriptive Statistics

3.4.1.2. Analysis of Hypothesis 1 and 2

Hypothesis 1 and 2 are stated as:

H1: The RIVM is superior to the DDM when using forecasted inputs for bank valuation

H2: Flow based models are superior to multiples based models

Tables 3 and 4, provide the descriptive statistics for the prediction errors of each model, both in bias (sign prediction errors) and accuracy (absolute prediction errors). The models

Valuation Model with a 4% growth rate, "P/E" the Forward Price to Earnings Multiple and "P/B" the Market to Book Multiple are less biased and more accurate the closest the errors are to zero. When a signed prediction error is negative (positive), the model undervalues (overvalues) a firm in comparison with the verified market share price.

- **Bias**

Regarding the bias of the models, it can be concluded from table 3 that the least biased model is the RIVM with a 0% growth rate, with mean and median errors of 7% and 1% respectively. In mean terms, it is followed by the DDM with a 4% growth rate (-14% error), the P/E ratio (-19%), the P/B ratio (-21%) the RIVM with a 4% growth rate (-60%) and the DDM with a 0% growth rate (-60%). In median terms, the RIVM with a 0% growth rate is still the least biased model (1%), followed by the P/E ratio (-23%), the DDM with a 4% growth and the P/B ratio (both with a -27% bias), the RIVM with a 4% growth rate (29% bias) and the DDM with a 0% growth rate (-64%).

Some general conclusions can be made of these observations:

1. All the median signed errors are more negative than their mean counterparts. This is most likely due to more extreme positive observations
2. Both the RIVM and DDM are extremely sensitive to the growth rate used, with the difference between using a 0% growth rate or a 4% one close to 30 percentage points in both models. A reason for this can be the forecast period of two years, which assigns a considerable weight of the total valuation to the terminal value of the models
3. The DDM gives the least biased prediction when using a 4% growth rate while the RIVM gives its least biased prediction with a 0% growth rate. This means that, residual income (income generated in excess of the required return on equity) is in general higher than dividends paid.
4. With the exception of the RIVM with a 0% growth rate, multiples based methods do not perform clearly worse than the RIVM and DDM in terms of bias, being even superior when compared to the DDM with a 0% growth rate and the RIVM with a 4% growth rate

In order to confirm that the above comparisons can be made, statistical tests were performed on the mean and medians with the following test hypothesis:

- H_0 (null hypothesis): The mean (or median) error difference between two models is zero
- H_1: H_0 is false

The results for the signed prediction errors are reported in tables 6 and 7:

Signed Error - Mean			
Comparison	**Observations**	**Pr > |t|**	**Hypothesis Result**
DDM vs RIVM	881	0.0000	Reject Null
DDM vs P/E	881	0.0000	Reject Null
DDM vs P/B	881	0.0000	Reject Null
RIVM vs P/E	881	0.0000	Reject Null
RIVM vs P/B	881	0.0000	Reject Null
P/E vs P/B	881	0.2827	Do not reject Null

Table 6 - Signed Error Mean Difference T-test

In this table, "Pr > |t|" indicates the p-value of a two-sided t-test on H_0 for signed errors, as previously stated

Signed Error - Median			
Comparison	**Observations**	**Pr > |z|**	**Hypothesis Result**
DDM vs RIVM	881	0.0000	Reject Null
DDM vs P/E	881	0.0000	Reject Null
DDM vs P/B	881	0.0000	Reject Null
RIVM vs P/E	881	0.0000	Reject Null
RIVM vs P/B	881	0.0000	Reject Null
P/E vs P/B	881	0.0024	Reject Null

Table 7 - Signed Error Median Difference Wilcoxon Signed-Rank Test

In this table, "Pr > |z|" indicates the p-value of a two-sided Wilcoxon Signed-Rank Test on H_0 for signed errors, as previously stated

As it can be observed, the null hypothesis is rejected for every comparison between models (at a 5%) significance level, with the exception of the mean difference between the P/E and P/B ratios[5], meaning that there is statistical evidence in favour of the hypothesis that the verified differences between the mean and median signed errors of the prediction models are not zero and the conclusions drawn from the data have statistical support.

[5] The statistical tests of tables 6 and 7 include the models with 0% growth rate. The same tests were performed with a 4% growth rate and led to the conclusions.

- **Accuracy**

In terms of accuracy, the models perform similarly to how they do in terms of bias.

The most accurate model when using the mean as the measure is the RIVM with a 0% growth rate (29% error), followed by the P/E ratio (35%), the P/B ratio (38%), the DDM with a 4% growth rate (46%), the DDM with a 0% growth rate (62%) and the RIVM with a 4% growth rate (63%). In median terms, the RIVM with a 0% growth rate is still the most accurate model (18% error), followed again by the P/E ratio (30%) and the P/B ratio (35%), the DDM with a 4% growth rate (40%), the RIVM with a 4% growth rate (41%) and the DDM with a 0% growth rate (64%).

