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Investigating the Effect of Business Strategy and Stock Price Synchronicity on Stock Price Crash Risk

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ABSTRACT

Stock price crash risk has a significant impact on investors, creditors, managers, and shareholders, so the prediction of this phenomenon is a very important issue in investment and risk management decisions. This research investigates the effect of business strategy and stock price synchronicity on stock price crash risk. Following Bentley et al. [2], composite strategy score has been used to proxy for an organization's business strategy, expanded market model regression following Chen et al. [3] to measure the firm-specific crash risk, and R^2 method of Johnstone [16] to calculate the stock price synchronicity. In order to achieve this point, financial information of 171 companies that are listed on Tehran stock exchange have been selected during the time period of 2013 to 2018, and data was analysed using regression model. According to the results, companies with defender (analyser and prospector) business strategy are less (more) prone to future crash risk. Moreover, results show that stock price synchronicity has positive effect on stock price crash risk, while in companies with analyser business strategy it can reduce the stock price crash risk. The interactive effect of business strategy and stock price synchronicity on stock price crash risk in companies with prospector and defender business strategy is not significant. Other findings suggest that Institutional ownership has positive, and company's age has negative effect on stock price crash risk.

1 Introduction

Stock price crash risk is the subject that due to the recent financial scandals of some big companies including Enron, WorldCom, Satyam, and especially after the financial crisis of 2008, has attracted the attention of many researchers and academics. Stock price crash risk, which is one of the many kinds of risk related to shareholders, is defined as the asymmetry or the conditional skewness of the distribution of stock return [20]. It can also be known as a phenomenon which is caused by bubbles in stock prices [2]. Jin and Myers [14] stated that information asymmetry between the managers and the shareholders, along with personal interests of the manager's influence stock price crash risk. In many cases managers are eager to hide the negative news from shareholders and pile it inside the company. This causes the company to seem better than what it really is. However, the amount of bad news that can be piled up in

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a company is limited, because not disclosing the negative news for longer periods of time when it reaches a certain amount will be impossible and can even cost more. As a result, as the pile of negative news reaches its peak, it suddenly gets disclosed in the market and results in a dramatic drop in gain or the price of stocks [11]. Some of the actions made by the managers including tax avoidance, doing projects with a negative internal return rate, and the lack transparency in financial reports can result in stock price crashes. Recent studies somehow show that all these elements can be determined by the unique strategy chosen by the company, which does not really change throughout time [6-24]. Therefore, it can be said that the company's strategy as the first potential effective element in stock price crash risk can have direct consequences on shareholders. Miles and Snow [20] mentioned three kinds of business strategies including prospectors, defenders, and analysts which show the difference in product and competition in the market. Previous studies regarding organization theory have shown that the followers of prospector strategy, due to uncertainty of profit, face information asymmetry more [7-20]. Information asymmetry can cause incorrect financial reporting. Bentley et al. stated that disorder in financial reporting, facing weaknesses in identifying and reporting information on time, and piling up of negative news happen to prospectors more.

This issue causes the prospectors to be more likely to face stock price crash risk [2]. In addition, Jin and Myers [14] showed that stock price synchronicity with the changes in the market and stock price crash risk in the countries which have a low information disclosure is more. Stock price synchronicity shows a level of market and industry information which is reflected on stock price [16]. This standard can be calculated by R^2. The higher R^2 is, it means that market and industry return explain the company return more. Chen et al. [3] define lower stock price synchronicity as the existence of specific information in the company. Based on the results from the study of Jin and Myers [14] it can be reasoned that with the extension of company's accounting disclosure policies, stock price synchronicity reduces. Therefore, the lower stock price synchronicity is, the chances of hiding negative news by managers and suddenly disclosing they decrease, and as a result stock price crash risk also decreases [1]. Based on the reasoning of Bentley et al. [2] the companies that use prospector business strategies, due to high control risk, are more likely to face falsification in financial reporting. The reason why this happens is that the controlling atmosphere of these companies is more unique and unstable and this causes the company to face more bad news, and if the company does not reflect the news in the stock price it could result in stock price synchronicity and suddenly releasing it in the market increases stock price crash risk. On the other hand, some studies have stated that the followers of prospector business strategy, due to more coverage by financial analysts and the higher amount of voluntary disclosure, have a clearer information environment [7], which as a consequence, their information asymmetry, stock price synchronicity, and stock price crash risk are lower. However, the existence of information asymmetry by itself cannot explain incorrect financial reporting in prospector companies, because based on Bentley's reasoning [6], these companies face weaker internal controls.

2 Theoretical Fundamentals and Research Background

2.1 Stock Price Crash Risk

According to the definition of the dictionary of financial and investment terms, stock price crash risk is the sudden and also considerable decrease in the stock price of a firm which results in the decline of the market cap of a firm and it is usually accompanied with an inflation in the stock market. The reasons for stock price crash risk include an economic bubble, prices that are much higher than the intrinsic price, and too much use of leverage. Investors may start to sell their shares with the immediate decline in the value of a particular stock which can turn into a vicious cycle and ultimately result in a load of

negative behaviour in the market [8-14]. The definition of stock price crash risk carries three specific characteristics:

1) Stock price crash is an enormous and unusual changes in the stock price that happen without an important economic phenomenon.
2) These enormous phenomena are negative.
3) Stock price crash is a contagious phenomenon in the market, which means the decline in the stock price does not only affect one specific stock, in fact it affects all stocks in the market.

2.2 Business Strategy

Miles and Snow [22] have defined three kinds of business strategies based on their differences in changes in size and the direction of the product market among various industries that include prospectors, defenders, and analysts. Business strategies of firms are located in an interval in a way that prospector and defender business strategies are the two ends of this interval. The followers of prospector business strategy, in order to lead and innovate in the market, in different areas, change their combination of their product market continuously [28]. While defenders focus on a specific product, in order to compete based on the price of the product and the quality of the services provided. The firms that are located in the middle are called analysts and they follow a combination of prospector and defender business strategies [22].

2.3 Stock Price Synchronicity

Song [26] defined stock price synchronicity as a degree of market and industry information which is reflected in the stock price and it shows how much market and industry return explain the changes in the firm's stock price return. With this definition in mind it can be said that stock price synchronicity is equal to the ratio of systematic risk to unsystematic risk. Stock price behaviour follows the two major factors that include the changes in the market and specific information of a firm [10]. The changes in the market are influenced by internal, external, and political factors, and the specific information of a firm is related to the factors associated with the firm itself. Investors' profit depends more on the firm specific information and if the association between firm return and market return (stock price synchronicity) is little, it means the specific information of a firm is more reflected in the stock price. Therefore, it can be said that if stock price synchronicity is low, it can mean that their prices are less dependent on the changes in the market [19].

