Adv. Math. Fin. App., 2023, **8**(2), P. 513-530

Advances in Mathematical Finance & Applications
www.amfa.iau-arak.ac.ir
Print ISSN: 2538-5569
Online ISSN: 2645-4610
Doi:10.22034/AMFA.2022.1927502.1586

Research Paper

Investigating the Role of Arbitrage Costs and Feelings in the Relationship between Fundamental Power Strategy and Stock Returns

Mohsen Hashemigohar[a,] *, Mojdeh Mansouri[b]

[a] *Department of Accounting, Shahr-e Qods Branch, Islamic Azad University, Shahr-e Qods Branch, Tehran, Iran*

ARTICLE INFO

Article history:
Received 2021-04-20
Accepted 2022-02-20

Keywords:
Fundamental Power Strategy
Future Stock Returns
Arbitrage Cost
Investor Feelings

ABSTRACT

The aim of the present study was to investigate the fundamental power strategy in the stock market, considering the role of arbitrage cost versus feelings in companies listed on the Tehran Stock Exchange. The spatial domain of this research was the companies listed on the Tehran Stock Exchange, and the temporal domain encompassed the years between 2014 and 2019. The present research is classified as an applied study, characterized by its descriptive nature and correlational method. A library method was employed to collect data and information for this study. Through the systematic elimination method, 139 companies were selected as the statistical sample. Descriptive and inferential statistics were utilized to describe and summarize the collected data. To analyze the data, several tests were conducted including variance heterogeneity test, F-Limmer test, Hausman test, and Jarque-Bera test. Subsequently, a multivariate regression test was employed to confirm or reject the research hypotheses using Eviews software. The results indicated that the fundamental power strategy could predict future returns, and both shareholder feelings and arbitrage cost enhanced the relationship between the fundamental power strategy and stock returns.

1 Introduction

When investor sentiment is high, optimistic investors tend to dominate pessimistic investors in stock pricing. If there are mandatory short-term selling constraints, stock prices are likely to be influenced by optimistic investors, leading to higher pricing. If incorrect pricing is driven by fluctuations in investor sentiment, it is expected that the fundamental power strategy will be profitable primarily during periods of high sentiment, especially when arbitrage costs are at their lowest. Conversely, if arbitrage costs are low, the strategy may not yield significant profits.

Furthermore, if investor sentiment has a distinct and incremental impact on incorrect pricing beyond the influence of arbitrage costs, it is anticipated that the fundamental power strategy will generate higher returns after periods of high sentiment compared to low sentiment, regardless of whether arbitrage costs are high or low. If the presence of arbitrage constraints largely explains the delay in correcting incorrect pricing, it is expected that this strategy will deliver higher returns for stocks with high arbitrage costs compared to those with low arbitrage costs following periods of high sentiment. Even when sentiment is low, there will still be optimistic investors driving up asset prices. Conse-

* Corresponding author. Tel.: *+989125396769*
E-mail address: *mhgohar@yahoo.com*

quently, stocks with high arbitrage costs may be priced higher than stocks with low arbitrage costs, even in the absence of high investor sentiment [1]. In economics and finance, arbitrage refers to taking advantage of price discrepancies between two or more markets to earn profits. In other words, arbitrage profit is achieved when a similar product is available in different markets or formats at different prices. Arbitrage arises when the aggregate price of assets is zero or negative under all conditions, and its return is greater than or equal to zero in all conditions, with strictly positive returns in some cases. This means that positive profits can be earned without incurring any costs. Arbitrage profit arises when a similar product is available in different markets or formats at different prices. Arbitrage is a consequence of market inefficiency and serves as a mechanism to prevent prices from deviating significantly from their fair and intrinsic value in the long run [2]. The main objective of this study is to examine the moderating role of arbitrage costs and investor sentiment in the relationship between the fundamental power strategy and future stock returns.

2 Theoretical Framework and Hypotheses

An issue entitled "Investor feeling, non-systematic volatility and incorrect stock pricing in companies listed on the Tehran Stock Exchange was examined. Evidence and experimental results of the study indicate that both the variables of investor feeling and non-systematic volatility have a positive and significant effect on incorrect stock pricing [3]. A study entitled "non-systematic risk pricing by explaining arbitrage risk" has addressed the issue that the results show that considering the arbitrage risk, the relationship between non-systematic risk and expected return is negative and significant [4]. A study entitled "Investigating the effect of arbitrage constraints on conservative financial reports of companies listed on the Tehran Stock Exchange" has addressed this issue Research results suggest that short-term constraints do not affect conservative financial reporting [5]. A study entitled “Comparing the effects of combined strategies of technical analysis with the method of buying and holding to buy stocks in ascending and descending periods, examined the effectiveness of methods of buying stocks using technical strategies compared to buying and holding method.

The results showed that when the market is highly ascending, technical strategies do not have the necessary efficiency, but in periods when the market trend is balanced or the market is descending, technical strategies for buying stocks are more efficient [6]. A study entitled “Testing Olsen model efficiency using F index in predicting companies' stock returns”, has addressed this issue The findings of the mentioned study indicated that the Olsen model combined with the Piotroski index is effective in predicting the stock returns of companies due to the significance of all independent variables and the results of Wald test [7]. The performance of the enterprise firm is one of them most effective factors on firm stock value, which is realized maximizing shareholder wealth [13]. One of the most challenging and exciting issues for many researchers and experts is selecting the firm's performance using a set of financial ratios. Existence of Surplus of financial resources in a firm is of valuable as it ensures availability of enough funds for investing on profitable opportunities for company [14].

