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Predicting the Factors Affecting on the Migration of Growth Firms with Financial Health in the Tehran Stock Exchange by Using the Random Forest Method

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ABSTRACT

The purpose of this research is to investigate the factors affecting migration of growth companies with financial health in the Tehran Stock Exchange. In order to make better decisions and also to innovate, this research was conducted only on companies with financial health based on the Black, Scholes and Merton (BSM) model. The statistical population of this study is all companies listed on the Tehran Stock Exchange between 2012 and the end of 2019; therefore, all companies have been operating on the stock exchange during these years and their fiscal year ends in March, Participated in this research. After extracting the statistical sample, the researcher calculated the financial health of the statistical sample companies based on the model introduced by Black, Scholes and Merton (BSM) model, and then by using the Fama and French model, companies with growth migration were identified. Due to superiority of artificial intelligence methods over statistical linear models as well as the benefits of nonlinear methods in prediction, the present study presented a model for predicting the migration of growth stocks using nonlinear algorithm of random forests. Based on the results of the present study, it can be acknowledged that by using historical information, we can suggest factors for modeling growth migration.

Keywords:

Growth Migration, Random Forest, Modeling.

1. Introduction

Various investment strategies have been developed and used by professional investors to earn high returns in the stock market. Among them, value investment strategy and growth investment strategy have probably been most popular in the investment community around the world. Growth investors, however, buy stocks with future growth potential which can lead to a significant increase in stock prices in the long run. Growth stocks are expected to be currently trading at prices higher than their intrinsic value because of the growth potential and, accordingly, their value ratios are generally low (An,.., 2017). Fama and French (1997) showed that high B/M, E/P or C/P stocks have higher average returns than the low B/M. They classify firms with high ratios of Book-to-Market (B/M) as value stocks. In contrast growth stock is stocks with low ratios of Book-to-Market (B/M) (Fama, French, 1997). The behavior of growth and value stocks is an interesting phenomenon in finance as researchers have worked over the years on different aspects of it. Fama and French (1992, 1996) and Lakonishok, Shleifer, and Vishny (1994) proved the existence of strong value premium in average returns for the US stocks. (Takahashi, 1999). Fama and French (2007) showed that Growth firms tend to be highly profitable and fast-growing, while value firms are less profitable and grow less. Fama and French (2007) found that the price-to-book ratios of growth portfolios tend to fall in the years after portfolio formation. Conversely, the price-to-book ratios of value portfolios tend to rise in the years after portfolio formation, as some value firms restructure, their profitability improves, and they are rewarded by the market with lower discount rates. The evidence that convergence in price-to-book ratios is an important component of the value premium in average stock returns suggests that migration of stocks across groups, which gives rise to convergence, is important in describing the cross-section of average returns (Fama, French, 2007). Rahmanifirouzjae and coworker (2017) investigate the effect of stock migration on the premium of portfolios' Return in Tehran stock exchange. According to the results, the wealth of stockholders increased by investing in companies that had migration from small size to big size. The results of Davari and coworker (2016) in Iran show that there is a significant relationship between Value-growth migration and capital productivity. In this paper, we try to investigation of factor effecting stock migration. In this regard we examine the factors that may make stock migration. In order to examine more precisely the factors affecting the stock market, we used only companies that had financial health based on the Black, Scholes & Merton (BSM) model. Current research findings can help investors choose the right investment strategy. Considering the financial health of companies as well as a group of stocks (migration of growth stock), the findings of the current research can help investors in choosing the right investment strategy.

2. Literature Review

Schroder and Esterer (2016) findings shows that shares with a high book-to-market ratio of equity value (also called value stocks) provide different average higher returns than shares with a low book-to-market ratio(growth stocks). this additional return is not a compensation for the shares 'higher systematic risk exposure as implied by the CAPM, but seems to be a pricing anomaly with respect to this fundamental pricing model.Athanasakou and Athanassakos (2019) Showed that the literature on the value-growth phenomenon has shed light to two key explanations, risk and behavioral biases. A bulk of studies have associated the value premium with measures of risk, such as the standard deviation of returns, or of analyst forecasts and idiosyncratic volatility. Karkkolainen find (2020) a clear outperformance of value investing compared to growth. Lakonishok, Shleifer and Vishny (1994), suggest that investors appear to consistently underestimate future growth rates for value stocks, therefore underprice them. This results in value stocks outperforming growth stocks. Porta, Lakonishok, Shleifer and Vishny (1995) found that expectational errors about future earnings prospects play an important role in the superior return to value stocks... Fama and French (1996) argued that the value stocks compensated investors for bearing high fundamental risks. Fama and French (1997) showed that the difference between average returns on global portfolios of high and low B/M stocks is 7.60% per year. Chan and Lakonishok (2004) did a review on the current state of value and growth investing where they present some of the explanations for performance presented in literature and updates some of the empirical results. Abhyankar, Ho, and Zho (2006), by using US data, found strong evidence that growth stocks stochastically dominated value stocks during