2.4 Literature Review

Tavakolnia identified [29] Investigating the Relationship Between Business Strategy and Human Capital Reporting Using GMM Method, and the results showed a positive and meaningful impact that the firms with a prospector business strategy in Tehran Stock Exchange have more tendency to report on human capital information. Hajiha [7] in a study titled "Prospector and Defender Business strategy, Information Asymmetry, and Stock Price Crash" illustrated that the prospector business strategy, increases stock price crash risk; while the defender business strategy deceases this risk. Also in a harsh information asymmetry, the prospector business strategy increases stock price crash risk even more. Matinfard et al. [21] in a study titled "Test the Effectiveness of Stock Price Synchronicity on Risk of Stock Price Reduction" examined the test of stock price synchronicity on stock price crash risk of the listed firms in Tehran Stock Exchange and found that stock price synchronicity is a significant factor in

stock price crash risk. Other findings of the study include the positive and meaningful impact of the negative skewness coefficient of stock efficiency and efficiency index on stock price crash risk and the negative relation of the ratio of the investment of institutional investors and the size of the firm on stock price crash risk and also the meaningless relation of progress chances and financial leverage with stock price crash risk factor. Pasandideh Parsa and Sarraf [24] explained the relationship between the comparability of financial statements as a qualitative financial reporting feature with the expected risk of stock price crash in a study titled "Financial Statement Comparability and the Expected Crash Risk of Stock Prices". In this Study 81 companies were selected for the period between 2010 and 2017 as a sample of the study. The research has been performed in the framework of deductive-inductive reasoning and for analysis of the research hypothesis; statistical analysis of the logistics has been assisted. The results of the research hypothesis test showed a significant and negative relationship between the comparability of financial statements and the expected crash in stock prices. Serve et al [25] in a research titled "Predict the Stock price crash risk by using firefly algorithm and comparison with regression" model the Stock price crash risk of listed companies in Tehran Stock Exchange using firefly algorithm and compare the results with multivariate regression as a traditional method. The results show that the ability of meta-meta-heuristic methods to predict the risk Stock price crash risk is not generally higher than the traditional method of multivariate regression, and the research hypothesis was not approved.

Habib and Monzur Hasan [6] in a study titled "Business strategy, overvalued equities, and stock price crash risk" investigated the impact of business strategy on future stock price crash risk and the impact of overvaluing equity, and prepared some evidence for understanding the basic factors that influence stock price crash risk. By proposing a combinational ranking of business strategy and two criteria for measuring stock price crash risk, they realized that the stock price of prospectors compared to defenders is more prone to crash in the future. Also the chance of overvalued equity, which can increase the chance of stock price crash risk, is higher in these firms. Jin et al. [15] in a study titled "Stock price synchronicity and stock price crash risk: Based on the mediating effect of herding behaviour of QFII" found that herding has a direct impact on stock price synchronicity. Also herding and stock price crash risk have a direct impact on one another. Nevertheless, after defining the interaction variable, in order for investigating herding effect, on the increase of direct impact between stock price synchronicity and stock price crash risk, they found a direct but meaningless impact. As a result, they stated that herding behaviour acts as the mediating role between stock price synchronicity and stock price crash risk. Ning [23] in a research titled "Corporate innovation strategy and stock price crash risk" examined the association between corporate innovation strategy and future stock price crash risk and found that exploration-oriented (exploitation-oriented) firms are more (less) prone to stock price crash risk. Guang and Edmund [5] examined the relationship between business strategy and the trading profits earned by corporate insiders. They found that the profitability of trading by insiders at prospector firms is higher than the profitability of trading by insiders at defender firms. Kaijuan et al [18] by examine the impact of analyst coverage on stock price synchronicity using exogenous shocks of brokerage mergers and closures, found that after brokerage mergers and closures, the reduced analyst coverage leads to a decrease in stock price synchronicity by using a difference-in-differences research design. Hence, greater analyst coverage likely only produces market-wide rather than firm-specific information in emerging markets. Feiyang et al. [4] by investigating the impact of raising short-term debt for long-term investment (SDFLI) on stock price crash risk, found that SDFLI leads to less information disclosure, higher information risk, and lower information transparency, which eventually exacerbates future crash risk. Moreover, the effect of SDFLI on crash risk is affected by firm characteristics, monitoring mechanisms, and

economic environment. Kai and Xiaoguang [17] extended the application of detecting the critical transitions by constructing an indicator based on correlation of elements in a system from the natural sciences in detecting stock market crashes. They show that this method can provide early warning signals for the four stock market crashes before they burst in China's stock market. The more volatile the indicators becomes; the higher probability the crash occurs.

3 Proposed Methodology

3.1 Population and Sample

The statistical population of this study includes all enlisted companies in Tehran Stock Exchange during the period of 2013 and 2018. In this study the systematic elimination method is used for screening. In order to select a homogenous sample, the companies must have been enlisted in the stock market before the beginning of this study and must be traded during the time of this study. Companies' stocks trades must not have been stopped more than four months and during the time of study, they must not have changed their fiscal year or their field of activity. As a result, all the observations related to samples are 1026, that include 171 companies in a period of 6 years between 2013 and 2018.

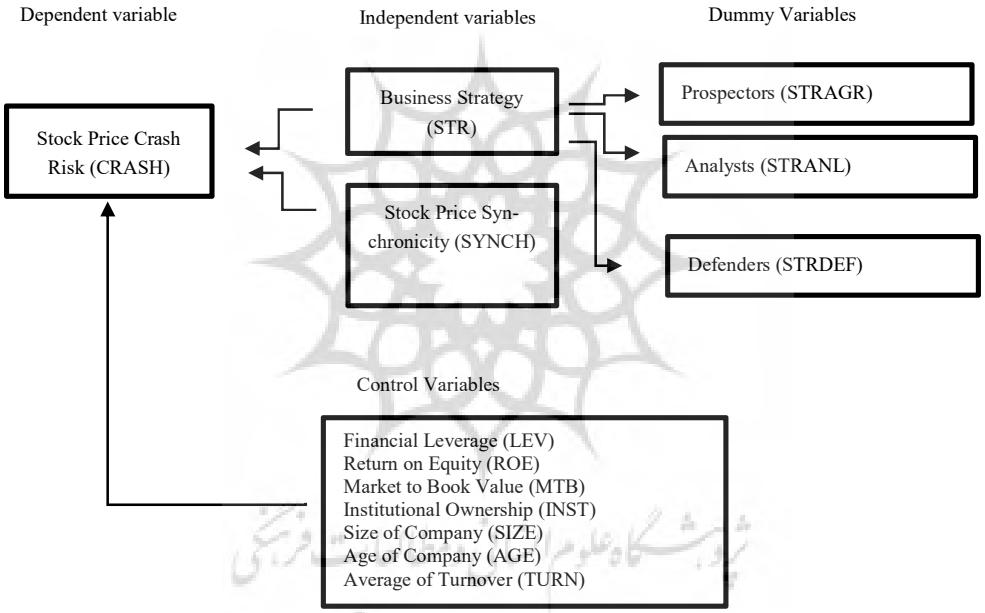

Fig. 1: Conceptual Model

3.2 Research Hypotheses

The first Hypothesis: Business strategy has a significant influence on stock price crash risk.

The first subsidiary hypotheses

- ✓ The prospector business strategy has a significant influence on stock price crash risk.
- ✓ The analyst business strategy has a significant influence on stock price crash risk.

- ✓ The defender's business strategy has a significant influence on stock price crash risk.

The second hypothesis: The interaction effect of business strategy and stock price synchronicity on stock price crash risk is significant.

