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The Contributions of Behavioral Finance to Explain The Value Relevance of Fundamental Value

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According to the modern financial theory, stock prices fluctuations can be explained by the changeability of future dividends or expected cash-flows. Sums of these variations represent what it can be called "fundamental value" while the stock price refers to the concept of a "market value". A convergence between these two values can justify a strong link between financial information and stock prices when a divergence illustrates an increase of other variables, mainly psychological factors. In fact, the multiplication of inconsistencies between fundamental value and market value within the financial market has increased interests in exploration of other lines of research that may better explain stock price variations. The purpose of this article is to verify investor's behavior effect on value relevance of financial information and how this relevance can change over time. To achieve this objective, we've conducted a study in US stock market between 1980 and 2010. The sample includes 41, 895 firm-years observations. Based on the RIM (Residual Income Model), this study empirically shows that the disconnection between the market price and fundamental value, and therefore the decline in value relevance of fundamental value over time is confirmed. This finding illustrates the increasing role of investors' behavior in stock valuation. This result is consistent with our assumption related to the growing power of behavioral finance in explaining the variation of stock prices.

JEL Codes: G12, G14 and G17

1. Introduction

The value relevance of the financial information continues to be a major concern for investors, policy makers and other stakeholders. This value relevance could have a deep effect on the whole economy. Such an effect can be assessed on the basis of the use of financial information by investors as a key element in the allocation of financial resources. Thus, it is argued that the decline in the value relevance of financial information may possibly "lead to a loss in economic efficiency", Sinha and Watts (2001) and that the private and social prejudice can be caused by deficiencies induced by information asymmetries itself resulting from the increase of intangible elements (Lev 2001).

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The main issue is that the deviation of market prices from the fundamental value generates an efficiency problem. More stock price moves away from the fundamental value, the further we get away from efficiency. In fact, the conventional method based on defining a relation between stock prices and financial information, is increasingly called into question.

The hypothesis that the stock price is an unbiased estimate of fundamental value is getting non valid. Many factors have contributed to make the study of the value relevance of financial information our priority: the recurrence of financial crises where stocks prices seem to be so far from fundamental values, the strategic role of financial information in the decisions making process, the significant increase of Goodwill in firms' valuation and the emergence of Behavioral Finance.

Indeed, Behavioral finance which focuses on the study of the repercussion of psychology on financial decisions of investors, on markets and on organizations has largely tried to justify the gap between stock prices and fundamental value. De facto, the human behavior becomes a determinant factor we should take in consideration in setting new econometric models: Shiller (2003).

The main objective of our study is to examine the effect of investor's behavior on the value relevance of financial information. Our study tries to implement an alternative valuation model that could measure the value relevance of financial information and quantifies the deviation of the stock price from the fundamental value. This assessment will help us to better understand the weight of human behavior inside the setting up of stock prices.

To realize our study, we have used a valuation framework, based on the Residual Income Model (RIM), where stock price is decomposed in two levels: fundamental value and non-fundamental value, or in other terms, in tangible and intangible elements. Our study is correspondingly based on literature review by taking account of the ways by which previous studies have addressed the issue of deviation of stock price to fundamental value.

Our study leads to two major findings:

1. Stock price values include more and more a proportion, which has been calculated through non-fundamental value, related to investors behavior (behavior effect);
2. The unregistered value declines in terms of stock valuation (accounting effect);

Thus, even if the accounting measures become more effective in capturing financial information which already has been unregistered, the stock prices are more shaped by investors' behavior and financial market are more led through investors' temperament.

In this article, we present a literature review which describes previous works and studies related to value relevance of fundamental value; we present also the conceptual framework that shapes in theory our study and the adopted methodology, and finally we expose the empirical result and their implications.

2. Literature Review

During the last decades, most Western countries have experienced a change in an industrialized economy to an economy of high-tech oriented primarily towards services. How these changes affect the value relevance of historical cost in financial statements? This is a question that has been analyzed and studied by several researchers in recent decades.

Collins, Maydew and Weiss (1997) discussed the relevance of the earnings and book value over time using the valuation framework provided by Ohlson (1995). R^2 is used as the main indicator to assess the relevance of the value. The explanatory power of earnings and book value of equity is decomposed into three components: (1) the explanatory power of earnings, (2) the explanatory power of the book value of equity and (3) the explanatory power of earnings and book value of equity. Collins, Maydew and Weiss (1997) concluded that the value relevance of earnings has declined over the last forty years, compared to an increase in the relevance of book value over the same period. But overall, they conclude that the relevance of the value of earnings and the book value increased slightly during this period. This finding contrasts the popular view that changes in the value relevance of financial information in recent decades have contributed to the decline in the value relevance.

Collins, Maydew and Weiss (1997) explained the change in the value relevance of earnings to book value, citing among other things:

- the extent of non-recurring or exceptional
- the increasing frequency of negative earnings
- And changes in average firm size and intensity of intangible assets over time.

Francis and Schipper (1999) found the same results when using tests similar to those used by Collins, Maydew and Weiss (1997). However, Brown, Kin and Lys (1999) found that the relevance of the value measured by the R^2 drops significantly when there are control scale effects. They also presented evidence that the increase of R^2, noticed in previous studies, is largely attributable to the increase in the scale effect, which offset the decline in the explanatory power of the underlying relationships.

Therefore, Francis and Schipper (1999) carried out an additional test which is fundamentally different. They used the total return that could have been earned if we assume a pre-knowledge of the financial information for the relevant measure of value. Unlike the tests realized on explanatory power, the new test controlled both scale increases and changes in the volatility of market returns over time. However, the results of their study are contradictory and do not say whether or not there is decline in value relevance over the last decades.

On the other hand, the study of Lev and Zarowin (1999) suggested that the relevance of the result value, cash flow and book value has deteriorated over the last 20 years. This decline is less pronounced at the cash flow and book value as compared to earnings. They argued that the decline in the value relevance of accounting items was due to the exchange rate. They showed that the exchange rate has increased to U.S. companies over the last two decades.

Dontoh, Radakrishnan and Ronen (2004) noted that the reported decline in the association between stock prices and shares accounting information may be due, at least in part, to increased strategies not based on financial information. They found that this effect had been particularly strong for firms with significant intangible assets.

Brimble and Hodgson (2007) concluded, in Australian market, that the relevance of the value of the normal earnings has not declined significantly over time. Brimble and Hodgson (2007) also found that the book value hadn't had a strong association with the market price as in the case of earnings. Indeed, the relationship between the book value and the market price has been lower than in comparable studies using data on the U.S. market.

Although research on the relevance of value is widely established, this line of research in the beginning was largely focused on the study of the value relevance of financial information at a given moment of time and does not respond to the concern about the relevance value over time. Through the analysis of the previous studies, we have noticed that there is no consensus concerning the evolution of the value relevance of the financial information. Moreover, even when the decline in the value relevance is observed, these studies don't tell anything about the sources inherent to that decline.