The following conclusions can be made of these observations:

1. As with the bias of the models, all the median signed errors are more negative than their mean equivalents.
2. Both the RIVM and DDM are extremely sensitive to the growth rate used, (although less than the in the bias case).
3. Once more, the DDM gives the least biased prediction when using a 4% growth rate while the RIVM gives its least biased prediction with a 0% growth rate.
4. The only flow based method that performs better than multiples based methods is the RIVM with a 0% growth rate.

To confirm the validity of these inferences, the same statistical tests performed for the signed errors. The results are as follows:

Absolute Error - Mean			
Comparison	**Observations**	**Pr > |t|**	**Hypothesis Result**
DDM vs RIVM	881	0.0000	Reject Null
DDM vs P/E	881	0.0000	Reject Null
DDM vs P/B	881	0.0000	Reject Null
RIVM vs P/E	881	0.0000	Reject Null
RIVM vs P/B	881	0.0000	Reject Null
P/E vs P/B	881	0.0004	Reject Null

Table 8 - Absolute Error Mean Difference T-test

In this table, "Pr > |t|" indicates the p-value of a two-sided t-test on H_0 for absolute errors, as previously stated

Absolute Error -Median			
Comparison	**Observations**	**Pr > |z|**	**Hypothesis Result**
DDM vs RIVM	881	0.0000	Reject Null
DDM vs P/E	881	0.0000	Reject Null
DDM vs P/B	881	0.0000	Reject Null
RIVM vs P/E	881	0.0000	Reject Null
RIVM vs P/B	881	0.0000	Reject Null
P/E vs P/B	881	0.0000	Reject Null

Table 9 - Absolute Error Median Difference Wilcoxon Signed-Rank Test

In this table, "Pr > |z|" indicates the p-value of a two-sided Wilcoxon Signed-Rank Test on H_0 for absolute errors, as previously stated

As it can be observed, the null hypothesis is rejected for every comparison between models (at a 5% significance level)[6], meaning that there is statistical evidence in favour of the hypothesis that the verified differences between the mean and median signed errors of the prediction models are not zero and the conclusions drawn from the data have statistical support.

- **Regression Analysis**

Finally, a regression analysis was conducted with the aim of explaining the relationship between the value estimates and the market price. The regression is the following:

$$P_t = \alpha + \beta Value\ Estimate_t + \varepsilon \quad (16)$$

Where P_t is the stock price 4 months after the fiscal year-end of year t, $Value\ Estimate_t$ is the output of the value estimate provided by each model at time t and ε is the error term.

The results can be observed in table 10, as follows:

[6] The statistical tests of tables 6 and 7 include the models with 0% growth rate. The same tests were performed with a 4% growth rate and led to similar conclusions.

Regression Analysis				
Value Estimation by:	R-Squared	Adjusted R-Squared	Pr > |t|	Observations
DDM	0.4619	0.4613	0.000	881
DDM_g	0.402	0.4013	0.000	881
RIVM	0.5369	0.5364	0.000	881
RIVM_g	0.3479	0.3472	0.000	881
P/E	0.5314	0.5308	0.000	881
P/B	0.3287	0.3279	0.000	881

Table 10 - Value Estimates Regression Analysis

As it can be observed, all the regressions present significant value estimates (all p-values for the independent variable are zero), meaning that the models are good approximations of the share price. The model with the highest explanatory power is the RIVM with a 0% growth rate (adjusted R-Squared of 53.64%), which is not surprising taking into account the analysis of bias and accuracy performed in earlier sections. The P/E ratio presents almost the same explanatory power (adjusted R-Squared of 53.08%), showing again that multiples based valuation methods can perform as well as flow based ones. Surprisingly, the DDM with a 0% growth rate presents more explanatory power (46.13%) than the DDM with a 4% growth rate (40.13%). Finally, the models with lower explanatory power are the RIVM with a 4% growth rate (34.72%) and the P/B ratio (32.79%).

- **Concluding Remarks**

The analysis performed in previous sections has showed that:

- Concerning Hypothesis 1, one cannot say that either the RIVM or the DDM clearly outperform one or the other, as they have been shown to be extremely sensitive to the growth rate of the terminal value used. Therefore, an analyst using one of these models should take into account that the DDM will, in principle, provide lower valuations than the RIVM for the same growth rate. Also, in order to reduce the weight of the terminal value term, the analyst should try to have a reasonable forecasting period. Due to constraints on availability of data, this analysis was performed with only 2 forecast periods, which has most likely increased the volatility of the results to the growth rate used. Hence, there is no clear evidence to support hypothesis 1.
- Regarding Hypothesis 2, both the forward P/E ratio and the P/B have proved to be good valuation methods for the equity of banks. In fact, while the DDM and RIVM present some complexity due to their sensitivity to a number of factors

such as the forecast horizon, growth rate used and inputs for the cost of equity, the multiples based methods used avoid these problems and provide a relatively reliable value estimate both in terms of bias and accuracy. Taking this into account one can conclude that the combination of their simplicity with the obtained results make multiples based methods a clearly good alternative to flow based methods and, thus, hypothesis 2 is rejected.

