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Assessing the Predictive Power of Customer Satisfaction for Financial and Market Performances: Price-to-Earnings Ratio is a Better Predictor Overall

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ABSTRACT: Our paper shows that based on the RMSE criteria, Price-to-Earnings ratio is a better predictor of financial and market performances of the firm than the Customer Satisfaction index (CS). This conclusion is based on the choice of five financial and seven market indicators that we consider as proxies for financial and market performances with a sample comprising eighty-six companies: Book value, dividend yield, Gross Profit Margin, Price to Cash-Flows, Price-to-Earnings, Price to Sales, Annual return, *ROA*, *ROE*, *ROI*, Volatility and Tobin's *Q*. However, CS clearly outperforms our five benchmarks (Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself) when forecasting Tobin's *Q*, Volatility, ROE and ROI. In periods of volatile market such as year 2008, CS is a more stable predictor of Volatility or *ROE* than the indicators themselves (i.e. Volatility for Volatility, *ROE* for *ROE*).

Key-words: Customer satisfaction; Financial performance; Market performance; Price-to-Earnings; Financial ratio; Market ratio
JEL Classifications: C15; C53; M31; M41; G17

1. Introduction

For the last fifty years, academics and practitioners have written on Customer Satisfaction (CS). Evrard (1993) provided an extensive review. CS has been the corner stone of the discipline on consumer behavior. CS is generally considered as an indicator of future cash flows generated by the company and can be viewed as relevant information for investors, shareholders, consumers, etc. (Fornell, 1992; Vandermerwe, 2000).

Some studies confirmed that investors and shareholders show growing interest in non-financial measures such as CS (Ernest & Young, 1997). Thus, the main preoccupations of our study are the following: Can a non-financial measure such as CS forecast the financial and market performances? Can financial indicators such as Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings and Volatility be better predictors than CS?

In this paper, asumptions are that: 1) Financial and market indicators such as Book value, dividend yield, Gross Profit Margin, Price to Cash-Flows, Price-to-Earnings, Price to Sales, Annual return, *ROA*, *ROE*, *ROI*, Volatility and Tobin's *Q* are good proxies of financial and market performances of companies. 2) CS has a predictive power for financial and market indicators at *t+1* year, *t+2* year, etc. 3) Financial and market indicators such as Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself have a predictive power for financial and market indicators at *t+1* year, *t+2* year, etc. We will assess the second and third asumptions with OLS for the period 2004-2009.

Our paper is organised as follows: the literature review highlights the importance for managers of monitoring CS and discusses how authors have use CS in forecasting financial and market performance. The methodology section presents our model, its inputs and outputs and describes the database. We wrap up our results and we make relevant comments in the two last sections.

2. Literature Review

Reviewing the existing literature on CS, we discuss the importance of CS for the firm when monitoring the demand and implementing a strategy and we focus on the relationship between CS and financial and market performance of the firm. We analyze the choice of the optimal model to capture this relationship.

2.1 CS as an indicator

CS is a gauge to monitor the demand and to implement a strategy. Cronin and Taylor (1992) define CS in the framework of financial and market performance: they express CS as a behavior of re-purchasing the product and an attachment to the product. Measuring CS is fundamental to companies in order to guide a strategy focused on quality and to make optimal investment and organizational choices. Measuring CS will help 1) Marketing products that meet customers demand; 2) Building customer loyalty and attract new clients; 3) Increasing sales. A traditional measure (Shin and Elliot, 2001) is based on identifying the main attributes of the product or service, then evaluating CS relative to each attribute, giving a weight to each one. Authors such as Veloutsou et al. (2005) challenge this technique by prefering an international measure to estimate CS because one can observe similar features of satisfaction among different cultures.

Sweden has been the first country to introduce a CS index in 1989 (the SCSB), then Germany in 1992, the USA in 1994 with the ACSI (Fornell, 1996) and Europe in 1998 with the ECSI. These global indices present a challenge to build a questionnaire (closed due to the large number of people under survey), to create measurement scales and a valid process of aggregation of various questions such as the weight given to each question. The existing indices are the results of thousands of questionnaires. They target products or services of a panel of private or public companies.

In this study, we use the ACSI index as proxy of CS. The ACSI (American Customer Satisfaction Index), built by Fornell (1994), is the U.S. CS index for clients of listed companies and government institutions. Published quarterly in the Wall Street Journal, the ACSI index is managed in partnership with the University of Michigan. More than 200 companies are targeted by the index, which represents 40 industrial sectors belonging to seven major sectors. The *"client"* is always a representative set corresponding to a market segment considered homogeneous.

The ASCI index compares, year after year, the global satisfaction of clients for a given company and its sector. The index not only incorporates the answers relative to CS but also contrasts them to numerous data of the company. The survey is realised via internet or telephone.

2.2 Investigating the relationship

The relationship between CS and financial and market performance has been investigated by the European Foundation for Quality (EFQM)[1] or authors such as Bughin (2005). They agree on the fact that CS is upstream of the global performance of the company. Kaplan and Norton (1998) identify four indicators related to CS (return, total sales, *ROA*[2], *ROE*). Neely and Adams (2001) casted a multidimensional model which they called a "performance prism" integrating all the stakeholders (shareholders, human resources, suppliers, customers) and their needs.

In Sweden, Anderson et al. (1994) looked at the positive relationship between CS (measured by the CSB index) and the *ROI*. In their paper, CS data are compiled at the beginning of the semester, *ROI* data at the end. A profit coming from the improvement of CS is not immediate. This is why they measure the CS efficiency with a time lag.

Yeung et al. (2002) show the significant and complex relationship between CS and customer loyalty, buzz marketing and financial and market indicators. Moreover, Anderson et al. (1994) find that CS contributes to improve financial performance of a company by tightening customers' loyalty that reduces price elasticity, decreasing the costs infered by a positive marketing buzz and the

[1] EFQM models the resources and results of a company.

[2] Return On Asset, Return On Equity, Return On Investment and other ratios are presented in the methodology.

transactional costs. Even if the CS impact on performance is not always reflected in the accounting ratios, CS comoves positively with the company stock price. Fornell and Lehman underscore the time consistency of CS on the performance of the company.