In a study entitled "Fundamental Power Strategy: The Role of Investor Feelings in the Face of Arbitrage Constraints." The relationships between these variables have been investigated. The results of linear regression method and panel data showed that the efficiency of the fundamental power strategy is more effective when feelings are high than when feelings are low [8]. In a study entitled "The relationship between financial indicators, information transparency and stock returns" the relationship between these variables has been examined. The results showed that financial variables such as market value to book value, sales growth, company size, etc. provide results in accordance with the theo-

retical literature. Also, the information environment provides evidence that the ability of earnings to show changes in stock returns is less in environments with a lower level of information transparency. Thus, increasing the quality of accounting information indicates a positive signal [9]. This issue has been investigated in a study entitled "The ability to predict the Findex in predicting the future performance of stocks". The results of mentioned study showed that the high ratio of book value to market value for companies with a high F index could change the simultaneous and future distribution of stock performance in favor of investors in the Indian market [10]. A study entitled "Arbitrage Constraints and non-systematic Risk: Evidence from the Chinese Stock Market" examined how arbitrage restrictions affect unsystematic risk pricing. The results of above-mentioned research showed that arbitrage constraints are effective in non-systematic risk pricing, so that the negative relationship between non-systematic risk and expected returns is stronger and more significant in stocks with high arbitrage constraints [8]. This issue was examined in a study entitled "Investor Feeling, Incorrect Stock Pricing and Long-Term Growth Expectations". The results mentioned study showed that stocks with higher growth predictions are more negatively revised and subsequent stock returns are lower, especially after a period of high investors' tendency period [11].

Investors' feelings refer to non-fundamental demand for assets that their prices deviate from their fundamental economic value. One of the most challenging observations in financial markets is that in contrast to the efficient market hypothesis, ordinary stock returns at different time returns have a specific behavior and it is possible to gain more return than market return by applying an investment strategy tailored to the desired time horizon. Understanding investor psychology is the foundation of behavioral investing. If the investor's decision is predictable, the stock market becomes predictable, meaning that investors who know how the stock market works will achieve the desired return without tolerating the risk. When entering the capital market, every investor seeks to achieve and apply strategies that can win the market and gain additional returns. In contrast to the modern financial theory and its core essence, the efficient market hypothesis claims that it is not possible to obtain return more than average market returns. In this paradigm, it is claimed that there is no trend in price and market return and no additional profit can be obtained from market trends. Based on modern financial theory, the price of securities is equal to their intrinsic value, since if the price of securities deviates from their intrinsic value, they are quickly eliminated since economic agents behave rationally. Thus, in such a market, no profit cannot be obtained on free, and to obtain any profit, its risks should also be accepted. Several studies provide empirical evidence that feelings have a significant impact on asset pricing and companies' decisions. the effect of cash holding is significant only after periods of low feeling [15]. Companies that are fundamentally strong (The companies that have no financial constraints and can make good use of investment and growth opportunities) will have higher future returns compared to other companies. Thus, the first hypothesis is:

1- Fundamental Power Strategy Can Predict Future Returns

At current, companies with weak foundation that face declining profits have more pressure leverage or are less efficient in the company performance, while companies with strong foundation experience increased profit leverage, have less leverage or more efficiency in the company performance. Thus, more investors are likely to trade stocks of fundamentally weak companies in their high feeling periods than in low feeling periods in their trades, because investors are more optimistic to trade in these highly weak stocks than in high feeling periods. Thus, fundamentally weak companies are likely to become overpriced in periods of high feeling, and experience lower future returns and in the case of gradual correction of high pricing. In contrast, companies that are fundamentally strong, they will be less underpriced, because both optimistic and pessimistic investors in high-feeling and low-feeling

periods tend to trade in fundamentally strong firms, even though they might be overpriced. During a high feeling period, asset prices generally inflate. During low feeling periods, investors and capital struggle to increase quality and raise the asset prices of fundamentally strong companies. In general, the efficiency of the fundamental power strategy is expected to be higher in the period with high level of feelings than in the period with low level of feelings, so the second hypothesis is:

2- Shareholder Feeling Affects the Relationship between Fundamental Power Strategy and Stock Returns

Arbitrage is one of the most important concepts in economics and means gaining profit from the simultaneous price difference of an asset between two or more markets. The occurrence of these conditions is the result of price imbalances between different markets. In other words, when the valuation of a basic asset, such as a commodity, currency or stock, is not the same in different markets, arbitrageurs obtain profit from this price difference by buying an asset at the lowest price (a market that is less expensive than others) and selling it quickly at higher price levels (a parallel market where the asset is more expensive) and they can increase the future return of the company. Therefore, the third hypothesis of the research is:

3-The cost of arbitrage affects the relationship between the fundamental power strategy and stock returns.

3 Research Model

In this study, the fundamental power strategy is an independent variable, stock returns is a dependent variable and arbitrage cost and investor feeling are moderator variables. The variables of company size, financial leverage, operating cash flow and accruals ratio are considered as control variables.

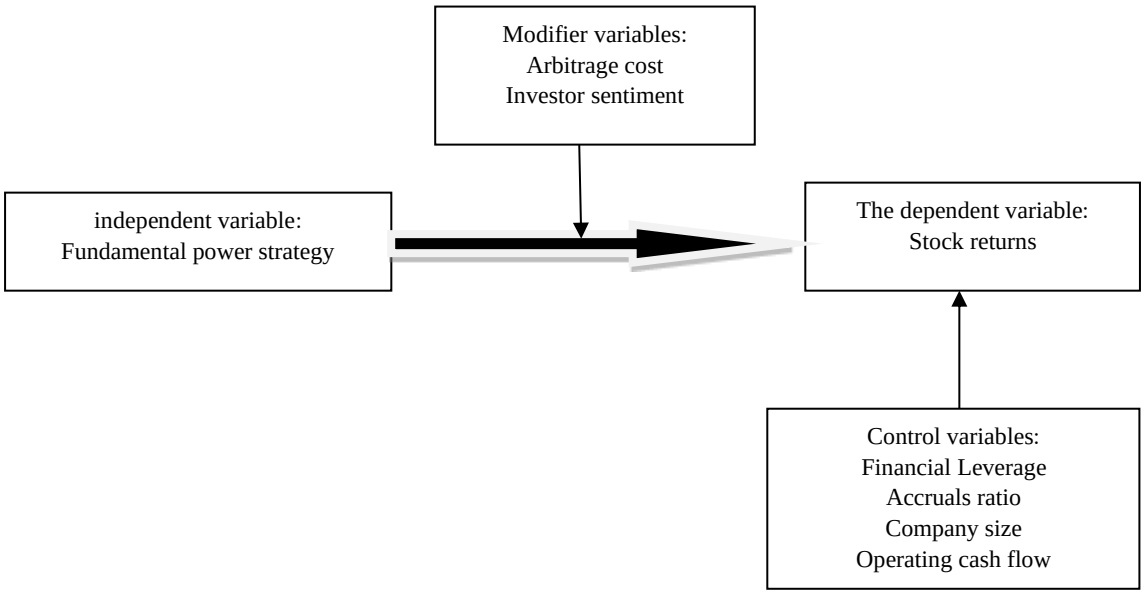

Fig. 1: Diagram of Conceptual Model of Research

The regression models for testing research hypotheses are as follows:

$$R_{i;t} = a_0 + \beta_1 FPS_{i;t} + \beta_2 Size_{i;t} + \beta_3 ACC_{i;t} + \beta_4 OCF_{i;t} + \beta_5 LEVERAGE_{i;t} + \varepsilon_{i,t} \quad (1)$$

$$R_{i,t} = a_0 + \beta_1 FPS_{i,t} + \beta_2 INVFEEL_{i,t} + \beta_3 INVFEEL_{i,t} * FPS_{i,t} + \beta_4 Size_{i,t} + \beta_5 ACC_{i,t} + \beta_6 OCF_{i,t} + \beta_7 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$R_{i,t} = a_0 + \beta_1 FPS_{i,t} + \beta_2 arbitrage_{i,t} + \beta_3 arbitrage_{i,t} * FPS_{i,t} + \beta_4 Size_{i,t} + \beta_5 ACC_{i,t} + \beta_6 OCF_{i,t} + \beta_7 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where,

Ri,t= Stock returns, FPS = fundamental power strategy, arbitrage = arbitrage cost, INVFEEL = investor feeling, LEVERAGE = financial leverage, size = company size, ACC = accrual ratio, OCF = operating cash flow.

3.1 Defining Variables

A: Independent variable= Fundamental power strategy

The market power strategy is calculated using the following formula. This numerical index is between zero and 9. If the F-score is greater than 5, the company is in a strong position in terms of financial health [1].

FScore=ROA+CFO+ΔROA+ACCRUAL+ΔLEVERAGE+ΔLIQUIDITY+ΔEQUITY+ΔMARGIN+ΔTURNOVER

F-index variables are defined as follows: [1]

ROA	If the return on assets is positive, it is equal to one; otherwise, it is equal to zero ROA=net profit/total assets
CFO	If the operating cash flow is positive, it is equal to one; otherwise, it is equal to zero Operating cash flow is extracted directly from the company's cash flow.
Δ ROA	If the difference between the ratio of "Return on assets of the current period to total assets" and "Ratio of returns of assets of the previous period on total assets" is positive, it is equal to one; otherwise, it is equal to zero.
Accruals	If the accruals (operating cash flow minus profit before discretionary accruals) are negative, it is equal to one; otherwise, it is equal to zero.
ΔLeverage	If the difference between the ratio of current long-term debt to total assets" and ratio of long-term debt of the previous period to total assets is negative, it is equal to one; otherwise, it is equal to zero.
ΔLiquidity	If the difference between the current ratio in the current period and the current ratio in the previous period is positive, it is equal to one; otherwise, it is equal to zero. Current ratio= current debts/ current assets
ΔEquity	If the difference between the number of shares held by shareholders in the current period and the number of shares held by shareholders in the previous period is negative, it is equal to one; otherwise, it is equal to zero.
ΔMargin	If the difference between the ratio of "gross profit margin of the current period to total

	sales" and "ratio of gross profit margin of the previous period to total sales" is positive, it is equal to one; otherwise, it is equal to zero. The gross profit margin of each company is also obtained from the difference between the sales and the total price of the sold goods.
Δ Turnover	If the difference between the ratio of "total sales of the current period to total assets" and "total sales of the previous period to total assets" is positive, it is equal to one; otherwise, it is equal to zero.

B) Dependent variable: stock returns

Annual stock return is the set of earnings that a shareholder receives during a financial period as follows:

1- Price change: Change in stock price over a period, is one of the main factors of return, which is called the profit or loss of capital.

2- Cash profit per share: which is paid to shareholders after deducting the tax and is called dividend.

3- Benefits resulting from the pre-emptive rights to buy shares: Shareholders of public joint stock companies have pre-emptive rights over others in buying new shares issued by the company after the capital increase, and can use their right within the specified period. This right has exchange value [1].

Annual stock returns mean changes in the first and last period stock prices in addition to other earnings resulting from buying of shares, such as benefits from pre-emptive rights, dividends and cash dividends, divided by the stock price in the first period [1].

$$k_t = \frac{\{(P\}_t - P_{t-1}) + D_t + \frac{(P_t - P_n)\backslash astN_e}{N_t} - \frac{+N_{c\backslash astP_t}}{N_t}}{P_{t-1}}$$

Kt =Annual stock returns, Pt = share price at the end of the fiscal year, Pt-1 = stock price at the beginning of the fiscal year, Dt = gross cash profit per share, Ne = number of shares increased by accumulated profits, Nc = number of shares increased through cash profit, Nt = number of shares before capital increase

A: Moderator Variables

1- Arbitrage COST:

To calculate this variable, first its indices are extracted and calculated. Then, based on the principal components method, a value for each company and in each year is extracted and replaced in regression equations. Arbitrage cost indices are the mean of the two Amihood liquidity indices and the relative price gap.

Amihood Liquidity Index

The Amihood liquidity index optimized by Gulapan is calculated as follows [8].

Ni, t = number of trading days

Ri, t = stock return, which is calculated as the difference between the price logarithm of time t and t-1[8].

Pi, j = final stock price

$$Liq_{i,t} = \frac{1}{N_{i,t}} \sum_{t=1}^{N_{i,t}} \sqrt{\frac{|R_{i,j}|}{vOL_{i,j} \cdot P_{i,j-1}}}$$

Relative price gap:

The relative price gap is obtained using the following formula:

$BA_i = \frac{AP-BP}{\frac{AP+BP}{2}}$

BA= The difference between the bid price of the relative daily buying and selling of stocks

AP = The best bid price for selling the stock of Company i per day

BP = The best bid price for buying the stock of Company i per day

2- Investor Feelings

Investor feeling measurement is stock turnover in market or the market liquidity that is the ratio of the total volume of reported stock trading during the year to the stock market value at the end of the year. With increasing the trading volume in the market, the investors' tendency to buy stocks increases, so the feelings will be positive.

D) Control Variables

1- Financial Leverage

Financial leverage determines and evaluates the ratio of financial resources used by a business unit in terms of debts or equity. It examines the way they are combined. In this study, the division of book value of long-term debt to the total assets is used to measure the company's financial leverage, [12].