3.4.2. Sample B

Hypothesis 3 and 4 are stated as:

H3: OCI is significant when used together with the value estimates of the DDM and the RIVM to explain bank's stock prices

H4: The difference between the outputs of the RIVM and the DDM, using ex post data, is significantly related to the presence of OCI

As previously explained, due to the limited availability of data for Comprehensive Income (which, therefore, limits the number of observations of Other Comprehensive Income), a separate sample was used to analyse hypothesis 3 and 4. Furthermore, another reason to use a separate sample is that analysts do not forecast Comprehensive Income items. For this reason, only actual values of these data are present in databases such as the one used. In order to be consistent with this, the models are estimated using actual realized values instead of forecasted ones.

3.4.2.1 Descriptive Statistics

In this section a summary of the descriptive statistics for the variables used in the analysis of "Sample B" is provided.

The first table in this section contains the statistical properties for the input variables used in the valuation models.

Variable	Observations	Mean	Standard Deviation	Minimum	Median	Maximum
Net Income Per Share	117	2.61	3.75	0.16	1.46	22.57
Net Income Per Share FY1	117	2.61	3.74	0.36	1.69	28.90
Net Income Per Share FY2	117	2.24	1.75	0.42	1.85	11.06
Dividends Per Share	117	0.71	0.73	0.04	0.56	4.11
Dividends Per Share FY1	117	0.74	0.72	0.04	0.60	4.10
Dividends Per Share FY2	117	0.73	0.56	0.08	0.62	3.79
OCI Per Share	117	2.67	30.77	-62.08	-1.24	288.25
OCI Per Share FY1	117	2.85	28.72	-29.16	-1.44	288.25
OCI Per Share FY2	117	4.27	40.40	-14.08	-1.56	407.46
Price	117	27.07	23.50	4.30	20.40	164.58
Book Value per Share	117	17.90	10.73	4.29	15.09	57.04
Dividend Payout Ratio	117	0.38	0.23	0.02	0.37	1.00
Cost of Equity	117	0.08	0.01	0.07	0.08	0.09
Present Value OCI Per Share	117	6.23	43.23	-28.08	-2.73	341.12

Table 11 – "Sample B" Descriptive Statistics

3.4.2.2. Analysis of Hypothesis 3 and 4

Since the main analysis in this section is concerned with the explanatory power of OCI when added to the DDM and RIVM, a regression analysis was executed with the objective of assessing if:

1. It increases the explanatory power of both models (measured by R-Squared and Adjusted R-Squared)
2. This change is driven by adding OCI to the regression (measured by the statistical significance of OCI in the regression)
3. The difference between the outputs of the DDM and the RIVM is due to OCI, as it breaks the CSR in the RIVM

The estimated regressions are:

$$P_t = \alpha + \beta_1 Value\ Estimation_t + \beta_2 PVOCI_t + \varepsilon \quad (17)$$

Where P_t is the stock price 4 months after the fiscal year-end of year t, $Value\ Estimate_t$ is the output of the value estimate provided by each model at time t, $PVOCI_t$ is the present value of OCI and ε is the error term.

$$Diff\_Models_t = \alpha + \beta_1 PVOCI_t + \varepsilon \quad (18)$$

And,

$$Diff\_Models_t = Value\ Estimate\_DDM_t / Value\ Estimate\_RIVM_t \quad (19)$$

$Diff\_Models_t$ is the percentage difference between the value estimates of the DDM and the RIVM at time t, $PVOCI_t$ is the present value of OCI and ε is the error term. This regression is used to measure if there is a relationship between the percentage difference in the value estimation of both models and the magnitude of OCI.

The results of the regressions are presented in the following table:

Regression Analysis					
Value Estimation by:	**R-Squared**	**Adjusted R-Squared**	**Model - Pr > |t|**	**OCI - Pr > |t|**	**Observations**
DDM	0.2821	0.2759	0.000		117
DDM_OCI	0.3007	0.2884	0.000	0.052	117
DDM_g	0.2494	0.2428	0.000		117
DDM_g_OCI	0.2673	0.2545	0.000	0.077	117
RIVM	0.4697	0.465	0.000		117
RIVM_OCI	0.4735	0.4642	0.000	0.277	117
RIVM_g	0.3336	0.3278	0.000		117
RIVM_g_OCI	0.3432	0.3317	0.000	0.169	117
Diff_DDM_RIM	0.0505	0.0422		0.005	117
Diff_DDM_RIM_g	0.0085	0.0000		0.194	117

Table 12 - The Impact of OCI in Valuation Models - Regression Results

As it can be perceived, using the present value of OCI as an additional explanatory variable together with the value estimations by each valuation model slightly increases both the R-Squared and Adjusted R-Squared of the regressions. Nonetheless, it is not clear if this slight increase is driven by adding the present value of OCI as an explanatory variable, as it is not significant in any of the models at a 5% level. This can be due to the relatively low number of observations.