Hence, we try in this paper to explore another way to examine the change in the value relevance of financial information, especially through the use of behavioral finance theory.

The central ideas of behavioral finance have been described by Thaler (1993), Dreman (1995), Shefrin (2001a, 2002), Daniel & al. (2002), Barberis and Thaler (2003) and De Bondt (2002, 2005, 2008a).

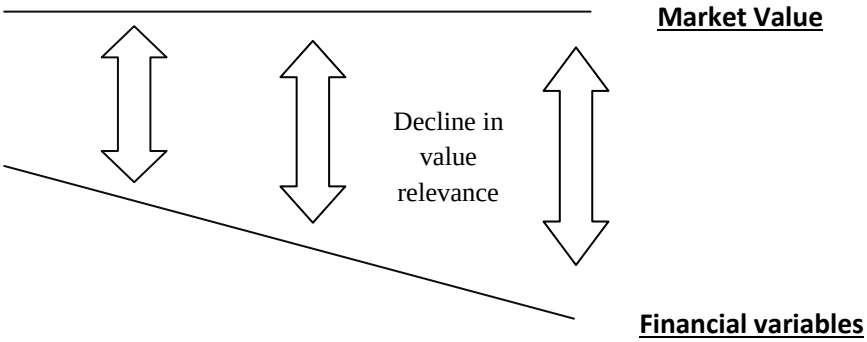
There are three categories of discovery. Firstly, there is a whole through, for example, forecast errors such as overconfidence in judgment (overconfidence). Specific errors depend on the context, but are nevertheless systematically. The research examines the psychological mechanisms that shed light on how the human mind works. It also explains why the financial judgment is fallible.
The second category of results focuses on the dynamics of stock prices of speculative assets in global financial markets. Here, the main lesson is that systematic errors, made by noisemakers who create profit opportunities for experts, cannot be used since it is risky.

Third, researches in behavioral finance are interested in how decision-making process shapes earnings. Here, again, the study of financial fiascos is instructive because it directs us to decision making process variables that are essential.

3. Conceptual Framework

The concept of value relevance has been treated in previous studies on the basis of the correlation between stock prices and financial variables. The following figure illustrates how the accuracy of the value may decline where market value deviate from financial variables.

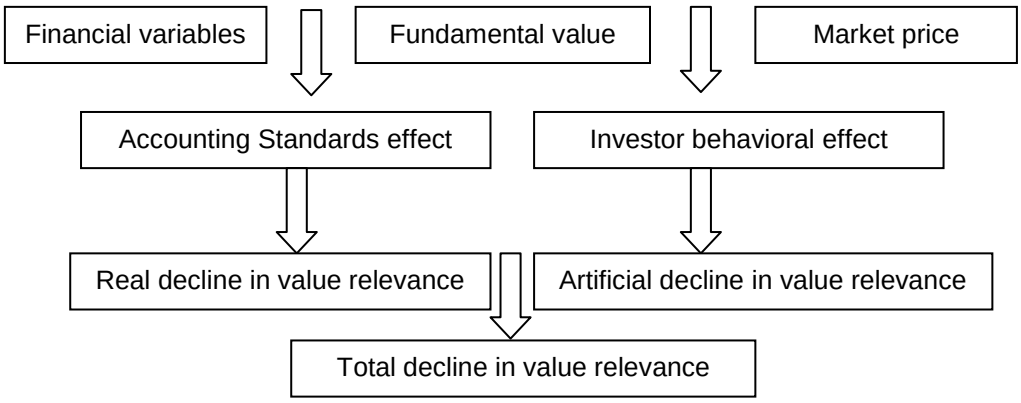
Figure 1: Decline in value relevance



To understand why the value relevance of fundamental value declines, we need to examine thoroughly the factors that may reduce the correlation between stock prices and financial variables.

The stock price (dependent variable) and financial information (independent variable) are supposed to reflect the fundamental value of the company. Any deviation from either side of this value will cause a decrease in the correlation between these variables. On the one hand, financial information, due to several constraints (e.g. conservatism which characterizes accounting standards), may not accurately reflect the fundamental value. On the other hand, examination of stock prices shows that market prices deviate from rational valuation. In such circumstances, the market price cannot be considered as an unbiased estimator of the fundamental value. The following figure distinguishes between the sources of decline in the value relevance.

Figure 2: Distinction between sources of decline in value relevance



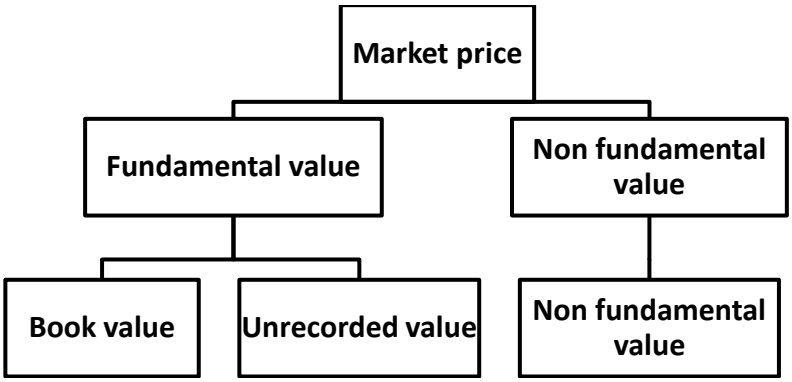
The use of the RIM model taking into account the growing evidence that justifies the deviation of market prices from their fundamental values is a theoretical framework that can be used to measure the impact of both effects of declining relevance of value. In the figure 3, we propose a decomposition of market price in two elements: fundamental value and non-fundamental value. The fundamental value is also divided into book value and unrecorded value.

According to RIM model, the enterprise value can expressed through the sum of its present book value and its present value of future residual incomes, which can be illustrated as follows:

$$V_t = BVPS_t + \sum_{i=1}^{\infty} \frac{FEPS_{(t+i)} - (BVPS_{(t+i)-1} \times r)}{(1+r)^i}$$

- V : Fundamental value
- BVPS : Book value per share
- FEPS : Future earnings per share
- r: cost of capital.

Figure 3: Decomposition of market price



The unrecorded value and non-fundamental value will be used to examine the impact of the effect of accounting measures and the effect of investor behavior and prices on the value relevance of fundamental value. Several endogenous and exogenous factors contribute to widening the gap between the fundamental value and book value. This discrepancy may be explained by the existence of the effect of accounting measures that contributes to a decline in value relevance of fundamental value.