Ittner and Larker (1999) analyzed the impact of CS on stock return but underscored the impact on accounting ratios. The public announcement of CS scores impacts directly stock returns that adjust over a 10-day period.

Regarding the impact of CS on annual return, Jacobson and Mizik (2009) show that 'excess stock portfolio returns for firms with strong customer satisfaction are small and statistically insignificant, and if there is any above-market performance at all, it is due to a small set of firms in the computer and Internet industries'.

Tuli and Bharadwaj (2009) analyzed the impact of CS on volatility. They find 'empirical support for the hypotheses that increases (i.e. improvement) in CS result in decreases (i.e. reduction) in overall and downside systematic and idiosyncratic risk'.

Finally, some authors have underscored the close link between Price-to-Earnings (PE) ratio, growth and performance (e.g. Easton, 2004, and Thomas and Zhang, 2006). Our paper will emphasize the forecasting power of the PE ratio for the financial and market performance of the firm.

2.3 Choosing the optimal model

Yeung et al. (2002) are supporters of the Ordinary Least Square model to forecast performance indicators from CS. They started with the asumption of the non-linearity of the relationship (e.g. exponential). Their conclusion is surprising: not only it contradicts their initial asumption but also it shows that the hypothesis of linearity is acceptable. The opponents will say that we cannot capture in a simple model the beneficial effects of CS on the performance of the firm since this relationship is too complex and the channels too evolved.

Zahorik (2001) explored the relationship through a complex model that allows the manager to optimally allocate ressources to increase CS. The model integrates the relationship between CS and individual loyalty, aggregated retention, market share, profits and demonstrates how a dollar value in the change of CS can be measured. However, this model is very difficult to implement for an average manager, necessitates a fastidious collect of data, a hazardeous calibration of the effort function, which measures how much money should be expensed to improve optimally some identified attributes of CS. Their paper is a good academic exercise but disconnected from the market practice.

At the opposite, the OLS model is simple and belongs to the «KISS[3]» family. The model is standard, simple, robust, universally recognized, and easily reproducible by any manager. By contrast, a non-linear model requires hypotheses; it is not standard, and not easily reproducible. It reacts like a black box: we will find an exponential relationship between CS and one given variable, a quadratic relationship with another one. If quadratic, the relationship may have a 2-degree order with one variable, a 3-degree order with another, i.e. we deal with a field of infinite possibilities, not easily reproducible.

3. Methodology

We divide the methodology in three sections. We describe 3.1) the indicators tested by our model, 3.2) the database, and 3.3) the model.

Our paper assesses the ability of CS in forecasting firms' financial and market performance. We benchmark CS with five indicators: Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility and the forecasted indicator itself. We choose financial and market indicators as proxies for the performance of the firm. In the following section, we present these indicators.

3.1 Description of indicators

In this section, we describe the five financial indicators and the seven market indicators that will be forecasted.

3.1.1 Financial indicators

$$1.\ ROE = \frac{\text{Net Income}}{\text{Average Total Stockholders' Equity}} \qquad (1)$$

[3] Keep It Sophisticately Simple

2. $ROA = \frac{\text{Net Income}}{\text{Average Total Assets}}$ (2)

3. $ROI = \frac{\text{Net Operating Profit} - \text{Adjusted Tax}}{\text{Invested Capital}}$ (3)

4. $\text{Gross Profit Margin} = \frac{\text{Gross Profit}}{\text{Net Sales}}$ (4)

5. Price to Sales = Share Price/Sales per Share (5)

3.1.2 Market indicators

1. $\text{Book Value} = \frac{\text{Total Stockholders' Equity} - \text{Preferred Stock Equity}}{\text{Number of Common Shares Outstanding}}$ (6)

2. $\text{Dividend Yield} = \frac{\text{Dividend per Common Share}}{\text{Market Price per Common Share}}$ (7)

3. $\text{Price to Cash Flows} = \frac{\text{Share Price}}{\text{Cash Flows per Share or EBITDA}}$ (8)

4. $\text{Price-to-Earnings Ratio} = \frac{\text{Market Value per Share}}{\text{Earnings per Share}}$ (9)

Earnings per share = net income / number of common shares outstanding (10)

5. Tobin's Q = Total Market Value of Firm/Total Asset Value = (Share price*number of Shares outstanding+total value of preferred stock+long-term debt+short-term debt)/Total assets (11)

6. Annual return = (Share Price on Jan. 1 for the year t+1 / Share Price on Jan. 1 for the year t) - 1 (12)

7. $\text{Volatility} = \left[\sqrt{\frac{1}{90}\sum_{i=1}^{90}(R_i - \bar{R})}\right].\sqrt{250}$ (13)

with R_i, the last 90 daily returns of the company stock for the year.

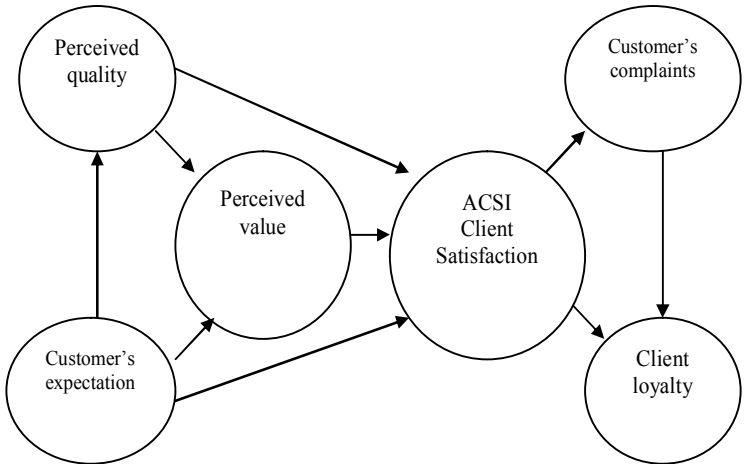
3.2 The database

In this section, we describe how we have built the database. The variables are CS and the twelve indicators presented above.

3.2.1 ACSI index

CS computation follows the methodology of the American Customer Satisfaction Index based on interviews with customers as inputs of a multi-equational econometric model developed by the Ross business school of the University of Michigan. The ACSI model is a model of causes and effects. The inputs of ACSI CS are customer's expectation, perceived quality and perceived value (see Figure 1). Outputs of ACSI CS are customer's complaints for the product, customer loyalty including customer's retention and price tolerance. The CS goes from 0 to 100. Our database includes the ACSI index of eighty-six public companies from 2004 to 2009.