economic recession periods. Fama and French (2007) results indicate that the size premium is due almost entirely to the extreme positive returns of small stocks that move to a big stock portfolio from one year to the next. Lakonishok ET al.Chahine (2008) shows that value investing can be a relative simple investment strategy and with it he finds that there exists a value premium in Europe during 1988 to 2003. Abhyankar, Hob and Zhao (2009) found that value premiums in the UK, Germany and Italy are statistically insignificant. The findings of Saji (2012) provided evidence on the outperformance of growth stocks by value stocks during market downturn.Fama and French (2012) report that the value premium exists in the four regions of North America, Europe, Japan, and Asia Pacific.Pei Fun & Ronni Basana (2012) results indicate that cheaper stocks were doing better in comparison to more expensive stocks only at short-time period.Asness, Moskowitz, and Pedersen (2013) show that value premiums exist across many regions of the world and in di_erent asset classes. Carpenteret al. (2014), Cakici et al. (2015), Cheung et al. (2015) document significant value effect in stock market. Faulkenberry (2015) states that enterprise value is a key metric for value investors because it best represents the total value of a company and are capital structure neutral. Hussaini (2016) results indicate that: first, there is a size premium in the Stock Exchange of Thailand and the difference between the average monthly returns is 2.02 percent; second, value stocks do not generate higher average monthly returns than growth stocks and it is true for both small size stocks and large size. An, Cheh, Kim (2017) showed that high EBIT/EV and BV/EV ratios may be a good indicator of the underpriced security. Ahmad, Amir Shah (2017) reports the existence of strong value premium for Pakistan equity market. Liu, Stambaugh, Yuan (2019) construct size and value factors in China. They find Size and value are important factors in the Chinese stock market, with both having average premiums exceed- in 12% per year. Value effects in China are captured much better by EP than by BM.The main objective of this paper is to investigate the factor affecting the Migration of growth stocks in Tehran Stock Exchange over the period of 2012-2019.

3. Methodology

3.1. Research method

This study is an applied research. The primary objective of applied research is to develop applied knowledge in a specific field. In terms of data collection, the research is descriptive. Descriptive research can be divided into survey, correlation, action research, case study, and retrospective study. This research is correlational and the scale of data measurement is relative.

To test the research's questions, we use data from March 2012 to March 2019 which have the following characteristics: 1) The Fiscal year of the companies will end in March.2) There is a company's balance sheet information. Meanwhile, companies' stocks have no negative book value or zero.3) There is no stop trading for more than three months (they have market price at least in nine months of the year).4) the companies' market value is available at the end of each year.

So, we use all active companies in the stock exchange between 2012 to 2019, which are eligible. Meanwhile, the researcher is used the companies with financial health to investigate the factor affecting the Migration of growth stocks. To identify and extract the companies with financial health, we use proposed BSM model by Li and Xia (2017) as follows:

EDFi,t = N(-DDi,t);

$$DD_{it} = \frac{\log\left(\frac{E_{i,t}+F_{i,t}}{FF_{i,t}}\right) + \left(r_{i,t-1} - \frac{\sigma_{Vi,j}^2}{2}\right) \times T_{i,t}}{\sigma_{Vi,j} \times \sqrt{T_{i,t}}}$$

$$\sigma_{Vi,t} = \frac{E_{i,t}}{E_{i,t}+F_{i,t}} \times \sigma_{Ei,t} + \frac{E_{i,t}}{E_{i,t}+F_{i,t}} \times (0.05 + 0.25 \times \sigma_{Ei,t})$$

E_{it} is the stock market value of company at the end of year t, F_{it} is the nominal value of the company's debts at the end of year t (equal to the total short-term debt and 50% of long-term debt), $r_{i,t-1}$ is the annual return of company i in year t-1, β_{vit} is approximate volatility of the company value at the end of year t, β_{Eit} is the volatility of stock returns i in year t (is calculated using the standard deviation of the monthly stock returns of the company in year t-1). T is deadline (one year is considered). N (0) is cumulative probability of normal distribution's is a company-specific criterion that calculates the value of each company based on the financial situation and financial resources and capital

resources, not based on its credit rating, as a result it provides a more accurate rating (Shams et al, 2017). Based on the results, the results of companies' model can be divided into three categories.