Residual Income Model (RIM) defines shareholder value as the sum of book value and present value of residual income. This model assumes that, "*the fundamental value, for a number of reasons, may deviate from the book value, although the two values should converge in the long term*" (Penman, 1992).When there is a difference between book value and the fundamental value, the second component of the RIM model is different from zero. Peasnell (1981), Ohlson (1995), Feltham and Ohlson (1995, 1996) suggest that the residual income or the present value of abnormal income represents the value of the so called "Goodwill" which also expresses the difference between book value and fundamental value. However, we rather prefer the use of "*unrecorded value*" to "*goodwill*" with the purpose of avoiding any conceptual confusion.

Financial theory suggests that the value of the firm equals the present value of future cash flows (in this context the economic income). Along the lines of the RIM, we can distinguish between two categories of results: normal and abnormal. The Hicks Theory or Result suggests that "*the firm is exposed to generate normal results that are based on its invested capital and cost of obtaining this capital*" (Hicks, 1946).Consequently, the future normal result is the product of the current book value and the cost of equity.

According to (Ohlson, 1991): "*the present value of the normal income can be reasonably estimated by the present book value"*. Nevertheless, if the company has other sources of value that are not fully considered by the book value, these sources will generate a residual or abnormal income. Therefore, accounting measures can fail

to reflect the economic value of the company due to non-registration of its sources of value.

Gu & Lev (2001) have warned to follow the common practice which consists of estimating unrecorded value by the difference between market price and book value. This practice is based on two assumptions, namely: there is no mispricing in financial markets and the book value of assets (historical value) reflects their present value. To overcome these deficiencies, the unrecorded value will be calculated using the model RIM. According to this model, the unrecorded value that represents the accounting measures effect can be estimated through the following equation:

$$Unrecorded\_value = \sum_{i=1}^{\infty} \frac{EPS_{(t+i)} - (BV_{(t+i)-1} \times r)}{(1+r)^{i}}$$

Where BV, EPS and r represent respectively Book Value, Earning Per Share, and the cost of capital.

This study assumes that prices are determined on the basis of a weighted average of fundamental value and non-fundamental value and that the weight assigned to each component changes over time. The change in the fundamental value leads to a change in the stock price. In a similar way, the change in stock price may be caused by factors not related to changes in the economic value of the company.

Non-fundamental value should not be equated with irrationality. While some investment decisions are driven by psychological factors (Herding Behavior, momentum...) investors can engage, or refrain from investing activities being based on rational concerns. An example of these concerns is transaction costs. Besides, investment strategies in the short term may be influenced by market dynamics rather than by changes in the fundamental value of the company. Otherwise, changes in stock prices can occur without reflecting a real change in the financial health of the company, inducing a deviation in stock prices from fundamental value.

Thus, in this study, we define Non-fundamental value as "*a component of the market price that reflects the investment decisions made independently of fundamental business*". On the basis of RIM and the latest research contributions about the sources related to the decline in value relevance of fundamental value, the effect of investor behavior can be estimated by measuring the extent of non-fundamental elements as follows:

$$NFV_t = P_t - V_t$$

Where P is the market price, V is the fundamental value estimated on the RIM basis and NFV is the Non-fundamental value.

4. Methodology and Data Base Conception

As mentioned previously, this study selects as a slice analysis period of the years from 1980 to 2009. Several factors justify this choice:

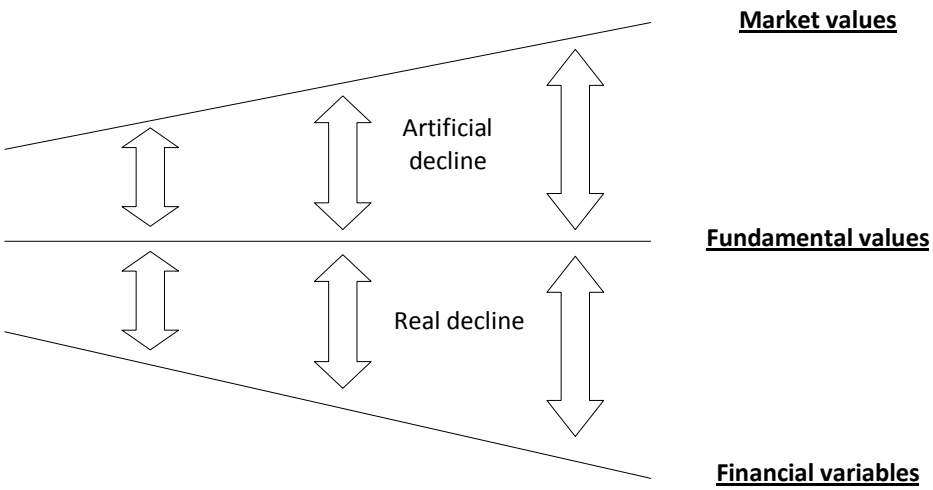
1. The financial world has evolved significantly from the 1980s, with strong market liberalization and technological breakthroughs. So concerns about the decline in the relevance of the fundamental value would be more relevant to analyze from the 1980s;

2. Stock prices are an important parameter to follow from 1980. Lev (2001) examined the PER for the S & P 500 and showed that there has been a sustained growth in this ratio from 1980. During the year 1980 the PER was close to 1, which means that the share price reflects the actual value of the index set. So the year 1980 is a good starting point to study the decline in the relevance of fundamental value;

3. Finally, the availability of earnings' forecasts made by financial analysts is vital for the estimation of variables in our study. Although I/B/E/S database contains data from 1976, observations with complete data are very limited in the years before 1980.

The model developed in this paper is different to previous models because we try not only to identify if there is a decline in value relevance of financial information but also to understand why this decline occurs. In fact, we distinguish between two types of declines: real decline and artificial decline.

Figure 4: Decomposition of market price



4.1 Measuring the Value Relevance of Fundamental Value

4.1.1 The Variation in the Extent of the Value Relevance of Fundamental Value

Several studies have shown the decline in the value relevance (Sinha and Watts, 2001) (Lev, 2001) (Ball and Brown, 1968) (Beaver, 1968) (Lev and Zarowin, 1999), (Brown, Lo, and Lys, 1999), and (Core, Guay and Buskirk, 2003) against other studies that could not rule on this issue (Collins, Maydew, and Weiss, 1997), (Francis and Schipper, 1999), and (Ely and Waymire, 1999). Most previous studies have been accomplished in mid-1990s. The incorporation of recent years in assessing the value

relevance will give more reliability and precision in our study. Therefore, the following hypothesis is proposed:

Hypothesis 1: between 1980 and 2010 there was a significant decline in the value relevance of financial information.

4.1.2 The Role of Unrecorded Value in Stock Valuation

Several factors contribute to mis-recording of company assets. This factor could be endogenous or exogenous. Endogenous factors are associated with current practices of financial reporting, such as conservatism. Exogenous factors may be related to the economic environment and the emergence of new assets to the economy.

