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Enterprise risk management and firm performance evidence from financial market of Iran

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Abstract

The purpose of present research is examine the effect of enterprise risk management (ERM) approaches on firms' performance by investigating financial asset and market variables and its effect on ERM. Using a sample of 66 firms which report establish Risk Assessment Unit (RAU) or administrative units with same functions as an administrative division. Research results shows that firms adopting ERM have meaningful decrease in their stock price fluctuations and unpredictability. Firms establishing Risk Assessment Unit (RAU) compared to similar and non-RAU firms in their industry group, have considerable improvement in dispel their asset opacity, decreased market to book ratio and decreased earnings volatility. In addition, we find that there is a meaningful negative relationship between the change in firms' market to book ratio and earnings fluctuations. Our finding confirm that banks and financial institutions increase leverage after ERM implementation. Finally, we find no meaningful evidence to support that ERM can have an important role in value creating.

Keywords: Enterprise risk management (ERM), Risk assessment unit (RAU), Financial market of Iran, Firm performance.

Introduction

ERM is a most popular policy which tries to measure and control many type of risks. Thus, ERM use by the firm's in order to determine what type of risks should be accepted or avoided. It should be noted that recently this issue has been located at the center of attention, and it's due to its relationship with firm performance. Present research is tried to examine the different aspect and effect of ERM implementation, and its benefits. Thus, we try to find out how ERM increase firm's value and promote its performance, as Marsh and McLennan[1] which noted benefits of ERM implementation. Indeed, the main purpose of ERM is to control the effects of financial crisis and help them to follow their investment strategies. Undoubtedly, steadier earnings and cash flow lead to having higher leverage and improve it and also cause to pursue more growth opportunities and consequently have a profitable company.

Conceptual framework: Interaction between capital markets accompanied with absence of asymmetric information and risk management at the corporate level leads to negative NPV project. Stulz[2,3], Nocco and Stulz[4], Tufano[5] explain that risk management proceedings could be create value for shareholders considering agency costs and market imperfections or information asymmetries interfere with perfect capital markets mechanisms. Generally risk concept is considered as possibility of outcomes which has a root in what was expected, and the negative consequence. Stulz, elaborate value creation role of it in the risk management and mitigate or elimination of negative consequence. Included negative earnings and cash flow fluctuations. Possible costs are financial problems such as bankruptcy and uncertainty situations. Also, negative earnings and unexpected cash flow fluctuations. In most cases, companies do not inform their shareholders about the ERM adoption, and their future risk management policies[5]. Walker[6] concluded that ERM purpose needs top management support.

It should be noted there are many variables which have to be consider in ERM definition, the main definition is that ERM is a way of evaluate firm's risk. Although sometimes ERM consider as a manager policies that can be useful to increase firms wealth. ERM will have its inevitable effect on earnings by decreasing its variance via controls on risk of costs and revenues. Pagach and Warr[7] find out there is no meaningful stock price changes (rise or fall) considering ERM implementation.

However, examine cross-sectional shows that firms in non-financial companies are more likely having a positive stock price reaction by ERM implementation. Stulz, confirmed that only firms who face these costs are benefit from ERM. Results of this study are dissimilar with the research conducted by Hoyt[8] and Bertinetti[9], which previously found that there are influences of both. However, this study is similar to Pagach and Warr[10], Tahir and Razali[11], Skerci[12] who found that there are no significant influences of both.

In order to examine the effect of ERM implementation on company's performance, there are many variables; these factors can be categorized as: risk specifications, financial specifications, asset specifications and market specifications.

Risk specifications as aim of ERM approach is to reduce operational uncertainty and particularly operational losses. Financial specifications are related to the probability of the firm experiencing a costs in long-time. The most important financial specifications are leverage. Firms with higher leverage are more likely expose to financial distress.