FL=BV/TOTL ASSETS

BV = book value of long-term debts

2- Company Size

The company size is calculated in different ways, such as assets. In this study, it is calculated through assets, that is, the logarithm of the total assets is a measure of the company size of the company.

Company size log (total assets) [8].

3 Ratio of Accruals

Accruals are items that do not include cash in the financial statements and are items that can be manipulated by managers, such as depreciation cost [9]. Total accruals (TAi, t) are derived from the difference between earnings before unexpected accruals (EARNi, t) and cash flows resulting from operating activities (CFOi, t). Total accruals divided by total assets indicate the ratio of accruals [8].

4 Operating Cash Flows

Operating activities are the main activities that generate the operating income of a business unit. These activities include the production and sale of goods and the provision of services, and the related costs and revenues are considered in determining operating profit or loss in the event of a profit or loss. Cash flows arising from operating activities primarily include cash inflows and outflows related to those activities. Operating cash flow includes cash inflows and outflows arising from operating activities (main and operating income-generating activities) as well as those cash flows that are not directly related to other cash flow classes in the cash flow statement. The following formula is used to calculate the operating cash flow [10]:

CFO = NI + NCC + ΔWC

Where: NI net profit and NCC non-cash costs that should be added to net profit, because these types of costs have reduced the net profit but no money has been taken out of it, such as WCC depreciation = changes in working capital.

3.2 Population and Statistical Sample

The statistical population of the study included all companies listed on the Tehran Stock Exchange from 2014 to 2019. In the present study, the systematic elimination sampling (screening) method was used. The sample companies were selected according to the following criteria and limitations:

Table 1: Table of Determining the Statistical Sample Size

row	Criteria	Number of excluded samples	Remaining
1	To select a homogeneous sample, companies should be listed on the Tehran Stock Exchange before 2014 and their shares have been traded on the stock exchange since the beginning of 2014.	259	353
2	In order to select active companies, the transactions of these companies during 2014 to 2019 in the stock exchange have not been interrupted for more than three months.	66	287
3	To increase the comparability, the financial period of companies should the final day of the year.	40	247
4	No change in activity or change in fiscal year between 2014 and 2019	27	220
5	Not to be included among the investment, financial intermediary, banking and leasing industries.	61	159

After considering all the above criteria, 139 companies were selected as a statistical sample. Therefore, our observations during 2014 to 2019 led 834 years*companies (6 years * 139 companies)

4 Results

4.1 Descriptive Statistics

Before testing the research hypotheses, the research variables are examined (Table 2).

Table 2: Descriptive Statistics of the Research

Variable	Number of observations	Mean	SD	min	max	Skewness	Kurtosis
Future returns of the company	834	0.08302	0.1765	-0.0938	0.1763	1.4960	4.6456
Fundamental power strategy	834	3.39134	2.26626	1.01152	7.59731	2.67503	5.81595
Investor feelings	834	0.01213	0.39895	0.00378	0.04251	0.49048	3.6548
Arbitrage cost	834	0.26576	0.72143	0.10932	0.41176	2.1774	5.1326
Company size	834	5.4809	2.71355	4.1763	7.8452	2.98496	11.24594
Accruals	834	0.29714	0.0984	0.15043	0.45532	1.03611	4.1621
Financial Leverage	834	0.43649	0.42397	0.20136	0.5779	7.3779	9.4933
Operating cash flows	834	0.11069	0.28772	0.08966	0.19761	3.60999	2.0392

Source: Software calculations

Based on Table, the mean future return of the sample companies is equal to 0.08302 and its minimum and maximum are equal to -0.038 and 0.1763, respectively. Based on above table, and descriptive statistics of research variables, the highest mean is related to the variable of company size and the lowest is related to the variable of investor feelings.

4.2 Examining the Normality of the Dependent Variable

In this research, the dependent variable normality was tested using the Jarque-Bera method. Since the normality of the variable depends on the normality of the residuals of the model, it is necessary to examine its normality before fitting the model.

Table 3: Results of testing the normality of the dependent variable of the research

Variable	n	Jarque-Bera	sig
Future return of the company	834	3.218	0.069

Source: Software calculations

Since the significance level of Jarque-Bera test statistic is more than 0.05 for the variables of future return of the company, the H_0 hypothesis (distribution of these variables is normal at the 95% confidence level) is confirmed and indicates that the future return of the company variable has a normal distribution.

4.3 Testing Reliability of Research Variables

In this section, the reliability of the variables and their tests in the panel data are examined using the Levin and Lin, and Chu test.

Table 4: Levin and Lin, and Chu Test Results

Variables	Levin and Lin, and Chu test statistic	sig
Future returns of the company	-27.3216	0.0000
Fundamental power strategy	-19.1776	0.0000
Investor feelings	-32.4432	0.0000
Arbitrage cost	-44.1034	0.0000
Company size	-35.0326	0.0000
Accruals	-21.2216	0.0000
Financial Leverage	-48.3774	0.0000
Operating cash flows	-19.1668	0.0000

Source: Researcher Findings

As seen, the significance level of the unit root test in all variables is less than 0.05 and show that they are of zero order (I (0) and at the stationary level. It means that the mean and variance of variables over time and the covariance of variables between 2014 and 2019 has been fixed, indicating that the variables are stationary.

4.4 Examining the Correlation Between Research Variables

Based on the results of the correlation test, the variables of fundamental power strategy, investor feeling, arbitrage cost and company size have a direct and significant correlation with the future return of the companies. The variables of ratio of accruals and financial leverage of the company have a significant inverse correlation with the future return of the companies. No significant correlation was found between the ratio of operating cash flows and the future return of the company.

4.5 Examining Collinearity Among the Research Variables

Testing collinearity of research variables is as Table 6. Since the status index for each of the variables is less than 15 and the eigenvalue is not close to zero (above 2), there is no problem of collinearity in explanatory variables.

4.6 Chow and Hausman Test

To determine whether the use of the panel data method in estimating the desired model will be effective or not, Chow test is used. Also, to determine which method (fixed effects or random effects) is more suitable for estimation, Hausman test is used. The results of these tests are presented in Tables 7, 8 and 9.