Figure 1. Methodological framework for building the ACSI CS index



Source: ACSI[4]

3.2.2 Financial and market indicators

Beside the ACSI index, our database comprises financial and market indicators of eighty-six public companies from 2004 to 2009: Book value, dividend yield, Gross Profit Margin, Price to Cash-Flows, Price-to-Earnings, Price to Sales, Annual return, *ROA*, *ROE*, *ROI*, Volatility and Tobin's *Q*. We obtained these indicators from the financial statements and historical prices available on Reuters and Yahoo Finance.

We based the selection of the twelve indicators on the literature review, given that these indicators are the most tested or the most representative among the group of market and financial indicators.

Eighty-five companies are American; one is European (Daimler-Chrysler) the later remains in our sample since Daimler-Chrysler had an extensive activity in the U.S. during the study period.

We present the list of companies in the appendix (Table 7). Seventy-five companies under review are included in the S&P 500 index, i.e. 87%. Our sample has a survivorship bias. Our initial sample was of about one hundred companies when we started to collect data. The original selection criterion was to be part of the ACSI database. Failures and M&A made the initial number to shrink to eighty-six companies. We retained in the sample only firms that survived until 2009.

In terms of activity sectors, Figure 4 in the appendix illustrates the sample of eighty-six companies used in this study compared to the S&P 500 index: the sample is overweighted in the sector of Utilities (16% versus 6%), Consumer Staples (24% versus 8%) and Consumer Discretionary (23% versus 18%). We consider the overweight of these three sectors as relevant since they are present more than any other sectors in consumers' mind in terms of emotions and loyalty. For example, Procter & Gamble (Consumer Staples), Federal Express (Utilities) and Ford (Consumer Discretionary) are present in consumer habits since these products and services are popular and regularly pushed by marketing campaigns. The consumer gains consistently possession of the use and the representation of the product or service. The marketing reinforces the sens of possession. Therefore, we expect that a relationship exists between CS and performance indicators, CS being stronger for products or services better known by consumers. If a customer is satisfied, he/she consumes. An increase in demand means an increase in revenues, in stock return, etc. Yeung and Ennew (2001) confirmed that 'happy customers are more likely to be loyal, loyal customers are more profitable'.

[4] ACSI CS indices are available on http://www.theasci.org/.

3.3 The OLS model

The objective of the paper is to assess the ability of CS in forecasting twelve indicators, taken individually, with the following Ordinary Least Square model (OLS):

$$Y_{t+j} = \beta X_t + C \qquad (14)$$

j= 1, 2, 3, 4 year, from 2005 to 2008 for calibrating, from 2006 to 2009 for forecasting.
X = Customer Satisfaction, Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility or each of the twelve indicators choosen as Y.
Y = Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility, *ROA*, Price-to-Sales, *ROE*, *ROI*, Book Value, Dividend Yield, Price Return or Gross Profit Margin.
For example, 1) we run the OLS equation using *X* as the series of Customer Satisfaction index levels of eighty-six companies in year 2004 and *Y* as the series of *ROA* of eighty-six companies in year 2005. 2) We then forecast *Y*, the series of *ROA* of eighty-six companies in year 2006 from the OLS equation obtained in 1) and with the new inputs *X* as the series of Customer Satisfaction index levels of eighty-six companies in year 2005.

We repeat steps 1) and 2) in order to compute the forecasted *ROA* in year 2007 from CS index levels observed in year 2006 and the OLS equation obtained from *ROA* observed in 2006 versus CS index levels observed in 2005, etc.

We forecast the twelve financial and market indicators introduced in section 3.1 using CS, Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself choosen as *Y*. Our objective is to benchmark CS against financial and market indicators such as Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings and Volatility in order to assess the forecasting ability of CS.

The choice of the indicators Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings and Volatility as benchmarks of CS relies on an initial correlation analysis where we noticed that, taken individually, these indicators have the highest number of significant correlations with the other indicators (Bilateral Pearson test). Since the coefficient of determination R^2 is simply the square of the correlation coefficient in the case of a simple linear regression model such as the one that we use in our paper, the correlation analysis is a way to identify the indicators with the highest forecasting power.

Besides Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings and Volatility, the choice of a given indicator to forecast itself in the future (e.g. *ROA* at *t-1* forecasts *ROA* at *t*) is based on the intuition that the indicator today will be the best estimate of its value in the future.

Finally, the choice of the index or indicator level rather than the annual change in value is the result of the analysis of the correlation matrix between 1) the annual change in value (annual returns) and 2) the absolute levels of index and indicators for the whole sample. We observed less significant correlations with the annual returns than the absolute levels.

Using equation 14, we forecast the twelve financial and market indicator at *t+1* year, *t+2* years, *t+3* years and *t+4* years since our sample is limited in time (from year 2006 to 2009).
In order to assess the forecasting power of CS, Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself, we use two measures:
1) The «Root Mean Square Error or RMSE» measure. RMSE is used extensively in the literature:

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{86}\left(Observed - Forecasted\right)^2} \qquad (15)$$

2) The correlation coefficient that measures the strength and the direction of the relationship between the forecasted and observed series. The correlation coefficient tells us that the closer the value to one, the better the forecast. In addition, it tells how much the forecasted and observed series move in phase.

4. Results

4.1 General results

Tables 1 and 2 below report the measures of RMSE and correlation coefficient of the forecasts of the twelve financial and market indicators based on CS, Tobin-*Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility and the indicator itself. For each indicator, we shade the best measure of RMSE

and correlation coefficient. Table 1 provides the results at *t+1* year and Table 2 the results at *t+2* years.

