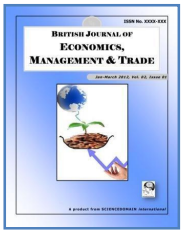

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Empirical Investigation of the Net Operational Asset Levels Efficiency in Prediction of Future Stock Return

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The general purpose of this research is studying the relationship between net operational assets (actual levels, expected and unexpected) and future stock return in Tehran Stock Exchange listed companies over the period 2008-2012. To test the research hypotheses, the multiple regression modules using Panel data methods were employed. Findings indicate that future stock return is a function of net operational assets; meaning that future stock returns can be predicted based on various levels of net operational assets. This relationship is significant and direct on both actual and expected levels of net operational assets, while at the same time; a significant and reverse relationship is present at the unexpected level of the net operational assets. Conclusively, as net operational assets at both actual and expected levels increase (decrease), future stock returns increase (decrease) as well; yet, as differences in levels of actual and expected net operational assets increase (decrease), future stock returns decrease (increase); in other words, an increase (decrease) in deviation of expected and actual levels of net operational assets, ends in a decrease (increase) in future stock returns.

Keywords: Net operational assets (actual, expected, unexpected); future stock return.

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1. INTRODUCTION

People are constantly seeking investment opportunities with the lowest risk and the highest possible return, thus making them perpetually interested in predicting future returns of various entities using accepted theories and empirical observations to enable them to select the most appropriate opportunities for investment. The prediction of entity returns is quite significant to investors and other related groups such as creditors. Entity return is influenced by a series of internal and external conditions. Accordingly, the present research attempts to identify factors influencing future stock returns and the level of their interference. This will be presented as a set of factors and their significance to investors and other users to enable them to predict each entity's future stock returns and to make investment or credit decisions accordingly.

Other studies have indicated that data extracted from accounting information systems, provide the possibility of predicting future stock return. Among these, information from balance sheets can be named from which all data relating to net operating assets can be extracted. Accordingly, the present research is attempting to discover whether or not a significant relationship exists among net operating assets (at three levels; actual, expected and unexpected) and future stock returns. In other words, the researchers attempt to discover whether or not net operating assets can be employed to predict future stock returns.

Investors within a capital market, tend to direct their financial funds towards opportunities with the smallest risk and the largest return. Evidently, the prediction of stock price and return under these conditions are among the most significant issues and factors to be considered by investors and stockholders in selecting the optimal investment opportunity. Investors seek to utilize accounting information to predict future cash flows followed by future stock returns. In fact, they tend to employ past and present information in order to make investments or non-investment decisions (based on future stock returns). Since financial statements include the entity's historic accounting information which is actual and reliable, the present research tends to discover a significant relationship between net operating assets as part of the information reflected in the balance sheet and future stock returns. In other words, the present research attempts to discover whether or not information from the balance sheet (net operating assets in three levels namely actual, expected and unexpected) may be used for predicting future returns.

1.1 Theoretical Basis of Research

The diversity of factors influencing capital markets and their obscurity has led to a lack of certainty in investment decisions. Variables influencing the stock market are partially extracted from financial information of economic entities derived from the accounting system employed. The extent of this influence is quite complex and somewhat unknown and decisions made under these conditions are accompanied by feelings of uncertainty and anxiety.

In order to assist investors to make their decisions with higher certainty, researchers have attempted to employ various methods and sound theories to increase the predictability of entities active in stock exchange. Considering the fact that prediction is one of the tools for reducing uncertainty in the stock market, investors tend to employ methods that are better able to predict stock returns in order to obtain the highest return from their investments. It should be noted that results of a number of domestic researches indicate that the distribution of price and stock return is not accidental in the Tehran Stock Exchange and that it does follow a specific module. Thus, various models can be presented for predicting stock price and return.

In the early years of the present century, a group of financial experts experienced in the evaluation of securities, claimed that research and analysis of past trends of variables such as price and stock return, can help in presenting an image for predicting stock return patterns. The group believed that the identification of a relationship between past information and historical stock return and the determination of a module for these changes can easily help determine future stock returns. In unstable conditions, and the uncertainty prevailing over today's capital markets and the various factors that account for these conditions, the prediction of future stock returns is of significant value for investors in their decision making. Stock returns are significant for reasons other than the decision making process, namely their contribution to capital market efficiency. The accurate prediction of stock returns by the market helps current stock prices be closer to their intrinsic values. In other words, stock prices would be correct. Stock return prediction is used as a differentiating tool for

companies performing with different degrees of economic efficiency. An appropriate prediction of stock return, directs resources towards companies that are higher in efficiency, hence assisting in the optimal allocation of resources and an increase in social welfare.

