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The Value-Relevance of a Simple Fundamental Analysis

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ABSTRACT

This paper examines the value relevance of a simple fundamental analysis. This tool is basically used to assess the firms' activities and prospects, partly through published financial statements. Bond credit rating and analyst's long-term earnings growth forecasts are used as proxies for the firms' value. The fundamental signals of interest are selected based on existing literature on fundamental analysis. In general, the results provide some supports for the value relevance of basic fundamental analysis. Additional analyses also reveal that there is a two-way relationship between bond credit rating and analysts' forecasts. However, the relation does not exist in the case of commercial paper credit rating.

Keywords: Fundamental Analysis, Credit Rating, Analyst's Forecasts, Firm's Value

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บทคัดย่อ

งานวิจัยนี้ศึกษาความเกี่ยวข้องกับการตัดสินใจของเทคนิคการวิเคราะห์ปัจจัยพื้นฐาน ซึ่งเป็นเครื่องมืออย่างง่ายที่ใช้ข้อมูลที่เปิดเผยในงบการเงินในการประเมินผลการทำกิจกรรมและแนวโน้มผลการดำเนินงานในอนาคตของกิจการ งานวิจัยนี้ใช้อันดับความน่าเชื่อถือของหุ้นกู้และประมาณการการเติบโตของกำไรในระยะยาวของนักวิเคราะห์หลักทรัพย์เป็นตัวชี้วัดมูลค่าของกิจการ สำหรับปัจจัยพื้นฐานประกอบด้วยอัตราส่วนทางการเงินต่าง ๆ ซึ่งคัดเลือกมาจากงานวิจัยในอดีตที่เกี่ยวข้อง ผลการวิจัยพบว่า เทคนิคการวิเคราะห์ปัจจัยพื้นฐานเป็นเครื่องมือที่ให้ข้อมูลที่เกี่ยวข้องกับการตัดสินใจ จากการวิเคราะห์เพิ่มเติมพบว่า ความสัมพันธ์ระหว่างอันดับความน่าเชื่อถือของตราสารและประมาณการการเติบโตของกำไรในระยะยาวจะเป็นแบบสองทิศทาง แต่ไม่พบความสัมพันธ์ดังกล่าวระหว่างอันดับความน่าเชื่อถือของตราสารการเงินระยะสั้นกับประมาณการการเติบโตของกำไรในระยะยาว

คำสำคัญ: การวิเคราะห์ปัจจัยพื้นฐาน อันดับความน่าเชื่อถือ ประมาณการของนักวิเคราะห์หลักทรัพย์ มูลค่าของกิจการ

INTRODUCTION

The users of financial statements have long concerned whether the accounting numbers are accurate and reliable. Their potential to be manipulated has been brought to attention recently considering from the frequent appearance of the topic of earnings management in both the business press and academic journals. Nonetheless, existing research provides evidence that accounting data do have value-added to the decision making process. For instance, asserting that academic researchers tend to move toward the elimination of ratio analysis as an analytical technique in assessing the performance of the firm, Altman (1968) constructs accounting-based model to predict bankruptcy. The evidence indicates that accounting data are of value since his model can predict the bankruptcy of 36% of the 33 bankrupt sample firms five years before bankruptcy.

Although there are many assumptions underlying the financial statement preparation (such as historical cost principle), financial statements prepared under generally accepted accounting principles can be a key source of information about the firm's financial health. Based on conceptual framework, financials statements are purported to provide useful (reliable, relevant, and comparable) information to decision makers. An audit is done to offer a reasonable assurance that the entity's financial statements fairly present its financial position and results of operation in accordance with certain accounting principles. Under the Sarbanes-Oxley Act in a post-Enron world, any reporting errors may be punishable by imprisonment. As a result, the new generation of CEOs must personally vouch for their companies' financial statements (France et. al., 2004). As this situation continues at the cost of the firms, users

gain benefits from greater reliable information which is readily and publicly available.

Fundamental analysis *"involves an assessment of a firm's activities and prospects through published financial reports as well as other sources of information concerning the firm, the product markets in which it competes, and the overall economic environment. An advantage of fundamental analysis is that it avoids many of the pitfalls inherent in the discounted cash flow valuation method"* (Buaman, 1996, p.1). As basic (and essential) as its name indicates, fundamental analysis applies simple techniques to analyze financial statements. Provided that some users are not "sophisticated", this fundamental analysis should be a handy tool for the so-called "not too advanced" decision makers. Therefore, if accounting data are of value, can we go back to the simple fundamental analysis? Obviously, the answer to this question is an empirical issue.

The purpose of this paper is to investigate the question addressed above by applying a simple fundamental analysis to the firm's valuation and examine whether some selected financial ratios can explain the firm's valuation and its changes. Credit rating and analysts' forecasts, which have long been used as a surrogate for the firms' value, are applied in this study. The fundamental signals of interest are selected based on existing literature. The sample period of this study spans for 10 consecutive years.

This study provides some supports for the value relevance of fundamental analysis. That is, most fundamental signals selected in this study have an incremental explanatory to the firm's valuation, which is proxied by credit ratings and analysts' forecasts. Additional analyses also reveal that there is a two-way relationship between bond credit rating and analysts' forecasts. However, the relation does not exist in the case of commercial paper credit rating.