Table 1. 1-year forecast of twelve financial and market indicators based on OLS and CS, Tobin-Q, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself

1-year Forecast	Using Customer Satisfaction		Using Tobin-Q		Using Price-to-Cash Flows		Using Price Earnings		Using Volatility		Using the indicator itself	
Forecasted indicators:	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values
Tobin-Q	6.56	0.04	8.59	0.34	9.44	0.28	6.97	0.15	6.64	0.08	8.59	0.34
Price-to-Cash Flows	42.38	-0.01	53.87	0.73	71.49	0.77	33.77	0.40	43.81	0.08	71.49	0.77
Price Earning	72.80	0.00	63.80	0.73	73.50	0.73	50.38	0.37	73.44	0.06	50.38	0.37
Volatility	34.05	0.21	34.35	0.11	35.03	0.12	34.52	-0.02	56.50	0.67	56.50	0.67
ROA	0.07	0.24	0.08	0.23	0.08	0.05	0.08	-0.03	0.10	0.25	0.06	0.60
Price-to-Sales	11.94	0.04	13.60	0.75	16.46	0.78	8.58	0.64	12.13	-0.05	14.78	0.94
ROE	1.88	0.10	2.74	-0.12	2.45	-0.36	2.87	-0.22	2.45	0.07	6.24	0.32
ROI	0.44	0.13	0.46	-0.02	0.45	-0.01	0.45	0.07	0.45	-0.07	0.63	0.37
Book Value	15.14	-0.01	15.93	0.23	16.07	0.14	15.44	-0.02	16.04	0.13	7.61	0.89
Dividend Yield	0.03	0.03	0.03	0.11	0.03	-0.01	0.03	0.03	0.03	0.07	0.02	0.61
Price Return	0.52	0.02	0.52	0.07	0.53	0.01	0.53	0.04	0.63	-0.14	0.52	0.00
Gross Profit Margin	0.17	0.02	0.17	0.07	0.17	0.03	0.17	0.17	0.19	0.22	0.10	0.84
Average:	15.50	0.07	16.18	0.27	18.81	0.21	12.82	0.13	17.70	0.11	18.08	0.56

Table 2. 2-year forecast of twelve financial and market indicators based on OLS and CS, Tobin-Q, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself

2-year Forecast	Using Customer Satisfaction		Using Tobin-Q		Using Price-to-Cash Flows		Using Price Earnings		Using Volatility		Using the indicator itself	
Forecasted indicators:	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values
Tobin-Q	8.06	-0.03	11.59	0.03	11.99	0.12	9.26	-0.12	8.09	0.03	11.59	0.03
Price-to-Cash Flows	51.49	0.01	35.68	0.66	33.22	0.75	44.77	0.49	51.23	0.04	33.22	0.75
Price Earning	89.52	0.01	59.80	0.68	62.05	0.71	75.47	0.27	88.80	0.09	75.47	0.27
Volatility	43.05	0.23	43.75	-0.03	43.14	0.07	42.97	0.00	43.05	0.23	43.05	0.23
ROA	0.08	0.20	0.09	0.20	0.09	-0.02	0.09	-0.09	0.08	0.10	0.07	0.48
Price-to-Sales	14.28	0.05	8.97	0.67	9.86	0.76	12.11	0.52	14.24	0.05	12.07	0.83
ROE	2.38	0.02	5.38	-0.14	5.75	-0.09	3.04	-0.10	2.58	0.04	2.44	0.01
ROI	0.36	0.13	0.36	0.17	0.40	-0.02	0.39	0.09	0.35	0.04	0.44	0.44
Book Value	14.53	-0.02	15.17	0.24	15.28	0.14	14.55	0.09	15.08	0.16	9.61	0.78
Dividend Yield	0.03	0.01	0.03	0.17	0.03	0.14	0.03	0.11	0.03	0.18	0.03	0.29
Price Return	0.60	0.03	0.61	-0.07	0.61	0.09	0.60	-0.08	0.63	-0.21	0.60	0.01
Gross Profit Margin	0.17	0.01	0.17	0.09	0.18	0.06	0.17	0.20	0.17	0.17	0.11	0.76
Average:	18.71	0.05	15.13	0.22	15.22	0.23	16.95	0.11	18.69	0.08	15.73	0.41

Overall, Table 1 shows that Price-to-Earnings is the best variable to forecast the twelve financial and market indicators (lowest average RMSE at 12.82).

Based on the correlation criteria, the indicator is the best predictor of itself (average correlation at 56% in Table 1).

According to Tables 1 and 2, the forecasting power of Tobin's *Q*, Price to Cash Flows and the indicator itself improves at *t+2* years (RMSE at respectively 15.13 versus 16.18, 15.22 versus 18.81 and 15.73 versus 18.08). The analyses at *t+3* years and *t+4* years (refer to Table 8 in Appendix) do not confirm the trend, i.e. the optimal forecasting lag of these three predictors is *t+2* years. Concerning the other predictors (Customer Satisfaction, Price-to-Earnings and Volatility), the optimal forecasting lag is *t+1* year.

We note that regarding the *t+3* years forecasts, based on the RMSE and correlation criterias, the indicator itself is the best predictor overall with a RMSE of 19.09 and a correlation of 0.35 on average over the twelve forecasted indicators. Concerning the *t+4* years forecasts, based on the RMSE

criteria, the Price to Cash Flows ratio is the best predictor overall with a RMSE of 32.86 on average over the twelve forecasted indicators.

Table 1 shows that Tobin's *Q*, Volatility, *ROE* and *ROI* have the lowest RMSE when forecasted with CS. CS satisfaction looks a superior predictor.

All the other indicators (Price-to-Cash Flows, Price-to-Earnings, *ROA*, Price-to-Sales, Book Value, Dividend Yield, Price Return and Gross Profit Margin) are better forecasted by Price-to-Earnings or the indicator itself (e.g. Price-to-Cash Flows at t using Price-to-Cash Flows at *t-1*, etc.).

4.2. Forecasting Tobin's Q, Volatility, ROE and ROI

Table I presents the *t+1* year forecasts. Based on the RMSE measure, CS is the best predictor of Tobin's Q, Volatility, *ROE* and *ROI*. CS beats its benchmarks: Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility and the indicator itself as predictors at *t+1*. These results give support to the works of Anderson, Fornell and Lehmann (1994) which found a close relationship of CS and *ROI*, the works of Kaplan and Norton (1998) regarding ROE, the works of Tuli & Bharadwaj (2009) highlightening Volatility and the works of Williams and Naumann (2011) concerning Tobin's *Q*. However, if we have a closer look at the results, we observe that the RMSE of Price-to-Earnings when used as a predictor is very close to the RMSE of CS, 6.97 versus 6.56 for Tobin-*Q* forecasted by CS, 34.52 versus 34.05 for Volatility, 2.87 versus 1.88 for ROE, 0.45 versus 0.44 for *ROI*.

