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A Study of Impact of Financial Performance on Disclosure of Financial Information through the Internet in Iran

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Abstract
In present study, we examine the relationships between financial performance (FF) and Disclosure of financial information through the Internet (DFII) of the listed companies on the Tehran Stock Exchange (TSE). Data were gathered from the audited financial statements of the firms provided by TSE's website from 2010 to 2015. The results of multiple linear regression analysis show that financial performance; including (Return on Investment, financial leverage, firm size, Earnings per share, Return on sales) have significant effects on Disclosure of financial information through the Internet. There is a no significant relationship between Return on equity, and Disclosure of financial information through the Internet. However, the results of fuzzy regression analysis indicate significant relationships between the DFII and all the independent variables except Return on equity.
Keywords: financial performance, DFII, Return on equity, Return on Investment regression, Earnings per share.
JEL classification: G31, G34, M41, M48.

1. Introduction

Nowadays, the Internet is a powerful means for companies to voluntarily disclose all kind of financial information. A wide academic literature exists on the field. Findings reveal that the financial information disclosed is wider than that normally required by accounting regulations. Furthermore, the disclosure on the Internet of compulsory information can be considered as a voluntary reporting practice in itself.

Van Kerckhoven (2002) investigated whether these differences in Internet reporting policies might be due to cultural differences in corporate reporting. The results of their study might be useful to standardizing committees who consider regulating the Internet corporate reporting scene and to all other interested parties.

Bonson and Escobar (2002) showed that there is a statistically significant relationship between these three variables (their sector, country of origin and size) and the extent of voluntary disclosure (transparency) on the Internet.

In this study, we examine the relationship between financial performance (FF) and disclosure of financial information through the Internet. Our paper delivers new evidence on the link between financial performance (FF) and Disclosure of financial information through the Internet. Section 2 motivates the study and lists the hypotheses to be tested. Section 3 describes our research design, including measurement of primary variables and empirical specification. Section 4 describes sample selection and descriptive statistics, the results from our regression analyses. And Section 5 concludes.

2. Literature review and hypotheses

An examination of the nature of information technology (IT), financial information and corporate financial reporting (CFR) indicates that the evaluation of IT impact on CFR requires a general, flexible and adaptive framework. Analogous to the contingency theory of organizations (CTO), (Xiao et al, 1996) in their paper proposed such a framework. Its general assumptions were that the impact of IT on different aspects of CFR varies and the degree and pattern are contingent upon environmental, organizational, and managerial characteristics.

Pirchegger and Wagenhofer (1999) analyzed the use of the Internet to present financial information by Austrian companies listed in the most liquid market segment of the Vienna Stock Exchange. Their study covered two points in time, end of December 1997 and 1998, respectively. Their results showed that for Austria that larger companies and companies with higher percentage of free float score higher.

Craven and Marston (1999) examined the extent of financial information disclosure on the Internet by the largest companies in the UK in 1998. They also investigated whether that information was in summary form or whether the full annual report was available. They found a statistically significant positive relationship between the size of a company and the use and extent of disclosure on the Internet. They showed that there was no significant association between industry type and disclosure.

Larran and Giner (2002) studied the use of the Internet by Spanish companies to disclose financial

information, they also discussed about the reasons of companies to use the new technologies to communicate with interested parties and its consequences. Their results showed that size is the main factor that explains not only the quantity but also the quality of financial information.

Haasbroek and Filistea (2002) they determined the current state and level of adoption of the Internet as a delivery and communication mechanism for disseminating online/digital annual reports in the largest listed companies in South Africa. Their Results indicated that the top 100 South African companies have increased their corporate Web presence from 43% in 1999 to 92% in 2002. Top 100 companies with annual reports on the Internet increased from 11% in 1999 to 84% in 2002. Their Results indicated that 227 (75,6%) of the top 300 companies had a website and 31 (10,3%) had no home page. The websites were also analyzed to investigate how many companies had detailed electronic annual reports available. They showed that 179 (59,6%) companies had digital annual reports and 48 (16,0%) had no digital annual report available on the Internet. Of the companies surveyed, 131 (43,6%) had their annual reports in PDF format and 58 (19,3%) in HTML. Only 38 companies (12,6%) presented annual reports in HTML and PDF format on the Internet. Very few companies provided users with the functionality to download data in spreadsheet format for manipulation. Only 7 companies (2,3%) offered this feature. they also investigated the relationship between digital annual reports (dependent variable) and company characteristics. there is a significant association between industry sector and digital annual reports, with 63,6% companies in the industrial sector with digital annual reports, compared to 82,1% in the financial sector and 77,4% in the mining resources sector. The conclusion can be drawn that there is no significant correlation between companies with a Web presence and the industry type in which each company operates. Of the companies in the industrial sector, 85,8% had Web presence compared to 92,3% in the financial sector and 90,3% in the mining resources sector.