Regarding the explanatory power of OCI in terms of the difference between the output of the DDM and the RIVM, it is only a significant explanatory variable in the case where both models use a 0% growth rate. Despite this, it seems to have low explanatory power even when it is significant, with very low R-Squared and Adjusted R-Squared results.

- **Concluding Remarks**

The analysis in this section does not provide support for both hypothesis 3 and 4. OCI does not clearly increase the explanatory power of both the DDM and RIVM and it does not seem to be the driver of the different outputs between the models. Despite this, the analysis may be limited by the number of observations.

4. Small Sample Analysis

4.1. Introduction

Following the discussion in the first chapter of this text on which valuation models are theoretically adequate to value banks and the analysis of the performance of four of these models in the second chapter, this chapter focuses on the following questions:

1. Which valuation models are actually employed by analysts in practice to value banks?
2. How has the recent financial crisis influenced the research of equity analysts?

4.2. Research Design

I. Data Collection

All information used in the small sample analysis comes from analysts' reports, which were downloaded from the Thomson Research database.

II. Period Covered and Sample Selection

The criteria used to retrieve the reports is driven mainly by research question 2. In order to assess the potential impact of the financial crisis in equity analysis a time frame that includes observations pre, during and post the peak of the financial crisis was chosen (2006-2011).

The sample includes 2 reports per bank per year analysed, for 7 banks, for a total of 84 reports. The reasons for the format of the sample are the following:

- Since the analysis is done for 7 banks, over a time period, two research houses are investigated per analysed bank in order to obtain perspectives from different research houses.
- Not all reports provide sufficient information/reasons for changes in valuation methods to answer research question 2. The analysis performed for research question 2 tries to detect any changes in valuation methodology and comments of the analysts on why they did so. Due to the lack of comprehensive comments by analysts on this issue, theoretical comments based on the literature reviewed in the first chapter accompany the analysis.

4.3. Small Sample Analysis – Empirical Findings

	2006	2007	2008	2009	2010	2011	Total
RIVM	2	2	2	2	2	2	12
DDM	2	2	0	1	1	3	9
DCF	2	1	1	1	0	0	5
P/E	4	5	2	1	4	2	18
P/B	1	1	5	0	1	1	9
P/TBV	1	2	3	7	6	6	25
SOP	3	4	5	3	3	2	20

Table 13 - Use of valuation models by analysts between 2006 and 2011

This table describes the number of times each valuation model is used in the selected sample of analyst reports per year (2006-2011) and in total.

Table 13 describes the number of times that a certain valuation method is included in the valuation/recommendation/rating section of an analyst report, per year.

A standout conclusion that can be made is that multiple based valuation is the method that is predominantly used by the research firms in the years that the sample covers, totalling 52 yearly observations. Despite this, only three multiples are included as part of the final recommendation in all reports: P/E, P/B and P/TBV, reflecting the fact that, notwithstanding its discussed limitations, analysts continue to use multiples based valuation as a standard valuation tool. Besides this, the Sum of the Parts method (SOP), with 20 yearly observations, appears to also be fundamental instrument for bank analysts. This method has, however, been hardly discussed in the financial literature. It consists in dividing the analysis of the bank by its different geographical sites or business segments, or a combination of both. Each division can then be evaluated using any of the other method. In the reports covered in this analysis, the analysts used mainly P/E and P/B multiples in order to do this.

The P/B ratio is a crucial multiple for the valuation of banks. As mentioned before, the possibility of applying mark-to-market accounting on the majority of a bank's assets makes the P/B one of the most adequate tools for this type of analysis.

Within multiple based valuation, Gross (2007) has described P/E multiples as having limited explanatory power, particularly for diversified banks, where this ratio varies noticeably across each different division. According to the same author, the P/B ratio provides a remedy for this by giving an assessment of the market's outlook about future performance relative to the capital invested. She recommends the P/B ratio as a better meter to use to value banks. Furthermore, analysts have the possibility of enhancing this method by adjusting for intangible assets and goodwill to produce more comparable and conservative figures, leading to the P/TBV multiple.

As it can be observed in table 13, the P/TBV is one of the most used multiples in the studied reports, with 25 yearly observations. In 2008, one the first years of the financial crisis, the P/B and P/TBV register 5 and 3 observations respectively, with the P/TBV ratio becoming clearly the most used metric after this period, at the expense of the P/E multiple.