Based on the correlation coefficient criteria between the forecasted and observed series, we observe that CS is not the best predictor. Comparing CS as a predictor with the indicator itself (e.g. Volatility at t used as a predictor of Volatility at *t+1*), we observe that the indicator itself is the best predictor of Tobin-*Q*, Volatility, *ROE* and *ROI*.

These contradicting results deserve an explanation. The RMSE measures the square root of the square of the average distance between the observed and the forecasted series. The correlation measures the tightness of the relationship between the observed and the forecasted series. Should they not converge to the same result? The following microanalyses show that the correlation coefficient, used in conjunction with RMSE when assessing the forecasting power of a model, can help market analysts identifying outliers such as in year 2008 when high market volatility has affected the forecasting power of two benchmarks, i.e. Volatility and *ROE*.

Focusing on the Volatility forecasts, based on RMSE, CS is the best predictor of Volatility. On the contrary, based on the correlation coefficient criteria, Volatility at *t-1* is the best predictor of Volatility at *t*. We illustrate the forecasted volatility for year 2006 obtained from the Volatility (Figure 2 below) and from CS (Figure 3 below). Since we have four forecasted samples (year 2006 to 2009), we observed RMSE and Correlation for each year in Table 3:

Table 3. RMSE and Correlation for 1-year forecasted volatility

***t+1* year forecast**	**Forecasted volatility**	**2006**	**2007**	**2008**	**2009**	**Average**
Predictor is Volatility	RMSE	7.02	13.64	51.82	153.52	56.5
	Correlation	0.64	0.69	0.56	0.78	0.67
Predictor is CS	RMSE	8.16	14.08	61.43	52.55	34.05
	Correlation	0.1	0.24	0.25	0.24	0.23

Table 3 clearly shows that year 2009 is an outlier (RMSE equals to 153.52) when the predictor is Volatility. This is why the average tops 56.5 whereas the average of the first 3 years of RMSE equals to 24.16 versus 27.89 when CS is a predictor of Volatility. The explanation is very simple: 2008 was the year of a credit crisis, there was much volatility in the market; for example, on October 24, 2008, the VIX index reached an historical high of 89.53 for a long-term average of 19; the result is that Volatility in 2008 lost its forecasting power for 2009.

We may conclude, in regards with this volatility micro approach, that in a normal market, Volatility is a better predictor of Volatility than CS; in a volatile market, CS is the best predictor of Volatility.

Figure 2. Observed volatility (VOL_2006) versus Forecasted volatility (FVOL_2006) for 86 companies in 2006 using volatility at *t-1*. RMSE = 7.02; Correlation = 0.64

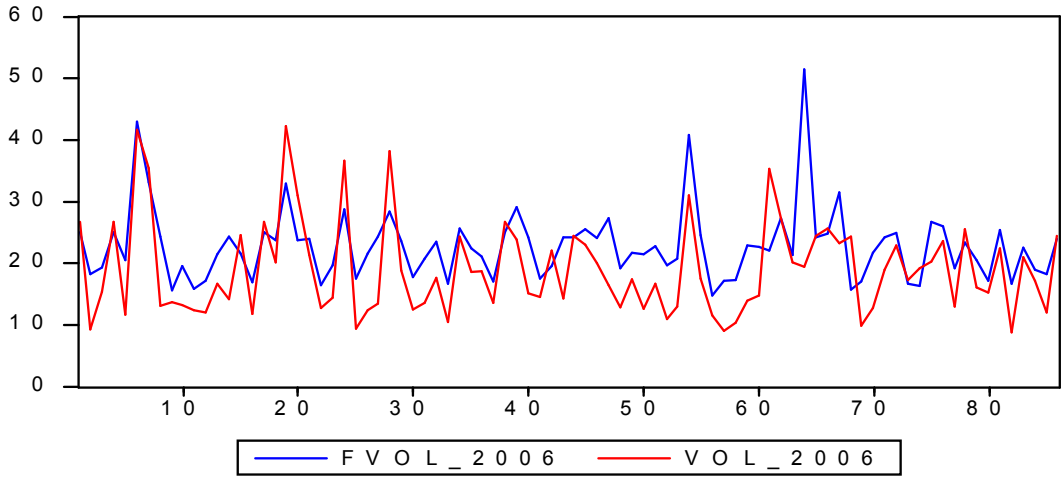
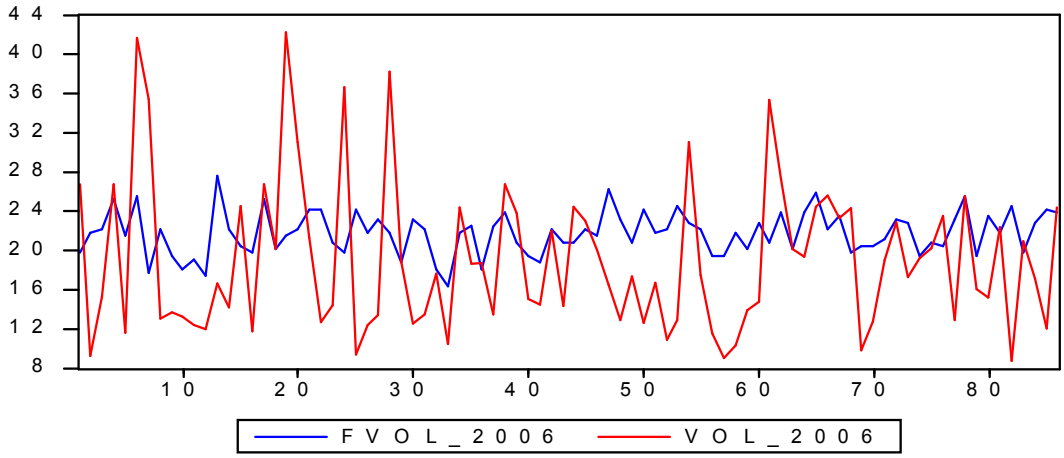


Figure 3. Observed volatility (VOL_2006) versus Forecasted volatility (FVOL_2006) for 86 companies in 2006 using CS at *t-1*. RMSE = 8.16; Correlation = 0.10



We repeat the same micro approach with Tobin's *Q*, *ROE* and *ROI*. We obtain respectively Tables 4, 5 and 6. Table 4 shows that CS beats Tobin's *Q* when forecasting Tobin's *Q*. There is no special outlier on year 4.