The remainder of this paper is organized as follows. Section 2 briefly reviews the literature on fundamental analysis, credit ratings, and analysts' forecasts. Section 3 develops hypotheses and model. Sample selection is addressed in Section 4 and Section 5 presents empirical results. Section 6 concludes.

Literature Review

Under efficiency markets hypothesis, investor cannot use publicly available information to generate abnormal returns. However, research shows that investors routinely use information from publicly available financial statement to assess the value of the firm. For instance, Previts et al. (1994) show that (sell-side) analysts commonly evaluate assets and liabilities based on a cost, not a market value basis, and base their recommendation primarily on an evaluation of company income. Watts and Zimmerman (1986) conclude from existing research that accounting variables are associated with market-based measures of risk and can be used to produce estimates of risk for unlisted securities and that rating agencies use accounting data publicly available in the published financial statements to predict bond ratings and their changes.

One of the key tasks in the fundamental valuation approach is the analysis of a firm's financial statements (Bauman, 1996). Ou and Penman (1989) derive a summary measure from financial statements that predicts future stock returns. The value measure is based on observed correlations with one-year-ahead earnings and ignored earnings for years further in the future. The evidence shows that their fundamental measure can capture equity values that are not reflected in stock prices. Stober (1992) then extends Ou and Penman's study by distinguishing between the information contained in the Ou and Penman's (1989) measure and that contained in analysts' forecasts of earnings per share. He finds the evidence consistent with the Ou and Penman's measure capturing at least some information not impounded in market prices.

The Ou and Penman's findings are also supported by Holthausen and Larcker's (1992) statistical model, which is based on historical cost accounting information. Their overall results indicate that financial statement items can be combined into one summary measure to yield insights into the subsequent movement of stock prices. In addition, Abarbanell and Bushee (1997), using a collection of signals that reflect traditional rules of fundamental analysis, find the evidence consistent with the underlying focus of fundamental analysis on the prediction of earnings.

Credit rating issued by credit rating agencies such as Moody's and Standard & Poor's has been largely used as a surrogate measure for the financial and operating conditions of the firm. For instance, Sengupta (1998) tests the association between bond ratings and disclosure quality and finds that bond ratings capture the default risk of the firm. Copeland and Weston (1988) claim that the rating is a useful source of information provided that on average, the raters provide unbiased estimates of default risk of the firm.

Short-term debt market is also an important source of fund. Diamond (1991) shows that reputation of the borrower affects whether the firm borrows directly or through an intermediary. Crabbe and Post (1994) follow Diamond's model and investigate the effect of a rating downgrade on an outstanding commercial paper[1] (CP). They show that outstanding CP does not fall significantly before the downgrade; however, it declines considerably in the weeks after the downgrade, which means that the downgrade does convey new information to the market. Uday and Nayar (1998) show that the information on lower and/or higher variability of future earnings associated with severe downgrades constitutes new information unavailable to the market prior to the rating change announcement.

Serving somewhat different groups of investors, financial analysts evaluate values of the firm and

[1] A short-term unsecured promissory notes issued by a corporation in which the maturity is typically less than 270 days.

express their opinion to the investors. Abarbanell et al. (1995) assert that the use of forecasts to proxy for investor beliefs has become a routine methodological practice in accounting and finance research. They construct a model of rational trade that incorporates earnings forecasts. The evidence shows that investor uncertainty can be expressed in terms of the information available to the investor including forecast precision. However, dispersion alone is not sufficient to proxy for investor uncertainty since other forecast properties such as the number of forecasts also affect forecast precision. Dechow et al. (1999) find evidence consistent with the hypothesis that sell-side analysts make overly optimistic long-term earnings growth forecasts for firms issuing equity, which are reflected in stock prices. Das et al. (1998) show results consistent with the hypothesis that analysts have greater incentives to seek and acquire non-public information for low predictability firms because firms characterized by low earnings predictability offer greater opportunities to improve upon the market's earnings expectations. As a result, they tend to issue more optimistic forecasts for the low predictability firms than for high predictability firms.

Nonetheless, existing research on analysts' forecasts shows that analysts do provide new information to the market. For instance, Francis and Soffer (1997) find that stock recommendations and earnings forecast revisions together explain about 5% of the variation in excess returns cumulated over days (–1, +1) relative to the report publication dates.

Hypotheses and Model Development

1. Fundamental Signals and Credit Ratings

The objective of this study is to investigate the information content of fundamental analysis in explaining short-term and long-term credit ratings and long-term earnings growth forecasts. Commercial paper credit rating is used as a measure of short-term creditworthiness of the firm whereas bond credit rating is used as a proxy for long-term credit rating. The fundamental signals of interest and their hypothesized relationships with credit ratings are described as follows.