As explained in the previous steps, in this study we use the companies with financial health. As a result, considering the above descriptions, 701 companies are selected for analysis.

Table 1: dividing companies based on the results of BSM

The result of computing BSM	Company Status
BSM < 0.33	Companies with financial health
$0.33 <$ **BSM** < 0.66	Companies with moderate inability
BSM > 0.66	Companies with high inability

(Source: Fadaiinejad, Shahrari, Salim ,2015)

3.2. Research questions

According to the arguments in the statement of the problem, the following questions have been formulated to examine the Factors Affecting on the migration of growth firms with financial health in the Tehran Stock Exchange over the period of 2012-2019.

RQ 1: Are fluctuations in the specific characteristics of healthy companies as factors influencing the migration of growth companies?

RQ 2: Are fluctuations in the characteristics of the Iranian capital market considered as factors influencing the migration of growth companies?

RQ 3: Are fluctuations in macroeconomic characteristics as factors influencing the migration of growth companies?

RQ 4: Using the historical information of the variables in the above questions, can we suggest factors for modeling the migration of growth companies?

3.3. Value and Growth portfolios

Our tests center on six portfolios formed on size and price-to-book ratios. As in Fama and French (1993,1995,1998,2007), At the end of calendar year from 2011 to 2018, companies are selected to be included in the study. The selected companies are ranked by size (market capitalization) and sorted into two groups with median size of the market. So All companies were divided into 2 groups; companies have market value more than cutting point are big company (B) while companies have market value less than cutting point are small company (S).

The companies are also ranked by BE/ME than the stocks are divided to 3 groups according to BE/ME ratio. First group, 30 percentage of whole stock has BE/ME highest (called High: H group) second group, 40 percentage of whole stock has BE/ME in medium (Medium: M group) and the last group, 30 percentage of whole stock has BE/ME lowest (called Low: L group).

Then the stock will be organize into six groups according to their size and BE/ME ratio(S/L, S/M, S/H, B/L, B/M, B/H). For example group S/L consist of the stock that exist in small group has BE/ME at the lowest or B/H group consist of stock that exist in large (Big) stock group has BE/ME highest, etc.

Table 2: six portfolios

SIZE	BOOK- TO –MARKET RATIO		
	H (Above 70%)	**M (Between 70%-30%)**	**L (Below 30%)**
B (Above 50%)	Big / High(B/H)	Big / Medium(B/M)	Big / Low(B/L)
S (Below 50%)	Small / High(S/H)	Small / Medium(S/M)	Small / Low(S/L)

(Source: Fama, French, 1993, 1995, 1998, 2007)

The intersection of these independent sorts produces six portfolios, S/L, S/M, S/H, B/L, B/M, and B/H, refreshed at the end of March each year. As in Fama and French (1998), we divided portfolio into three groups (growth portfolio, Neutral portfolio, and value portfolio) base on their BE/ME ratio. Value portfolio consist of all stocks with high BE/ME ratio, Neutral portfolio consist of all stocks with middle BE/ME ratio, Growth portfolio consist of all stocks with low BE/ME ratio. The means of growth migration is the movement of firms from Value to Growth portfolios along two years. So in each year growth migration consist of all stocks that were in value portfolio in the past year and now came to the growth portfolio. As a result, considering to the above descriptions, 183 companies are selected for the growth migration analysis.

3.4. Research variables

Due to superiority of artificial intelligence methods over statistical linear models as well as the benefits of nonlinear methods in prediction, the present study

presented a model for predicting the migration of growth stocks using nonlinear algorithm of random forests.

The dependent variable used in this research is the ratio of book to market value, which is the main factor in defining value and growth migration. Value companies are companies that have a higher book to market value ratio than other companies and the growth companies are also companies that have a lower book to market value ratio than other companies according to the fama and french three factor model.

The independent variables are variables that typically explain part of the behavior of a dependent variable. Independent variables in this research include the following three groups: The first group including the financial ratios or specific characteristics of companies, the second group: including the characteristics of the Iranian capital market and the third group: including macroeconomic characteristics of Such as gold price in the domestic market, coin price, Iranian oil price, world oil price, global gold price are considered as inputs for random forest algorithm and then based on analyzes and coefficient of importance of each of the mentioned factors as output The most important factors will be identified by the researcher. Then, based on these factors, the training and testing steps will be implemented.