Since the balance sheet is considered a financial statement that contains past and actual information of a company, the present research attempts to investigate the relationship between net operating assets (within three levels; actual, expected and unexpected) as part of the balance sheet information and future stock returns of listed companies. The presence of a significant relationship would then enable stockholders to employ balance sheet information to predict future returns and to make investment decisions with a higher relative certainty. Net operating assets are in fact considered a significant part of the balance sheet and are a result of the combination of the current items of working capital and net non-current items of operating assets. Net current items of working capital are computed by calculating the difference between the current assets portion of working capital and its current liabilities. Net non-current items of operating assets are a result of subtracting non-current operating liabilities from non-current operating assets.

The resulting figure would ultimately reflect net operating assets as a sum and actual number. In the present research, the expected and unexpected portions have been examined along with actual net operating assets. The expected portion of net operating assets has been calculated using the ratio of weighted average of actual net operating assets within the past three years to the weighted average of actual sales in the same time range, while the unexpected portion has been calculated by deducting the actual net operating assets from the expected portion.

1.2 Research Background

According to claims made by Hirshleifer et al. net operating assets is a strong predictor of future stock return and that an increase in operating assets leads the investor to optimistically perceive that entities with higher operating assets, are valued higher than entities with low levels of the same assets, leading to incorrect investment decisions. The present research indicates that operating assets have a positive correlation with earnings, cash flow and size, and a negative relationship with beta and abnormal future stock return [1]. Lewellen (2004) concluded that the book to market ratio and the ratio of earnings to stock price may only predict returns in the short term, while it is only the dividends to price per share ratio that is able to predict returns for a longer period [2]. Hirshleifer et al. believed that when cumulative net operating income (accounting value added) outstrips cumulative free cash flow (cash value added), subsequent earnings growth is weak. They argue that investors with limited attention overvalue the firm, because naïve earnings-based valuation disregards the firm's relative lack of success in generating cash flows in excess of investment needs. The normalized level of net operating assets is a measure of the extent to which operating/reporting outcomes provoke excessive investor optimism. Result indicates that net operating asset scaled by beginning total asset is a strong negative predictor of long-run stock returns. Predictability is robust with respect to an extensive set of controls and testing methods [3]. Cooper et al. studied the relationship between the four variables namely the ratios of market to book value of equity, company size, stock beta and asset growth rate to dividends per share and concluded that a negative significant relationship is present between the growth rate of total assets and future stock returns [4]. Zhang argued that at least part of the information conveyed by NOA is industry common and cannot be diversified away when forming industry portfolios conditioning on NOA. If investors do not see through NOA that come in part from inter-industry differences, then investor misperceptions should be related to both the industry and the firm-specific components of NOA. He showed that both the cross industry and the within industry components of NOA are strong negative predictors for future stock returns [5]. Michlidiss et al. realized that a positive and significant relationship is present when comparing company size and the book to market ratio to market value, sales growth and stock return [6]. Ang et al. have calculated the non-systematic risk per share based on the tri-factor modules of French and Fama and developed portfolios according to the non-systematic risk per share. They discovered the inverse relationship between non-systematic risk and stock return [7]. Aga and Berna claimed the presence of a negative relationship among the ratio of price to earnings per share and stock returns [8]. Richardson et al. claimed that the predictability of change in net operating assets. Preservation of future profitability and stock