1.1 Capital Structure (Debt to Equity Ratio)

The firm's creditworthiness is related to its capital structure. The firm's capital structure affects the potential of default and bankruptcy, and thus affects its credit rating. Long-term debt to common equity is normally used as a proxy for the firm's capital structure. In general, firms with relatively high debt to equity ratio are more susceptible to adverse effects in economic changes and thus expose to more risk. Therefore, both the levels and changes in debt to equity ratios are hypothesized to negatively associate with the level of credit rating and its change.

1.2 Short-Term Liquidity (Current Ratio and Cash Flow)

Short-term liquidity measures the ability of the firm to pay short-term debt. Two measures are used to capture short-term debt paying ability. The first indicator is current ratio. In general, the higher the ratio, the more liquid the company. Cash flow is another indicator of the ability to pay dividends and liabilities. The higher the cash flow,

the better the paying ability. Therefore, positive relations between short-term liquidity measures and credit ratings are expected.

In addition, Nayar and Rozeff (1994) show that firms with high CP ratings have higher announcement period stock returns than those with lower ratings due to the fact that firms with high CP ratings can enter into the debt market at cheaper transaction costs. As such, short-term liquidity measures are expected to be more pronounced in the case of CP ratings than in the case of bond credit ratings.

1.3 Profitability (ROA, Times Interest Earned, and EPS)

Three measures are used in profitability test. The first ratio is return on asset (ROA), which measures profitability of the firm in performing its primary business functions. In general, the higher the ratio, the better the performance. The second and third measures are times interest earned ratio, which reflects the likelihood that creditor will continue to receive their interest payments and earnings per share (EPS), which measures accounting performance of the firm. All three signals are expected to associate positively with credit ratings. In addition, EPS is also expected to associate positively with analysts' forecasts.

2. Fundamental Signals and Analysts' Forecasts

To investigate whether fundamental analysis captures value of the firm proxied by analyst's long-term earnings growth forecasts, fundamental signal is selected following Lev and Thiagarajan's (1993) study. Lev and Thiagrajan (1993) (see also Abarbanell and Bushee (1997)) conduct fundamental information analysis to identify a set of financial variables claimed by analysts to be useful in evaluating firm's performance and estimating future earnings. Based on their study, the following signals that may affect long-term growth forecasts are included. (All signals are calculated in the way that a positive value of each signal is a priori perceived as bad news).

2.1 Inventories (Relative to Sales)

Disproportionate inventory increases relative to sales are mostly viewed by analysts as a negative signal, consistent with the production-smoothing motive. Lev and Thiagarajan (1993) show that the inventory signal is negatively correlated with stock returns. Therefore, the hypothesized argument is that disproportionate increases in inventory (to sales) signal should negatively affect the revisions in long-term growth forecast.

2.2 Accounts Receivable (Relative to Sales)

Lev and Thiagarajan (1993) claim that disproportionate increases in accounts receivable (to sales) are mentioned by analysts as conveying a negative signal almost as often as inventory increases, i.e., they might suggest the earnings manipulation. Therefore, disproportionate increases in accounts receivable (to sales) signal is expected to associate negatively with the revisions in long-term growth forecast.

2.3 Gross Margin (Relative to Sales)

Gross margin is defined as net sales minus costs of goods sold. Analysts view a disproportionate decrease in the gross margin (to sales) as a negative signal. Lev and Thiagarajan (1993) note that variation in the gross margin fundamental

clearly affects the long-term performance of the firm and is thus informative with respect to earnings persistence and firm values. As such, the disproportionate decrease in the gross margin signal is hypothesized to associate negatively with the revisions in long-term growth forecasts.

2.4 Selling and Administrative (S&A) Expenses (Relative to Sales)

A disproportionate increase in S&A expenses (to sales) reflects the inefficiency of management. Lev and Thiagarajan (1993) shows evidence consistent to this perception. Therefore, a negative relation between the disproportionate increase in S&A expenses and the revisions in long-term growth forecast is expected.

Accordingly, the general forms of the estimating equations are:

$$RATE_t = \beta_0 + \beta_1 DE_t + \beta_2 CR_t + \beta_3 CF_t + \beta_4 ROA_t + \beta_5 INT_t + \beta_6 EPS_t + \beta_7 LASSET_{t-1} + \varepsilon \quad (1)$$

$$GF_t = \beta_0 + \beta_1 INV_t + \beta_2 AR_t + \beta_3 GM_t + \beta_4 SA_t + \beta_5 EPS_t + \beta_6 LASSET_{t-1} + \varepsilon \quad (2)$$

where $RATE_t$ is either $BOND_t$ when bond credit rating is a dependent variable or CP_t when CP rating is a dependent variable, and t is the year-index.

GF_t = Percentage of long-term earning growth forecast

DE_t = Debt to equity ratio

CR_t = Current ratio

CF_t = Level of cash flow

ROA_t = Return on asset

INT_t = Times interest earned ratio

EPS_t = Earnings per share

INV_t = Level of inventories relative to sales

AR_t = Level of accounts receivable relative to sales

GM_t = Level of gross margin relative to sales

SA_t = Level of selling and administrative expenses relative to sales

$LASSET_{t-1}$ = Natural log of the beginning of year total assets. This variable is added as a control variable for firm size.