Changes in the economic environment throughout the past two decades have resulted in the emergence of new sectors based on new types of assets that are not recognized by the current financial reporting (Elliott, 2000).Other studies have noted changes in the conservative nature of accounting in the new environment (Givoly and Hayn, 2000; Holthausen and Watts, 2001). These two factors increase the gap between book value and the fundamental value and therefore the appearance of unrecorded value. This brings us to state our second hypothesis:

Hypothesis 2: between 1980 and 2010 there is an increase in unrecorded value in stock prices.

4.1.3 The Role of Non-Fundamental value in the Determination of Market Price

As already mentioned, the stock prices deviate from fundamental value because of the existence of non-fundamental factors in these prices. Several factors contribute to the explanation of this deviation. They may be linked to technological developments in information and trading, the rise of speculative activity, high media coverage, the influence of institutional investors who induces herding behavior. It is recognized that recent advances in information technology have had a significant impact on financial markets. Technological advances have led to major changes in the quality, quantity and timeliness of information disseminated to the financial community.

Ahmed, Schneible and Stevens (2003) found evidence that the e-commerce has increased the number of naive investors leading to different interpretations of earnings announcements. Some investors can observe trends and hope they will continue while others may interpret it differently and predict a trend reversal. This disagreement among investors on the interpretation of the same news could be related to the growth of non-fundamental factors in market prices (Shefrin, 1999).

There is growing evidence that the volatility of stock prices has increased over the last two decades. Hoitash, Krishnan and Sankaraguruswamy (2002) examined the change in quality of earnings and stock prices and concluded that, based on the analysis of abnormal returns, speculation has increased over time. Lev (2001) showed that the Price to book (P/B) ratio related to S&P 500 has jumped six times between 1980 and early 2001.

On the basis of the above, we can observe that the stock price may include non-fundamental components which are not related to the intrinsic value of the company. This leads us to state the following hypothesis:

Hypothesis 3: between 1980 and 2010 there was an increase in non-fundamental component in stock prices.

4.1.4 The Effect of Unrecorded Value and Non-Fundamental Value in the Value Relevance of Fundamental Value.

While previous researches have highlighted the deterioration of the value relevance, it would be more appropriate to understand why this deterioration has occurred. It is suggested in the foregoing that the deteriorating relationship between market prices and financial variables (H1) can be caused by two effects: an effect of accounting measures reflected in growing share of unrecorded value (H2) and an increase in the share of non-fundamental value that reflects the effect of investor behavior (H3). Therefore, the evaluation of the value relevance should take into account these two effects on the correlation between financial variables and the market price. Hence, the following hypothesis is proposed:

Hypothesis 4: the increasing role of the unrecorded value and the growing influence of non-fundamental value in the stock valuation contributed to the deterioration of the value relevance of fundamental value between 1980 and 2010.

4.2 Database Conception

Three types of analysis will be conducted within this study to achieve the research objectives initially developed. The first analysis focuses on the question of the variation in the value relevance that will be reviewed again with a goal to provide a new estimate following the recent developments experienced by financial markets. The new study also aims to reconcile the inconsistent results found in previous studies that have investigated this issue.

A second analysis will be conducted using the RIM model to estimate the key variables that are considered as sources of the decline in the value relevance. These variables are the unrecorded value (which represents the effect of accounting measures) and non-fundamental value (which represents the effect of investor behavior).

Finally, the third analysis will focus on measuring the change in the role of unrecorded value and value non-fundamental in the declining relevance of value.

The data used in this study were collected from the following sources: the Compustat database, CRSP and IBES. The information we collected from these three sources are for all companies in the U.S. market (NYSE) excluding financial institutions.

The data collected to meet the objective of our study are as follows:

- Book value, earnings and dividend for the year (t);

- Stock price and number of outstanding shares three months after the fiscal year end (t);
- Beta, risk premium, risk free rate of the companies listed in NYSE market.

The value relevance of financial information is evaluated via the correlation between stock price and financial variables. Precisely, the stock prices are regressed on book values and results for each year of our sample as follows

$$P_t = \alpha + \beta_1 BVPS_t + \beta_2 EPS_t + \varepsilon_t \qquad \textbf{(1)}$$

Where:

- P_t : stock price three months after fiscal year end (t);
- $BVPS_t$: Book value per share for the fiscal year (t) ;
- EPS_t: Earning Per Share for the fiscal year (t).

To measure changes in the value relevance, the values of R^2 obtained annually from the regression of the above equation have been tested on a time variable. A negative coefficient for this variable indicates that the value relevance declines over time. The regression equation is as follows:

$$R^2_{(VR)} = \alpha + \beta TIME_t + \varepsilon_t \qquad \textbf{(2)}$$

Where:

- $R^2_{(VR)}$: Adjusted R^2 obtained from the regression of stock prices with book values and results.
- $TIME_t$: a time variable from 1 to 31, corresponding to each year of our sample (1980-2009).

Based on the model RIM Model and price breakdown that we conducted in the firstpart, unrecorded capital gains can be theoretically estimated by the present value of residual profits (accounting profit after deduction of capital requirements) as follows:

$$Unrecorded_t = \sum_{i=1}^{\infty} \frac{EPS_{(t+i)} - (BVPS_{(t+i)-1} \times r)}{(1+r)^i} \qquad \textbf{(3)}$$

- EPS_t : Earning Per Share for the fiscal year (t).
- $BVPS_t$: Book value per share for the fiscal year (t).
- r : Cost of capital.

Unrecorded can be estimated (indirectly) through the gap between fundamental values and book values, as follows:

$$Unrecorded_t = V_t - BVPS_t \qquad \textbf{(4)}$$

- V_t : Fundamental Value.

The role of unrecorded value in the share valuation is estimated by the relationship between fundamental values and unrecorded value. Specifically, the regression between fundamental values and unrecorded values has been tested for each year.

$$V_t = \alpha + \beta Unrecorded_t + \varepsilon_t \qquad \textbf{(5)}$$

To examine the role of The Unrecorded value in stock valuation, the explanatory powers of the previous annual regressions is subject to a temporal analysis:

$$R^2{}_{(UnrecV)_t} = \alpha + \beta TIME_t + \varepsilon_t \qquad \textbf{(6)}$$

- $R^2{}_{(Unrec)t}$: Adjusted R^2 obtained in the equation (5)
- $TIME_t$:a time variable from 1 to 31, corresponding to each year of our sample (1980-2009).