4.7 Classical Assumptions of Regression Model

To measure the validity of the model and to examine the assumptions of classical regression, in addition to checking the absence of collinearity between the independent variables entered in the model,

tests related to the normality of the residuals, homogeneity of variances, independence of the residuals and the absence of model specification error (model linearity) should also be performed.

Table 5: Pearson Correlation Test

Variable	Future return of the companies	Fundamental power strategy	Investor feelings	Arbitrage cost	Company size	Accruals	Financial Leverage	Operating cash flow
Future return of the companies	1	0.213 Sig(.000)	0.198 Sig(.000)	0.218 Sig(.000)	0.174 Sig(.000)	-0.132 Sig(.000)	-0.220 Sig(.002)	0.317 Sig(.066)
Fundamental power strategy		1	0.165 Sig(.194)	0.410 Sig(.166)	0.332 Sig(.056)	0.164 Sig(.077)	0.332 Sig(.199)	0.164 Sig(.172)
Investor feelings			1	0.200 Sig(.142)	0.117 Sig(.115)	0.003 Sig(.084)	0.117 Sig(.216)	0.003 Sig(.077)
Arbitrage cost				1	0.478 Sig(.173)	0.319 Sig(.216)	0.478 Sig(.149)	0.319 Sig(.094)
Company size					1	0.278 Sig(.317)	0.134 Sig(.058)	0.416 Sig(.127)
Accruals						1	0.299 Sig(.414)	0.285 Sig(.109)
Financial Leverage							1	0.105 Sig(.119)
Operating cash flow								1

Table 6: Collinearity Test

Variable	Tolerance	Status index
Future return of the companies	1.265	3.014
Fundamental power strategy	1.317	3.662
Investor feelings	1.668	3.932
Arbitrage cost	1.804	4.122
Company size	1.932	4.276
Accruals	2.012	4.416
Financial Leverage	2.165	4.821
Operating cash flow	2.212	4.993

Source: Software calculations

Table 7: Chow and Hausman Test Results For the First Model

Test	n	statistic	Statistic value	df	P-Value
Chow	834	F	4.1654	4	0.0000
Hausman	834	χ^2	5.2177	4	0.0000

Source: Software calculations

One of the statistical assumptions of classical regression is the homogeneity of variance of the residuals. If the variances are heterogeneous, the linear estimator is skewed and will not have the lowest variance.

Table 8: Chow and Hausman Test Results For the Second Model

Test	Test	n	statistic	Statistic value	df
Chow	834	F	5.3245	6	0.0000
Hausman	834	χ^2	5.1094	6	0.0000

Source: Software calculations

Table 9: Chow and Hausman Test Results For the Third Model

Test	Test	n	statistic	Statistic value	df
Chow	834	F	6.1176	6	0.0000
Hausman	834	χ^2	5.1553	6	0.0000

Source: Software calculations

Table 10: Results of Tests Related To Statistical Assumptions For the First Model

statistic Ramsey		statistic Durbin-Watson	statistic Breusch-Pagan	
$P-Value$	F	D	$P-Value$	F
0.1657	3.225	1.813	0.009	1.9768

Source: Software calculations

Table 11: Results of Tests Related To Statistical Assumptions For the Second Model

statistic Ramsey		statistic Durbin-Watson	statistic Breusch-Pagan	
$P-Value$	F	D	$P-Value$	F
0.0943	5.0326	2.265	0.0042	1.835

Source: Software calculations

Table 12: Results of Tests Related To Statistical Assumptions For the Third Model

statistic Ramsey		statistic Durbin-Watson	statistic Breusch-Pagan	
$P-Value$	F	D	$P-Value$	F
0.0732	6.1119	2.214	0.035	2.254

Source: Software calculations

Table 13: Results of Multivariate Regression of the First Hypothesis

Variable type	Symbol	variables	Coefficient	Statistic t	sig
The dependent variable	Y	Future returns of the company	_	_	_
Constant	α	Alpha	3.326	-6.326	0.000
independent variable	X1	Fundamental power strategy	*0.387	3.109	0.000
Control variables		Company size	*0.412	5.165	0.000
		Financial Leverage	*-0.513	-6.653	0.000
		Accruals ratio	*-0.133	-6.923	0.000
		Operating cash flow ratio	0.240	1.534	0.104
		Durbin-Watson	1.813	_	_
		Statistics F	9.165	_	0.000
R Square		coefficient of determination	0.327	_	_
Adjusted R Square		Adjusted coefficient of determination	0.325	_	_

*The significance level is 0.05.
Source: Software calculations

In this study, Breusch–Pagan test was used to examine the homogeneity of variances. Since the significance level of this test is less than 0.05, the null hypothesis on variance homogeneity is rejected and it can be stated that the model has the problem of variance heterogeneity. In this study, the generalized least squares estimation (GLS) method was used to solve this problem in estimation. Also, Durbin-Watson (D-W) test was used to test the non-correlation of residues, which is one of the assumptions of regression analysis and is called auto-correlation. According to the initial results of estimating the model, the Durbin-Watson statistic value it is between 1.5 and 2.5, so it can be concluded that the residuals are independent of each other. Also, Ramsey test was used to test whether the model has a linear relationship and whether the desired model has been correctly explained in terms of linearity or nonlinearity. Since the significance level of the Ramsey test is greater than 0.05, the null hy-

pothesis of this test (The model is linear) is confirmed and the model does not have a specification error). A summary of the results of the above tests is presented in Tables 10, 11 and 12.

4.8 Testing the First Hypothesis

The first hypothesis of the research examines the relationship between the fundamental power strategy and the future return of the company. The results of multivariate regression are presented in Table 13. As the table shows, the significance level of the variables of fundamental power strategy, company size, financial leverage, and accruals ratio is less than 5%. Therefore, there is a significant relationship between these variables and the future return of the company and the operating cash flow ratio has no significant relationship with future return of the company (because the significance level of this variable is higher than 5%). The positive coefficient of the fundamental power strategy variable (0.387) indicates the direct relationship between this variable and the future returns of the company, so that with one unit of increase in the fundamental power strategy will increase the future return of the company by 0.387 units.