ε = Error term

CF_t, INV_t, AR_t, GM_t, and SA_t are deflated by the beginning of year total assets. The general forms of the estimating equations for changes in dependent variables and changes in fundamental ratios are as follows.

$$\Delta RATE_t = \beta_0 + \beta_1 \Delta DE_t + \beta_2 \Delta CR_t + \beta_3 \Delta CF_t + \beta_4 \Delta ROA_t + \beta_5 \Delta INT_t + \beta_6 \Delta EPS_t + \beta_7 LASSET_{t-1} + \varepsilon \quad (3)$$

$$\Delta GF_t = \beta_0 + \beta_1 \Delta INV_t + \beta_2 \Delta AR_t + \beta_3 \Delta GM_t + \beta_4 \Delta SA_t + \beta_5 \Delta EPS_t + \beta_6 LASSET_{t-1} + \varepsilon \quad (4)$$

where Δ represents changes in respective variables. The definitions of terms are the same as addressed above. The measurements of each variable examined in this study are summarized in Table 1.

Table 1 Definition and Measurement of Variables Examined in the Study

Variables	Measurement
Bond ratings ($BOND_t$)	Bond ratings take value 1 through 18 for bond rated AAA through CCC.
CP ratings (CP_t)	CP ratings take value 1 through 6 for CP rated A–1+ through D.
Changes in credit ratings ($\Delta RATE_t$)	Changes in ratings are calculated whether the rates are upgrades, downgrades, or non-change.
Changes in long-term growth forecasts (ΔGF_t)	$(GF_t - GF_{t-1}) / P_{t-1}$ where P_{t-1} is stock price at the beginning of the year
Earnings per share (EPS_t)	Basic EPS before extraordinary item
Change in earnings per share (ΔEPS_t)	$(EPS_t - EPS_{t-1}) / P_{t-1}$
Debt to equity ratio (DE_t)	Long-term debt to common equity
Change in debt to equity ratio (ΔDE_t)	$(DE_t - DE_{t-1}) / MVE_{t-1}$ where MVE_{t-1} is the beginning of year market value of equity
Current ratio (CR_t)	Current assets to current liabilities
Change in current ratio (ΔCR_t)	$(CR_t - CR_{t-1}) / MVE_{t-1}$
Cash flow (CF_t)	Cash flows deflated by total $asset_{t-1}$
Change in the level of cash flow (ΔCF_t)	$(CF_t - CF_{t-1}) / MVE_{t-1}$
Return on asset (ROA_t)	Net income to total assets
Change in return on asset (ΔROA_t)	$(ROA_t - ROA_{t-1}) / MVE_{t-1}$
Times interest earned ratio (INT_t)	Net income to interest expense
Change in times interest earned ratio (ΔINT_t)	$(INT_t - INT_{t-1}) / MVE_{t-1}$
Level of inventories relative to sales (INV_t)	$INV_t - sales_t / TA_{t-1}$ where TA_{t-1} is the beginning of year total assets
Change in inventories relative to sales (ΔINV_t)*	Percentage ΔINV_t – Percentage changes in sales $\%\Delta INV_t = (INV_t - E(INV_t)) / E(INV_t)$ $E(INV_t) = \frac{1}{2}(INV_{t-1} + INV_{t-2})$ %Δsalest are measured similarly.
Level of accounts receivable relative to sales (AR_t)	$AR_t - sales_t / TA_{t-1}$

Table 1 Definition and Measurement of Variables Examined in the Study (Cont.)

Variables	Measurement
Change in AR relative to sales (ΔAR_t)*	Percentage ΔAR_t – Percentage changes in sales (The measurement is similar to that of inventory)
Level of gross margin relative to sales (GM_t)	$sales_t - GM_t / TA_{t-1}$
Change in GM relative to sales ΔGM_t)*	Percentage changes in sales – Percentage ΔGM_t (The measurement is similar to that of inventory)
Level of selling and administrative expenses relative to sales (SA_t)	$SA_t - sales_t / TA_{t-1}$
Changes in S&A expenses relative to sales (ΔSA_t)*	Percentage ΔSA_t – Percentage changes in sales (The measurement is similar to that of inventory)
Natural log of total assets ($LASSET_{t-1}$)	Natural log of the beginning of year total assets

* These signals are calculated following Lev and Thiagarajan's (1993) study.

Sample Selection

S&P's bond credit ratings and CP ratings are used in this study and are obtained for all active firms from Compustat database during the period of April 1994 – April 2004. Ratings of April are chosen in order to assure that rating agencies have utilized publicly available information from published financial statements (assume that financial statements of most firms are available at this month). Bond ratings take values 1 through 18 for bond rated AAA through CCC. CP ratings take values 1 through 6 for CP rated A–1+ through D. Current ratings are compared to previous ratings to measure whether they have been upgraded, downgraded, or constant. The neutral case is included in the sample because excluding firms without changes in credit ratings may create bias in the test. The final samples are as follows: 123 bond downgrades, 119 bond upgrades, 1,013 bond neutrals, 35 CP downgrades, 31 CP upgrades, and 204 CP neutral.