Theoretically, there is support for the choice made by the analysts in the sample. First, it is probable that, in a period of financial crisis (particularly one that hit bank assets in particular), earnings become more unstable and, therefore, less forecastable. Secondly, this instability may even lead to periods of negative earnings. When performing a P/E valuation, the selected peer group of banks will therefore be subject to these conditions, which makes P/B or P/TBV better multiples for valuation analysis.

In fact, some analysts in the selected reports recognize this situation. For example, in the 2008[7] (page 9) and 2009[8] (page 3) analysis of Lloyds Banking Group by Deutsche Bank, the following comments can be found, respectively:

"We value Lloyds TSB at a 50% discount to forecast tangible book value per share of 216p, arriving at our revised target price of 110p, reduced from 180p beforehand. We expect the group will trade at a substantial discount to its net asset value whilst it generates low earnings and whilst a weak economic environment suggests material risks of further capital requirements."

"We value LBG on the basis of our 15p estimate of post-crisis earnings for the group, having previously valued the business on a discount to underlying tangible NAV on fears over bank solvency.

In fact, the previous excerpt underlines another possible reason to why the P/TBV may be the most adequate valuation multiple during a period such as the financial crisis. If there are "*(…) fears over bank solvency."* as the analyst commented, it is natural that the

[7] Hill, A., Napier, J., December 2008. Downgrade to Sell. Deutsche Bank Global Markets Research. Available from Thomson Research/Investext, accessed July 31, 2015
[8] Napier, J., June 2009. For the Journey – Upgrade to Buy. Deutsche Bank Global Markets Research. Available from Thomson Research/Investext, accessed July 31, 2015

market/analysts look at the tangible book value as a valuation measure, due to the fact that it probably represents the best estimate of how much value an investor can receive in case of liquidation of the bank's assets, which is information that a P/E multiple (due to the instability/possible negative earnings) or a P/B (due to the inclusion of intangible assets in the denominator) cannot provide.

Concerning the use of the DCF method, table 13 shows that it is only used in 5 reports, with all the observations included in reports by Credit Suisse analysts. It should be noted that the analyst do not specify if the DCF model is a FCFE or DDM, nor can this be concluded by analysing the data in the reports.

The remaining research teams limit themselves to the use of DDM with different degrees of complexity, such as a *"(...) one-stage Gordon growth model (...)"*[9] (page 1) in the 2006 UBS report on Lloyds Banking Group or a five-stage DDM in the 2006 report[10] (page 9) by Deutsche Bank also on Lloyds Banking Group. As discussed before, two probable reasons support this choice of model instead of a FCFE based approach: firstly, calculating free cash flow to shareholders from outside the bank is a troublesome task and, secondly, when banks are dealing with tight capital ratios it can be supposed that dividends are a good approximation of the maximum amount of free cash flow to equity. For example, in the 2006 report by Deutsche Bank on Lloyds Banking Group the analysts estimated a 7.8% tier 1 capital ratio for the fiscal years of 2006 and 2007.

It should also be stressed that only the research house Morgan Stanley uses the RIVM methodology, even though this method can be calculated for banks in a rather straight forward fashion and is one of the most supported methods in literature as discussed earlier.

Nonetheless, the impact of the financial crisis in banks earnings also led to modifications in the valuation model used by Morgan Stanley's analysts. While in 2006, the valuations/price targets for both Wells Fargo and U.S. Bancorp were mainly based on the RIVM, in the following years the economic condition's effect on bank's earnings and

[9] Andrews, S., Lee, P., Ryan, A., February 2006. Deal or no Deal? UBS Investment Research. Available from Thomson Research/Investext, accessed July 31, 2015

[10] Napier, J., Sheridan, J., February 2006. The Tanker is Turning. Deutsche Bank Company Bulletin. Available from Thomson Research/Investext, accessed July 31, 2015

market valuation affects the analyst's valuation methodology. For instance, in the 2009 report by Morgan Stanley on Wells Fargo[11] (page 6) the analysts comment that:

"Valuation and Risks: Our price targets are based on residual income valuation, using a normalized beta and cost of equity capital. We expect that the market will start to value banks off of longer-term, normalized earnings as nonperforming loans peak out, likely in 2H09. Our bull case intrinsic values use residual income valuation and our bear case intrinsic values are based on 2009, bottom-of-cycle, bear case, price-to-tangible book, assuming all nongovernment preferred is converted to common shares."

Whereas, in 2006[12] (page 2), multiples played a smaller role in the investment recommendation, as the following passage demonstrates:

"We rate Wells Fargo shares Overweight with a $40 price target. Our valuation work is largely based on residual income, our intrinsic value framework; we also incorporate relative multiples in our valuation work."