Thus, according to the analysis of the first hypothesis of the research, it can be concluded that there is a significant and direct relationship between the fundamental power strategy and the future return of the company. Since the significance level of F statistic is less than 5% (0.000), the calculated regression model is significant. In other words, a logical relationship has been created between the variables. Also, based on the obtained coefficient of determination, the independent and control variables explain 32.7% of the changes in the future return of the company. Durbin-Watson statistic value is between 1.5 and 2.5 (1.813), so it can be concluded that there is no autocorrelation problem between the error terms in the regression equation .

4.9 Testing the Second Hypothesis

The second hypothesis of the research examines the effect of investor feelings on the relationship between fundamental power strategy and the future return of company. The results of multivariate regression are presented in the table below.

Table 14: Results of Multivariate Regression of the Second Hypothesis

Variable type	Symbol	Variable name	Coefficient	Statistic t	sig
dependent variable	Y	Future returns of the company	_	_	_
Constant	α	Alpha	0.219	6.176	0.000
independent variable	X1	Fundamental power strategy	*0.415	7.361	0.000
Moderator variable	X2	Investor feelings	*0.304	6.823	0.000
	X3	Fundamental power strategy * Investor feelings	*0.322	7.177	0.000
Control variables		Financial Leverage	*-0.248	-5.174	0.000
		Company size	*0.228	3.336	0.000
		Accruals ratio	*-0.102	-4.318	0.000
		Operating cash flow ratio	0.115	1.662	0.093
		Durbin-Watson	2.265	_	_
		Statistics F	11.5416	_	0.000
R Square		coefficient of determination	0.399	_	_
Adjusted R Square		Adjusted coefficient of determination	0.377	_	_

*:The significance level is 0.05.
Source: Software calculations

As this table shows, the significance level of the variables of fundamental power strategy, investor feelings, company size, financial leverage, and accruals ratio is less than 5%. Therefore, there is a significant relationship between these variables and the future return of the company and the operating cash flow ratio has no relationship with the future return of the company (because the significance level of this variable is higher than 5%). The positive coefficient of the variable of fundamental power strategy (0.415) indicates the direct relationship between this variable and the future returns of companies, so that one unit of increase in the fundamental power strategy increases the future return of the company by 0.415 units. Also, the positive coefficient of the investor feelings variable (0.304) indicates the direct relationship between this variable and the future returns of companies, so that one unit of increase in investor's feelings increases the future return of the company by 0.304 units.

By comparing the variable coefficients of the fundamental power strategy in Tables 13 and 14, it can be concluded that investor feelings strengthen the relationship between fundamental power strategy and the future return of the company because by entering the moderator variable of investor feeling, the coefficient of fundamental power strategy increased from 0.387 to 0.415. Since the significance level of F statistic is less than 5% (0.000), the calculated regression model is significant. In other words, a logical relationship has been created between the variables. Also, according to the obtained coefficient of determination, independent, moderator and control variables explain 39.9% of the changes in the future returns of the company. Durbin-Watson statistic is between 1.5 and 2.5 (2.265), so it can be concluded that there is no autocorrelation problem between the error terms in the regression equation. In general, the second main hypothesis is confirmed and the investor's feelings strengthen the relationship between the fundamental power strategy and the future return of the company.

4.10 Testing the Third Hypothesis

The third research hypothesis examines the effect of arbitrage cost on the relationship between fundamental power strategy and future returns of the company. The results of multivariate regression are presented in the table below.

Table 15: Results of Multivariate Regression of the Third Hypothesis

Variable type	Symbol	Variable name	Coefficient	Statistic t	sig
dependent variable	Y	Future returns of the company	_	_	_
Constant	α	Alpha	0.832	3.216	0.000
independent variable	X1	Fundamental power strategy	*0.399	5.633	0.000
Moderator variable	X2	Arbitrage cost	*0.165	5.412	0.000
	X3	Fundamental power strategy * Arbitrage cost	*0.117	4.045	0.000
Control variables		Financial Leverage	*-0.163	-4.315	0.000
		Company size	*0.199	3.177	0.000
		Accruals ratio	*-0.213	-7.043	0.000
		Operating cash flow ratio	0.165	1.773	0.071
		Durbin-Watson	2.214	_	_
		Statistics F	14.1773	_	0.000
R Square		coefficient of determination	0.374	_	_
Adjusted R Square		Adjusted coefficient of determination	0.369	_	_

*:The significance level is 0.05.
Source: Software calculations

As this table shows, the significance level of the variables of fundamental power strategy, arbitrage cost, company size, financial leverage, and accruals ratio is less than 5%. Therefore, there is a signifi-

cant relationship between these variables and the future return of the company and the operating cash flow ratio has no relationship with the future return of the company (because the significance level of this variable is higher than 5%). The positive coefficient of the variable of fundamental power strategy (0.399) indicates the direct relationship between this variable and the future returns of companies, so that one unit of increase in the fundamental power strategy increases the future return of the company by 0.399 units. Also, the positive coefficient of the arbitrage cost variable (0.165) indicates the direct relationship between this variable and the future returns of companies, so that one unit of increase in investor's feelings increases the future return of the company by 0.165 units.

By comparing the variable coefficients of the fundamental power strategy in Tables 13 and 15, it can be concluded that arbitrage cost strengthens the relationship between fundamental power strategy and the future return of the company because by entering the moderator variable of arbitrage cost, the coefficient of fundamental power strategy increased from 0.387 to 0.399. Since the significance level of F statistic is less than 5% (0.000), the calculated regression model is significant. In other words, a logical relationship has been created between the variables. Also, according to the obtained coefficient of determination, independent, moderator and control variables explain 37.4% of the changes in the future returns of the company. Durbin-Watson statistic is between 1.5 and 2.5 (2.214), so it can be concluded that there is no autocorrelation problem between the error terms in the regression equation. In general, the third main hypothesis is confirmed and the arbitrage cost strengthens the relationship between the fundamental power strategy and the future return of the company.

7 Discussion and Conclusion

The present study was an attempt to examine the fundamental power strategy in the stock market with the role of arbitrage cost versus feelings. According to the regression results, the following results were obtained:

1- Fundamental power strategy can predict future returns.

2- Shareholder feelings affect relationship between fundamental power strategy and stock returns.

3- Arbitrage cost affects the relationship between the fundamental power strategy and stock returns.