Data on long-term earnings growth forecasts during the same period are obtained from IBES summary statistics file. In this study, long-term growth forecast is chosen because its effects on credit rating of the firm should be different depending on the types of credit ratings. That is, the effect of long-term growth forecast should be more pronounced in the case of long-term credit rating than in the case of short-term rating. Other accounting data are obtained from Compustat database during the period 1993–2004. After eliminating observations with missing or extreme values, the final samples are 2,266 observations (firm-years) for the level and 2,125 for the changes. Summary statistics of each variable are shown in Table 2.

Table 2 Summary Statistics

Panel A: Summary Statistics for the Measurement Level* (N = 2,266)

Variables	Mean	Median	Std. dev.	Skewness	Minimum	Maximum
$BOND_t$	7.10	7.00	3.42	0.42	CCC (18)	AA+ (1)
CP_t	2.04	2.00	0.90	0.63	C (6)	A-1+ (1)
GF_t	12.49	11.83	3.78	2.23	2.00	52.91
DE_t	80.81	44.80	232.58	14.23	0.0	5325.05
CR_t	1.74	1.58	0.86	6.76	[illegible]	17.48
CF_t	86.68	39.38	128.55	3.29	-195.[illegible]	956.02
ROA_t	6.10	6.21	6.45	−1.44	[illegible]5.59	34.54
INT_t	7.02	4.13	16.72	11.8[illegible]	−245.24	486.59
INV_t	−718.17	−390.66	983.49	−3.68	−7130.88	−12.84
AR_t	−629.77	−356.50	784.66	−3.04	−5618.21	−7.97
GM_t	462.33	241.88	739.63	4.35	−7940.88	10493.92
SA_t	−559.83	−306.09	736.94	−[illegible].1	−5567.51	18.27
EPS_t	1.23	1.19	1.50	−0.99	−11.79	12.54
$LASSET_{t-1}$	8.04	8.00	1.24	0.12	4.00	11.50

Panel B: Summary Statistics for the Measurement Changes* (N = 2,125)

Bond downgrades	123 observations	CP downgrades	35 observations
Bond upgrades	119 observations	CP upgrades	31 observations
No changes	1,013 observations	No changes	804 observations

Variables	Mean	Median	Std. dev.	Skewness	Minimum	Maximum
ΔGF_t	−0.02	0.00	0.30	−8.45	−7.27	3.30
ΔDE_t	0.03	0.00	1.17	16.07	−12.67	35.89
ΔCR_t	−0.00	0.00	0.00	−6.47	−0.05	0.04
ΔCF_t	0.01	0.01	0.11	−7.92	−2.84	1.10
ΔROA_t	0.00	0.00	0.04	18.45	−0.46	1.29
ΔINT_t	0.00	0.00	0.01	16.88	−0.10	0.36
ΔINV_t	−0.0[illegible]	−0.02	0.27	2.62	−1.21	2.99
ΔAR_t	0.0[illegible]	0.00	0.23	6.49	−1.05	4.09
ΔGM_t	0.16	0.01	2.59	−16.52	−66.84	20.59
ΔSA_t	0.00	0.00	0.11	2.64	−0.69	1.62
ΔEPS_t	0.00	0.01	0.11	−7.37	−2.92	1.29
$LASSET_{t-1}$	8.09	8.00	1.24	0.14	4.01	11.54

* The definition and measurement methods are as described in Table 1.

Empirical Results

Panel A of Table 3 shows the regression results for the level of bond rating on the explanatory variables. The adjusted R^2 for the regression is 0.49. The coefficient of debt to equity ratio is positive and significant at the 0.01 level. Recall that rating takes value 1 through 18 for bond rated AAA through CCC. Thus, the interpretation is that as debt to equity ratio is increasing, the agencies tend to decrease the firm's credit rating. The coefficient of return on asset is negative at the 0.01 level, which means, the higher the return, the better the rating. The coefficient of EPS is positive and significant at the 0.01 level. It seems counterintuitive that as EPS increases, bond rating will be downgraded. The possible explanation is that this ratio may proxy for the level of risk. Thus, as EPS increases, the firm is more risky (take the internet firm as an example). The coefficient of natural logarithm of the beginning of year total asset is negative and significant at the 0.01 level, which means as firm gets bigger, its credit rating is of higher level.

Logistic regression is used to test the association between change in bond credit rating and financial signals. Firms are divided into two groups; the first group with bond upgrades or constant, the second with bond downgrade or constant. The division is for ease of interpretation. Panel B of Table 3 shows the results of logistic regression for the sample firms with bond upgrades compared to neutrals. Only the coefficient of total asset is positive and significant at the 0.05 level, which means as firm is getting bigger, its credit rating tends to be upgraded.

Panel C of Table 3 shows the results for the sample firms with bond downgrades compared to neutrals. The coefficients of change in cash flow and change in ROA are negatively and significantly associated with rating change at the 0.05 level, which, again, seems to be counterintuitive. The coefficients of change in times interest earned ratio and change in EPS are positively significant at the 0.01 and the 0.05 levels, respectively. This shows that as firm increases its EPS and cash flows, the raters tend to revise their rate upward.