Random forest algorithm

Random forest algorithm is a group algorithm with a set of decision trees. Random forest algorithms can increase predictive accuracy compared to individual classification trees. In the individual tree, with small changes in the training set, instability is created, which disrupts the accuracy of the prediction in the experimental sample. But being a group of random forest algorithms adapts to changes and eliminates instability (Namazi and Sadeghzadeh, 2019).As mentioned in the previous steps, the random forest of a class is a set consisting of decision tree classifications. Each classifier for each input sample is h (x, $\boldsymbol{\theta}$k). X is an input sample and $\boldsymbol{\theta}$k is a training set for the KM tree. They are independent of each other but with the same distribution. For each x sample, each tree provides a prediction for the x sample category, and finally the category with the highest number of tree votes on the x input is selected as the sample category.

Training phase

In the process of creating a forest, in constructing each tree and to divide each node, we select a subset of the input attributes to be random, and to obtain the best attribute in the node to create a branch, the information utility criterion is used. Each tree on the forest has its own set of OOB specimens. We obtain the accuracy of each tree using the OOB samples of that tree and consider it as the weight of that tree. The weight of each tree is calculated from Equation 4 and 5:

$$W_k = \frac{\sum_{i=1}^{N} I(h_k(x_i)=y_i\ ,\ (x_i\ ,\ y_i)\in OOB_k)}{\sum_{i=1}^{N} I((x_i\ ,\ y_i)\in OOB_k)}$$

$$I(h_k(x_i)=y_i\ \ ,\ \ (x_i\ \ ,\ \ y_i)\in OOB_k)=\begin{cases}1\ h_k(x_i)=y_i\\0\ h_k(x_i)\neq y_i\end{cases}$$

N: The number of all samples of the main training set, Xi: sample i on the main training set, Yi the real Xi category, and I: the index function (is obtained from the ratio of 4).

Tasting phase

In this phase, we use a test data set to evaluate the algorithm. The experimental specimens are predicted based on the weight of the forest trees. To obtain the category of each sample, all forest trees participate and we use the 6 equation, which is based on the weight of the trees obtained in the training phase. For each category c, we obtain the set of weights of the trees in the c category for example x, and then the category with the highest average weight on the trees is considered as the experimental category. In the following relation, y(x) is the category predicted by the improved random forest for example x, k is the number of trees and Wk. is the weight of km tree.

$$y(x)=arg\ max_c\left\{\frac{1}{K}\sum_{k=1}^{K} W_k, I(h_k(x)=c)\right\}$$

In this research, the Accuracy criterion is used according to the following definitions to evaluate and compare the performance of the proposed method with the actual value. Accuracy criterion: The ratio of the number of correctly classified streams divided by the total number of streams.

In addition, in this study, to measure the accuracy of random forest estimates, the mean square error (MSE), square root mean error (RMSE) and mean absolute error value (MAE) were used.

$$MSE = 1/n \sum_{i=1}^{n} (Y_i - \hat{Y})^2$$

$1/n \sum_{i=1}^{n} (Y_i - \hat{Y})^2$ Is averages the of square error of each data.

$$RMSE = \sqrt{1/n \sum_{i=1}^{n} (Y_i - \hat{Y})^2}$$

$$MSE = 1/n \sum_{i=1}^{n} |Y_i - \hat{Y}|$$

$1/n \sum_{i=1}^{n} |Y_i - \hat{Y}|$ Which calculates the average of the error value of each data.

In this study, first the required data were prepared from the stock exchange and then, using Excel and Access, the initial and required information for statistical analysis were provided. The Python software were used to test the research questions. In addition, Eviews software has been used for the descriptive statistics section.

4. Results

4.1. Descriptive statistic

The total statistical sample studied during the research period encompassed 189 companies in different industries and given that the collected data was related to 12 years and the variables were calculated annually, the number of observations related to the mentioned variables was equal to 2196 i.e. 12*183.

Table 3: Descriptive statistics of some variables related to companies with growth migration

Description	GROA	GROE	GFAR	GOWR	GDER	GDR	GTT	GQR	GCR	GFA	GMR
Mean	9.26	0.48	0.13	0.2	0.23	0.34	32.55	28.21	3.74	37.17	0.25
Median	6.5	0.25	0.09	0.13	0.15	0.22	11.7	15.19	2.53	42.02	0.22
Maximum	45.54	11.79	0.53	3.15	3.05	4.02	3454.38	552.25	31.2	88.12	122.97
Minimum	-3.1	-8.56	0.01	0	0.01	0.02	-41.9	-21.9	-10.36	3.01	-55.03
Std. Dev	8.16	0.92	0.1	0.22	0.27	0.35	139.06	43.48	4.32	16.74	4.25
Skewness	1.79	3.34	1.5	4.38	3.92	3.81	17.69	4.56	2.08	-0.03	11.05
Kurtosis	6.22	47.85	4.69	41.43	27.41	27.23	385.91	36.98	9.34	2.08	364.57
Observations	2196	2196	2196	2196	2196	2196	2196	2196	2196	2196	2196
GMR : The return of growth companies ،GFA : The age of growth companies ،GCR : Current ratio of growth companies ،GQR : The quick ratio of growth companies ،GTT : Total turnover of growth assets ،GDR : debt-to-value ratio ،GDER : Debt ratio to shareholders' equity ،GOWR : Ownership ratio of company growth ،GFAR: Ratio of fixed assets returns of growth companies ،GROE: Return on equity of growth companies ،GROA: Total return on assets of growth companies ،											