The asset specifications provide important information about the degree to which a firm's assets are likely to be devastated in financial crises. Opacity and growth are two main specifications which are considered in this paper. Stock price return volatility, firms market risk (or non-diversifiable) and valuation of the firm are main area in market specification. Bank specification is the last issue should be examined.

Research objective: Research objective focuses on the following areas. First of all, examine coincide of change in earnings volatility and ERM implementation time. Since the ERM aim to reducing uncertainty by allowing managers to have a better understanding of potential financial and non-financial events. Second, examine the possible relationship between ERM implementation in order to promote financial performance considering pervious performance and their industry.

Thus, it should be noted ERM can creates value by recognizing and demonstrate risks. Third, examine change in financial characteristics of firm after ERM implementation. Corporate and governmental agencies are the most important benefiters of present research results in order to developing and implementing ERM programs.

Methodology

In present research we examine firms who implement ERM in the Banks and financial institution (21 sample), investment companies (32 sample) and financial intermediation companies (13 samples). Thus, our sample consists of 66 banks, institution and companies from Tehran Stock Exchange (TSE). We consider establishing announcements of Risk Assessment Unit (RAU) or administrative units with same functions as a sign of firm's adoption with ERM process.

Thus, our statistical sample consist of127 announcements of RAU released from 2001-2015 from Tehran Stock Exchange (TSE)[13] website and Codal website (Securities and Exchange Organization data center of Iran)[14]. We need firms with seven years of continuous data (three years prior to and three years after establishing (RAU)). Thus, our sample is reduced to 97 firms.

We gather statistical data for all firms listed in TSE and Codal website. Table-1 shows distribution of the announcements through time and also the distribution across sample study. Majority of RAU sunit tend to be in the later part of the sample period, from 2010 through 2015. A significant part of the RAU establishing is belonging to Bank and financial institutions, investment companies and financial intermediation companies.

In order to examine whether RAU are related to changes in main financial factors, our main methodology is to evaluate changes in these factors one years after RAU establishment and considering years before. We use multivariate analysis, matched sample and logit model to examine differences possibility between the RAU sample and the companies and institutions matched sample (without RAU unit).

Table-1: RAU announcements.

Year	All Firms	Banks and Financial institutions	Investment companies	Financial intermediation companies
2001	1	1	0	0
2002	2	1	1	0
2003	3	3	0	0
2004	4	2	1	1
2005	5	3	1	1
2006	3	1	1	1
2007	2	2	0	0
2008	6	2	2	2
2009	8	4	2	2
2010	7	5	1	1
2011	12	8	3	1
2012	9	7	2	0
2013	13	8	3	2
2014	10	7	3	0
2015	12	7	4	1
Total	97	61	24	12

Risk variable, measuring by earnings volatility (SD(E)) by calculating standard deviation of the error term by using regression of the firm's quarterly earnings on the prior quarter's earnings. Stock price fluctuation (SD (RET)) variable is the standard deviation of the firm's daily returns over the year prior to the establishing RAU. Financial variable, measuring as below:

Leverage = Total liabilities/Total Assets (1)

Accounting return has two components of return on equity, namely the profit margin and the asset turnover ratio. The third component, leverage, is included above:

Profitability = Net Income/Net Sales (2)
Asset Turnover = Net Sales/Total Assets (3)
Financial slack as the proportion of the firm's assets that are cash or cash equivalents:
Slack = Cash and Marketable Securities/Total Assets (4)

Asset variables, Opacity is the ratio of intangibles to total assets:

Opacity = Intangibles/ Total Assets (5)

Proxy for growth options using the market-to-book (MB) ratio and R&D expense which are computed as:

MB = Market Value of Equity/Book Value of Equity (6)
RD = Research and Development Expense/Total Assets (7)

Market variable, include size as a control variable, where size is measured as the market value of equity. Market-to-book also proxies for firm valuation, as higher market-to-book indicates that the investors perceive that the firm is more valuable. To measure the unique financial risks faced by sample study include three measures of risk.