The second subsidiary hypotheses:

- ✓ The interaction effect of prospector business strategy and stock price synchronicity on stock price crash risk is significant.
- ✓ The interaction effect of analyst business strategy and stock price synchronicity on stock price crash risk is significant.
- ✓ The interaction effect of defender's business strategy and stock price synchronicity on stock price crash risk is significant.

3.3 Regression model and Definition of variables

The conceptual model of multiple regression used in this research is as Fig. 1. The regression models below have been used to investigate the study's hypotheses:

The first hypothesis regression model:

$$CRASH_{i,t} = \alpha + \beta_1 STRAGR_{i,t-1} + \beta_2 LEV_{i,t-1} + \beta_3 ROE_{i,t-1} + \beta_4 MTB_{i,t-1} + \beta_5 INST_{i,t-1} + \beta_6 SIZE_{i,t-1} + \beta_7 AGE_{i,t-1} + \beta_8 TURN_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

$$CRASH_{i,t} = \alpha + \beta_1 STRANL_{i,t-1} + \beta_2 LEV_{i,t-1} + \beta_3 ROE_{i,t-1} + \beta_4 MTB_{i,t-1} + \beta_5 INST_{i,t-1} + \beta_6 SIZE_{i,t-1} + \beta_7 AGE_{i,t-1} + \beta_8 TURN_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

$$CRASH_{i,t} = \alpha + \beta_1 STRDEF_{i,t-1} + \beta_2 LEV_{i,t-1} + \beta_3 ROE_{i,t-1} + \beta_4 MTB_{i,t-1} + \beta_5 INST_{i,t-1} + \beta_6 SIZE_{i,t-1} + \beta_7 AGE_{i,t-1} + \beta_8 TURN_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

The second hypothesis regression model:

$$CRASH_{i,t} = \alpha + \beta_1 STRAGR_{i,t-1} + \beta_2 SYNCH_{i,t-1} + \beta_3 STRAGR_{i,t-1} * SYNCH_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 ROE_{i,t-1} + \beta_6 MTB_{i,t-1} + \beta_7 INST_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10} TURN_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

$$CRASH_{i,t} = \alpha + \beta_1 STRANL_{i,t-1} + \beta_2 SYNCH_{i,t-1} + \beta_3 STRANL_{i,t-1} * SYNCH_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 ROE_{i,t-1} + \beta_6 MTB_{i,t-1} + \beta_7 INST_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10} TURN_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

$$CRASH_{i,t} = \alpha + \beta_1 STRADEF_{i,t-1} + \beta_2 SYNCH_{i,t-1} + \beta_3 STRADEF_{i,t-1} * SYNCH_{i,t-1} + \beta_4 LEV_{i,t-1} + \beta_5 ROE_{i,t-1} + \beta_6 MTB_{i,t-1} + \beta_7 INST_{i,t-1} + \beta_8 SIZE_{i,t-1} + \beta_9 AGE_{i,t-1} + \beta_{10} TURN_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

3.4 Business Strategy Composite Measure

Following Bentley et al. [2], we use a discrete strategy composite score to proxy for an organization's business strategy. Higher strategy scores represent companies with prospector strategies and lower scores represent companies with defender strategies. Bentley et al. [2] adapted some from Ittner et al. and extended other measures based on the Miles and Snow framework in constructing their composite strategy score. Characteristics included are: (a) the ratio of research and development to sales (measure of a firm's propensity to see knew products); (b) the ratio of employees to sales (firm's ability to produce and distribute its goods and services efficiently); (c) a measure of employee fluctuations (standard deviation of total employees); (d) a historical growth measure (one-year percentage change in total sales) (proxy for a firm's historical growth); (e) the ratio of marketing (SG&A) to sales (a proxy for firms' emphasis on marketing and sales); and (f) a measure of capital intensity (net PPE scaled by total assets) (designed to capture a firms' focus on production)[4-18-21]. All variables are computed using a rolling average over the prior five years. Each of the six individual variables is ranked by forming quintiles within each two-digit SIC industry-year. Within each company-year, those observations with variables in the highest quintile are given a score of 5, in the second-highest quintile, a score of 4, and so on, and those observations with variables in the lowest quintile are given a score of 1 (except capital intensity, which is reversed-scored so that observations in the lowest (highest) quintile are given a score of 5 (1)). Then for each company-year, the scores across the six variables are summed such that a company could receive a maximum score of 30 (prospector-type) and a minimum score of 6 (defender-type). In which a firm can maximum have a score of 30 (prospector's business strategy) and a score of 6 (defender business strategy). Rankings of 6-12 can be attributed to companies with a defender business strategy, 13-23 can be attributed to companies with an analyst business strategy, and 24-30 can be attributed to companies with a prospector business strategy [2].

Prospector business strategy (STRAGR): Equals 1 for the companies that have a prospector business strategy and 0 otherwise.

Analyst business strategy (STRANL): Equals 1 for the companies that have an analyst business strategy and 0 otherwise.

Defender business strategy (STRDEF): Equals 1 for the companies that have a defender business strategy and 0 otherwise [4-18-21].

3.5 Stock Price Crash Risk

In this study two measures of firm-specific crash risk are used [3]. Both measures are based on the firm-specific weekly returns estimated as the residuals from the market model. This ensures that our crash risk measures reflect firm-specific factors rather than broad market movements. Specifically, we estimate the following expanded market model regression:

$$R_{i,\theta} = \beta_0 + \beta_1 R_{m,\theta-2} + \beta_2 R_{m,\theta-1} + \beta_3 R_{m,\theta} + \beta_4 R_{m,\theta+1} + \beta_5 R_{m,\theta+2} + \varepsilon_{i,\theta} \quad (7)$$

Where Ri,ɵ is the return of firm i in month ɵ, and $r_{m,\theta}$ is the return on CRSP value-weighted market return in month ɵ. The lead and lag terms for the market index return is included, to allow for non-synchronous trading [2-3]. The firm-specific monthly return for firm i in month ɵ (Wj, ɵ) is calculated as the natural logarithm of one plus the residual return from Eq. (7) above. In estimating Eq. (7), each

firm-year is required to have at least 12 monthly stock returns. Our first measure of crash risk is the negative conditional skewness of firm-specific weekly returns over the fiscal year (NCSKEW). NCSKEW is calculated by taking the negative of the third moment of firm-specific monthly returns for each year and normalizing it by the standard deviation of firm-specific monthly returns raised to the third power. Specifically, for each firm i in year ɵ, NCSKEW is calculated as:

$$NSKEW_{i,t} = -\frac{\left[N(N-1)^{\frac{3}{2}}\sum_{\theta\in t} W^{3}_{i,\theta}\right]}{\left[(N-1)(N-2)(\sum_{\theta\in t} W^{2}_{i,\theta})^{3/2}\right]} \tag{8}$$

Our second measure of crash risk is the down-to-up volatility measure (DUVOL) of the crash likelihood. For each firm i over a fiscal-year period ɵ, firm-specific monthly returns are separated into two groups: "down" months when the returns are below the annual mean, and "up" months when the returns are above the annual mean. The standard deviation of firm-specific monthly returns is calculated separately for each of these two groups. DUVOL is the natural logarithm of the ratio of the standard deviation in the "down" months to the standard deviation in the "up" months:

$$DUVOL_{i,t} = \ln\left\{\frac{(N_u-1)\sum_{Down} W^{2}_{i,\theta}}{(N_d-1)\sum_{Up} W^{2}_{i,\theta}}\right\} \tag{9}$$

A higher value of DUVOL indicates greater crash risk. As suggested in Chen et al, DUVOL does not involve third moments, and hence is less likely to be overly influenced by extreme monthly returns [2-3-4].