(Source: based on research findings)

According to the information provided in Table 4, growth companies have an average current ratio of 3.74 with a scatter of 4.32 during the years under review. The ratio of growth companies indicates that this group of companies always has current assets more than current liabilities; therefore, it can be argued that this group of companies are conservative companies. According to the Table 4, growth companies are on average 37 years old. Among them, the minimum age is 3 years and the maximum age is 88 years. In addition, the standard age distribution of development companies is 16 years.

Testing the research questions

Current research is trying to predict the effective factors to predict on the migration of growth stocks using nonlinear classification of random forests. In the present study, 70% of the data were selected for model training and 15% were divided for validation and residual data for model testing. In the random forest model, we selected 100 classification trees to grow in the random forest model. In general, the higher the number of trees in the random forest model, the better the results. But in the end, this performance reaches a limited value. After a certain amount of observations, it shows that with increasing number of trees, the amount of error fluctuations is constant. The number of attributes randomly assigned to each tree division is 5.

All trees used in the study were selected from unlimited depth. And entropy was used to separate the

nodes. As an example, one of the decision trees and its output is presented in the figure below.

The most important factors influencing the migration of the growth companies in the period under review are described in Table 6.

Table 4: List of features used in random forest for growth migration

Row	name feature	data type	Row	name feature	data type
1	Dollar market price	General conditions	23	Next Monthly Price	Company features
2	Euro market price	General conditions	24	Firm Age	Company features
3	global Oil	General conditions	25	last price	Company features
4	Iranian Oil Prices	General conditions	26	P/E	Company features
5	Coin Price	General conditions	27	number of share	Company features
6	Internal gold price	General conditions	28	Number of buyers	Market features
7	OPEC oil prices	General conditions	29	Number of transactions	Market features
8	global price of gold	General conditions	30	The volume of shares traded	Market features
9	USD	General conditions	31	Trading Value	Market features
10	CNY	General conditions	32	Day market value	Market features
11	EUR	General conditions	33	30 large companies	Market features
12	Current Ratio	Company features	34	50 more active companies	Market features
13	Quick ratio	Company features	35	Top 50 Companies Price	Market features
14	Total Turnover of Assets	Company features	36	Free float	Market features
15	Debt Ratio	Company features	37	First market	Market features
16	Debt To Equity Ratio	Company features	38	Second Market	Market features
17	Ownership Ratio	Company features	39	Market returns	Market features
18	Fixed Assets Return	Company features	40	Cash return	Market features
19	ROE	Company features	41	Total index	Market features
20	ROA	Company features	42	Industry	Market features
21	Monthly returns	Company features	43	Value Weighted Price	Market features
22	Monthly price T	Company features	44	The OTC	Market features