Table 4 shows the results for commercial paper rating regression. The results of level regression are in Panel A. The coefficients of debt to equity ratio, ROA, and EPS are significant at the 0.01 level. The coefficient of natural logarithm of total asset is significant at the 0.05 level. These coefficients have the same signs as those in the case of bond rating. Therefore, the interpretations for each case are similar. However, the coefficient of cash flow, which is not significant in the case of bond rating, is negative and significant at the 0.01 level in this case. This shows that as firm increases its level of cash flows, the raters tend to increase the quality of the firm's CP rating. This is possible because the lender, when granting short-term loan, tends to focus on the firm's short-term liquidity.

Panel B of Table 4 shows the logistic regression results for the sample firms with CP rating upgrades compared to neutrals. Only the coefficient of change in debt to equity ratio is significant (at the 0.05 level). The interpretation is that as the firm

Table 3 Results of Bond Credit Rating Regression

Panel A: $BOND_t = \beta_0 + \beta_1 DE_t + \beta_2 CR_t + \beta_3 CF_t + \beta_4 ROA_t + \beta_5 INT_t + \beta_6 EPS_t + \beta_7 LASSET_{t-1} + \varepsilon$ (1)

Variable	Coefficient	t value	P value
Intercept	19.4900	28.16	0.0001
DE_t	0.0009	3.00	0.0027
CR_t	0.0526	0.62	0.5359
CF_t	0.0007	0.81	0.4190
ROA_t	−0.2064	−15.03	0.0001
INT_t	0.0073	1.90	0.0579
EPS_t	0.2759	5.01	0.0001
$LASSET_{t-1}$	−1.5006	−18.32	0.0001

Adjusted $R^2 = 0.49$

Panel B: Logistic Regression for the Sample with No Change or Upgrades

$\Delta BOND_t = \beta_0 + \beta_1 \Delta DE_t + \beta_2 \Delta CR_t + \beta_3 \Delta CF_t + \beta_4 \Delta ROA_t + \beta_5 \Delta INT_t + \beta_6 \Delta EPS_t + \beta_7 LASSET_{t-1} + \varepsilon$ (3)

Variable	Coefficient	Wald χ^2	Pr > χ^2
ΔDE_t	0.0082	0.0065	0.9355
ΔCR_t	−46.8013	0.7637	0.3822
ΔCF_t	−5.9849	1.1071	0.2927
ΔROA_t	6.0545	0.6781	0.4102
ΔINT_t	−24.3071	1.5649	0.2110
ΔEPS_t	7.6321	1.7496	0.1859
$LASSET_{t-1}$	0.1684	4.4718	0.0345

Likelihood ratio $\chi^2 = 9.748$ (p = 0.2033)

Panel C: Logistic Regression for the Sample with No Change or Downgrades

$\Delta BOND_t = \beta_0 + \beta_1 \Delta DE_t + \beta_2 \Delta CR_t + \beta_3 \Delta CF_t + \beta_4 \Delta ROA_t + \beta_5 \Delta INT_t + \beta_6 \Delta EPS_t + \beta_7 LASSET_{t-1} + \varepsilon$ (3)

Variable	Coefficient	Wald χ^2	Pr > χ^2
ΔDE_t	0.0165	0.0774	0.7809
ΔCR_t	10.8527	0.1833	0.6686
ΔCF_t	−9.6069	4.0898	0.0431
ΔROA_t	−14.2587	5.7701	0.0163
ΔINT_t	55.3648	8.4203	0.0037
ΔEPS_t	9.8226	4.2930	0.0383
$LASSET_{t-1}$	−0.0871	1.2375	0.2660

Likelihood ratio $\chi^2 = 22.810$ (p = 0.0018)

Table 4 Results of Commercial Paper Rating Regression

Panel A: $CP_t = \beta_0 + \beta_1 DE_t + \beta_2 CR_t + \beta_3 CF_t + \beta_4 ROA_t + \beta_5 INT_t + \beta_6 EPS_t + \beta_7 LASSET_{t-1} + \varepsilon$ (1)

Variable	Coefficient	t value	P value
Intercept	2.9871	9.50	0.0001
DE_t	0.0031	2.99	0.0029
CR_t	0.0407	1.21	0.2277
CF_t	−0.0013	−3.96	0.0001
ROA_t	−0.0718	−11.58	0.0001
INT_t	−0.0016	−0.58	0.5595
EPS_t	0.1437	6.96	0.0001
$LASSET_{t-1}$	−0.0719	−1.97	0.0498

Adjusted $R^2 = 0.30$

Panel B: Logistic Regression for the Sample with No Change or Upgrades

$\Delta CP_t = \beta_0 + \beta_1 \Delta DE_t + \beta_2 \Delta CR_t + \beta_3 \Delta CF_t + \beta_4 \Delta ROA_t + \beta_5 \Delta INT_t + \beta_6 \Delta EPS_t + \beta_7 LASSET_{t-1} + \varepsilon$ (3)

Variable	Coefficient	Wald χ^2	Pr > χ^2
ΔDE_t	−0.4039	5.4357	0.0197
ΔCR_t	−1276.1000	0.0000	0.9952
ΔCF_t	5.6126	0.2087	0.6478
ΔROA_t	25.5032	0.0875	0.7674
ΔINT_t	−7.2566	0.0130	0.9093
ΔEPS_t	−2.5083	0.0330	0.8558
$LASSET_{t-1}$	−0.0513	0.0448	0.8324