The estimation of the Non Fundamental Value (NFV) in this study is made on the basis of the difference between the stock price (P) and Fundamental Value (V).

$$NFV_t = P_t - V_t \qquad \textbf{(7)}$$

The relation between stock prices and non-fundamental values estimations has been tested to examine the influence of NFV on the stock valuation. The model is as follows:

$$P_t = \alpha + \beta NFV_t + \varepsilon_t \qquad \textbf{(8)}$$

In the same way that the previous analysis, the changing role of NFV is tested based on the basis of the coefficient of determination of the following time series:

$$R^2{}_{(NFV)t} = \alpha + \beta TIME_t + \varepsilon_t \qquad \textbf{(9)}$$

The $R^2{}_{(NFV)}$ represents the adjusted R^2 obtained from the regression model of stock prices and non-fundamental values in equation (8). The significance and sign of the trend variable indicates whether this role has become more important over time as we have previously assumed in our hypothesis.

To examine if the unrecorded value influence inside stock valuation has contributed to deterioration of value relevance of fundamental value, we have tested the relationship between the coefficient of determination $R^2{}_{(VR)}$ of stock prices obtained from the equation (2) and the coefficient of determination of Unrecorded Value $R^2{}_{(UnrecV)}$ obtained from the equation (5).

$$R^2{}_{(VR)t} = \alpha + \beta R^2{}_{(UnrecV)t} + \varepsilon_t \qquad \textbf{(10)}$$

Similarly, to verify our hypothesis that the growing role of NFV in stock valuation has contributed to deterioration of value relevance of fundamental value, we have also

tested the relationship between the coefficient of determination $R^2_{(VR)}$and the coefficient of determination of Unrecorded Value $R^2_{(UnrecV)}$ obtained from the equation **(8).**

$$R^2_{(VR)t} = \alpha + \beta R^2_{(NFV)t} + \varepsilon_t \qquad \textbf{(11)}$$

In addition to uni-variate regression used throughout this study, the causes of decline in the relevance of the fundamental value, namely the effect of accounting measures and the effect of investor behavior, are examined using multiple regressions. Specifically, the relationship between the coefficients of determination of the value relevance of the fundamental value is and the coefficients of determination of Unrecorded Value and NFV, is tested as follows:

$$R^2_{(VR)t} = \alpha + \beta_1 R^2_{(UnrecV)t} + \beta_2 R^2_{(NFV)_t} + \varepsilon_t \qquad \textbf{(12)}$$

5. Empirical Results

Table1: Descriptive statistics of sample firms

The sample includes 41,895 observations of U.S. companies that are the result of the intersection between the three databases COMPUSTAT, CRSP and IBES after joining companies that have at least two years of earnings forecasts and after removal of negative book values and outliers. The year and the fiscal year t are years from which the data are obtained to achieve the estimated values and to evaluate the relevance of the value. Number of firms' column shows the number of business firms in year t. MV is market capitalization and P is the market price that is obtained from the CRSP database; both are calculated at the valuation date that is three months after the end of fiscal year t. EPS is the earning per share before extraordinary items for the year t and BVPS is the book value per share for the year t. PE is Price to earnings ratio and PB is the price to book ratio. The last line is the average of all indicators throughout the study period.

Year	Number of Firms	Market value	Price	EPS	BkVPS	PE	PB
1980	274	428,727.35	31.51	2.21	18.57	15.82	2.24
1981	389	454,221.61	32.37	2.50	19.37	15.05	2.31
1982	437	356,745.14	29.20	2.42	18.12	14.52	2.18
1983	601	328,165.09	25.94	1.99	16.08	14.20	2.46
1984	707	468,994.69	27.37	2.08	16.97	15.43	2.24
1985	738	416,609.81	25.38	1.98	15.19	14.68	2.32
1986	795	432,426.24	23.17	1.66	13.09	13.23	2.44
1987	898	513,473.19	22.84	1.64	13.28	15.91	2.55
1988	997	550,537.98	22.74	1.58	12.86	13.29	2.35
1989	981	600,107.59	23.22	1.56	12.51	14.68	2.40
1990	1043	574,270.27	23.52	1.61	12.79	14.69	2.50
1991	1093	545,753.62	23.42	1.57	12.36	14.87	2.55
1992	1229	560,944.40	22.74	1.46	11.51	14.60	2.68
1993	1492	603,784.51	22.28	1.34	10.94	15.92	2.64
1994	1583	738,991.91	22.30	1.33	11.33	14.76	2.60
1995	1649	806,596.60	22.13	1.32	11.53	14.71	2.65
1996	1842	843,531.51	21.85	1.25	11.33	13.85	2.61
1997	1859	849,655.28	21.69	1.21	11.21	15.30	2.76
1998	1805	1,017,302.14	21.49	1.21	11.08	14.72	2.70
1999	1606	1,149,926.65	21.56	1.16	11.20	13.71	2.61
2000	1461	1,393,786.75	21.60	1.13	10.86	14.01	2.70
2001	1521	1,210,184.99	21.74	1.12	10.52	15.54	2.79
2002	1712	1,472,854.00	21.97	1.12	10.31	14.22	2.92
2003	1903	1,632,060.15	21.62	1.06	10.25	14.52	2.83
2004	1976	1,989,882.57	21.89	1.10	10.36	15.10	2.85
2005	2037	1,957,286.13	22.29	1.12	10.65	16.02	2.81
2006	2027	2,065,107.83	22.58	1.16	10.78	14.50	2.72
2007	2000	2,302,893.73	22.84	1.21	10.97	13.39	2.71
2008	1675	2,152,413.11	22.77	1.19	10.15	13.73	2.97
2009	1781	2,467,298.84	23.67	1.25	10.82	16.51	2.91
2010	1784	2,605,778.82	23.35	1.30	10.93	14.47	2.60
	41895	1,080,332.66	23.65	1.48	12.51	14.71	2.60

Descriptive statistics related to variables used in the models are shown in table 1. The total number of observations is 41 895. For each year, we have selected all market data and we have proceeded through elimination of firms which don't have sufficient data to calculate the fundamental value and outliers.

We notice that the market capitalization has undergone a significant development during the late 90's going from 0.84 billion in 1996 to 1.4 in 1999. This jump is due to

the dotcom bubble that marked this period. Stock price, book value per share and earnings per share have declined generally during this period. However, this decline is not regular as shown by the evolution of the PB ratio of 2.2 in 1980 to 2.9 in 2009 while PE has declined slightly in the same period from 15.8 to 10.8. These developments show clearly an increase in the valuation gap between ways investors evaluate companies and what is implied by the financial variables.