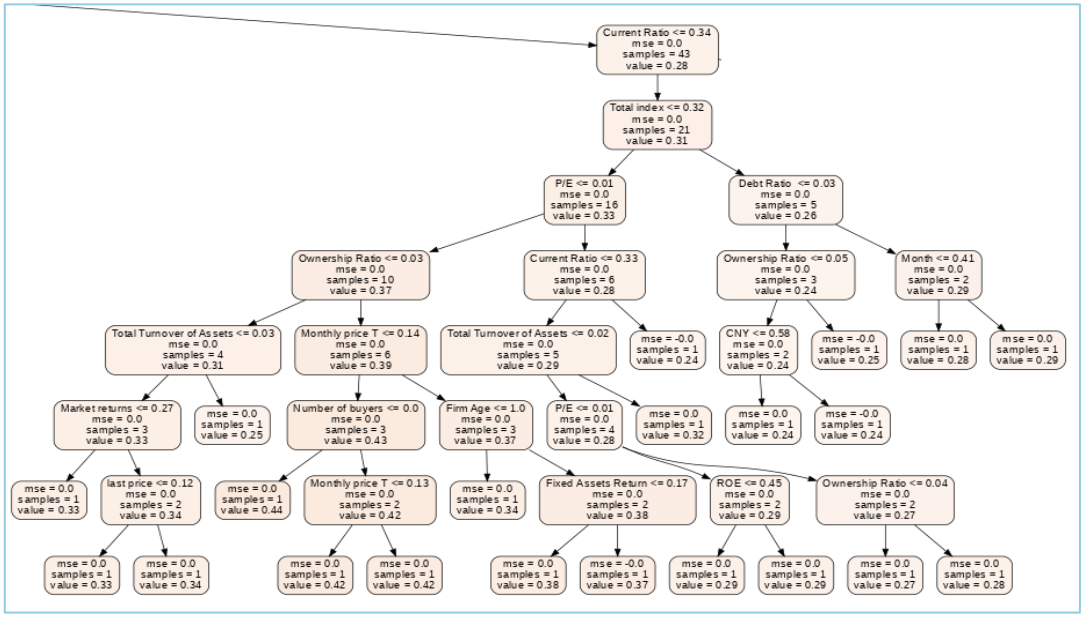

Figure 1: An example of a decision tree and its quantities for growth migration
(Source: based on random forest outputs)

Table 5: List of the most important features affecting growth migration

Row	name feature	data type	relative importance
1	last price	Company features	13.747%
2	P/E	Company features	11.159%
3	Monthly price T	Company features	10.388%
4	Quick ratio	Company features	10.135%
5	Firm Age	Company features	5.439%
6	Total Turnover of Assets	Company features	5.307%
7	number of share	Company features	4.560%
8	ROA	Company features	2.573%
11	Monthly returns	Company features	2.524%
13	Ownership Ratio	Company features	2.316%
14	Current Ratio	Company features	2.223%
16	ROE	Company features	1.841%
18	Debt To Equity Ratio	Company features	1.253%
19	Debt Ratio	Company features	1.202%
20	Fixed Assets Return	Company features	1.139%
10	Number of buyers	Market features	2.535%
12	Day market value	Market features	2.384%
15	Number of transactions	Market features	2.173%
21	The volume of shares traded	Market features	1.046%
9	Dollar market price	General conditions	2.541%
17	global price of gold	General conditions	1.465%

(Source: based on random forest outputs)

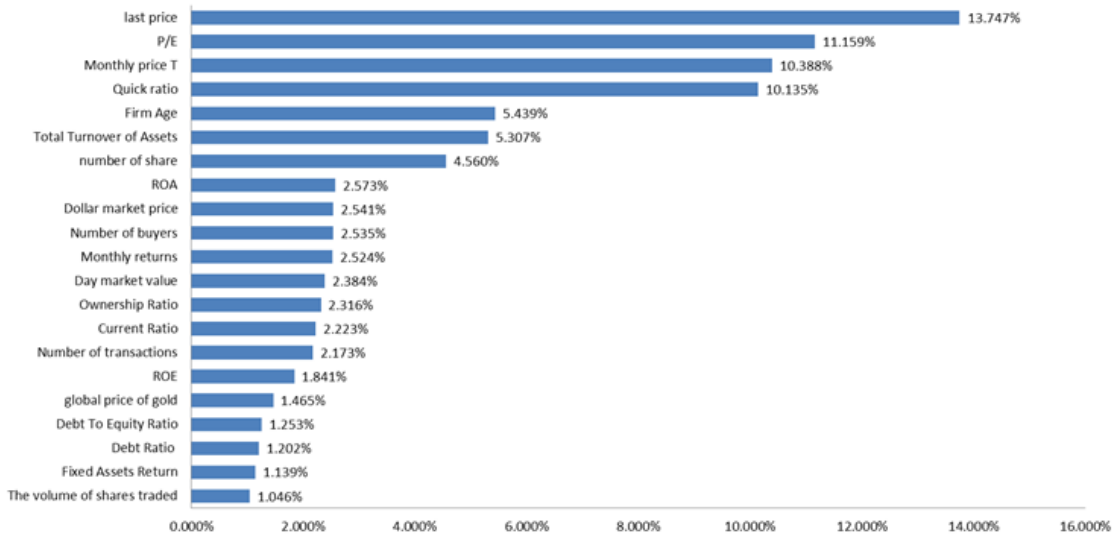

Figure 2: percentage of relative importance of critical factors influencing growth migration

Based on random forest output data to select the most important factors influencing growth migration, it can be acknowledged that the last share price, P / E ratio, monthly price and quick ratio are the most important factors influencing growth migration; Therefore, continuous attention to these factors, as well as the factors affecting them, can be one of the most factors for the success of shareholders in estimating or predicting the growth of companies migration. As the Table 6 shows, all of these factors

have a coefficient of importance above ten percent, which indicates the relative importance of these factors compared to other factors used in this study.