Likelihood ratio $\chi^2 = 6.244$ (p = 0.5115)

Panel C: Logistic Regression for the Sample with No Change or Downgrades

$\Delta CP_t = \beta_0 + \beta_1 \Delta DE_t + \beta_2 \Delta CR_t + \beta_3 \Delta CF_t + \beta_4 \Delta ROA_t + \beta_5 \Delta INT_t + \beta_6 \Delta EPS_t + \beta_7 LASSET_{t-1} + \varepsilon$ (3)

Variable	Coefficient	Wald χ^2	Pr > χ^2
ΔDE_t	0.1866	0.2820	0.5954
ΔCR_t	1253.9000	0.0000	0.9970
ΔCF_t	−21.0231	5.4956	0.0191
ΔROA_t	88.1594	2.0576	0.1514
ΔINT_t	−17.4274	0.0996	0.7523
ΔEPS_t	19.1669	3.7448	0.0530
$LASSET_{t-1}$	−0.0451	0.0873	0.7676

Likelihood ratio $\chi^2 = 7.222$ (p = 0.4062)

increases the level of debt, the credit agencies tend to revise the rate downward. Panel C of Table 4 shows the results for the sample firms with CP rating downgrades compared to neutrals. The coefficient of change in cash flow is negative and significant at the 0.05 level.

Panel A of Table 5 reports the results for the long-term earnings growth forecast. All coefficients except for that of inventories are significant. The interpretation is that analysts tend to increase their forecasts as the firm (1) decreases its level of accounts receivable (relative to sales), (2) increases its gross margin (relative to sales), and (3) increases its selling and administrative expenses (relative to sales). However, the coefficients of EPS and natural logarithm of total asset are negatively associated with growth forecast.

The regression results of the changes are shown in Panel B of Table 5. Only the coefficients of change in inventory, change in EPS, and natural logarithm of total asset are significant. These results show that the analysts consider the decrease of inventory (relative to sales) as a good signal, which is consistent to Lev and Thiagarajan's (1993)

Table 5 Results of Long-Term Earnings Growth Forecast Regression

Panel A: $GF_t = \beta_0 + \beta_1 INV_t + \beta_2 AR_t + \beta_3 GM_t + \beta_4 SA_t + \beta_5 EPS_t + \beta_6 LASSET_{t-1} + \varepsilon$ **(2)**

Variable	Coefficient	t value	P value
Intercept	14.2955	18.63	0.0001
INV_t	–0.0010	–1.46	0.1444
AR_t	–0.0032	–3.991	0.0001
GM_t	–0.0005	–2.25	0.0245
SA_t	0.0045	6.06	0.0001
EPS_t	–0.1196	–3.745	0.0002
$LASSET_{t-1}$	–0.1945	–1.79	0.0736

Adjusted $R^2 = 0.42$

Panel B: $\Delta GF_t = \beta_0 + \beta_1 \Delta INV_t + \beta_2 \Delta AR_t + \beta_3 \Delta GM_t + \beta_4 \Delta SA_t + \beta_5 \Delta EPS_t + \beta_6 LASSET_{t-1} + \varepsilon$ **(4)**

Variable	Coefficient	t value	P value
Intercept	–0.1875	–4.424	0.0001
ΔINV_t	–0.0468	–1.92	0.0546
ΔAR_t	0.0173	0.61	0.5450
ΔGM_t	0.0022	0.89	0.3749
ΔSA_t	0.0178	0.31	0.7594
ΔEPS_t	–0.3216	–5.32	0.0001
$LASSET_{t-1}$	0.0213	4.107	0.0001

Adjusted $R^2 = 0.22$

findings. However, we cannot conclude from the negative coefficient of change in EPS that the analysts will decrease their forecasts as the EPS is changing upward. The rational is that the forecast does not only depend on the amount of changes but also on the quality of changes. We have to investigate whether the change is transitory or persistence.

The results when growth forecast is included as an explanatory variable are shown in Table 6. Two-stages least square is used to deal with the chance of causality. The results from the first stage (not reported here) show that there exists a probability of simultaneity problem between growth forecast and bond rating, but this problem does not pronounce in the case of CP rating. The possible explanation may be that, in order to rate short-term rating and estimate long-term growth, raters and analysts focus on different time horizon. The effect of near term forecast, rather than that of long-term forecast, should be more pronounced in the case of CP rating.