Duration Ratio = [Change in interest income-change in interest expense] / Total Assets (8)

Loan Loss Provision = Provision for Loan and Asset Losses/Total Assets (9)
Tier 1 Risk Adjusted Capital Ratio (10)

Results and discussion

Table-2 and 3 shows descriptive statistics for our sample study. The average firm has high leverage degree, according to the large number of statistical sample. Majority of them have slack on their financial statements, with the average of cash and marketable securities being 9.33% of total assets. The average firm in our sample is profitable with an average of a 5.23% profit margin. The sample firms have an average of 5% opaque assets. Table-3 provides industry specific data for our sample of banks. Tier 1 capital is the core measure of a bank's financial stability from a regulator's perspective and is measured as a percentage of weighted risk assets. The FDIC requires a minimum level of 3.75% Tier 1 capital to weighted risk assets.

In Table-4 and 5 we examine changes and its effect on main variables before and after the RAU establishment. For each variable of interest we test that the change in the three year average before the RAU establishment compared to the three year average after the RAU establishment is equal to zero. The only exception to this approach is for the earnings volatility, SD(E), variable and for the Duration Ratio variable which are computed over six quarters. For these variables we measure the change from the twelve quarters prior to the RAU establishment to the twelve quarters after the RAU establishment.

Table-2: Descriptive statistics for all RAU firms (Data in form of percentage).

RAU	Mean	Median	Std. Dev
Leverage	68.36	75.12	18.29
Slack	9.33	3.46	8.76
Size (Million)	6,374	3,589	13,865
Opacity	4.37	1.02	8.56
R & D	0.11	0.00	0.13
Market to Book	1.88	1.16	2.14
Profitability	5.23	4.25	10.78
TATO	0.41	0.24	0.36
SD (RET)	1.67	1.61	1.14
SD (E)	0.66	0.14	1.43
N = 97			

Table-3: Descriptive statistics for Bank and financial institutions (Data in form of percentage).

Bank and financial institutions	Mean	Median	Std. Dev
Duration ratio	0.52	0.31	0.39
Loan Loss Provision	0.38	0.19	0.36
Tier1 Capital	9.13	8.11	3.53
N = 16			

We find a significant decrease in the standard deviation of stock returns, SD (RET), for the firms who establish RAU. This decline has meaningful relationship with firm becoming less risky, following the RAU establishment and the ERM implementation. Thus, according to these findings we cannot reject the market broad effects. Therefore, we have little and insignificant change in earnings volatility SD(E).

On the other hand, statistical results dose not confirm significant leverage increase with and after the creation of the RAU

establishment relative to the period prior to the unit creation, but the change is positive. As be expected, by increasing size, we have witness of rising in stock market prices more than ERM effect on it. In univariate analysis we have not effective factor which cause any meaningful changes.

Table-4: Before and after RAU establishment t-tests for all RAU firms.

RAU	Before	After	Change	t-stat	P-value
Leverage	64.023	68.625	1.002*	1.117	0.178
Slack	6.512	6.321	0.008	0.008	0.415
Size	7,256	9,214	2,103**	1.629	0.013
Opacity	4.419	4.615	0.149	0.431	0.219
R&D	0.089	0.088	0.005	-1.031	0.074
Market to Book	0.233	1.697	1.745	0.635	0.096
Profitability	7.418	7.544	-0.044	-0.109	0.419
TATO	0.431	0.322	-0.006	-1.001	0.045
SD(RET)	1.694	1.725	-0.006**	-1.526	0.003
SD(E)	0.268	0.637	-0.022	-0.324	0.455

*, **, *** indicates significance at the 10%, 5%, and 1% levels respectively.

Table-5: Before and after RAU establishment t-tests for Bank and financial institutions.