return, are a result of changes in assets. They claimed that past changes in net operating assets hold low predictability for future stock returns [9]. Cooper et al. tested for firm-level asset investment effects in returns by examining the cross- sectional relation between firm asset growth and subsequent stock returns. Asset growth rates are strong predictors of future abnormal returns. They found that a firm's annual asset growth rate emerges as an economically and statistically significant predictor of the cross-section of U.S. stock returns [10]. Tehrani and Rahnama (2008) realized that the book to market ratio can be an appropriate replacement for risk in models for pricing capital assets and the ability to determine returns [11]. Papanastasopoulos et al. illustrated that the negative relationship between abnormal stock returns and net operating assets indicates the low levels of growth in current earnings durability [12]. Hang indicated that fluctuations in cash flows are negatively related to stock returns [13]. Lipson et al. found that the ability of asset growth to explain the cross section of returns is closely related to firm idiosyncratic volatility. They found that alphas still exhibit time-series patterns consistent with mispricing for high idiosyncratic volatility firms. Finally, they showed that a risk factor based on asset growth does not generate a significant risk premium. These findings highlight the link between the asset growth effect and idiosyncratic risk, and suggest that the mispricing that can arise from high arbitrage costs plays a major role in this effect [14]. Khodadadi and Kargarpoor illustrated the positive and significant relationship present between cash flows from operations and the quick ratio, with stock returns. They also indicated that no significant relationship is present between the ratio of net working capital to total assets and stock return [15]. Valipoor indicated that short term fluctuations of cash flows from operations contain relevant information for predicting stock returns and that the relationship between these two variables is direct and positive; yet long term fluctuations of the mentioned do not have any significant influence on stock return [16]. Bozorg Asl and Shiri concluded that no significant relationship exists between net operating assets and abnormal stock returns. In other words, they proved that information contained in the balance sheet, lacks informative content for investors deciding on abnormal stock returns [17]. Slotte examined the asset pricing impact of asset growth on cross-sectional stock returns in the stock market. The results indicate a negative relation between the assets growth and expected stock returns in the UK stock market [18]. Asgari and Bayi Lashaki discovered a weak positive relationship between remaining net operating assets and stock return, and no significant relationship among changes in net operating assets and changes in stock return [19]. Arab Salehi et al. found a significant negative linear relationship among net operating assets and stock return. Moreover, the relationships between company size and book to market value as control variables with stock returns are positively and negatively significant respectively [20]. Rashedi indicated a strong positive relationship exists between the ratios of earnings per share and predicted stock return. He added that the earnings per share, market price to book value, price to earnings, price to sales and asset return have, respectively, the most intense influence on predictions of stock return. He also noted the non-homogeneity and inefficiency of markets in Iran [21]. Asadi and Poorbagherian concluded that an inverse and significant relationship exists among cash flow from financing activities and future stock return and also between cash flow from debts and future stock returns. Moreover no significant relationship was found between cash flow from issuance of shares and future stock return [22]. Izadiniya and Karbalayi indicated that neither the free flowing variables, nor cash returns from investments and economic value added have any influence on stock returns; yet earnings per share has a positive and significant influence on returns [23]. Choi and Lee found that there exists a negative relationship between realized daily skewness and subsequent stock returns when there is no high-impact information release, but that the relationship becomes positive if the realized skewness is associated with such releases [24].

1.3 Statistical Population and Sample

The statistical population of the research includes companies listed in the Tehran Stock Exchange. The sample was selected using the systematic omission method and criteria including constant presence in the Stock Exchange Market, unchanged fiscal year and no long term interruption of activities throughout the period of study. 190 companies were screened according to the criteria mentioned and selected from among all companies listed in the Tehran Stock Exchange as the research sample and related data for a 5 year period collected. Hence, observances relating to ultimate variables

reached 950 year-company. It should be noted that industry type did not create any limitations in sample selection and no industry was omitted from the population. The time period considered for the collection of data involves a 5 year period from 2008 to 2012.

2. RESEARCH HYPOTHESES

Since the balance sheet is considered a financial statement that contains past and actual information of a company, this research attempts to investigate the relationship between net operating assets (within three levels; actual, expected and unexpected) as part of the balance sheet information and future stock returns. The general hypothesis is that a significant relationship exists between net operating assets and future stock returns; the hypotheses can be segregated and studied as the following:

1. There is a significant relationship between actual net operating assets and future stock returns.
2. There is a significant relationship between expected net operating assets and future stock returns.
3. There is a significant relationship between unexpected net operating assets and future stock returns.

It is expected that net operational as part of the balance sheet information have an information contents in prediction the future stock returns**.** It is due to the existence some idea in financial reporting conceptual framework that every items of financial statement should have information contents that can use by financial users in prediction the future.