3.6 Stock Price Synchronicity

In order to measure stock price synchronicity, R^2 must be calculated for the firm i and in the fiscal year t from the developed regression model below:

$r_{i,k,n} = \alpha_i + \beta_i.r_{m,\mathrm{n}} + \gamma.r_{k,n} + \varepsilon_{i,n}$

$r_{i,k,n:}$ The return of the firm i in the industry k and in the month n;

$r_{m,n:}$ The weighted return of the market in the month n;

$r_{k,n:}$ The weighted return of the industry k in the month n;

Since R^2 can range from zero to one, in order to achieve an almost normal distribution, its natural logarithm, like model (2), is used to define the stock price synchronicity variable [11-12].

$$Synch = \ln\left(\frac{R^{2}}{1-R^{2}}\right) \tag{10}$$

Control Variables:

1) Leverage (LEV): Total debt divided by total asset;
2) Return on equity (ROE): Net income divided by the equity of the firm;
3) Market value divided by book value of equity (MTB): The Market value of equity divided by the Book Value of equity;

4) Institutional ownership (INST): The percentage of a firm's shares owned by institutions who hold at least %5 of the firm's shares;
5) Firm size (SIZE): The natural logarithm of the firm's sales income;
6) Firm age (AGE): The natural logarithm of the listing age of the firm;

4 Analysis and Findings

In order to use the regression model developed and believe the outcome of the study, first the basic hypotheses that include the normality of the remainders, sustainability of the variables, independence of the remainders, and the lack of collinearity of independent variables must be examined.

A) In order to examine the stationary of the variables of the study, the Augmented Dickey-Fuller test has been used. This test tests the null hypothesis that a unit root is present in a time series sample. According to the results, the studied series are stationary with a %5 error. Therefore, the behavior of the variables will not experience changes with a trend.

B) In order to examine the independence of the variables, the Durbin-Watson statistic has been used. As it can be seen in the final tables of the model tests of the hypotheses of the study, since the mentioned statistic has placed in the acceptable range (1.5-2.5), thus the independence of remainders of the regression model is accepted.

C) In order to examine the collinearity (the existence of relationship between independent variables), the Variance Inflation Factor is used. The results of the study illustrate that there is no collinearity between dependent variables.

Considering the confirmation of the hypotheses above, the results processed by the developed regression model can be trusted.

Table 1: Descriptive Statistics of Research Variables

Variable Description	Mean	Max	Min	Skewness	Kurtosis	Jarque-Bera	tatistical Probability
NSKEW	0.35447	3.21578	-2.86927	0.317671	3.461225	26.35058	0
DUVOL	0.22016	3.75277	-4.27164	0.290976	3.783545	40.72413	0
STR	11.553	25	6	2.509614	14.9256	7156.887	0
STRAGR	0.0155	1	0	7.819261	62.14084	159979.2	0
STRANL	0.2300	1	0	1.28304	2.646192	286.8503	0
STRDEF	0.75438	1	0	-1.18195	2.39701	254.4325	0
SYNCH	-0.4855	6.6857	-8.00224	-0.07206	3.848795	31.6873	0
INST	0.61339	0.9836	0	-0.42668	2.484358	42.49882	0
LEV	0.60719	2.077506	0.090164	0.739952	6.675295	671.0856	0
MTB	2.2653	121.5096	-154.322	-5.39639	228.7948	2184516	0
ROE	0.1632	6.88457	-72.6956	-27.9331	845.0863	30447852	0
Size	27.6655	33.53422	22.32002	0.604428	4.266185	131.0098	0
Age	2.6609	3.871201	0.693147	-0.08756	3.351008	6.578349	0.037285
Turn	3867264	95911953	10250	4.372396	29.04281	32263.39	0

4.1 Findings of the Study

Descriptive statistics of the model variables are shown in Table 1. Descriptive statistics shows that the average and median of data related to the dependent variable calculated by the negative skewness of stock returns are larger than zero that represents companies are exposed to stock price crash risk. Average and median of the calculated data with down-to-up volatilities method indicates a more favourable situation than the previous one. Discrete strategy composite score has an average of 11.5 and a median of 11 which is indicated that companies are more likely to follow defender's business strategy. The sum of the values of the data relating to the dummy variables of the types of business strategy indicates the number of observations that follow this type of strategy. So that, 16 observers have taken prospector's strategy, 774 observations with defender's strategy, and 236 observations have also taken the analyst's strategy. Independent variable of stock price synchronicity has negative average and median that indicates a lower synchronization of stock returns with market returns. The values of skewness and elongation of variables and Jarque-Bera statistics below the 5% error rate indicate that none of the variables follow the normal distribution. All variables have a positive elongation.

4.2 Multivariate Regression Results

4.2.1 The First Hypothesis Test

The first hypothesis of the study shows the effect of business strategy on stock price crash risk. In order to investigate this hypothesis, three subsidiary hypotheses are defined based on the type of business strategy. Results from the developed regression model of the first subsidiary hypothesis test which claims that prospector business strategy affects stock price crash risk, have been shown in table 2 with two measurement standards for the dependent variable. The results from Chow and Hausman test show that the suitable method for both standards is a combinational data regression with random effects. Although, considering the fact that random effects method in negative skewness of stock return method, based on F-test is meaningless and in down-to-up volatilities method has a coefficient of determination of 2% which is really low, we use the results of regression model with fixed effects which not only is significant, but also presents a better model with a higher coefficient of determination. Based on t-value related to the coefficient of the subsidiary variable of prospector business strategy and its probability in down-to-up volatilities method which is statistically significant, the first subsidiary hypothesis is accepted and it can be said that prospector business strategy has a positive and significant effect on stock price crash risk. Table 3 shows the results of the developed model for the second subsidiary hypothesis test which claims that analyst business strategy affects stock price crash risk.

The suitable method for developing a model in the negative skewness of stock return is using the fixed effects method, and in down-to-up volatilities is using the random effects method; however, because of the low coefficient of determination of the model with a 2% by random effects, the results of the model with fixed effects have been used as well. The T-value of the coefficient of analyst business strategy and its probability, in both standards, show that analyst business strategy has a significant and positive effect on stock price crash risk. The value of this coefficient compared to the coefficient of prospector business strategy down-to-up volatilities, states that the analyst business strategy has a less intense effect on stock price crash risk, compared to prospector business strategy. Table 4 shows the results of the third developed subsidiary hypothesis test. The appropriate method for estimating the model was chosen like the second subsidiary hypothesis. Based on the T-value of the coefficient of subsidiary

variable of defender business strategy and its probability, it can be said that the defender business strategy has a significant and negative effect on stock price crash risk. Therefore, the first hypothesis of the study is confirmed and it can be concluded that firms with a defender (analyst and prospector) business strategy, are less (more) prone to stock price crash risk.