RAU	Before	After	Change	t-stat	P-value
Duration ratio	0.385	0.302	-0.085	1.316	0.167
Loan Loss Provision	0.432	0.275	0.142	1.204	0.207
Tier1 Capital	8.922	9.911	0.014	0.044	0.876

It is possible that other factors are influence our results which are related to industry and market, and also time series influenced by them. In order to control these variables, we have to employ an adapted statistical sample in order to evaluate the changes of the RAU establishment in our sample. We calculate the following compound adapted rate (CAR) for companies who have RAU stock in our sample with each of the potential non-RAU stocks:

$$CAR = \sum_{K=1}^{4} \left[\frac{2\left(Y_k^{RAU} - Y_k^{Non-RAU}\right)}{\left(Y_k^{RAU} + Y_k^{Non-RAU}\right)} \right]^2 \quad (11)$$

In Equation 11, Y_k represents one of four stock reactions, and the symbol, RAU and NON-RAU, respectively related to RAU companies and non-RAU companies (potential adapted). For each RAU company's sample, choose the non-RAU firms with the lower rate. The stock attributes adapted refer to market equity value and market to book proportion. Stock properties are calculated by using the year in which the RAU establishment is occurred.

As noted above we need matched firms with seven years statistical data. Dummy variable is equal to 1 for firm which have RAU and 0 for adapted firms. Log it regression considering dummy variables and the dependent variable is proposed as below:

RAU Dummy variable = f(Leverage, Slack, Size, Opacity, R&D, Market to Book, Profitability, TATO, SD(RET), SD(E)) + e (12)

Table-6 shows log it regressions results, consist of regression results sample study without any exception. Our initial sample include 106 RAU firms, and matched sample consist of non-RAU firm's include 97 company. We find that increasing opacity of financial situation has a positive and significant relationship with effect on RAU before its establishment. Also, market to book ratio has a significant negative relationship with adoption change before RAU establishment. Thus, we conclude that earnings volatility decrease after ERM adoption.

In the second column, Banks and Financial institutions stock market are examined by regression equation. We have witness similar results, although market to book has insignificant meaning are is an exception. In the next section of table we focus on Investment companies, the results shows that profitability variable has meaningfully negative effect. However, observations in this calculation is limited to 24 sample, and we cannot find any strong evidence. The forth section of table shows financial intermediation results, in this analysis we find the same results as second parts.

The regression results indicate that after adopting ERM, firms increase their level of opaque assets related to non-adopters. Thus we can say that ERM has benefit for firms with more opaque assets it should be noted it has meaningful relationship with financial crisis. ERM creates the possibility of better portfolio management in risky business environment, thus they have an appropriate chance to invest in opaque assets. The second issue is increase in amount of opaque assets. ERM program can provide better understanding of risks in RAU.

Other finding indicates that by RAU establishment, market to book ratios became lower and consequently we have decline in market valuation. The most important results are significant decrease in the volatility of earnings. Table-7 shows OLS regression results, it proves that market to book ratio fluctuations leads to changes in other variables. Therefore, market to book fluctuations has meaningful relationship with leverage, slack and profitability.

Table-6: Log it regression results.

	All Firms	Banks and Financial institutions	Investment companies	Financial intermediation companies
Constant	0.376	1.216	4.623	4.365
	(0.65)	(0.86)	(0.53)	(0.48)
Leverage	0.063	-0.112	-2.264	-2.241
	(0.19)	(-0.12)	(-0.35)	(-0.32)
Slack	-0.052	-0.053	-0.042	-0.038
	(-0.61)	(-0.31)	(-0.42)	(-0.32)
Size	0.131	0.344	0.720	0.680
	(1.01)	(0.84)	(0.96)	(0.92)
Opacity	0.033	0.022	-2.119	-2.217
	(1.57)**	(2.03)**	(-1.13)**	(-1.25)**
Market to Book	-0.082	-0.011	0.882	0.936
	(-1.12)*	(-1.04)	(0.75)	(0.67)
Profitability	0.012	0.008	-0.522	-0.531
	(0.48)	(0.32)	(-1.97)**	(-1.87)**
TATO	-0.369	-0.855	-2.633	-2.871
	(-0.77)	(-0.86)	(-1.32)	(-1.48)
SD(Ret)	0.049	0.023	-0.413	-0.459
	(0.11)	(0.13)	(-0.56)	(-0.52)
SD(E)	-0.098	-0.117	0.226	0.242
	(-1.63)*	(-1.04)*	(1.25)	(1.31)
N	97	61	24	12
Pseudo R^2	0.038	0.117	0.286	0.302