2.1 Research Model and Variables

According to the hypotheses, the regression model can be formulated as follows:

$$R_{i,t+1} = \beta_0 + \beta_1 NOA_{i,t} + \beta_2 ROA_{i,t} + \beta_3 AG_{i,t} + \beta_4 LEV_{i,t} + \beta_5 BETA_{i,} + \beta_6 ETP_{i,t\,t} + \beta_7 CTP_{i,t} + \beta_8 BTM_{i,t} + \varepsilon_{i,t+1}$$

Based on the models presented, research variables are as follows (Table 1):

Table1. Model & variables

Variables		Definition	Description
Dependent	$R_{i,t+1}$	Future stock return	Stock Return includes the sum of all earnings of a stockholder throughout a fiscal period, from changes in stock price, stock dividends, precedence rights in stock offerings and stock return benefits or bonus shares.
Independent	$NOA_{i,t}$	Net operational assets	It is calculated by adding total current items of net operating to non-current items of net operating assets. ($NOA_{i,t} = NCOA_{i,t} + NNCOA_{i,t}$)
	$ENOA_{i,t}$	Expected portion of net operational assets	the ratio of moving average (last three years) of actual net operating assets multiplied by the moving average (last three years) of actual sales
	$UNENOA_{i,t}$	Unexpected portion of net operational assets	net operational assets minus expected portion of net operational assets
Control	$LEV_{i,t}$	Leverage	debt divided by assets
	$ROA_{i,t}$	Return on assets	operational income divided by assets
	$AG_{i,t}$	Asset growth	changes in assets which may be positive or negative
	$BETA_{i,t}$	Systematic risk	dummy variable; equal to one for firms audited by big auditor and zero otherwise
	$ETP_{i,t}$	Earnings to Price ratio	Earnings per share divided by market Price of share
	$CTP_{i,t}$	Cash to price ratio	Cash per share divided by market Price of share
	$BTM_{i,t}$	Book to market ratio	Book value per share divided by market Price of share

2.1.1 Dependent variables

$R_{i,t+1}$: Future stock return; Stock Return includes the sum of all earnings of a stockholder throughout a fiscal period, from changes in stock price, stock dividends, precedence rights in stock offerings and stock return benefits or bonus shares. Using indices offered in the stock exchange website, daily return was calculated. Daily return was then changed into monthly return and using the following formula monthly returned was then changed into annual return; ultimately each year's annual return was changed into future stock return for the previous year.

$$R_{i,t}=(1+r_1)(1+r_2)(1+r_3)\ldots\ldots\ldots(1+r_{12})-1$$

2.1.2 Independent variables

In order to consider all levels of net operating assets including actual, expected and unexpected and to carry out relevant tests, each variable and all its sub-variables were divided by end of the period assets and thus homogenized.

$RNOA_{i,t}$: Net operating assets at the actual level; net operating assets are calculated by adding total net current items of working capital (receivable accounts, inventories and other current assets minus payable accounts and other current liabilities) to net non-current operational assets (net property, plant and equipment, intangibles assets and other long term assets minus long term liabilities).

$$NOA_{i,t} = NCOA_{i,t} + NNCOA_{i,t}$$

$NCOA_{i,t}$: Net current items of operating assets
$NNCOA_{i,t}$: Net non-current items of operating assets
$ENOA_{i,t}$: Expected portion of net operating assets; the variable is calculated by multiplying the ratio of moving average of actual net operating assets of the last three years to the moving average of actual sales of the same period by actual sales level of the relevant year.
$S_{i,t}$: Actual sales levels of the relevant year
$UNENOA_{i,t}$: Unexpected portion of net operating assets; the variable is calculated by subtracting the expected portion from actual net operating assets.

$$UNENOA_{i,t} = NOA_{i,t} - ENOA_{i,t}$$

2.1.3 Control variables

$LEV_{i,t}$: Leverage; accounting research this is used as representative of capital structure. In the present study, leverage is calculated by dividing liabilities to assets.

$ROA_{i,t}$: Return on Assets; the variable indicates earnings per Rial of assets. Asset return in the present research is calculated by dividing operational income to assets.

$AG_{i,}$: Asset growth; changes of assets in two consecutive years are called asset growth which may be positive or negative.