Table 2: Estimation of the Coefficients of the Eq.1 (Summary of the Results the First Hypothesis)

Test	Statistic		Statistic Value		Deg. Freedom	Statistical Probability	
Chow	F-test		1.897608		(170,847)	0	
Hausman	Chi-Squared Test		11.16048		8	0.1928	
Dependent Var:Crash (NSKEW)			Model:Regression panel/Fixed Effects			Type:OLS (Weighted)	
Sections(Number):171			Periods(Number): 6		Observation: 1026		
Descriptive Variables Names	Variable Symbols	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	2.480669	1.391817	1.782325	0.0751	-	-----
Prospector Business Strategy	STRAGR	0.264047	0.244279	1.080924	0.28	1.17394	Reject
Institutional Ownership	INST	0.165052	0.248354	0.664583	0.5065	1.416607	Reject
Levrage	LEV	0.154908	0.192554	0.80449	0.4213	1.077211	Reject
Return on Equity	ROE	0.001917	0.009172	0.20901	0.8345	1.115049	Reject
Market Value to Book Value	MTB	0.003878	0.00224	1.730872	0.0838	1.077274	Reject
Firm Size	SIZE	-0.02597	0.050326	-0.51607	0.6059	1.194735	Reject
Firm Age	AGE	-0.60569	0.170296	-3.55666	0.0004	1.612782	Accept
Trading Volume	TURN	$-1.16E^{-09}$	$4.47E^{-09}$	-0.25955	0.7953	1.010008	Reject
R^2:0.299109	R^2-Adj:0.151814		D-W:2.389898		F-test Statistic's Prob.: 0.0000		
Test	Statistic		Statistic Value		Deg. Freedom	Statistical Probability	
Chow	F-test		1.24914		(170,847)	0.026	
Hausman	Chi-2		5.061058		8	0.751	
Dependent Var:Crash (DUVOL)			Model:Regression Panel/Fixed Effects			Type:OLS (Weighted)	
Sections(Number):171			Periods(Number): 6		Observation: 1026		
Descriptive Variables Names	Variable Symbols	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Prospector Business Strategy	STRAGR	0.264047	0.244279	1.080924	0.28	1.17394	Reject
Institutional Ownership	INST	0.165052	0.248354	0.664583	0.5065	1.416607	Reject
Levrage	LEV	0.154908	0.192554	0.80449	0.4213	1.077211	Reject
Return on Equity	ROE	0.001917	0.009172	0.20901	0.8345	1.115049	Reject
Market Value to Book Value	MTB	0.003878	0.00224	1.730872	0.0838	1.077274	Reject
Firm Size	SIZE	-0.02597	0.050326	-0.51607	0.6059	1.194735	Reject
Firm Age	AGE	-0.60569	0.170296	-3.55666	0.0004	1.612782	Accept
Trading Volume	TURN	$-1.16E^{-09}$	$4.47E^{-09}$	-0.25955	0.7953	1.010008	Reject
R^2:0.299109	R^2-Adj:0.151814		D-W:2.389898		F-test Statistic's Prob.: 0.0000		

Table 2: Continue

Test	Statistic	Statistic Value	Deg. Freedom	Statistical Probability
Chow	F-test	1.24914	(170,847)	0.026
Hausman	Chi-2	5.061058	8	0.751
Dependent Var:Crash (DUVOL)		Model:Regression Panel/Fixed Effects		Type:OLS (Weighted)
Sections(Number):171		Periods(Number): 6		Observation: 1026

Descriptive Variables Names	Variable Symbols	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	-0.08645	1.495389	-0.05781	0.9539	--------	--------
Prospector Business Strategy	STRAGR	0.538839	0.236372	2.279622	0.0229	1.237829	Accept
Institutional Ownership	INST	-0.15639	0.30897	-0.50617	0.6129	1.404706	Reject
Levrage	LEV	-0.09068	0.25726	-0.35249	0.7246	1.120455	Reject
Return on Equity	ROE	0.028108	0.009734	2.887498	0.004	1.105367	Accept
Market Value to Book Value	MTB	0.004235	0.00251	1.687198	0.0919	1.127279	Reject
Firm Size	SIZE	0.044343	0.051432	0.862173	0.3888	1.121481	Reject
Firm Age	AGE	-0.29331	0.196888	-1.4897	0.1367	1.562401	Reject
Trading Volume	TURN	$-2.92E^{-09}$	$5.81E^{-09}$	-0.50307	0.615	1.016235	Reject

R^2:0.246836	R^2-Adj:0.088556	D-W:2.464241	F-test Statistic's Prob: 0.00003

Table 3: Estimation of the Coefficients of the Eq.2 (Summary of the Results the First Hypothesis)

Test	Statistic	Statistic Value	Deg. Freedom	Statistical Probability
Chow	F-Test	2.39648	(170,847)	0.000
Hausman	Chi-Squared Test	17.28389	8	0.0273
Dependent Var:Crash (NSKEW)		Model:Regression Panel/Fixed Effects		Type:OLS (Weighted)
Sections(Number):171		Periods(Number): 6		Observation: 1026

Variables Names	Variable Symbols	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	1.185731	1.305962	0.907937	0.3642	--------	--------
AnalystBusiness Strategy	STRANL	0.443108	1.305962	8.704711	0	1.075888	Accept
Institutional Ownership	INST	0.48275	0.050904	1.983287	0.0477	1.505385	Accept
Levrage	LEV	0.120267	0.243409	0.650593	0.5155	1.110265	Reject
Return on Equity	ROE	-0.00638	0.010891	-0.58547	0.5584	1.018567	Reject
Market Value to Book Value	MTB	0.005175	0.002165	2.389733	0.0171	1.104208	Accept
Firm Size	SIZE	0.024021	0.045979	0.52244	0.6015	1.140129	Reject
Firm Age	AGE	-0.74242	0.152718	-4.86139	0	1.511603	Accept
Trading Volume	TURN	$-5.21E^{-10}$	$4.91E^{-09}$	-0.10621	0.9154	1.005301	Reject

Table 3: Continue

R^2:0.37	R^2-Adj:0.2427	D-W:2.353878	F-test Statistic's Prob: 0.00003

Test	Statistic	Statistic Value	Deg. Freedom	Probability
Chow	F-Test	2.39648	(170,847)	0.000
Hausman	Chi-Squared Test	17.28389	8	0.0273

Dependent Var:Crash (DUVAL)	Model:Regression Panel/Fixed Effects	Type:OLS (Weighted)
Sections(Number):171	Periods(Number): 6	Observation: 1026

Variables Names	Variable Symbols	Coefficients	Standard Error	T-Value	Statistical Proba-bility	VIF	Test Re-sult
Intercept	C	-1.39595	1.558345	-0.89579	0.3706	--------	--------
AnalystBusiness Strategy	STRANL	0.354836	0.066857	5.307421	0.0000	1.056735	Accept
Institutional Ownership	INST	0.121626	0.310311	0.391948	0.6952	1.458222	Reject
Levrage	LEV	-0.10483	0.257025	-0.40786	0.6835	1.07689	Reject
Return on Equity	ROE	0.020228	0.010988	1.840927	0.066	1.022795	Reject
Market Value to Book Value	MTB	0.004892	0.002994	1.633775	0.1027	1.079663	Reject
Firm Size	SIZE	0.103212	0.05386	1.916297	0.0557	1.084317	Reject
Firm Age	AGE	-0.50573	0.192162	-2.63181	0.0086	1.46229	Accept
Trading Vol.	TURN	$-1.40E^{-10}$	$6.15E^{-09}$	-0.02275	0.9819	1.011164	Reject