The results obtained in the present study are in line with the documents mentioned in the theoretical framework of research and financial literature. Therefore, it is concluded that the fundamental power strategy can predict future returns. These results can enhance investors and researchers' understanding and knowledge in the field of capital market, and they help them to identify other factors that can explain the changes in future returns. Two general groups can use the practical results of this study. The first group is the users of financial information.

This group, which includes investors, creditors, managers and auditing companies, are directly dealing with the financial effects and results of companies' performance. The second group is researchers, policymakers, and developers of accounting standards or institutions such as stock exchanges that are interested in economic and financial issues. According to the results of examining the first hypothesis, it can be concluded that fundamental analysts try to predict future stock returns by estimating the value of key factors that affect future stock performance, and analysts try to examine the relationship between these factors to obtain estimates of future stock returns. Regarding the results of the present study, it can be stated that according to the efficient market hypothesis, assets reflect all available information and in a semi-strong efficient market, assets reflect general information such as financial information. Thus, in this efficiency, market agents cannot get too high returns from fundamental analysis, because all public information is available to everyone. Asset pricing models based

on market efficiency show that the only way for investors to achieve higher returns is to increase risk. However, the growing evidence contradicts the efficient market hypothesis and the concept of loss compensation. Several scientific studies have shown that fundamental analysis can generate abnormal returns, some of which are manifested as abnormalities.

The results of studies conducted by Nguyen; Elluech, Moradi [7], Takamasa et al.[18], Tripathy et al. [10] are in line with the results of the present study [10]. Examining the second hypothesis suggests that shareholder feelings affect the relationship between fundamental power strategy and stock returns. This hypothesis can be discussed in terms of "efficient market hypothesis theory" and "behavioral finance concepts". Based on the efficient market hypothesis, stock prices fully reflect all available information and are the result of competition among rational investors whose expectations are free of feeling and are based on principles. It ensures that assets are properly priced, so that stock prices ultimately reflect the reasonable value of expected cash flows. Even in the presence of irrational investors, who may cause temporary price movements due to demand created by feelings, the effect of investor feelings should be completely diverted by rational and informed traders, since these rational traders act as agents in financial markets help bring stock prices closer to their original value. Behavioral finance theory is also one of the new research topics attracted the attention of academics as well as specialists and experts in this field. The assumptions of this theory are related to the irrationality of investors, and states that investors do not behave rationally and their psychology of human beings influences their investment decisions. Behavioral financial theory expresses two basic assumptions. The first assumption is that investors make decisions under the influence of their feelings. The second assumption is that arbitrage versus investors' feelings is risky and costly.

Therefore, rational investors or arbitrageurs do not make much effort to return the prices to the base price. In short, considering the significant limitations of arbitrage and limited investment horizons, rational investors are unwilling to take a better position versus other irrational investors, so that the stock price fails to return to its intrinsic values. This price abnormally caused by irrational traders can be interpreted as a risk factor for persistent feelings that significantly affect the future return of stocks. Hence, it can be stated that shareholders' feelings affect the relationship between the fundamental power strategy and stock returns. The results of a study conducted by Heidarpour et al. [17] are in line with the results of the present study. Examining the third hypothesis suggests that the arbitrage cost affects the relationship between the fundamental power strategy and stock returns. Since disruptive traders form different beliefs about the future distribution of risky asset returns, they may be affected by one of the behavioral biases in information processing and return prediction or they may have misconceptions of risky nature of return since they are so self-confident. Hence, they select their investment portfolio based on such misconceptions.

Thus, it is desirable and optimal for arbitrageurs to exploit these misconceptions of disruptive traders. According to the efficient market hypothesis, in such situations, expert traders or arbitrageurs correct the prices by adopting a reverse strategy against this group of traders. However, this may not happen in inefficient markets, so that informed traders do not adopt a reverse strategy against disruptive traders and do not correct prices and they adapt themselves with them by adopting a disruptive strategy and increase the level of disruption and consequently inefficiency in the market. Results of the studies conducted by Hsieh et al., Zhu et al. are in line with the results of the present study [8].

After conducting scientific research, if the research has been conducted based on the systematic and research procedure, the researcher could express views about findings and results of research and introduce the strategies and suggestions to improve and expand future research. Thus, the following suggestions are provided based on the research results and further research. According to the obtained

results based on the findings of each hypothesis in the fourth chapter, the suggestions are as follows:
1. Based on the results of the first hypothesis, the fundamental strength strategy could predict future returns. Accordingly, it is suggested that financial market practitioners and stakeholders consider the results of the present research in order to expand and develop the market, create an efficient market and increase the transparency of information in the market; furthermore, based on the obtained results, it is suggested to investors to consider the Petrovski scores such as return on assets, flow operating cash, accruals, long-term financial leverage, number of shares, gross profit margin changes and asset turnover ratio when creating portfolio; Because this research indicates the positive and significant effect of these ratios on future returns; finally, considering the optimal results of the Piotroski score in explaining the future return on stocks to investors as well as managers of investment companies, it is suggested to use the Piotroski score to evaluate the performance of the portfolio. The results of this research help investors to make investment decisions, create an optimal portfolio, and lead to the efficient allocation of financial resources.
2. Based on the results of investigating the second hypothesis; the emotions of stockholders influence the relationship between fundamental strength strategy and stock returns. Therefore, it is suggested that investors and stockholders consider the present research results as a basis for their decisions and optimize their decisions on this basis. Also, considering the nature of marketable securities in the Tehran Stock Exchange, the Piotroski score is suggested to predict the value of the stock and risk management in this market. Managers, investigators, and financial analysts as information users are suggested to consider emotional factors. They do not use only traditional valuation models and, in other words, do not neglect behavioral factors and their role in stock valuation in companies' stock pricing. Furthermore, based on the results of this research, which shows the importance of the component of shareholders' emotions on the impact of the fundamental strength strategy on stock excess returns, that show the extent to which the strategy is fundamentally influential on stock returns, the investors are recommended to consider the factors of shareholders' emotions when making investment decisions and stock pricing and to consider these components when creating a stock portfolio.
3. Considering the results of investigating the third hypothesis; the cost of arbitrage affects the relationship between the fundamental strength strategy and stock returns; in this regard, relaxing the hypothesis related to the efficient market (symmetrical information, no friction, complete competition, etc.) leads to inefficiency of the Tehran Stock Exchange in the investments in the long-term horizons. According to this, it is recommended that the above problems be solved for long-term investments for the efficiency of the Tehran Stock Exchange. Finally, to allocate investigators financial resources, it is recommended that they consider the above model only for short-term and mid-term investment scales. They should determine the effects of arbitrage costs on the future stock returns of companies and consider the results in their decisions.
4. Based on the results of investigating the fourth hypothesis; Stockholder emotions and the cost of arbitrage affect the relationship between fundamental strength strategy and stock returns. Finally, before investing in a company's stock, using the fitted model in this research, investors are recommended to recognize the effects of arbitrage restrictions on the future stock returns of companies and to take the results into account in their decisions. Moreover, brokers and financial advisors active in the stock market are recommended to consider investment friction and the economic and accounting variables that affect returns. Suggestions for Future Research can be stated as follows:
1- It is recommended to study this research separately in different industries and compare the results obtained in different industries.