Table 2: Ordinary Least Square regression of stock prices on book values and earnings per share

$$P_t = \alpha + \beta_1 BVPS_t + \beta_2 EPS_t + \varepsilon_t$$

Year	Numbers of Firms	α	β_1	β_2	$R^2_{(VR)}$	Year	Numbers of Firms	α	β_1	β_2	$R^2_{(VR)}$
1980	274	11.47	0.26	6.93	0.56	1996	1,842	12.1	0.4	4.22	0.47
1981	389	14.9	0.3	4.7	0.43	1997	1,859	11.63	0.55	3.17	0.48
1982	437	11.85	0.14	6.1	0.53	1998	1,805	12.18	0.48	3.33	0.43
1983	601	11.78	0.23	5.25	0.5	1999	1,606	11.49	0.6	2.87	0.45
1984	707	11.5	0.4	4.34	0.52	2000	1,461	11.98	0.55	3.21	0.45
1985	738	9.35	0.32	5.66	0.59	2001	1,521	12.21	0.52	3.66	0.43
1986	795	9.27	0.46	4.72	0.52	2002	1,712	12.56	0.54	3.45	0.42
1987	898	10.55	0.4	4.26	0.52	2003	1,903	12.21	0.54	3.61	0.43
1988	997	8.68	0.43	5.39	0.52	2004	1,976	11.82	0.52	4.3	0.45
1989	981	8.86	0.6	4.43	0.55	2005	2,037	11.8	0.56	4.07	0.47
1990	1,043	9.42	0.53	4.58	0.56	2006	2,027	12.27	0.49	4.33	0.48
1991	1,093	10.87	0.47	4.29	0.54	2007	2,000	12.24	0.52	4.08	0.47
1992	1,229	10.1	0.49	4.82	0.55	2008	1,675	12.49	0.53	4.11	0.44
1993	1,492	11.23	0.46	4.46	0.47	2009	1,781	11.94	0.55	4.59	0.5
1994	1,583	11.35	0.44	4.5	0.49	2010	1,784	12.18	0.45	4.81	0.49
1995	1,649	11.61	0.49	3.64	0.49						

The results of the regression coefficients (b2) show a downward trend during the study period. The lowest coefficient of determination which is 0.43 corresponds to years 1981, 1998 and 2001 and the other coefficient with the value of 0.44 corresponds to year of 2008. These low rates may be explained by periods of recession undergone by the U.S. market during these years. Table 2 also provides the test results related to value relevance variations of earnings and book values which are estimated on the basis of the regression coefficients of determination R2 (VR) on a time variable according to the equation n° 2.

Table 3: Time series regression of R squared

$$R^2_{(VR)} = \alpha + \beta TIME_t + \varepsilon_t$$

Variables	B	Student Test	Significance	R^2
(constant)	6,272	4,107	0,000	0,308
TIME	-0,003	-3,786	0,001	

Table 3 shows that the trend of the regression line is negative (-0.003) and is statistically significant (0.001). The negative coefficient indicates an inverse relationship between the value relevance of financial $R^2_{(VR)}$ and time. In other words the value relevance decreases over time. According to our evaluation model where RIM has been used in estimating the fundamental value, we can also conclude indirectly that the decline in the value relevance of earnings and book values affects the relevance fundamental value. This result confirms our hypothesis H1 which states

that between 1980 and 2010, there was a significant decline in the relevance of fundamental value.

Table 4: Ordinary Least Square regression of fundamental value on unrecorded value

$$V_t = \alpha + \beta_1 Unrecorded_t + \varepsilon_t$$

Year	Numbers of Firms	α	β_1	$R^2_{(Unrec)}$	Year	Numbers of Firms	α	β_1	$R^2_{(Unrec)}$
1980	274	0.81	0.87	0.86	1996	1,649	1.13	0.80	0.87
1981	389	0.82	0.87	0.87	1997	1,842	1.13	0.80	0.87
1982	437	0.80	0.87	0.89	1998	1,859	1.04	0.82	0.88
1983	601	0.73	0.88	0.90	1999	1,805	0.95	0.84	0.89
1984	707	1.34	0.76	0.85	2000	1,606	0.81	0.86	0.88
1985	738	0.88	0.84	0.84	2001	1,461	0.75	0.87	0.90
1986	795	0.81	0.86	0.85	2002	1,521	0.93	0.84	0.87
1987	898	0.98	0.82	0.88	2003	1,712	1.13	0.79	0.85
1988	997	1.14	0.79	0.84	2004	1,903	1.12	0.79	0.84
1989	981	0.98	0.83	0.88	2005	1,976	1.22	0.77	0.83
1990	1,043	1.08	0.80	0.86	2006	2,037	1.31	0.75	0.82
1991	1,093	1.18	0.79	0.86	2007	2,027	1.36	0.73	0.79
1992	1,229	1.37	0.74	0.84	2008	2,000	1.25	0.75	0.75
1993	1,492	1.24	0.77	0.84	2009	1,675	1.03	0.79	0.74
1994	1,583	1.30	0.77	0.86	2010	1,781	1.15	0.76	0.74
1995	1,649	1.13	0.80	0.87					

Table 4 shows unrecorded value coefficients obtained from annual regression and values of adjusted R square. The Student test indicates that the estimations of coefficients are accurate and statistically significant for all years. Results illustrate an overall decline of R^2 over time, which implies an attenuation of role played by unrecorded values. The average mean of the coefficient of determination dropped from 0.86 during the two first decades to 0.80 during the last decade of the time period of our study.

Table 5: Time series regression of R squared

$$R^2_{Unrec_t} = \alpha + \beta TIME_t + \varepsilon_t$$

Variables	β	Student Test	Significance	R^2
(constant)	7.548	5.102	0.000	0.394
TIME	-0.003	-4.532	0.000	

The variation analysis of unrecorded values effect in stock valuation is presented in table 5. The coefficients of determination, obtained from annual regression in equation n° 3, were analyzed through time series assessment. Our second hypothesis presumed an increasing role of unrecorded values in stock valuation. According our study results, this hypothesis is not confirmed. The line regression coefficient is negative (-0.003) and significant (0.000), which shows a decrease of unrecorded values effect. This decline might be a result of an accounting system amelioration that makes possible to take into account an important number of intangible assets during the last decade.