R^2:0.259931	R^2-Adj: 0.104403	D-W: 2.469387	F-Test Statistic's Prob: 0.0000

Table 4: Estimation of the Coefficients of the Eq.3 (Summary of the Results the First Hypothesis)

Test	Statistic	Statistic Value	Deg. Freedom	Statistical Probability
Chow	F-Test	2.400811	(170,847)	0.000
Hausman	Chi-Squared Test	18.44565	8	0.0181

Dependent Var:Crash (NSKEW)	Model:Regression Panel/Fixed Effects	Type:OLS (Weighted)
Sections(Number):171	Periods(Number): 6	Observation: 1026

Variables Names	**Variable Symbols**	**Coefficients**	**Variables Names**	**Variable Symbols**	**Coefficients**	VIF	**Test result**
Intercept	C	2.17563	1.253934	1.735043	0.0831	--------	--------
Defender Business Strategy	STRDEF	-0.48325	0.051721	-9.34344	0.0000	1.081201	Accept
Institutional Ownership	INST	0.539795	0.243404	2.217695	0.0268	1.52081	Accept
Leverage	LEV	0.137551	0.184061	0.747313	0.4551	1.106955	Reject
Return on Equity	ROE	$-2.21E^{-05}$	0.009535	-0.00232	0.9981	1.021089	Reject
Market Value To Book Value	MTB	0.005282	0.002143	2.464738	0.0139	1.098755	Accept
Firm Size	SIZE	-0.00656	0.04366	-0.15023	0.8806	1.116991	Reject

Table 4: Continue

Firm Age	AGE	-0.63641	0.149469	-4.2578	0.0000	1.503964	Accept
Trading Vol.	TURN	$-2.14E^{-09}$	4.91E-09	-0.43586	0.6631	1.005881	Reject
R^2:0.386	R^2-Adj:0.2569			D-W: 2.3714		F-Test Statistic's Prob.:0.00	

Test	Statistic	Statistic Value	Deg. Freedom	Statistical Probability
Chow	F-Test	1.419345	(170,847)	0.001
Hausman	Chi-Squared Test	9.651195	8	0.2904

Dependent Var:Crash (Duvol)	Model:Regression Panel/Fixed Effects	Type:OLS (Weighted)
Sections(Number):171	Periods(Number): 6	Observation: 1026

Variables Names	Variable Symbols	Coefficients	Variables Names	Variable Symbols	Coefficients	VIF	Test Results
Intercept	C	-0.48001	1.448677	-0.33135	0.7405	--------	--------
Defender Business Strategy	STRDEF	-0.42138	0.06881	-6.12388	0.0000	1.059605	Accept
Institutional Ownership	INST	0.227273	0.310031	0.733065	0.4637	1.481618	Reject
Leverage	LEV	-0.08742	0.255009	-0.3428	0.7318	1.069309	Reject
Return on Equity	ROE	0.024878	0.009389	2.649751	0.0082	1.03166	Accept
Market Value to Book Value	MTB	0.005094	0.002904	1.75386	0.0798	1.071065	Reject
Firm Size	SIZE	0.071814	0.0486	1.477651	0.1399	1.056004	Reject
Firm Age	AGE	-0.40103	0.184272	-2.17628	0.0298	1.450501	Accept
Trading Vol.	TURN	$-9.10E^{-10}$	$6.06E^{-09}$	-0.15021	0.8806	1.011964	Reject
R^2:0.275515	R^2-Adj:0.123262			D-W:2.466957		F-Test Statistic's Prob.:0.00	

Table 5: Results of Chow and Hausman Tests

Model	Test	Statistic	Statistic Value	Degree Of Freedom	Statistical Probability
First Subsidiary (Negative Skewness of the Stock Return)	Chow	F-Limer	1.901203	(170.845)	0
	Hausman	Chi-Squared Test	12.023759	10	0.2835
First Subsidiary (Down-to-up Volatility)	Chow	F-Limer	1.251785	(170.845)	0.0249
	Hausman	Chi-Squared Test	6.319675	10	0.7877
Second Subsidiary (Negative Skewness of the Stock Return)	Chow	F-Limer	2.413939	(170.845)	0
	Hausman	Chi-Squared Test	18.924516	10	0.0412
Second Subsidiary (Down-to-up Volatility)	Chow	F-Limer	1.447689	(170.845)	0.0066
	Hausman	Chi-Squared Test	9.340918	10	0.3255
Third Subsidiary (Negative Skewness of the Stock Return)	Chow	F-Limer	2.415444	(170.845)	0
	Hausman	Chi-Squared Test	20.214382	10	0.0273
Third Subsidiary (Down-to-up Volatility)	Chow	F-Limer	1.446584	(170.845)	0.0006
	Hausman	Chi-Squared Test	11.668293	10	0.3079

In all the tables, the values for Durbin-Watson statistic are between 1.5 and 2.5 which stand for the independence of remainders, the F-test probability with a fault level of less than 5% which shows the

Table 6: Estimation of the Coefficients of the Eq.4 (Summary of the Results the Second Hypothesis)

Dependent Var: Crash (NSKEW)		Model: Regression Panel/Fixed Effects			Type:OLS (Weighted)		
Sections(Number):171		Periods(Number): 6			Observation: 1026		
Variables Names	Variable Symbol	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	2.369247	1.407279	1.683566	0.0926	-	Reject
Prospector Business Strategy	STRAGR	0.19416	0.241537	0.803851	0.4217	1.1908	Reject
Stock Price Synchronicity	SYNCH	0.010802	0.012042	0.897004	0.37	1.0415	Reject
Prospector Business Strategy*Synchronicity	STRAGR*SYNC	0.116156	0.092906	1.250258	0.2116	1.0725	Reject
Institutional Ownership	INST	0.178728	0.248254	0.71994	0.4718	1.4207	Reject
Leverage	LEV	0.157693	0.192097	0.820904	0.4119	1.0779	Reject
Return on Equity	ROE	-0.00032	0.008885	-0.03586	0.9714	1.1617	Reject
Market Value to Book Value	MTB	0.004155	0.002211	1.8795	0.0605	1.0849	Reject
Firm Size	SIZE	-0.02183	0.050944	-0.42844	0.6684	1.1997	Reject
Firm Age	AGE	-0.60842	0.170879	-3.5605	0.0004	1.6156	Accept
Average Volume	TURN	$-1.28E^{-09}$	$4.37E^{-09}$	-0.29368	0.7691	1.0144	Reject
R^2:0.301113	R^2-Adj:0.152237		D-W:2.384468		F-Test Statistic's Prob.: 0.000		
Dependent Var:Crash (DUVOL)		Model:Regression Panel/Fixed Effects			Type:OLS (Weighted)		
Sections(Number):171		Periods(Number): 6			Observation: 1026		
Variables Names	Variable Symbol	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	-0.09067	1.508068	-0.06012	0.9521	-	Reject
Prospector Business Strategy	STRAGR	0.414112	0.24191	1.711842	0.0873	1.3071	Reject
Stock Price Synchronicity	SYNCH	0.007069	0.014942	0.473068	0.6363	1.0402	Reject
Prospector Business Strategy*Synchronicity	STRAGR*SYNC	0.125987	0.107339	1.173725	0.2408	1.1342	Reject
Institutional ownership	INST	-0.16565	0.308781	-0.53645	0.5918	1.4055	Reject
Leverage	LEV	-0.08761	0.256464	-0.3416	0.7327	1.1143	Reject
Return on Equity	ROE	0.024712	0.009237	2.675181	0.0076	1.1871	Accept
Market Value to Book Value	MTB	0.004477	0.002466	1.815658	0.0698	1.1282	Reject
Firm Size	SIZE	0.046773	0.051887	0.901434	0.3676	1.1212	Reject
Firm Age	AGE	-0.31319	0.198202	-1.58014	0.1144	1.5632	Reject
Average Volume	TURN	$-3.28E^{-09}$	$5.82E^{-09}$	-0.56472	0.5724	1.0260	Reject
R^2:0.24628	R^2-Adj: 0.085724		D-W: 2.463855		F-test Statistic's Prob.: 0.0005		