Table 4. RMSE and Correlation for 1-year forecasted Tobin's Q

***t+1* year forecast**	**Forecasted Tobin's Q**	**2006**	**2007**	**2008**	**2009**	**Average**
Predictor is Tobin's Q	RMSE	1.39	6.73	11.57	14.66	8.59
	Correlation	0.75	0.6	0.99	-0.98	0.34
Predictor is CS	RMSE	2.08	7.74	5.54	10.85	6.56
	Correlation	0.17	-0.03	-0.01	0.032	0.04

Table 5 shows that CS beats *ROE* when forecasting *ROE* because there is an outlier in 2009 (RMSE of 18.54 versus 1.24). Here, we conclude that in a normal market *ROE* is as good as CS to forecast *ROE*. In a volatile market, CS is best.

Table 5. RMSE and Correlation for 1-year forecasted *ROE*

***t+1* year forecast**	**Forecasted *ROE***	**2006**	**2007**	**2008**	**2009**	**Average**
Predictor is *ROE*	RMSE	0.43	1.05	4.93	18.54	6.24
	Correlation	0.69	-0.09	0.61	0.06	0.32
Predictor is CS	RMSE	0.46	0.83	5.01	1.24	1.88
	Correlation	0.29	-0.08	-0.09	0.29	0.10

Table 6 shows that CS beats Tobin's *Q* when forecasting *ROI*. There is no special outlier. In conclusion, we have shown that using two criterias in conjunction to evaluate the forecasting power, RMSE and correlation, will help identifying samples with outliers that RMSE cannot capture alone.

Table 6. RMSE and Correlation for 1-year forecasted *ROI*

***t+1* year forecast**	**Forecasted *ROI***	**2006**	**2007**	**2008**	**2009**	**Average**
Predictor is *ROI*	RMSE	0.51	1.28	0.12	0.63	0.63
	Correlation	0.83	0.16	0.38	0.13	0.37
Predictor is CS	RMSE	0.71	0.32	0.12	0.63	0.44
	Correlation	0.11	0.21	0.16	0.06	0.13

5. Conclusion

Our paper shows that based on the RMSE criteria, Price-to-Earnings ratio is a better predictor of the financial and market performances of companies than Customer Satisfaction (CS). This conclusion relies on the choice of five financial and seven market indicators that we have considered as proxies for financial and market performances with a sample of eighty-six companies: Book value, dividend yield, Gross Profit Margin, Price to Cash-Flows, Price Price-to-Earnings, Price to Sales, Annual return, *ROA*, *ROE*, *ROI*, Volatility and Tobin's Q.

However, CS clearly outperforms our benchmarks (Tobin's *Q*, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself) when forecasting Tobin's *Q*, Volatility, *ROE* and *ROI*. Previous authors have clearly identified the tight relationship, which exists between CS, Volatility and Tobin's *Q* (market indicators), *ROE* and *ROI* (financial indicators). In period of volatile market such as the year 2008, CS is a more stable predictor of Volatility or *ROE* than the indicator itself (i.e. Volatility at *t-1* for Volatility at *t*, *ROE* at *t-1* for *ROE* at *t*).

We found that the optimal forecasting lag of the financial and market performance of the firm is 1 year for Customer Satisfaction, Price-to-Earnings and Volatility used individually as predictors and 2 years for Tobin's *Q*, Price to Cash Flows and the indicator itself. Concerning the optimal forecasting time lag of CS at *t+1* year, previous authors have explained that the lag is justifiable since a profit associated with the improvement of CS is not immediate. Our results are in line with the works of Anderson, Fornell and Lehmann (1994) regarding the impact at *t+1* year of CS on *ROI* but in addition, our study identifies the impact at *t+1* year on *ROE*, Volatility and Tobin's *Q*.

Moreover, our paper shows that, when forecasting a given financial or market indicator, the indicator itself at *t-1* is a good predictor most of the time and can easily compete with the two leaders, Price-to-Earnings ratio and CS.

Finally, we have shown that using two criterias in conjunction to evaluate the forecasting power, RMSE and correlation, will help identify samples with outliers that RMSE cannot capture alone. Our paper presents several limits. The length of time of its sample is restricted; the number of companies is also limited. We replicated the S&P 500 index in order to get a homogeneous sample,

but we overweighted the sample with Utilities, Consumer Staples and Consumer Discretionary since we believed that these three sectors have a bigger impact on consumers' mind in terms of emotions and loyalty than the other sectors of the S&P 500. We biased our sample in favor of CS. This approach may be questionable. One additional point in building our sample was a survivor bias that made our initial sample of about hundred companies to shrink to eighty-six companies. Besides, we may extend the research to other indicators or other approaches of forecasting such as Principal Components Analysis or neural networks.

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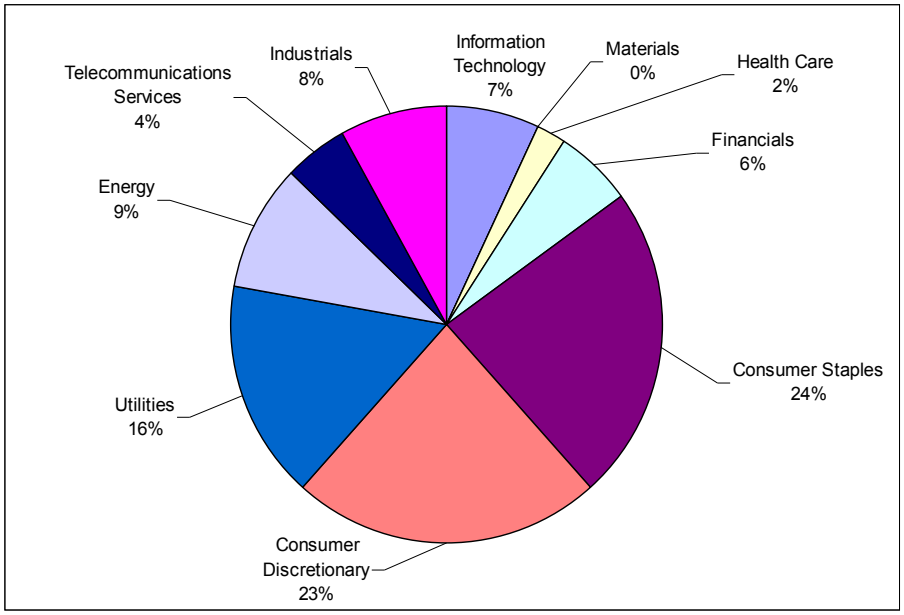
Appendix