2- The ability to predict the Piotroski score (Fundamental strength Strategy) in predicting functional criteria such as economic value-added and cash.
3-The effect of type of investment and stockholder trading behavior on the relationship between fundamental strength strategy and stock returns.
4- The considerable part of the risk and return of a share is due to non-systemic factors (with more emphasis on the situation of the Iranian stock market); it is effective to pay attention to the effects of these factors and variables on the share price. For example, inflation rate, exchange rate, the world price of gold, oil, degree of investment risk, etc., are all useful factors that pay attention to their effects on stock returns.
5- To predict the relationship between variables, the linear regression method was used in this research. It is recommended to use the nonlinear equation, quadratic, logarithmic equation method in future research.

References

[1] Asgarnejad Noori, B., *Factors affecting the stock returns of companies listed on the Tehran Stock Exchange: A meta-analysis approach,* Asset Management and Financing, 2018, **6**(1-20), P.29-50. Doi:10.22108/amf.2017.21193

[2] Bozorg Asl, M., Marfou, M., and Arabi, M., *The relationship between arbitrage restrictions with asset growth anomalies in the companies*. Financial Accounting and Auditing Research, 2018, **10**(39), P.65-80.

[3] Nikou, H., Ebrahimi, S.K., and Jalali, F., *Investor's emotional tendency, unsystematic volatility and inaccurate stock pricing in firms listed in Tehran Stock Exchange*. Financial Management Strategy, 2020, **8**(1), P.65-85. Doi:10.22051/jfm.2019.24325.1952

[4] Mohammadi, S., Asima, M., *Unsystematic risk pricing by explaining the risk of arbitrage*. Financial Management Strategy, 2019, **7**(3), P.1-24.Doi:10.22051/jfm.2019.24672.1977

[5] Yadi Pourchaleshtari, M., Motalebiyan, M., *Examining the effect of arbitrage restrictions on conservative financial statements of firms listed in Tehran Stock Exchange*. Third National Conference on Accounting, Economics and Management Innovation; Bandar Abbas: Islamic Azad University Bandar Abbas Branch, 2018.

[6] Rezvani Aghdam, M., and Pourzamani, Z., *comparing the effectiveness of technical analysis integrated strategies with the buying and holding of the stock in ascending and descending periods*. Financial Knowledge of Stock Analysis, 2017, **17**(5), P.17-31.

[7] Moradi, A.M., *Olsen Model Efficiency test using f-value in predicting the companies' stock return*. Khatam University, 2016,**14**(3), P.1-15.

[8] Zhu, Z., Sun, L., and Yung, K., *Fundamental strength strategy: The role of investor sentiment versus limits to arbitrage*. International Review of Financial Analysis, 2020, **71**, P.101452. Doi:10.1016/j.irfa.2020.101452

[9] Takamatsu, R.T., and Lopes-Fávero, L.P., *Financial indicators, informational environment of emerging markets and stock returns*. RAUSP Management Journal. 2019, **54**(3), P.253-68. Doi:10.1108/RAUSP-10-2018-0102

[10] Tripathy, T., Pani, B., *Effect of F score on stock performance: Evidence from Indian equity market*. International Journal of Economics and Finance, 2017, **9**(2), P.89-99. Doi:10.5539/ijef.v9n2p89

[11] Miwa, K., *Investor sentiment, stock mispricing, and long-term growth expectations*. Research in International Business and Finance, 2016, **36**, 414-23. Doi:10.1016/j.ribaf.2015.10.003

[12] Rahman seresht, H., Mazloumi. N., *Relationship between managerial performance of institutional investors and the share of ownership of these institutions in companies listed on the Tehran Stock Exchange*, Management studies, 2006, **47**, P.35-52.

[13] Ravanshad, F.R., Amiri, A., Salari, H., Khodadadi, D., *Application of the Two-Stage DEA Model for Evaluating the Efficiency and Investigating the Relationship between Managerial Ability and Firm Performance*, Journal of Advances in Mathematical Finance & Applications, 2020, **5**(2), P.229-245.
Doi: 10.22034/AMFA.2019.582206.1160

[14] Zalaghi, H., Godini, M., mansouri, K., The Moderating Role of Firms Characteristics on the Relationship between Working Capital Management and Financial Performance, Journal of Advances in Mathematical Finance& Applications, 2019, **4**(1), P.71-88. Doi:10.22034/AMFA.2019.581878.1158

[15] Jahanseir Khararoudi, R., Azar, A., Karim, T., *Evaluating the Performance of an Ambidextrous Bank Using an Agent-based Modelling Approach: A Case Study of Sepah Bank,* Advances in Mathematical Finance & Applications, 2019, **4**(4), P.39-49. Doi: 10.22034/amfa.2019.1874765.1269

[16] Zanjirdar, M., Madahi, Z., and Kasbi. P., Comparative analysis of sticky SGA costs and cost of goods sold: Evidence from Tehran Stock Exchange, Management Science Letters, 2014, 4.3, P.521-526.
Doi: 10.5267/j.msl.2014.1.014

[17] Heidarpour, F., Tariverdi, y., Mehrabi, M., The effect of investors' emotional tendencies on stock returns, Financial knowledge of securities analysis, 2013, **6**(1), P.1-13. Doi: 10.5267/j.msl.2014.1.014

[18] Takamasa Yamaguchi, Financial Modeling & Valuation Analyst, Corporate Finance Institute, 2020.
Doi: 10.22034/amfa.2019.1874765.1269