Amelia Garcia-Borbolla (2005) studied to the information published on their Websites in order to clarify certain doubts with respect to the type of target users and thus discover the objectives and strategies pursued by publishing a corporate Webpage. Given the low observed percentage of SMEs with a Website (31.74%) they have also studied the factors influencing the propensity of businesses to possess a corporate Website.

The Internet has emerged as a medium of communication of financial reporting information by companies since the mid to late nineties. There are various aspects of Internet based financial reporting that are different from the traditional hard copy presentation. These factors include the actual mode of presentation and, the process of access to the information that is accessing a company's website rather than the hard copy version of the financial reports. Various bodies mentioned in this paper have made recommendations to improve financial reporting disclosure online. There is lack of uniformity regarding financial reporting disclosure between companies worldwide (Tehmina Khan, 2007).

Chae et al (2014) reexamined the link between IT capability and firm performance. The results of their current analysis showed no significant link between IT capability and firm performance. They discussed several possible causes for the change in findings and present an in-depth comparison in business performance between the two groups--IT leader and control--over a period extending from 1991 to 2007.

Dewan and Shi (2007) developed empirical proxy measures of information technology (IT) risk and incorporates them into the usual empirical models for analyzing IT returns: production function and market value specifications. Their results showed that IT capital investments make a substantially larger contribution to overall firm risk than non-IT capital investments. Firms with higher IT risk have a higher marginal product of IT relative to firms with low IT risk. They estimated that about 30% of the gross return on IT investment corresponds to the risk premium associated with IT risk. Their findings indicated that IT risk provides part of the explanation for the unusually high valuations of IT capital investment in recent research.

Jae Hae et al (2011) used meta-analysis techniques to investigate research choices that affect findings with respect to the return on IT investment. They found, that the relationship between IT investment and performance varies, depending on how both financial performance and IT investment are measured. Despite criticism of accounting measures as indicators of IT payoff, they found that the relationship is often stronger in studies that employ accounting measures rather than market measures of firm performance. They discussed the practical implications of the results of our meta-analysis and suggest new directions for future theory development and research.

Adi Masli (2011) investigated the impact of superior IT capabilities on firm performance over the 1988–2007 periods, which allowed them to consider the structural shifts in the return of IT capability over time. Their results suggested that firms with superior IT capabilities were able to attain higher firm performance levels until 1999. They also found that a subset of firms that sustain high levels of IT capabilities during the period 1988 to 2007 continue to perform better than their peers.

Farhanghi et al (2013) investigated the effect of information technology (IT) on organizational structure (OS) and firm performance (FP). Their results showed that IT has a direct and indirect impact on FP. OS is found to have a direct effect on FP. Finally IT has a direct effect on OS. Hung et al (2012) examined the impacts of ATMs, one of the most widely accepted SSTs, on bank financial performance. Their results showed ATMs

have a positive relationship with profitability. They found no association between ATMs and growth performance.

Adi Masli(2011) investigated the link between information technology investment and business value. They examined financial and non-financial measures to represent different elements of business value and they survey IT investment measures and links with firm performance and they examined IT and business complementarities that affect firm performance. They showed the impact of business context and IT alignment with business strategy on resulting performance.

Kalkan et al (2011) investigated the impact of firm size, information system and the technological architecture associated with prospector strategy on performance of firms operating in Isparta, in Turkey. They focused on the interactions between firm size, prospector strategy, technological architecture and firm performance. They identified the relationships between firm size and the technological architecture on prospector strategy that support the firm performance best. Technological architecture was identified. The firm size has been measured in terms of employment. Environmental conditions offered many opportunities to firms. The strategic activity has been taken as prospector. The firm performance is based on the sales growth and profitability.

Lio et al (2013) found that the core information technology (IT) employees with firm specific skills are value-adding resources that aid the firm's performance whereas peripheral employees with less firm specific skills provide no value to the firm performance. They found that the economic impact of the presence of core IT employees is moderated by the organization's non-IT investment intensity. Their findings of the research provided insights that help to expand the understanding of resource complements and the role of strategic human resources in a firm.