Table 6: Ordinary Least Square regression of stock prices on non-fundamental value

$$P_t = \alpha + \beta_1 NFV_t + \varepsilon_t$$

Year	Numbers of Firms	α	β_1	$R^2_{(NFV)}$	Year	Numbers of Firms	α	β_1	$R^2_{(NFV)}$
1980	274	20.02	0.89	0.48	1996	1,842	12.14	0.92	0.53
1981	389	22.10	0.79	0.43	1997	1,859	11.70	0.95	0.52
1982	437	19.96	0.83	0.43	1998	1,805	11.89	0.92	0.54
1983	601	19.05	0.70	0.32	1999	1,606	11.71	0.95	0.55
1984	707	18.52	0.85	0.39	2000	1,461	11.21	0.97	0.57
1985	738	15.89	0.93	0.43	2001	1,521	10.78	0.98	0.61
1986	795	13.21	0.99	0.53	2002	1,712	10.55	0.98	0.62
1987	898	15.06	0.81	0.37	2003	1,903	10.12	1.01	0.66
1988	997	12.87	1.00	0.56	2004	1,976	10.13	1.02	0.67
1989	981	11.80	1.07	0.58	2005	2,037	10.21	1.04	0.66
1990	1,043	12.44	1.03	0.54	2006	2,027	10.66	1.01	0.63
1991	1,093	12.30	1.01	0.53	2007	2,000	10.89	1.01	0.62
1992	1,229	11.00	1.05	0.58	2008	1,675	9.62	1.04	0.69
1993	1,492	10.95	1.00	0.60	2009	1,781	9.83	1.08	0.69
1994	1,583	11.89	0.95	0.53	2010	1,784	10.45	1.04	0.67
1995	1,649	12.15	0.94	0.51					

The values of $R^2_{(NFV)}$ suggest a progressive growth of non-fundamental values effect of stock prices. The same observation can be made through the analysis of annual coefficient regression of non-fundamental values which are statistically significant during the time period of our study. Moreover, the weight of non-fundamental values inside stock prices is particularly more important during the last decade than the first one. The mean average of $R^2_{(NFV)}$ during the first decade is 0.89 while during the first decade, the $R^2_{(NFV)}$ was equal to 1.02.

Table 7: Time series regression of R squared

$$R^2_{NVF_t} = \alpha + \beta TIME_t + \varepsilon_t$$

Variable	β	Student Test	Significance	R^2
(constant)	-17.707	-8.660	0.000	0.724
TIME	0.009	8.930	0.000	

The results obtained from time series regression (table 7) show that there is no significant change of R squared over time. Consequently, the hypothesis n°3 is not verified. There was no increase in non-fundamental component of stock prices.

According to all result showed above, we have not identified any significant change in the value relevance of financial information, in the unrecorded value or in non-fundamental component. There is no need to examine the hypothesis n°4 which consists of verifying the combined effect of unrecorded value and non-fundamental value in the deterioration of the value relevance of fundamental value, as this effect has not been identified separately.

The analysis of the time series of annual values of $R^2_{(NVF)}$ is used to determine whether there was an increase in the role of non-fundamental values during the study period. The results presented in Table 7 show that the coefficient of the time variable is positive (0.009) and statistically significant (0.000). In other words, there is a positive relationship between fundamental values and time. This means that non fundamental values become more important over time. This result provides empirical support for our third hypothesis that predicts an increase of degree of non-fundamental values in the stock market during the period between 1980 and 2010.

The above results confirmed that there was a decline in the relevance of the fundamental value during the period 1980-2010 (H_1) and there was a decreasing role of unregistered values (H_2) and an increasing role of non-fundamental values (H_3) in stock valuation during the same period. Our fourth hypothesis examines whether the decline in value relevance may be related to the two proposed sources, namely the unregistered values and non-fundamental values. This hypothesis predicts that these two sources are negatively correlated with the decline in the relevance of fundamental value. In other words, the decline of unregistered values and the increase of non-fundamental values in stock valuations have contributed to the deterioration of the relationship between market values and financial information. This investigation is based on a univariate analysis and a multivariate analysis that includes measures for each of three components: the decline in the value relevance ($R^2_{(VR)}$), the role of unrecorded values in stock valuation ($R^2_{(Unrec)}$) and the role of non-fundamental value ($R^2_{(NFV)}$).

The results in Table 8 show that there is a positive relationship between the role of unrecorded values and relevance of fundamental value. However the coefficient of 0.059 was not statistically significant (0.745) which does not allow us to confirm that the decline in the role of unrecorded values during this period helps to improve the relevance of the fundamental value. What can we learn about the relationship between unrecorded values and value relevance, given that the null hypothesis (H_0) is not verified, is that the alternative hypothesis (H_1) is satisfied will be satisfied in this case. Particularly, the unrecorded values negatively affect or at least have no influence on the relevance of the fundamental value.

Similarly, table n° 9 shows a negative $R^2_{(NFV)}$ coefficient of (-0.196) and statistically significant (0.020). This indicates that the growing role for non-fundamental values is related to the observed decline in value relevance. These two conclusions based on univariate analysis are also confirmed by a multivariate analysis that combines both the $R^2_{(Unrec)}$ and $R^2_{(NVF)}$ on the basis of equation n° 12. In this analysis, the coefficient of $R^2_{(Unrec)}$ is negative (-0.353), but not statistically significant (0.101), while the coefficient of $R^2_{(NVF)}$ is also negative (-0.308) and is statistically significant. This model is statistically reliable with a Fisher value of 4.652 and an R^2 of 0.196.

Overall, our results partially confirm H_4, which states that the growing role of the stock valuation contributed to the deterioration of the value relevance fundamental difference between 1980 and 2010. In other words, the observed decline in the relevance of the fundamental value can be attributed to the increasing role of non-fundamental value.

Table 9: Relation between unrecorded values, non-fundamental values and the decline of value relevance of fundamental value

This table examines the relationship between the roles of unrecorded values and non-fundamental values in stock valuation and decline in the relevance of the fundamental value during the period 1980-2010. R^2_{VR} represent annual values from the regression of stock prices on book values and results. Annual values of R^2_{Unrec} represent the R^2 of annual regression of fundamental values on unrecorded values. Annual values on R^2_{NFV} represent R^2 of the regression of stock prices on non-fundamental values. R^2 represents the explanatory power of the time series analysis.

$$R^2_{(VR)_t} = \alpha + \beta R^2_{(Unrec)_t} + \varepsilon_t$$

Variable	β	Test de student	Signification	R^2
(constant)	0,441	2,920	0,007	-0,031
$R^2_{(Unrec)}$	0,059	0,328	0,745	

$$R^2_{(VR)_t} = \alpha + \beta R^2_{(NVF)_t} + \varepsilon_t$$

Variable	β	Test de student	Signification	R^2
(constant)	0,598	13,446	0,000	0,144
$R^2_{(NVF)}$	-0,196	-2,458	0,020	

$$R^2_{(VR)_t} = \alpha + \beta_1 R^2_{(Unrec)_t} + \beta_2 R^2_{(NVF)_t} + \varepsilon_t$$

Variable	β	Test de student	Signification	R^2
(constant)	0,958	4,421	0,000	0,196
$R^2_{(NVF)}$	-0,308	-3,027	0,005	
$R^2_{(Unrec)}$	-0,353	-1,694	0,101	

5. Conclusions

Undoubtedly the question of the deviation of stock prices from fundamental value, despite the evidence that we have presented in this article is very challenging. The economic and technological developments require continuous adaptation of accounting and financial system to adapt to these changes.