Panel A of Table 6 shows regression results for the level when long-term earnings growth revision is included as one of the independent variables. All coefficients are significant. As long-term growth forecast increases, bond rating tends to decrease. This may be that the increase in forecast reflects the increase in risk (again, such as the internet firm). The coefficients of debt to equity ratio, ROA, times interest earned ratio, and EPS have the same sign as those in Table 3 (where GFt is not included in the model). The additional coefficients that are significant here but are not pronounced in the model of Table 3) are those of current ratio and cash flow. As the firm increases its cash flow, the raters tend to increase the quality of the firm's rating. However, the result for current ratio is not as expected because as current ratio increases, the rating tends to be lower. Again, the explanation is that both quantity and quality of the increases do matter. The causes of the increase in current ratio

Table 6 Results of Two-Stages Least Square

Panel A: $BOND_t = \beta_0 + \beta_1 GF_t + \beta_2 DE_t + \beta_3 CR_t + \beta_4 CF_t + \beta_5 ROA_t + \beta_6 INT_t + \beta_7 EPS_t + \varepsilon$

Variable	Coefficient	t value	P value
Intercept	−16.7372	−20.05	0.0001
GF_t	2.0116	31.74	0.0001
DE_t	0.0005	1.79	0.0738
CR_t	0.4036	5.917	0.0001
CF_t	−0.0056	−10.36	0.0001
ROA_t	−0.2209	−18.56	0.0001
INT_t	0.0079	2.38	0.0173
EPS_t	0.7672	15.18	0.0001

Adjusted R^2 = 0.637

Table 6 Results of Two-Stages Least Square (Cont.)

Panel B: Logistic Regression for the Sample with No Change or Upgrades

$\Delta BOND_t = \beta_0 + \beta_1 \Delta GF_t + \beta_2 \Delta DE_t + \beta_3 \Delta CR_t + \beta_4 \Delta CF_t + \beta_5 \Delta ROA_t + \beta_6 \Delta INT_t + \beta_7 \Delta EPS_t + \beta_8 LASSET_{t-1} + \varepsilon$

Variable	Coefficient	Wald χ^2	Pr > χ^2
ΔGF_t	−106.4000	191.6675	0.0001
ΔDE_t	0.0422	0.0523	0.8192
ΔCR_t	−6.7930	0.0017	0.9671
ΔCF_t	−10.6665	0.5980	0.4394
ΔROA_t	−2.4332	0.0252	0.8739
ΔINT_t	−28.2206	0.5430	0.4612
ΔEPS_t	65.2349	20.1084	0.0001
$LASSET_{t-1}$	1.6161	51.4098	0.0001

Likelihood ratio χ^2 = 590.67 (p = 0.0001)

Panel C: Logistic Regression for the Sample with No Change or Downgrades

$\Delta BOND_t = \beta_0 + \beta_1 \Delta GF_t + \beta_2 \Delta DE_t + \beta_3 \Delta CR_t + \beta_4 \Delta CF_t + \beta_5 \Delta ROA_t + \beta_6 \Delta INT_t + \beta_7 \Delta EPS_t + \beta_8 LASSET_{t-1} + \varepsilon$

Variable	Coefficient	Wald χ^2	Pr > χ^2
ΔGF_t	−103.0000	142.5194	0.0001
ΔDE_t	−0.1306	1.7359	0.1877
ΔCR_t	39.1597	0.8652	0.3523
ΔCF_t	−24.8710	4.4319	0.0353
ΔROA_t	−11.5830	0.6935	0.4050
ΔINT_t	0.5[illegible]58	0.0002	0.9899
ΔEPS_t	21.69[illegible]6	3.3682	0.0665
$LASSET_{t-1}$	3.6746	94.6314	0.0001

Likelihood ratio χ^2 = 642.068 (p = 0.0001)

may be the increase in cash, account receivable, or inventory. The last two are usually viewed as a bad sign from the analysts' perspective.

Panel B of Table 6 shows the results of logistic regression for the sample firms with bond upgrades compared to neutrals. The coefficient of estimated long-term growth is negative and significant at the 0.01 level. The interpretation is that as analysts revise their forecasts upward, the likelihood of the raters changing the rate upward is decreased (compared to neutrals). Panel C of Table 6 shows the results for the sample firms with bond downgrades compared to neutrals. Again, the coefficient of estimated long-term growth

is negative and significant at the 0.01 level. As the analysts revise their forecasts upward, the likelihood of the raters changing the rate downward is increased. The results in both groups seem to be counterintuitive. The explanation may be that growth forecast is viewed by the agencies as an indicator of risk.

Conclusions

Fundamental analysis is used in this study as an analytical tool to analyze the valuation of the firm, which is represented by its credit rating and long-term earnings growth forecast. In the level regression, most fundamental signals have an incremental explanatory to the valuation of the firm. However, in the case of the changes, the incremental explanatory power decreases. The interpretation of some ratios seems to be counterintuitive. The rational for the opposite direction may be that those ratios (such as cash flow, growth forecast) may proxy for the level of risks. In addition, there is a two-way relationship between bond credit rating and analysts' forecasts. However, this relation does not exist in the case of CP credit rating. In sum, the results suggest that fundamental analysis be of value. That is, users can gain benefits from using fundamental analysis, which is handy and simple, in evaluating the firm.

Some caveats need to be considered. First of all, changes in credit ratings and revision in long-term earnings growth forecast between April 1994 and April 2004 are used, assuming that raters and analysts have utilized publicly available information. The results of the test may depend on the time period chosen. Secondly, long-term growth forecast revisions are not grouped into upward and downward. The grouping may affect change in credit rating differently.

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