Rong et al (2006) investigated the association among strategy, the extent of IT applications to 12 planning and control functions, and firm performance. Special attention was paid to the moderating effect on these relationships of 15 technical, human, and organizational impediments to IT implementation. They analyzed survey data obtained from 296 Taiwanese companies, supplemented by financial data from publicly disclosed financial reports. Their results indicated that strategy significantly influenced the extent of IT applications for planning and control. In turn, the extent of IT applications had a significant direct effect on firm performance, while the direct effect of strategy was insignificant. The relationship between strategy and the extent of IT applications, and between the latter and firm performance were both stronger when the level of impediments to IT implementation was low.

Broadbent and Weill (1997) explained how successful firms create business-driven IT infrastructures. Some firms did not invest in a firm wide infrastructure, while others invest up to 10 percent of their revenues in an IT infrastructure, such as communication networks, databases, and expertise that is shared across multiple business units. Both approaches may be correct, provided they match the firm's specific needs.

Kyeong et al (2009) investigated the effects of IT investment on firm financial performance in the electronics industry of China, still classified as a developing country, and compare it with the United States. They found that IT investment has a positive impact on firm performance in China. Moreover, the impact in China was not different from what occurred in the United States in terms of direction and the size against the assertion of previous studies and expectations.

We extend this work by investigating the following question: What is the relationship between financial performance and disclosure of financial information through the Internet? This question leads to the three following hypotheses in this paper:

H_1**:** There is a significant relationship between Return on Investment (ROI) and DFII.
H_2: There is a significant relationship between Return on sales (ROS) and DFII.
H_3**:** There is a significant relationship between financial leverage (LEV) and DFII.
H_4**:** There is a significant relationship between firm size (SIZE) and DFII.
H_5: There is a significant relationship between earnings per share (EPS) and DFII.
H_6**:** There is a significant relationship between return on equity (ROE) and DFII.

3. Data, variables and model

3.1. Data

The data is collected from 94 samples firms listed in Tehran Stock Exchange for the period from 2010 to 2015. Table 2 provides mean, median, standard deviation, maximum, and minimum values for the research variables. The sample comprises firms that meet the following conditions:

1. Firms that have been listed in the stock exchange before 2015;
2. Firms whose financial year ends at the end of the Iranian calendar;
3. Firms that have no financial year changes;
4. Firms that have been operating in TSE during the period of interest;
5. Firms that have data available for the period of interest;

6. Investment companies are excluded. Given these conditions, 94 firms were selected as sample.

3.2. Research model

The present research uses the model proposed for the hypotheses:

$$DFII_{i,t} = \beta_0 + \beta_1 \mathrm{ROI}_{i,t} + \beta_2 \mathrm{ROS}_{i,t} + \beta_3 \mathrm{LEV}_{i,t} + \beta_4 \mathrm{SIZE}_{i,t} + \beta_5 \mathrm{EPS}_{i,t} + \beta_6 \mathrm{ROE}_{i,t} + \varepsilon_{i,t}$$

3.3. Research variable

3.3.1 Dependent variable

In this study, the dependent variable is disclosure of financial information through the Internet (IDFII). Equal to one if the firm is disclosed to the components, zero otherwise. The present research uses the model proposed by:

$$IDFII = \frac{\sum A}{\sum B}$$

A: disclosed components.

B: All components

Table 1. Financial information

Components of financial information	**Disclosure percent**
Non-balance-sheet processing.	**40**
Income statement none processed.	**48**
Cash Flow Statements none processed.	**38**
Balance-sheet processing.	**5**
Income statement processed.	**3**
Cash Flow Statements.	**1**
Financial statement non processing.	**16**
financial statement processing	**3**
Notes with links	**25**
Financial Ratio.	**8**
Audit report	**30**
Board Performance Report.	**25**
Predicted Information	**36**
Market information.	**32**
Tax information	**23**

3.3.2. Independent variable

In this study, the independent variable is Return on Investment, financial leverage, firm size, Earnings per share, Return on sales and Return on equity. The present research uses the model proposed by:

$$ROI = \frac{NET\ INCOME}{TOTAL\ INVESTMENT}$$

$$ROE = \frac{ROI}{1 - DEBT\ RATIO}$$

$$ROS = \frac{NET\ INCOME}{NET\ SALES}$$

$$\mathrm{EPS} = \frac{\mathrm{NET\ INCOME}}{\mathrm{N}}$$

3.3.3. Control variable

In this study, the control variables are firm size, financial leverage.

$$financial\ leverage = \frac{total\ debt}{shareholders\ equity}$$

Firm size: It is the natural logarithm of total sales for firm.

4. Sample selection and descriptive statistics

Multivariate regression analysis and fuzzy regression analysis were applied at the 5% significance level for testing the hypotheses. Descriptive and inferential (multivariate and fuzzy regression analyses) analyses are used for testing the hypotheses of the research.