$BETA_{i,t}$: Systematic risk; this is representative of the portion of total stock risks created due to factors affecting all stocks in the market and cannot be reduced. To calculate systematic risk for each company-year on a daily basis, pairs of variables including market return and stock return were arranged and subsequently applied in the regression equations to present the susceptibility of stock to market return or the market return impact factor which is presented as the systematic risk index in the following regression model:

$$R_{i,t} = \alpha + \beta R_{m,t} + \varepsilon_{i,t}$$

$R_{i,t}$: Stock Return
$R_{m,t}$: Return of the Stock Market Index
B: Systematic Risk

$ETP_{i,t}$: Earnings to Price ratio; this is calculated by dividing earnings per share to share price and is indicative of the earnings expected by share holders for the price paid for each stock.

$CTP_{i,t}$: Cash to Price ratio; this ratio is equivalent to the cash flow to price of each stock, indicating the cash flow produced by each stock compared to the price that has been paid for it.

$\underline{BTM_{i,t}}$: Book value to Market value ratio of each stock; indicating the percentage of the market price that the book value of each share as per the company's records holds. The surplus of market to book value of a stock indicates the growth pattern of the company.

2.2 Descriptive Statistics

Descriptive parameters of research variables have been presented in Table 2. Descriptive parameters of the future stock return variable indicates that sample companies have on average experienced a 25 percent positive return. Considering maximum and minimum figures, a number of companies have had positive while others have displayed negative returns.

In sample companies, the actual net operating assets make up an average of 30 percent of all assets. The same parameter would be 31 percent for the expected level and 1 percent for the unexpected. The positive value for mean actual and expected net operating assets indicates that they form a larger part on average than operating liabilities. In other words in sample companies, the current asset portion of working capital is on average higher than the current liability portion and the same holds true for non-current assets as compared to non-current liabilities. The mean value is negative for unexpected net operating assets. This is due to the fact that on average, the actual net operating assets are less than the expected level.

The mean value for return on assets indicates that companies have been profitable on average and that the level of their profitability is approximately 12 percent; however the sample includes companies that may have incurred loss at a certain period in time. On average, sample companies have had a positive growth of assets equivalent to approximately 15 percent. This indicates a pattern of growth for company investments at the asset level; while a number of companies have faced a negative growth in assets. The average liabilities in sample companies form approximately 66 percent of total assets; in other words, liabilities make up 66 percent of the company's assets. An investigation of the highest value in the leverage shows that liabilities in one of the sample companies is 2.7 times its assets which occurs when residual loss is present in the company's capital structure. Average earnings per share are approximately 14 percent of market price. The operating cash flow per share is on average 28 percent, while book value per share is on average 52 percent of the market price per share. Mean values for these three ratios indicate that in sample companies, the average earnings, operating cash flow and book value per share is quite lower than the market price per share. Results reflect a negative skewness for variables such as the current asset portion of working capital, net current items of working capital, actual and expected net operating assets, beta risk, earnings to price ratio per share and cash flow to price ratio per share; while the skewness for other variables of the research is positive. Positive (negative) skewness, illustrates the tail leaning to the right (left) side, indicating how far scattered the observations are from the central index at the right (left) latitude of the unit of measurement. All research variables display positive kurtosis. The kurtosis coefficient is in fact the height of the chart displaying variable distribution. Positive (negative) kurtosis of variable distribution indicates the height (shortness) of the distribution curve compared to normal distribution. Accordingly, the distribution curve of all research variables is taller than the normal distribution. Overall, the abnormality of research variables has been approved based on skewness and kurtosis parameters.

2.3 Normality Test and Unit Root Test

In the present research, the Jarque-Bera parameter and its related probabilities were used to study the normality of research variables. According to the results reflected in Table 3, as Jarque-Bera probability values are less than 5 for all research variables, none have a normal distribution. In fact, the natures of many variables involved are with fat tails and skewed probability density.

Variable sustainability has also been considered in the regression model analysis; the presence of un-sustainable variables in the model lead to the invalidity of the significance tests performed on the regression model and its descriptive variables, resulting in an inaccurate deduction of the relationship among variables. In order to ensure the presence of sustainable variables in the regression models of the research, the panel unit root test by Im, Pesaran and Shin (W statistics) has been performed, with results illustrated in Table 3. As the statistical probability is less than 5 percent for all research variables, variable sustainability can be approved.

2.4 Correlation Test

The Pierson correlation coefficients have been used to test variable correlation with results illustrated in Table 4. The highest correlation coefficient is approximately 81 percent indicating a positive and strong correlation among actual and expected levels of net operating assets; moreover, the correlation between the expected and unexpected levels of net operating assets is approximately 49 percent which is considered average. As it is shown in Table 4, there are significant correlations in some cases between variables.