Also, it has negative correlation with earnings changes. It proves that firms with lower market valuations has more stable financial situation. Considering option pricing if the volatility of assets decrease the value of the call option will be changes consequently.

Table-7: Regression of the change in market-to-book on changes in other variables.

	All Firms	Banks and Financial institutions	Investment companies	Financial intermediation companies
Constant	-0.133	-0.113	-0.141	-0.121
	(-0.18)	(-0.22)	(-0.44)	(-0.12)
Leverage	1.324	1.268	1.466	1.342
	(2.56)**	(2.33)**	(2.17)**	(2.52)*
Slack	0.126	0.142	0.168	0.122
	(1.88)**	(1.68)*	(1.26)**	(1.42)*
Profitability	0.011	0.009	0.005	0.007
	(1.44)*	(1.24)*	(1.12)	(1.62)
SD(RET)	-0.242	-0.116	-0.124	-0.266
	(-1.01)	(-1.25)	(-0.73)	(-1.07)
SD(E)	-0.051	-0.063	-0.021	-0.033
	(-2.01)**	(-1.89)*	(-2.01)**	(-1.31)*
N	97	61	24	12
R^2	0.231	0.255	0.211	0.255

Table-8 shows the result of ERM adoption on firm characteristics in financial firms and banks. The results indicate that market to book ratio decrease with ERM adoption and there is no other variables with significant change. In the second part (column) we examine small subsidiary of banks and financial institutions. Tier 1 capital ratio and loan loss provision are specific characteristic which are belong to these entities. By ERM adoption, these variables decrease meaningfully. The other result is of interest variable we have no doubt that banks are more comfortable with higher leverage and consequently it leads to have a better understanding of their portfolio and their operational risks.

Table-8: Log it regression on the effects of a RAU establishment for banks and other companies.

	Banks and Financial institutions	Investment and Financial intermediation companies
Constant	-1.721	-0.322
	(-1.15)	(-0.24)
Leverage	1.755	--
	(1.23)	
Slack	0.003	0.105
	(0.02)	(0.57)
Size	0.105	0.179
	(0.44)	(0.31)
Opacity	0.225	0.063
	(1.21)	(1.09)
Market to Book	-0.167	0.127
	(-1.05)*	(0.21)
Profitability	0.004	0.157
	(0.45)	(0.74)
SD(Ret)	-0.125	-0.568
	(-0.22)	(-0.63)
SD(E)	-0.062	-0.286
	(-1.02)	(-1.06)
Duration Ratio	--	0.213
		(1.05)
Loan Loss	--	1.143
		(2.15)**
Tier1	--	-1.456
		(-2.01)**
N	61	24
Pseudo R^2	0.063	0.178

Conclusion

Present study is aim to examine the change in financial performance considering ERM implementation. In univariate tests, our sample study which is applying ERM shows fewer stock price fluctuation and have meaningful increases in size and leverage variables.

On the other hand, other firms consider opaque assets as suitable opportunities for investment and have lower market to book ratios and lower earnings volatility in comparison to firms that have not adopted ERM. Also there is a negative correlation between market to book and earnings volatility.

By adopting ERM banks willing to increase their leverage, it gives them higher ability to manage risk, on the other hand ERM consider as a positive act by rating agencies or regulators.

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