Figure 4. Sample of 86 companies by sector (top pie) compared to the S&P 500 index (bottom pie)



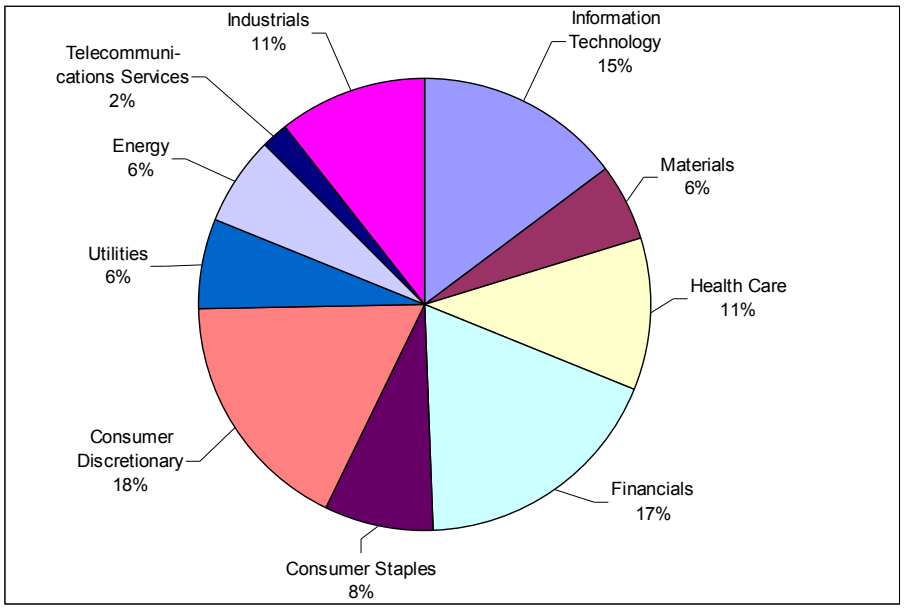


Table 7. Sample of 86 public companies

Company name	Ticker	Sector	Included in the SP 500 index
Apple	AAPL	Information Technology	1
Ameren Corporation	AEE	Utilities	1
American Electric Power Company, Inc.	AEP	Utilities	1
Aetna Inc.	AET	Health Care	1
The Allstate Corporation	ALL	Financials	1
AMR Corporation	AMR	Industrials	0
Amazon.com, Inc.	AMZN	Consumer Discretionary	1
Allegheny Energy, Inc.	AYE	Utilities	1
Anheuser-Busch InBev NV	BUD	Consumer Staples	1
ConAgra Foods, Inc.	CAG	Consumer Staples	1
Colgate-Palmolive Company	CL	Consumer Staples	1
The Clorox Company	CLX	Consumer Staples	1
Comcast Corporation	CMCSA	Consumer Discretionary	1
CMS Energy Corporation	CMS	Utilities	1
Costco Wholesale Corporation	COST	Consumer Staples	1
Campbell Soup Company	CPB	Consumer Staples	1
Delta Air Lines, Inc.	DAL	Industrials	0
Daimler	DCX	Consumer Discretionary	0
Dillards, Inc.	DDS	Consumer Discretionary	1
Dell	DELL	Information Technology	1
DISH Network Corp	DISH	Consumer Goods	0
DTE Energy Company	DTE	Utilities	1
Duke Energy Corporation	DUK	Utilities	1
EBAY	EBAY	Information Technology	1
Consolidated Edison, Inc.	ED	Utilities	1
Entergy Corporation	ETR	Utilities	1
Exelon Corporation	EXC	Utilities	1
Ford Motor Company	F	Consumer Discretionary	1
FedEx Corporation	FDX	Industrials	1
FirstEnergy Corp.	FE	Utilities	1
Florida Power & Light Company	FPL	Utilities	1
Honda Motor Co., Ltd.	HMC	Utilities	0
H.J. Heinz Company	HNZ	Consumer Staples	1
Starwood Hotels & Resorts Worldwide, Inc	HOT	Consumer Discretionary	1
Hewlett-Packard Company	HPQ	Information Technology	1
The Hershey Company	HSY	Consumer Staples	1
Ibm	IBM	Information Technology	1
InterContinental Hotels Group PLC	IHG	Industrials	0
J.C. Penney Company, Inc.	JCP	Consumer Discretionary	1