Table 2. Descriptive statistics

	$R_{i,t+1}$	$NOA_{i,t}$	$ENOA_{i,t}$	$UNENOA_{i,t}$	$ROA_{i,t}$	$AG_{i,t}$	$LEV_{i,t}$	$BETA_{i,t}$	$ETP_{i,t}$	$CTP_{i,t}$	$BTM_{i,t}$
Mean	0.254765	0.302463	0.313554	-0.010686	0.124476	0.152435	0.660203	-0.005934	0.139883	0.277132	0.523353
Median	0.077003	0.310000	0.294852	0.001060	0.108461	0.101514	0.650860	3.26E-05	0.153245	0.190000	0.407857
Maximum	0.662083	0.960000	0.996261	0.821673	0.708056	8.227611	2.755327	0.8935926	1.766074	5.630000	6.666667
Minimum	-0.886451	-0.986871	-0.683288	-0.979967	-0.565286	-0.754351	0.039306	-0.628655	-3.240385	-8.960000	0.017250
Std. Dev.	0.599368	0.266307	0.403375	0.385689	0.123490	0.402595	0.268428	0.289699	0.254799	0.586273	0.467814
Skewness	2.647772	-1.952997	-3.901199	6.152049	0.625091	10.40592	2.016626	-19.61964	-3.591238	-1.707451	4.131874
Kurtosis	13.63434	15.08686	167.0410	230.8446	6.085698	184.3184	15.28938	565.0497	46.62015	91.55317	43.69979
Sum	230.0523	287.3400	296.9360	-10.12000	117.1324	144.8134	623.8921	-5.227821	124.0765	246.3700	467.3539
Sum Sq. Dev.	324.0361	67.30264	153.9251	140.7231	14.33490	153.8165	68.01857	73.85421	57.52128	305.2202	195.2142
Observations	903	945	941	941	941	950	945	881	887	889	893

Ri,t+1: Future stock return; NOAi,t: Net operational assets; ENOAi,t: Expected net operational assets; UNENOAi,t: Unexpected net operational assets; ROAi,t: Return on assets (operational income to assets ratio); AGi,t: Asset growth (changes of assets in two consecutive years); LEVi,t: Leverage (liabilities to assets ratio); BETAi,t: Systematic risk; ETPi,t: Earnings to price ratio; CTPi,t: Cash to price ratio; BTMi,t: Book value to market value ratio

Table 3. Results of the normality test and unit root test

	$R_{i,t+1}$	$NOA_{i,t}$	$ENOA_{i,t}$	$UNENOA_{i,t}$	$ROA_{i,t}$	$AG_{i,t}$	$LEV_{i,t}$	$BETA_{i,t}$	$ETP_{i,t}$	$CTP_{i,t}$	$BTM_{i,t}$
Jarque-Bera	5310.091	6386.732	1064204.	2054381.	434.6045	1318501.	6587.278	11652680	72227.87	290900.3	64175.52
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
IPS. W-stat	-20.0255	-7.78627	-6.01676	-9.34654	-8.01156	-9.71129	-4.10636	-2907.95	-7.48484	-11.7002	-6.42758
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	903	945	941	941	941	950	945	881	887	889	893

Ri,t+1: Future stock return; NOAi,t: Net operational assets; ENOAi,t: Expected net operational assets; UNENOAi,t: Unexpected net operational assets; ROAi,t: Return on assets (operational income to assets ratio); AGi,t: Asset growth (changes of assets in two consecutive years); LEVi,t: Leverage (liabilities to assets ratio); BETAi,t: Systematic risk; ETPi,t: Earnings to price ratio; CTPi,t: Cash to price ratio; BTMi,t: Book value to market value ratio

Table 4. Correlation coefficients matrix of descriptive variables

Correlation probability	$NOA_{i,t}$	$ENOA_{i,t}$	$UNENOA_{i,t}$	$ROA_{i,t}$	$AG_{i,t}$	$LEV_{i,t}$	$BETA_{i,t}$	$ETP_{i,t}$	$CTP_{i,t}$	$BTM_{i,t}$
$NOA_{i,t}$	1.000000									