In the chart above, the blue dots are the real value and the black dots are the predicted value in the training phase. Based on the results obtained from Random Forrest, the prediction accuracy is 0.94%.

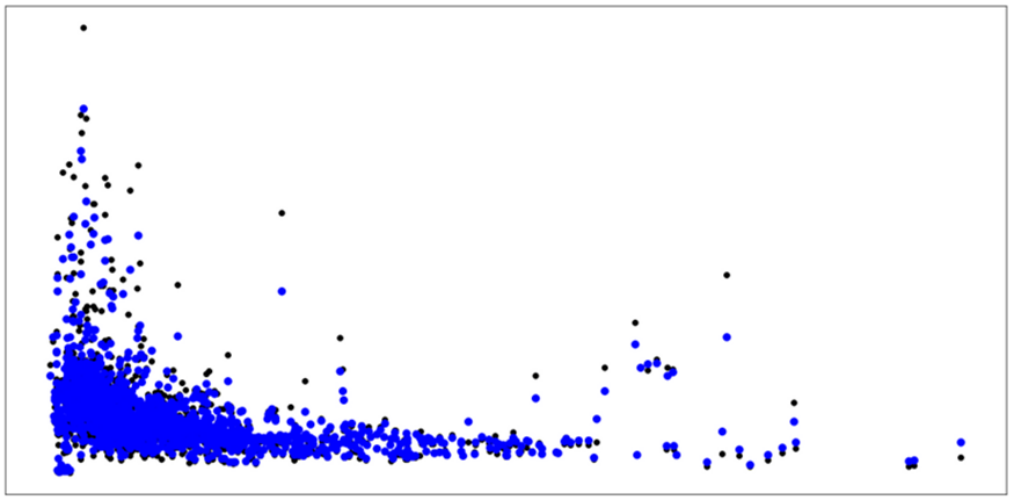

Figure 3: Distribution diagram of training data for growth migration

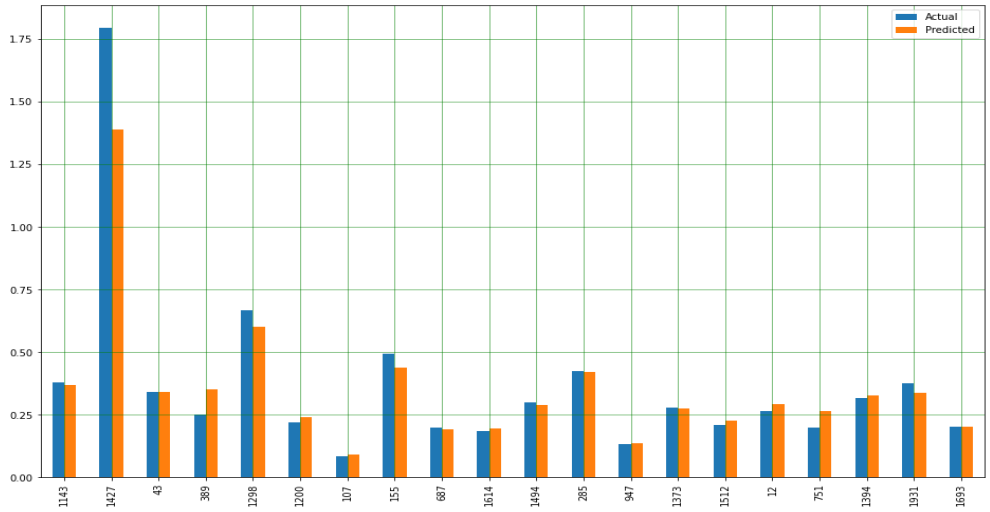

Figure 4: Column diagram of the predicted value of 20 observations

The results obtained for testing the model of Random Forest outputs are 0.66% prediction accuracy. Table 7 shows the criteria for measuring the impact and error level of the factors affecting growth migration. Based on the information provided in Table 7, the coefficient of determination between independent variables and the dependent variable is 66%, in other words, it can be stated that 66% of independent variables have the ability to predict the percentage of the dependent variable.

Table 6: Criteria for measuring the impact and error level of factors affecting growth migration

Row	Criterion type	Value
1	R Squared	66.472%
2	Adjusted R Squared	64.128%
3	MSE or Mean Squared Error	2.093%
4	RMSE or Root Mean Squared Error	1.447%
5	MAE or Mean Absolute Error	7.670%

The findings presented in Table 6 also show that based on the mean square error criteria, the mean square root square error and the absolute error value criterion, the predictions are less than the error level of 10%; therefore, the obtained results have a reasonable error level. In summary, based on the results obtained from random forest outputs for data belonging to growth companies, each of the following questions can be answered:

RQ1. Are fluctuations in the specific characteristics of healthy companies as factors influencing the growth migration of companies?