At the time, there was no scenario analysis such as a bull, base and bear case scenarios as in later reports (it should be noted that the P/TBV ratio is used by the analyst as the basis for the bear case scenario).

Finally, an examination of prediction errors was also done for the sample of analysed reports. The following prediction errors were calculated:

$$Signed\ Analyst\ Valuation\ Error = \frac{Target\ Price - Actual\ Share\ Price\ 12\ months\ later}{Actual\ Share\ Price\ Share\ Price\ 12\ months\ later} \quad (20)$$

$$Absolute\ Analyst\ Valuation\ Error = \frac{|Target\ Price - Actual\ Share\ Price\ 12\ months\ later|}{Actual\ Share\ Price\ Share\ Price\ 12\ months\ later} \quad (21)$$

The average signed and absolute errors for the whole sample of reports are present in table 14, while individual, per year, error calculations can be found in appendix 2.

[11] Graseck, B., Kwong, J. June 2009. Tweaking Up EPS on Mortgage and IB Fees; No New Capital Raise Expected. Morgan Stanley Research North America. Available from Thomson Research/Investext, accessed July 31, 2015

[12] Graseck, B. October 2006. Raising Estimates as Higher Expected Top Line Growth Outweighs Credit Concerns. Morgan Stanley Research North America. Available from Thomson Research/Investext, accessed July 31, 2015

	Average Signed Error	Average Absolute Error
2006	5%	20%
2007	64%	68%
2008	64%	75%
2009	13%	39%
2010	52%	56%
2011	43%	49%

Table 14 - Summary of Average and Absolute signed errors in brokers' reports

- **Concluding Remarks**

The sample analysed in this section demonstrates that analysts use models proposed by literature. Nevertheless, there are some nonconformities with the general literature in the approaches used. First, the FCFE model was not explicitly used in any report of the sample, which can be due to the difficulty in computing free cash flows further than the dividends. In the sample, discounted cash flow valuations are restricted to the DDM approach, although the reports by Credit Suisse mention a DCF analysis without being specific if it is a DDM or FCFE approach. Secondly, the SOP method also plays a relevant role and is used by some of the research houses, being the only method that is used across all the analysed years in two cases (the reports on Deutsche Bank by JP Morgan and HSBC Holdings by Deutsche Bank). Thirdly, analysts go beyond looking at book value relative to market price (P/B ratio) and also compute an adjusted book value (P/TBV or NAV), which becomes the predominant analysis tool during and after the period of the financial crisis.

This analysis, although short, points to three potential theoretical and practical areas with to further deepen this type of research. First and foremost, it would be of interest to survey analysts on how their choice of valuations models is affected by different settings (being the timeframe of the financial crisis and its implications for banks one of those settings). Secondly, by enlarging the analysis to a larger sample, with reports from a larger number of research houses of different businesses (including sell side and buy side), one could obtain generalizable results and fully understand how practitioners dealt with this particular period. Finally, a more complete outline of the various valuation methodologies used in the banking industries could be constructed.

5. Appendixes

5.1. Appendix 1 – Dividend Discount Model and Residual Income Valuation Model computation for Large Sample Analysis

The Dividend Discount Model estimate was computed as follows:

$$Value\ Estimate_{DDM} = DPS_{t+1}(1+ r_E)^{-1} + DPS_{t+2}(1+ r_E)^{-2} + TV(1+ r_E)^{-2}$$

DPS_{t+1} is the dividends per share of the company at period $t{+}1$. Dividends per share are equal the median forward dividends forecast of I/B/E/S commercial database. For the Dividend Discount Model, a 2 year forecasted period, which uses the 1 year ahead and 2 year ahead median forecast dividends. Following the second year, a terminal value is used. The terminal value is a growing perpetuity of 2 year ahead dividends per share, assuming a growth rates (g_r) of 0% and 4%. It is defined as:

$$TV = [DPS_{t+2} * (1+ g_r)]/(r_E - g_r)$$

The following procedure describes the calculation of the Residual Income Valuation Model estimate.

The book value per share was estimated as:

$$bvps_{t+1} = bvps_t + [(1 - divpayout) * EPS_{t+1}]$$

Where $bvps_{t+1}$ is the book value per share of the company at period $t{+}1$, while $bvps_t$ is book value per share in the previous period. Book value per share is adjusted to reflect stock splits, using the adjustment factor provided by the Compustat database (Adjustment Factor (Cum.) by Ex-Date, item number A27). The dividend pay-out ratio is equal to the total amount of dividends divided by the value of net income and is assumed to remain constant and with a maximum value of 1 (or 100%) for the remaining forecast periods. EPS_{t+1} is the earnings per share of the company at period $t{+}1$. Earnings per share are equal the median forward earnings forecast of I/B/E/S commercial database. In the Case of Residual Income Valuation Model, a 2 year forecasted period, which uses the 1 year ahead and 2 year ahead median forecast earnings. Residual income was calculated as follows:

$$RIps_{t+1} = EPS_{t+1} - r_E * bvps_t$$

$$RIps_{t+2} = EPS_{t+2} - r_E * bvps_{t+1}$$

Subsequently to the second year a terminal value was used. The terminal value is a growing perpetuity of 2 year ahead residual income, assuming a growth rates (g_r) of 0% and 4%. The terminal value term is as follows:

$$TV = [RIps_{t+2} * (1 + g_r)]/(r_E - g_r)$$

Lastly, the final expression that gives the value estimate by RIVM is:

$$Value\ Estimate_{RIVM} = bvps_t + RIps_{t+1}(1 + r_E)^{-1} + RIps_{t+2}(1 + r_E)^{-2} + TV(1 + r_E)^{-2}$$

5.2. Appendix 2 – Yearly valuation methods used and analyst valuation errors, per report

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Bank of America	20/06/2006	P/E	-			129%		129%
	19/07/2007	P/E	-					
	16/09/2008	P/TBV	-					
	20/06/2009	P/TBV	$ 17,5	$ 15,79	11%		11%	
	20/10/2010	P/TBV	$ 21,0	$ 6,47	225%		225%	
	26/07/2011	P/TBV	$ 18,0	$ 7,17	151%		151%	

Table 15 - Bank of America Analysed by JP Morgan Chase Co.

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Deutsche Bank	06/10/2006	Sum of Parts	€ 97	€ 135,16	-28%	4%	28%	14%
	01/08/2007	Sum of Parts	€ 115	€ 91,53	26%		26%	
	31/07/2008	Sum of Parts	€ 80	€ 64,90	23%		23%	
	16/12/2009	Sum of Parts	€ 55	€ 52,43	5%		5%	
	26/04/2010	Sum of Parts	€ 61	€ 60,91	0%		0%	
	29/04/2011	Sum of Parts	€ 43	€ 43,39	-1%		1%	

Table 16 – Deutsche Bank Analysed by JP Morgan Chase Co.

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
HSBC Holdings	06/03/2006	Sum of Parts	£ 10,50	£ 7,80	35%	17%	35%	22%
	30/07/2007	Sum of Parts	£ 9,00	£ 7,38	22%		22%	
	11/11/2008	Sum of Parts	£ 6,85	£ 7,26	-6%		6%	
	04/08/2009	Sum of Parts	£ 6,05	£ 6,72	-10%		10%	
	08/11/2010	Sum of Parts	£ 7,80	£ 5,38	45%		45%	
	01/03/2011	Sum of Parts	£ 6,45	£ 5,68	13%		13%	

Table 17 – HSBC Holdings Analysed by Deutsche Bank

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Lloyds Banking Group	20/02/2006	Gordon Growth	£ 4,90	£ 4,04	21%	146%	21%	146%
	17/01/2007	Sum of Parts	£ 5,50	£ 2,70	104%		104%	
	17/07/2008	Sum of Parts	£ 2,50	£ 0,59	321%		321%	
	07/05/2009	P/TBV	£ 1,40	£ 0,54	162%		162%	
	27/05/2010	P/TBV	£ 0,80	£ 0,53	52%		52%	
	06/06/2011	Gordon Growth	£ 0,86	£ 0,27	218%		218%	

Table 18 – Lloyds Banking Group Analysed by Deutsche Bank

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
JP Morgan Chase & Co.	01/03/2006	DCF	$ 50	$ 49,20	2%	25%	2%	25%
	07/03/2007	DCF	$ 60	$ 37,56	60%		60%	
	25/11/2008	DCF	$ 50	$ 44,32	13%		13%	
	15/01/2009	DCF	$ 45	$ 43,68	3%		3%	
	26/02/2010	P/TBV	$ 54	$ 46,68	16%		16%	
	15/08/2011	P/TBV	$ 58	$ 37,07	56%		56%	

Table 19 – JP Morgan Chase & Co. Analysed by Credit Suisse

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
U.S. Bancorp	18/01/2006	RIVM	$ 32	$ 35,57	-10%	6%	10%	9%
	17/06/2007	RIVM	$ 38	$ 30,67	24%		24%	
	27/11/2008	RIVM, P/E, P/B, SOP	$ 24	$ 22,95	5%		5%	
	21/12/2009	RIVM	$ 29	$ 26,56	9%		9%	
	21/07/2010	RIVM	$ 29	$ 27,01	7%		7%	
	06/06/2011	RIVM	$ 30	$ 29,70	1%		1%	

Table 10 – U.S Bancorp Analysed by JP Morgan Chase Co..