Jones Apparel Group, Inc.	JNY	Consumer Discretionary	1
Kraft Foods Inc.	KFT	Consumer Staples	1
The Kroger Co.	KR	Consumer Staples	1
Liz Claiborne, Inc.	LIZ	Consumer Discretionary	1
Lowes Companies, Inc.	LOW	Consumer Discretionary	1
Southwest Airlines Co.	LUV	Industrials	1
Marriott International, Inc.	MAR	Consumer Discretionary	1
McDonalds Corporation	MCD	Consumer Discretionary	1
MetLife, Inc.	MET	Financials	1
Altria Group, Inc.	MO	Consumer Staples	1
NiSource Inc.	NI	Utilities	1
NIKE, Inc.	NKE	Consumer Discretionary	1
Northeast Utilities System	NU	Utilities	0
PG&E Corporation	PCG	Utilities	1
priceline.com Incorporated	PCLN	Technology	0
Public Service Enterprise Group Inc.	PEG	Utilities	1
PepsiCo, Inc.	PEP	Consumer Staples	1
The Procter & Gamble Company	PG	Consumer Staples	1
Progress Energy, Inc.	PGN	Utilities	1
PPL Corporation	PPL	Utilities	1
Prudential Financial, Inc.	PRU	Financials	1
Papa Johns Intl, Inc.	PZZA	Industrials	0
Qwest Communications International Inc.	Q	Telecommunications Services	1
Reynolds American, Inc.	RAI	Consumer Staples	1
RRI Energy	RRI	Utilities	0
Sprint Nextel Corporation	S	Telecommunications Services	1
The Charles Schwab Corporation	SCHW	Financial	0
Sears Holdings Corporation	SHLD	Consumer Discretionary	1
Sara Lee Corp.	SLE	Consumer Staples	1
The Southern Company	SO	Utilities	1
Sempra Energy	SRE	Utilities	1
SUPERVALU INC.	SVU	Consumer Staples	1
Safeway Inc.	SWY	Consumer Staples	1
AT&T Inc.	T	Telecommunications Services	1
Molson Coors Brewing Company	TAP	Consumer Staples	1
Target Corporation	TGT	Consumer Discretionary	1
Tyson Foods, Inc.	TSN	Consumer Staples	1
Time Warner Inc.	TWX	Consumer Discretionary	1
UnitedHealth Group Inc.	UNH	Health Care	1
United Parcel Service, Inc.	UPS	Industrials	1
Verizon Communications Inc.	VZ	Telecommunications Services	1
Wendys Arbys Group Inc.	WEN	Consumer Discretionary	1

Wells Fargo & Company	WFC	Financials	1
Whirlpool Corporation	WHR	Consumer Discretionary	1
Wal-Mart Stores, Inc.	WMT	Consumer Staples	1
Xcel Energy Inc.	XEL	Utilities	1
Yum! Brands, Inc.	YUM	Consumer Discretionary	1
	13%	Not included in the SP 500 index	11
	87%	Included in the SP 500 index	75
	100%		86

Table 8. 3-year and 4-year forecast of twelve financial and market indicators based on OLS and CS, Tobin-Q, Price-to-Cash Flows, Price-to-Earnings, Volatility or the indicator itself

3-year Forecast	Using Customer Satisfaction		Using Tobin-Q		Using Price-to-Cash Flows		Using Price Earnings		Using Volatility		Using the indicator itself	
Forecasted indicators:	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values
Tobin-Q	8.21	-0.08	9.09	-0.02	8.52	0.02	8.41	0.01	8.25	-0.04	9.09	-0.02
Price-to-Cash Flows	46.50	-0.02	42.33	0.50	44.66	0.63	45.21	0.28	47.25	-0.05	44.66	0.63
Price Earning	103.57	-0.05	93.33	0.47	87.32	0.66	99.39	0.30	103.30	0.09	99.39	0.30
Volatility	57.15	0.23	57.20	0.08	57.22	0.07	57.29	0.09	53.14	0.53	53.14	0.53
ROA	0.08	0.15	0.08	0.31	0.08	0.08	0.09	0.08	0.08	-0.09	0.07	0.49
Price-to-Sales	13.52	0.07	12.20	0.50	11.92	0.66	13.03	0.30	13.66	0.06	8.69	0.75
ROE	3.17	0.05	4.10	-0.25	3.82	-0.38	3.46	-0.16	3.12	0.04	3.27	-0.30
ROI	0.37	0.11	0.37	0.22	0.38	0.01	0.38	0.16	0.37	-0.10	0.37	0.20
Book Value	14.47	0.02	14.17	0.25	15.88	0.14	14.81	-0.05	14.21	0.19	9.49	0.77
Dividend Yield	0.03	0.05	0.03	0.20	0.03	0.17	0.03	-0.08	0.03	0.23	0.03	0.22
Price Return	0.70	0.07	0.70	-0.06	0.72	-0.06	0.71	-0.11	0.72	-0.51	0.70	-0.10
Gross Profit Margin	0.17	-0.04	0.17	0.14	0.17	-0.01	0.17	0.20	0.17	0.17	0.12	0.71
Average:	20.66	0.05	19.48	0.20	19.23	0.17	20.25	0.09	20.36	0.04	19.09	0.35

4-year Forecast	Using Customer Satisfaction		Using Tobin-Q		Using Price-to-Cash Flows		Using Price Earnings		Using Volatility		Using the indicator itself	
Forecasted indicators:	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values	Average Root Mean Square Error between forecasted values and observed values	Average correlation between forecasted values and observed values
Tobin-Q	10.85	-0.12	11.03	-0.40	13.65	-0.67	11.13	-0.30	10.93	-0.04	11.03	-0.40
Price-to-Cash Flows	63.79	-0.06	62.65	0.45	53.35	0.66	62.25	0.29	63.59	0.04	53.35	0.66
Price Earning	139.46	0.05	138.54	0.39	119.15	0.60	137.15	0.27	139.18	0.05	137.15	0.27
Volatility	52.91	0.22	53.06	-0.03	53.30	0.28	53.39	-0.09	55.50	0.54	55.50	0.54
ROA	139.46	0.05	138.54	0.39	119.15	0.60	137.15	0.27	139.18	0.05	137.15	0.27
Price-to-Sales	17.79	0.09	17.61	0.45	14.46	0.67	17.42	0.31	17.78	0.04	16.75	0.64
ROE	1.25	0.28	1.31	-0.12	2.65	-0.18	1.31	-0.09	1.46	0.13	1.32	-0.45
ROI	0.63	0.05	0.63	0.11	0.63	0.05	0.62	0.21	0.63	0.06	0.63	0.13
Book Value	14.83	0.02	14.37	0.27	16.82	0.20	15.07	-0.03	14.82	0.10	10.08	0.74
Dividend Yield	0.03	0.09	0.03	0.20	0.03	0.18	0.03	0.19	0.03	0.26	0.03	0.28
Price Return	0.95	0.11	0.95	0.09	0.95	-0.01	0.95	0.00	0.98	-0.37	0.93	0.09
Gross Profit Margin	0.17	0.12	0.17	0.13	0.17	0.13	0.17	0.12	0.17	0.18	0.12	0.70
Average:	36.84	0.08	36.57	0.16	32.86	0.21	36.39	0.09	37.02	0.09	35.34	0.29