Most studies in this area occurred at the end of the decade of the previous century. These searches with different results have encouraged us to question again the issue of the relevance of the value of financial

Furthermore, our objective is to contribute to analyze and study a pertinent question at a time when the professional and academics are reflecting together on the fate of capitalism and the market economy. How financial information can be useful? and what are the sources that can influence its variables? These questions represent an important issue in order to identify the actions that can be expected to increase the stability financial markets.

The path we have explored throughout this article has allowed us to draw some conclusions: first, through the study of the variation in the value relevance of financial information using the test of our first hypothesis, we found a decline in the value relevance of financial information for the period ranging from 1980 to 2010.

Second, we have been able to identify sources of decline in value relevance: the first one is the effect of accounting measure we have tested through our second hypothesis which stipulated that during the study period there was a growing role of unrecorded values in the stock's valuation. On the contrary, the results of our analysis don't confirm this assumption; we have found a decreasing role of unrecorded values during the study period which means an improvement in the accounting system in term of recognition of intangible assets. The second source consists of the effect of investor behavior that we have tested through non fundamental value effect on stock valuation. The results of this test show that there is indeed a growing role of investor behavior in the stock valuation.

Third, we have tested the combined effect of both unrecorded value and non-fundamental value on stock valuation. The results of our tests partially confirm our fourth hypothesis. In fact, by using univariate tests, we can say that the decline of value relevance can be explained by non-fundamental value effect while multivariate test doesn't allow us to make a definite conclusion.

References

Ahmed, A, Schneible, R and Stevens, D 2003, 'An Empirical Analysis of the Effects of Online Trading on Stock Price and Trading Volume Reactions to Earnings Announcements', *Contemporary Accounting Research*, Vol. 20, no 3, pp. 413-439.

Ball, R and Brown P 1968, 'An Empirical Evaluation of Accounting Income Numbers', *Journal of Accounting Research*, Vol. 6, no 2, pp. 159-178.

Barberis, N and Thaler R 2003, 'A Survey of Behavioral Finance', in Ed. by G.M. Constandinides, M. Harris and R. Stulz, *Handbook of the Economics of Finance* Elsevier, pp. 1051-1121.

Beaver, W 1968, 'The Information Content of Annual Earnings Announcements', *Journal of Accounting Research*, Vol. 6, no 3, pp. 67-92.

Brimble M, Hodgson A 2007, 'On the intertemporal value relevance of conventional financial accounting in Australia', *Accounting & Finance*, Vol. 47, no 4, pp. 599-622.

Brown, S., Lo, K, Lys, T. 1999, 'Use of R2 in Accounting Research: Measuring Changes in Value Relevance over the Last Four Decades', *Journal of Accounting and Economics*, Vol. 28, no 2, pp. 83-115.

Collins, D, Maydew, and Weiss, E 1997, 'Changes in the Value-Relevance of Earnings and Book Values over the Past Forty Years', *Journal of Accounting and Economics*, Vol. 24, no 1, pp. 39-67.

Core, J, Guay, W and Buskirk, A 2003, 'Market Valuations in the New Economy: An Investigation of What has Changed', *Journal of Accounting and Economics*, Vol. 34, no 1-3, pp. 43-69.

Daniel, K.D, Hirshleifer, D and Teoh, S.H 2002, 'Investors Psychology in Capital Markets: Evidence and Policy Implications', *Journal of Monetary Economics*, Vol. 49, no. 1, pp. 139-209.

De Bondt, W.F.M, 2005, '*The Psychology of World Equity Markets*', Edward Elgar.

Dontoh A, Radhakrishnan S and Ronen J. 2004, 'The declining value relevance of accounting information and non-information-based trading: An empirical analysis', *Contemporary Accounting Research*, Vol. 21, no 4, pp. 795-812.

Elliott, R 2000, 'Financial Reporting for the 21st Century', *Practical Accountant*, Vol. 33, no 10, p. 74.

Ely, K & Waymire, G. 1999, 'Accounting Standard-Setting Organizations and Earnings Relevance: Longitudinal Evidence from NYSE Common Stocks, 1927-93', *Journal of Accounting Research*, Vol. 37, no 2, pp. 293-317.

Feltham, G & Ohlson, J 1996, 'Uncertainty Resolution and the Theory of Depreciation Measurement', *Journal of Accounting Research*, Vol. 34, no 2, pp. 209-234.

Feltham, GA, Ohlson, JA 1995, 'Valuation and clean surplus accounting for operating and financial activities', *Contemporary Accounting Research,* Vol. 11, no 2, pp. 689-731.

Francis, J & Schipper, K 1999, 'Have Financial Statements Lost Their Relevance?', *Journal of Accounting Research*, Vol. 37, no 2, pp. 319-352.

Givoly, D & Hayn, C 2000, 'The Changing Time-Series Properties of Earnings, Cash Flows and Accruals: Has Financial Reporting Become More Conservative?', *Journal of Accounting and Economics*, Vol. 29, no 3, pp. 287-320.

Holthausen, R & Watts, R 2001, 'The Relevance of the Value Relevance Literature for Financial Accounting Standard Setting', *Journal of Accounting and Economics*, Vol. 31, no 1-3, pp. 3-75.

Lev, B & Zarowin, P 1999, 'The Boundaries of Financial Reporting and How to Extend Them', *Journal of Accounting Research*, Vol. 37, no 2, pp. 353-385.

Lev, B 2001, '*Intangibles: Management, measurement, and reporting*', Brookings Institution Press, Washington, DC.

Ohlson, J 1991, 'The theory of value and earnings and an introduction to the Ball–Brown analysis', *Contemporary Accounting Research*, Vol. 7, no 1, pp. 1–19.

Ohlson, J 1995, 'Earnings, book values and dividends in equity valuation', *Contemporary Accounting Research*, Vol. 11, no 2, pp. 661 – 687.

Peasnell, K.V 1981, 'On Capital Budgeting And Income Measurement', *ABACUS*, Vol. 17, no 1, pp. 52-67.

Penman, S 1992, 'return to fundamentals', *Journal of Accounting, Auditing and Finance*, Vol. 7, no 4, pp. 465-483.

Shefrin, H 1999, 'Irrational Exuberance and Option Smiles', *Financial Analysts Journal*, Vol. 55, no 6, pp. 91-103.

Shefrin, H 2001a, '*Behavioral Finance*', Edward Elgar.

Shefrin, H 2002, '*Beyond Greed and Fear*', Oxford University Press.

Shiller, R 2003, 'From Efficient Market Theory to Behavioral Finance', *Journal of Economic Perspectives*, Vol. 17, no 1, pp. 83-104.

Sinha, N and Watts, J 2001, 'Economic Consequences of the Declining Relevance of Financial Reports', *Journal of Accounting Research*, Vol. 39, no 3, pp. 663-681.

Thaler, R 1993, '*Advances in Behavioral Finance*', Russell Sage Foundation, New York.