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Wells Fargo	27/10/2006	RIVM	$ 40	$ 34,55	16%	41%	16%	44%
	15/07/2007	RIVM	$ 42	$ 20,51	105%		105%	
	16/10/2008	RIVM, P/E	$ 40	$ 30,02	33%		33%	
	01/06/2009	RIVM	$ 44	$ 28,23	56%		56%	
	22/07/2010	RIVM	$ 42	$ 29,14	44%		44%	
	17/10/2011	RIVM	$ 32	$ 34,57	-7%		7%	

Table 21 – Wells Fargo Analysed by Credit Suisse

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Bank of America	21/04/2006	P/E	$ 54,0	$ 51,0	6%	57%	6%	62%
	17/08/2007	P/E	$ 59,0	$ 29,3	101%		101%	
	21/07/2008	P/BV	$ 27,0	$ 12,2	121%		121%	
	16/01/2009	P/TBV	$ 14,0	$ 16,26	-14%		14%	
	20/05/2010	P/E	$ 21,0	$ 11,58	81%		81%	
	20/07/2011	P/TBV	$ 10,5	$ 7,07	49%		49%	

Table 22 - Bank of America Analysed by UBS

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Deutsche Bank	03/05/2006	Sum of Parts	€ 90	€ 127,78	-30%	22%	30%	62%
	22/10/2007	Gordon Growth	€ 79	€ 41,53	90%		90%	
	01/02/2008	Sum of Parts	€ 65	€ 25,65	153%		153%	
	13/01/2009	Sum of Parts	€ 18	€ 73,10	-75%		75%	
	04/06/2010	Sum of Parts	€ 64	€ 59,62	7%		7%	
	11/04/2011	DDM	€ 39	€ 45,06	-13%		13%	

Table 23 – Deutsche Bank Analysed by Societe General

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
JP Morgan Chase & Co.	27/02/2006	P/E	$ 42	$ 49,22	-15%	4%	15%	15%
	15/08/2007	P/E	$ 47	$ 38,07	23%		23%	
	10/12/2008	P/B	$ 34	$ 41,27	-18%		18%	
	29/06/2009	P/TBV	$ 37	$ 37,06	0%		0%	
	02/06/2010	P/E	$ 54	$ 41,61	30%		30%	
	14/10/2011	P/TBV	$ 44	$ 41,62	6%		6%	

Table 24 – JP Morgan Chase & Co Analysed by UBS

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
HSBC Holdings	18/05/2006					14%		21%
	09/11/2007	Sum of Parts	£ 8,00	£ 6,50	23%		23%	
	24/10/2008	Sum of Parts	£ 5,80	£ 6,98	-17%		17%	
	04/12/2009	Gordon Growth	£ 6,80	£ 6,66	2%		2%	
	02/08/2010	Gordon Growth	£ 7,30	£ 6,10	20%		20%	
	19/04/2011	Gordon Growth	£ 8,00	£ 5,55	44%		44%	

Table 25 – HSBC Holdings Analysed by Morgan Stanley

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Lloyds Banking Group	26/02/2006	DDM	£ 6,10	£ 3,94	55%	106%	55%	106%
	19/07/2007	DDM, P/E, SOP	£ 6,30	£ 2,20	186%		186%	
	16/12/2008	P/TBV	£ 1,10	£ 0,56	98%		98%	
	05/06/2009	P/E, P/TBV	£ 1,00	£ 0,55	80%		80%	
	04/08/2010	P/E, P/TBV	£ 0,90	£ 0,35	157%		157%	
	09/11/2011	P/E	£ 0,70	£ 0,44	61%		61%	

Table 26 – Lloyds Banking Group Analysed by UBS

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
U.S. Bancorp	18/01/2006	P/E, P/B, P/TBV	-			10%		17%
	18/07/2007	P/E, P/TBV	-					
	02/10/2008	P/B	-					
	23/07/2009	P/TBV	$ 21	$ 23,70	-11%		11%	
	26/05/2010	P/E, P/B, P/TBV	$ 31,5	$ 24,95	26%		26%	
	06/06/2011	P/E, P/B, P/TBV	$ 34	$ 29,70	14%		14%	

Table 27 – U.S Bancorp Analysed by Morgan Stanley

	Report Date	Valuation Model	Target Price	Actual Price	Signed Error	Average S.E.	Absolute Error	Average A.E.
Wells Fargo	25/09/2006	DCF	$ 38	$ 36,07	5%	6%	5%	19%
	11/09/2007	P/E, P/B, P/TBV	$ 37	$ 33,85	9%		9%	
	10/11/2008	P/E, P/B, P/TBV	$ 38	$ 28,10	35%		35%	
	13/04/2009	P/TBV	$ 20	$ 32,15	-38%		38%	
	17/05/2010	P/TBV	$ 32	$ 28,75	11%		11%	
	19/01/2011	P/TBV	$ 34	$ 30,15	13%		13%	

Table 28 – Wells Fargo Analysed by Morgan Stanley

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