Table 7: Estimation of the Coefficients of theEq.5 (Summary of the Results the Second Hypothesis)

Dependent Var:Crash (NSKEW)		Model:Regression Panel/Fixed Effects			Type:OLS (Weighted)		
Sections(Number):171		Periods(Number): 6			Observation: 1026		
Variables Names	Variable Symbol	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	1.097952	1.30588	0.840776	0.4007	–	Reject
Analyst Business Strategy	STRANL	0.414769	0.05377	7.713751	0	1.1564	Accept
Stock Price Synchronicity	SYNCH	0.02774	0.013562	2.045454	0.0411	1.5009	Accept
Analyst Business Strategy*Synchronicity	STRANL*SYNC	-0.04008	0.023029	-1.7404	0.0822	1.6010	Reject
Institutional Ownership	INST	0.469727	0.245306	1.914857	0.0558	1.5223	Reject
Leverage	LEV	0.163399	0.18692	0.874164	0.3823	1.1025	Reject
Return on Equity	ROE	-0.00565	0.010455	-0.54056	0.589	1.0212	Reject
Market Value to Book Value	MTB	0.005126	0.002222	2.307307	0.0213	1.1198	Reject
Firm Size	SIZE	0.0243	0.045736	0.531306	0.5953	1.1478	Reject
Firm Age	AGE	-0.71258	0.154784	-4.60373	0	1.5102	Accept
Average Volume	TURN	$-7.31E^{-10}$	$4.61E^{-09}$	-0.15848	0.8741	1.0091	Reject
R^2:0.376811	R^2-Adj:0.244061		D-W:2.375709		F-Test Statistic's Prob.: 0.000		
Dependent Var:Crash (DUVOL)		Model:Regression Panel/Fixed Effects			Type:OLS (Weighted)		
Sections(Number):171		Periods(Number): 6			Observation: 1026		
Variables Names	Variable Symbol	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	-1.18653	1.530934	-0.77503	0.4385	–	Reject
Analyst Business Strategy	STRANL	0.309952	0.066879	4.6345	0	1.1059	Accept
Stock Price Synchronicity	SYNCH	0.033471	0.016658	2.00931	0.0448	1.3561	Accept
Analyst Business Strategy*Synchronicity	STRANL*SYNC	-0.07624	0.031254	-2.43927	0.0149	1.4166	Accept
Institutional ownership	INST	0.10525	0.310118	0.339387	0.7344	1.4534	Reject
Leverage	LEV	-0.05225	0.255254	-0.20469	0.8379	1.0797	Reject
Return on Equity	ROE	0.021239	0.010232	2.075686	0.0382	1.0313	Accept
Market Value to Book Value	MTB	0.004408	0.002911	1.513838	0.1304	1.0997	Reject
Firm Size	SIZE	0.094907	0.052555	1.805851	0.0713	1.0840	Reject
Firm Age	AGE	-0.49964	0.189843	-2.63187	0.0086	1.4570	Accept
Average Volume	TURN	$7.86E^{-10}$	$6.00E^{-09}$	0.131077	0.8957	1.0170	Reject
R^2:0.273261	R^2-Adj: 0.118452		D-W: 2.474061		F-test Statistic's Prob.: 0.0000		

significance of the whole model, and the VIF values are less than 10 which means the lack of multi

Table 8: Estimation of the Coefficients of the Eq.6 (Summary of the Results the Second Hypothesis)

Dependent Var:Crash (NSKEW)		Model:Regression Panel/Fixed Effects			Type:OLS (Weighted)		
Sections(Number):171		Periods(Number): 6			Observation: 1026		
Variables Names	Variable Symbol	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Y-Intercept	C	1.966345	1.26839	1.550268	0.1215	-	Reject
Defender Business Strategy	STRDEF	-0.46824	0.054586	-8.57797	0	1.1632	Accept
Stock Price Synchronicity	SYNCH	-0.00096	0.017872	-0.05396	0.957	2.7104	Reject
Defender Business Strategy*Synchronicity	**STRDEF*SYNC**	0.023088	0.022193	1.040344	0.2985	2.6584	Reject
Institutional Ownership	INST	0.535041	0.245713	2.177501	0.0297	1.5395	Reject
Leverage	LEV	0.160923	0.186114	0.864649	0.3875	1.1060	Reject
Return on Equity	ROE	0.000299	0.009454	0.031634	0.9748	1.0250	Reject
Market Value to Book Value	MTB	0.005371	0.002186	2.456967	0.0142	1.1137	Accept
Firm Size	SIZE	-0.00094	0.044186	-0.02132	0.983	1.1308	Reject
Firm Age	AGE	-0.6214	0.152107	-4.08528	0	1.5150	Accept
Average Volume	TURN	$-2.12E^{-09}$	$4.67E^{-09}$	-0.45488	0.6493	1.0089	Reject
R^2:0.386523	R^2-Adj: 0.255841		D-W: 2.363604		F-Test Statistic's Prob.: 0.000		
Dependent Var:Crash (DUVOL)		Model:Regression Panel/Fixed Effects			Type:OLS (Weighted)		
Sections(Number):171		Periods(Number): 6			Observation: 1026		
Variables Names	Variable Symbol	Coefficients	Standard Error	T-Value	Statistical Probability	VIF	Test Result
Intercept	C	-0.59479	1.470901	-0.40437	0.686	-	Reject
Defender Business Strategy	STRDEF	-0.38779	0.069406	-5.58722	0	1.1124	Accept
Stock Price Synchronicity	SYNCH	-0.0253	0.025974	-0.97388	0.3304	3.2903	Reject
Defender Business Strategy*Synchronicity	STRDEF*SYNC	0.050783	0.03071	1.653646	0.0986	3.3529	Reject
Institutional Ownership	INST	0.20687	0.310834	0.665532	0.5059	1.4763	Reject
Leverage	LEV	-0.04037	0.254502	-0.15864	0.874	1.0726	Reject
Return on Equity	ROE	0.025715	0.009361	2.746942	0.0061	1.0442	Accept
Market Value to Book Value	MTB	0.004821	0.002892	1.66676	0.0959	1.0880	Reject
Firm Size	SIZE	0.075505	0.049737	1.518083	0.1294	1.0652	Reject
Firm Age	AGE	-0.40992	0.185479	-2.21005	0.0274	1.4554	Accept
Average volume	TURN	$9.17E^{-11}$	$5.99E^{-09}$	0.015313	0.9878	1.0152	Reject
R^2:0.282065	R^2-Adj: 0.129132		D-W: 2.466522		F-Test Statistic's Prob.: 0.000		

collinearity of independent variables of the model. In addition, control variables that have a significant effect on stock price crash risk are institutional ownership with positive effect, the ratio of market

cap to book value and return on equity with a small positive effect, and firm age with negative effect on the dependent variable.