RQ 1: Are fluctuations in the specific characteristics of healthy companies as factors influencing the migration of growth companies?

Based on the results of the present study, factors such as the latest price, the price-to-profit ratio, Current market price, quick ratio, company age, total turnover, total number of shares of the company, total return on assets, return, proprietary ratio, current ratio, return on capital, debt to equity ratio, debt ratio and fixed asset return are the most important factor effecting migration of growth companies. Among these factors, such as the latest price, the price-to-profit ratio, the current market price and the instantaneous ratio are the most important factors that have a coefficient of importance above 10%; therefore, if the investor intends to predict the growth migration, he should pay special attention to these variables and the factors affecting them.

RQ2. Are fluctuations in the characteristics of the Iranian capital market considered as factors influencing the migration of growth companies?

Based on the results of the present study, factors such as the number of buyers, the market value of the day, the number of transactions and the volume of traded shares are the most important features available in the market that affect the migration of the growth of companies.

RQ3. Are fluctuations in macroeconomic characteristics as factors influencing the migration of growth companies?

In response to the question RQ3, It can be said that the two factors of the market price of the dollar and the global price of gold are the most important factors influencing the migration of the growth stock.

RQ4. Using the historical information of the variables in the above questions, can we suggest factors for modeling the migration of growth companies?

Based on the results of the present study, it can be acknowledged that using the historical information of the variables in the above questions, we can suggest factors for modeling the growth of companies. The model includes factors such as the latest price, price-to-earnings ratio, current market price, quick ratio, company age, total turnover, total number of shares of the company, total return on assets, return, proprietary ratio, current ratio, capital return, ratio Debt is denominated in special value, debt ratio, fixed asset return, number of buyers, market day value, number of trades, trading volume, dollar market price and global gold price.

5. Discussion and Conclusions

The purpose of this research is to investigate the factors affecting migration of growth companies with financial health in the Tehran Stock Exchange. Based on the finding, Growth companies have an average current ratio of 3,742 with a scatter of 4.32 over the years under review. In the present study, 70% of the data were selected for model training and 15% were divided for validation and residual data for model testing. In the random forest model, we selected 500 classification trees to grow in the random forest model. All trees used in the study were selected from a depth of four. According to the information obtained,, factors such as the latest price, price-to-profit ratio, current market price and quick ratio are the most important variables related to the first group (characteristics of the company), which have a coefficient of importance above 10%; Therefore, if the investor intends to anticipate migration of the growth, he should pay special attention to these variables and the factors affecting them. The results of Qalibaf and others' research in 2008 show that, contrary to the findings of Fama and French research, the average return on total growth of stocks on the Tehran Stock Exchange is higher than the value stocks; Therefore, based on the results of Qalibaf (2008), if the investor wants a higher average return than value stocks, he should know the

factors influencing on the growth and make the best decision in order to exploit it. Also, based on the results of the present study, factors such as the number of buyers, the market value of the day, the number of transactions and the volume of traded shares are the most important features available in the market that affect the migration of growth companies. Based on the finding, it can be acknowledged that by using the historical information of the variables in the above questions, we can suggest factors for modeling the migration of the growth companies. The model includes factors such as the latest price, price-to-earnings ratio, current market price, quick ratio, company age, total turnover, total number of shares of the company, total return on assets, return, proprietary ratio, current ratio, capital return, ratio Debt is denominated in special value, debt ratio, fixed asset return, number of buyers, market day value, number of trades, trading volume, dollar market price and global gold price. Khan Ahmadi and Tehrani (2010) stated that the variable of book to market ratio, as a criterion for determining the growth or value of stocks, will be different for companies at different times. However, based on the results of this study, it can be stated that this ratio is predictable based on internal and external factors. Meanwhile, according to the finding of Rahmani et al.'s (2016), the performance of portfolios formed based on stock transfer is improved using Jensen alpha; therefore, based on the results of the present study, the expectation of achieving higher returns, will not be far from expectation. In this study, only random forest algorithms were used to test the research questions; therefore, in future research, it is recommended to use other artificial intelligence techniques or linear models such as regression along with the mentioned algorithm. Based on the findings of the present study and considering the effect of historical variables on stock migration, it is suggested that the legislators of the stock exchange set rules to deal with the publishers of false and incorrect news.

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