4.1. Descriptive analysis

Table 1. Descriptive Statistics

	N	Mean	Minimum	Maximum	Std. Deviation
IDFII	470	3.25	3.02	8.03	2.02
ROI	470	18.25	5.21	62.1	11.87
ROS	470	61.23	14.70	182.18	45.17
LEV	470	32.12	6.22	98.30	13.45
SIZE	470	49.25	20.32	329.41	39.20
EPS	470	29.33	7.73	16.35	35.32
ROE	470	41.20	6.51	142.21	35.28

In the regression model, the effect of the independent variables (ROI, ROS, LEV, SIZE, EPS, and ROE) on the IDFII of the sample firms is examined. A multivariate linear regression model is used at the 5% significance level for testing the hypotheses. If there is no relationship between the independent variable and the dependent variable, all the coefficients in the regression model must be equal to zero. Thus, we can test the significance of the regression model, which is often done using F test. If the obtained F-statistic is less than the Table value of F at the 95% confidence level, the regression model will be significant.

4.2. Regression analysis

Table 3. The results of estimating the regression model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	CONSTANT	9.325	4.258	6.365	2.321	0.045
	ROI	1.470	1.325	2.012	3.741	0.032
	ROS	2.921	1.250	2.369	2.850	0.041
	LEV	1.235	1.012	1.874	1.965	0.032
	SIZE	0.457	0.245	0.547	1.365	0.025
	EPS	1.852	1.035	1.039	2.032	0.040
	ROE	4.325	2.032	4.102	1.047	0.620

Table 4. Model Summary

Model	Adjusted R Square	F	Durbin-Watson	Sig
	0.321	6.325	1.654	0.000

Fuzzy regression

Simple Linear Regression defined based on probability distribution, is always confronted with some limitations due to the hypotheses inflexibility. Also, the statistical regression models are used only when the observations' distribution is done based on a statistical model. But, the fuzzy regression models, in addition to their flexibility in adaptation to natural conditions, are an efficient instrument for demonstrating the effects of those variables with the same features. Time fuzzy regression is used when the variables or the observations are imprecise and vague, and when the relationship between variables is imprecise, as well as when the hypotheses' accuracy is uncertain (in small samples).However, in many cases, one or more hypotheses may be rejected or due to the sample size the hypothesis cannot be supported. In such cases, the common models do not have the required reliability and performance. The next alternative method is fuzzy regression. This kind of regression can be used when the variables or the relevant observations are imprecise and vague; also when the relationship between the variables is imprecise; or when the hypotheses are not certainly true (particularly, when the sample is small). The current study employs the fuzzy regression with fuzzy coefficients to examine the model.

The regression model:

$LN\ FEE = \alpha_0 + \alpha_1 \text{ERT} + \alpha_2 \text{LNSIZE} + \alpha_3 \text{LEV} + \alpha_4 \text{LOSS} + \alpha_5 \text{OPIN} + \alpha_6 \text{LNACC} + \theta_i$

Assuming that:

$y = LN\ FEE, x_1 = \text{ERT}, x_2 = \text{LNSIZE}, x_3 = \text{LEV}, x_4 = \text{LOSS}, x_5 = \text{OPIN}$

$, x_6 = \text{LNACC}$ And $\alpha_1 = (a_i, s_i)$, i=0,1,…,6

The objective function is expressed as follows:

$z = 2 * 80 s_0 + 2 s_1 \sum_{j=1}^{80} |x_{1j}| + 2 s_2 \sum_{j=1}^{80} |x_{2j}| + 2 s_3 \sum_{j=1}^{80} |x_{3j}| + 2 s_4 \sum_{j=1}^{80} |x_{4j}| + 2 s_5 \sum_{j=1}^{80} |x_{5j}| +$

$2 s_6 \sum_{j=1}^{80} |x_{6j}|$

Two constraints are defined for each observation with a total of 416 constraints. For instance, the first two constraints are as follows:

$(1-h)s_0 + (1-h)s_1|0.3| + (1-h)s_2|89| + (1-h)s_3|88| + (1-h)s_4|0.5| + (1-h)s_5|87| +$

$(1-h)s_6|0.8| - a_0 + a_1|0.3| + a_2|89| + a_3|88| + a_4|0.5| + a_5|0.87| + a_6|0.8| \geq -0.09$

Minimizing the objective function (z) with respect to the 416 constraints as well as $s_0 \geq 0$ for i= 0,1,…,6 and $a_i = 0,1,\dots,6$ is a problem in linear programming that is solved by Lingo software. Solving the problem for $h\epsilon(0,1)$ leads to the data provided in Table5.