4.2.2 The Second Hypothesis Test

The second hypothesis of the study has been proposed to investigate the effect of stock price synchronicity on stock price crash risk and also the interaction effect of business strategy and stock price synchronicity on stock price crash risk. In order to test this hypothesis three subsidiary models divided by the type of the business strategy have been defined. Table 5 shows Chow and Hausman tests for each of the subsidiary models. The results from developing the regression model of the first subsidiary hypothesis which claims the interaction effect of prospector business strategy and stock price synchronicity on stock price crash risk, have been shown in Table 6 with two measurement standards. The results from the Chow and Hausman test show that the appropriate method for both of the standards is the combinational data regression with random effects. However, considering the fact that the random effects method in the negative skewness of stock return method, based on the probability of F-test statistic is meaningless and also in the down-to-up volatilities method has a low coefficient of determination equal to 2%, we use the results of the regression model with fixed effects which not only is significant, but also presents a better model with a higher coefficient of determination. Based on the T-value of interaction effect of subsidiary variable of prospector business strategy and stock price synchronicity and its probability in both standards which is higher than the fault level of 5%, the first subsidiary hypothesis is not accepted and it can be said that the interaction effect of prospector business strategy and stock price synchronicity on stock price crash risk is meaningless. Table 7 shows the results from developing a model for the second subsidiary hypothesis test which claims the interaction effect of analyst business strategy and stock price synchronicity on stock price crash risk. The suitable method for developing a model in the negative skewness of stock return is using the fixed effects method and in the down-to-up volatilities is using random effects method; however due to the fact that the coefficient of determination with random effects method is really low, about 2%, the results from the fixed effects model is used for this standard as well.

The T-value of the interaction effect coefficient of the analyst business strategy and stock price synchronicity and its probability in the down-to-up volatilities method, show a significant and negative interaction effect of analyst business strategy and stock price synchronicity on stock price crash risk. According to this result it can be said that stock price synchronicity in firms with an analyst business strategy, lowers the stock price crash risk. Also the T-value of the coefficient of the independent variable of stock price synchronicity and its probability in both of the measuring methods show that stock price synchronicity has a significant and positive effect on stock price crash risk. Table 8 shows the results from developing the third subsidiary hypothesis. The appropriate method for estimating the model has been chosen similar to the second subsidiary hypothesis. Based on the T-value of the coefficient of interaction effect of defender business strategy and stock price synchronicity and its probability which has a fault level of less than 5%, it can be said that the interaction effect of the defender business strategy and stock price synchronicity on stock price crash risk is not significant. So, the results from the second subsidiary hypothesis test show that stock price synchronicity has a significant and positive effect on stock price crash risk; however in firms with an analyst business strategy, it decreases stock price crash risk. Also, in firms with a defender or prospector business strategy, stock price synchronicity does not have a significant effect on stock price crash risk.

In all the tables, the values for Durbin-Watson statistic are between 1.5 and 2.5 which stand for the independence of remainders, the F-test probability with a fault level of less than 5% which shows the

significance of the whole model, and the VIF values are less than 10 which mean the lack of multi collinearity of independent variables of the model. In addition, according to the other results from the second subsidiary hypothesis test, control variables have a significant effect on stock price crash risk, are institutional ownership with positive effect, the ratio of market cap to book value and return on equity with small positive effect, and firm age with negative effect on the dependent variable.

5 Discussion and Conclusions

Stock price crash risk is a vital element related to stock return for investors because of its unchangeable nature. Due to this importance, it is not too irrational that the search for the probable factors affecting it is on the rise. Real profit management and accruals as the index of dispersion for financial reports, the management's tendency to participate in tax avoidance activities, and stock holders' motives are the discovered elements that influence the changes in stock return. These results are a product of business strategy at the firm's level. Studying this issue that how following a business strategy specific to each firm can affect the firm's chance of facing stock price crash risk gives us some clues as to what factors affect this phenomenon. This study was done in the firms listed in Tehran Stock Exchange to investigate the effect of business strategy and stock price synchronicity on stock price crash risk. There have not been any studies that investigated the interaction effect of business strategy and stock price synchronicity on stock price crash risk so far, neither inside nor outside of Iran. Therefore, the results from the hypothesis test that resulted in the negative impact of stock price synchronicity on stock price crash risk in firms with an analyst business strategy could not be compared with other studies.

According to the other findings from this study, institutional ownership has a significant and positive impact on stock price crash risk. This matter shows that the higher the number of stocks owned by institutional owners is, the chance of stock price crash risk increases. Stock price crash risk can be caused by the type of business strategy chosen by the management of the firm in order to compete in product market. Considering the results of this study, managers of firms are advised to pay extra attention to stock price crash risk if they follow the analyst or prospector business strategies, and if it is not possible to have a more prospector business strategy, they should follow the defender business strategy.

It is also necessary for the investors who aim to increase their return by stock price gain to pay attention to the firm's business strategy. Newly established firms or the ones with high risk projects are more prone to stock price crash risk. The direct impact of stock price synchronicity on stock price crash risk show that the lack of disclosure of the firm's special information can result in piling up of bad news and the sudden release of it, which is ultimately followed by stock price crash risk in the future. Therefore, managers of firms, shareholders, and investors must consider the fact that if there is undisclosed information in the company that can result in stock price synchronicity of the firm with changes in the market, they are exposed to stock price crash risk in the future. Nevertheless, stock price synchronicity reduces stock price crash risk in firms that have an analyst business strategy. Thus it can be said that the disclosure of information related to high risk projects can have a negative reaction from the market for these firms. Other findings of this study show that the firm's age has a significant and negative impact on stock price crash risk. Investors are advised to pay attention to this fact in order to lower stock price crash risk and also be careful with the firms which have recently been listed in the stock market and it has not been long that they are being traded.

Due to the importance of stock price crash risk for investors and analysts, it is suggested that some

standards should be issued to require the firms to calculate and report their stock price crash risk. Also providing a report on the type of business strategy yearly used by the firm can be profitable.

These topics are suggested for future studies to be done:

- ✓ Investigating the impact of business strategy and information asymmetry on stock price crash risk
- ✓ Investigating the impact of stock price synchronicity and information asymmetry on stock price crash risk
- ✓ Investigating the impact of overinvestment on stock price crash risk
- ✓ Investigating the impact of monetary policies in forms of expansionary and contractionary monetary policies on stock price crash risk

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