Table 5. Estimating the objective function based on different membership degrees

h	s_0	z
0.1	0.39	79
0.2	0.43	89
0.3	0.49	103
0.4	0.57	119
0.5	0.24	142
0.6	0.86	179
0.7	1.14	232
0.8	1.8	355
0.9	3.5	710

Considering the above Table, we will have the following calculations for all the h values:

$s_0 = s_1 = s_2 = s_3 = s_4 = s_5 = s_6 = 0$

$a_0 = 0.17, a_1 = 0.21, a_2 = 0.008, a_3 = 0.11, a_4 = 0.10, a_5 = 0.12, a_6 = 0$

By replacing the coefficients obtained in the regression model, for certain values of independent variables the output is fuzzy and in the form of symmetric triangular fuzzy numbers. Therefore, we defuzzify the output using Center of Area (COA) in MATLAB. Finally, the MSE of the model can be obtained by comparing the estimated model with real values. In this case, the final regression model is the one with the lowest MSE. The output of MATLAB is provided in Table 6.

Table 6. Estimating the objective function based on real value

h	α_0	MSE
0.1	0.171	0.0320
0.2	0.182	0.0313
0.3	0.172	0.0318
0.4	0.173	0.0320
0.5	0.180	0.0318
0.6	0.172	0.0317
0.7	0.164	0.0315
0.8	0.162	0.0316
0.9	0.08	0.0318

Considering the Table above, the lowest MSE occurs when h=0.09.

Therefore, the fuzzy regression model is:

$\tilde{y} = 0.17 + 0.21x_1 + 0.008x_2 + 0.11x_3 + 0.10x_4 + (-0.12)x_5 + 0x_6$

Defuzzification gives the following model

$y = 0.008 + 0.21x_1 + 0.008x_2 + 0.11x_3 + 0.10x_4 + (-0.12)x_5 + 0x_6$

Hypothesis 1

According to the first hypothesis (ROI) is significantly associated with DFII. Based on the results of multivariate regression model (Table 3), ROI has a beta coefficient of 1.470 and p-value of 0.032 therefore; there is a significant relationship between ROI and DFII at 5% significance level.

Hypothesis 2

According to the second hypothesis ROS is significantly associated with DFII. Based on the results of multivariate regression model (Table 3), ROS has a beta coefficient of 2.921and p-value of 0.041 Therefore; there is a significant relationship between ROS and DFII at 5% significance level.

Hypothesis 3

According to the third hypothesis financial leverage (LEV) is significantly associated with DFII. Based on the results of multivariate regression model (Table 3), LEV has a beta coefficient of 1.235 and p-value of 0.032 therefore; there is a significant relationship between LEV and DFII at 5% significance level.

Hypothesis 4

According to the third hypothesis firm size (SIZE) is significantly associated with DFII. Based on the results of multivariate regression model (Table 3), SIZE has a beta coefficient of 0.457 and p-value of 0.025 therefore; there is a significant relationship between SIZE and DFII at 5% significance level.

Hypothesis 5

According to the third hypothesis EPS is significantly associated with DFII. Based on the results of multivariate regression model (Table 3), EPS has a beta coefficient of 1.852 and p-value of 0.040 Therefore, there is a

significant relationship between EPS and DFII at 5% significance level.

Hypothesis 6

According to the third hypothesis ROE is significantly associated with DFII. Based on the results of multivariate regression model (Table 3), ROE has a beta coefficient of 4.325 and p-value of 0.620 therefore; there is a no significant relationship between ROE and DFII at 5% significance level.

Table7. Results of testing the hypothesis with multivariate regression analysis

Variable	Beta	Sig	Result
ROI	1.470	0.032	accepted
ROS	2.921	0.041	accepted
LEV	1.235	0.032	accepted
SIZE	0.457	0.025	accepted
EPS	1.852	0.040	accepted
ROE	4.325	0.620	rejected

5. Conclusion

The present research examined the relationship between six variables (Return on Investment, financial leverage, firm size, Earnings per share, Return on sales, return on equity) and DFII of the firms listed in Tehran Stock Exchange. The results of multivariate regression rejected one the hypotheses of the research. The results of multiple linear regression analysis show that there is a significant relationship between Return on Investment, financial leverage, firm size, Earnings per share, Return on sales with IDFII. This finding is consistent with results (Adams et al 1987), (Buzby, 1975), (Cook, 1992), (Wagenhofer, 1990). The limitation is related to the lack of classified data in the database of TSE. Therefore, the researchers were forced to use the audited reports of the firms and data collection became a very time consuming process.

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