$ENOA_{i,t}$	0.806454	1.000000								
	0.0000	-----								
$UNENOA_{i,t}$	0.121120	-0.489266	1.000000							
	0.0003	0.0000	-----							
$ROA_{i,t}$	0.058244	0.037612	0.022766	1.000000						
	0.0864	0.2683	0.5030	-----						
$AG_{i,t}$	0.164693	0.132691	0.020159	0.169144	1.000000					
	0.0000	0.0001	0.5531	0.0000	-----					
$LEV_{i,t}$	-0.165655	-0.114319	-0.052420	-0.266855	-0.073410	1.000000				
	0.0000	0.0007	0.1228	0.0000	0.0306	-----				
$BETA_{i,t}$	0.018102	0.013906	0.003354	-0.009401	0.012888	-0.011569	1.000000			
	0.5943	0.6824	0.9214	0.7821	0.7045	0.7336	-----			
$ETP_{i,t}$	0.086763	0.075451	0.001308	0.208769	0.052444	-0.364654	0.004360	1.000000		
	0.0105	0.0262	0.9693	0.0000	0.1226	0.0000	0.8979	-----		
$CTP_{i,t}$	0.441637	0.435825	-0.235881	-0.036229	0.038143	0.031095	0.002800	0.075348	1.000000	
	0.0000	0.0000	0.0000	0.2863	0.2616	0.3602	0.9343	0.0264	-----	
$BTM_{i,t}$	-0.016192	0.005590	-0.033266	-0.138492	-0.163168	0.122051	-0.010634	-0.265232	0.064745	1.000000
	0.6338	0.8694	0.3276	0.0120	0.0000	0.0003	0.7544	0.0000	0.0566	-----

Ri,t+1: Future stock return; NOAi,t: Net operational assets; ENOAi,t: Expected net operational assets; UNENOAi,t: Unexpected net operational assets; ROAi,t: Return on assets (operational income to assets ratio); AGi,t: Asset growth (changes of assets in two consecutive years); LEVi,t: Leverage (liabilities to assets ratio); BETAi,t: Systematic risk; ETPi,t: Earnings to price ratio; CTPi,t: Cash to price ratio; BTMi,t: Book value to market value ratio

2.5 Testing the Research Hypotheses

The overall hypotheses of the research stated an investigation of the relationship between net operating assets and future stock return of companies listed in the Tehran Stock Exchange. For purposes of the present research, three criteria were selected for net operating assets namely the actual, expected and unexpected levels. To test the research hypotheses, regression models using panel data were applied. Results of over fitting models have been presented in Table 5, 6 and 7. The F-limer statistics of the Chow test and probabilities in the first, second and third models (lower than 5 percent error interval) indicates the suitability of the panel model. The χ^2 statistic of the Hausman Test and probabilities in the first, second and third models (lower than 5 percent error interval) indicates the suitability of the panel model with sustainable impact. The F-fisher statistics and probabilities (lower than 5 percent error interval) indicate the significance of all three regression models. The desirable level of the Durbin-Watson model (between 1.7 and 2.3) indicates independence of model residues; however the standardized residual values do not have a normal distribution based on the Jarque-Bera and related probabilities (lower than 5 percent error interval).

Results of tests on the first hypothesis indicated that in sample companies future stock returns are a function of the actual level of net operating assets according to the t-student parameter (higher than the absolute value of the 1.96 critical value) and related probabilities (lower than the 5 percent error interval); thus evidence suggests significance or positive impact at the actual level of net operating assets. In other words, a significant and positive relationship exists between actual net operating assets and future stock return. Accordingly, the hypothesis indicating the presence of a significant relationship among net operating assets and future stock return has been approved. Hence, the surplus of operating assets to operating liabilities in each fiscal period leads to the creation of net operating assets in that level. An increase in future stock return is observed along with an increasing pattern in net operating assets. In the present model, the impact factor of actual net operating assets is approximately 0.45. The adjusted determining factor of the first model indicates a determining ability of approximately 39 percent of the descriptive variables.

Results of tests on the second model suggest the significance of the expected net operating assets with a positive impact. In other words, a significant and positive relationship exists among expected net operating assets and future stock return. Accordingly, the hypothesis stating a significant relationship between net operating assets and future stock return has been approved at this level as well. In this model, the impact factor of the expected net operating assets is equivalent to approximately 0.14. The adjusted determining factor of the second model indicates a determining ability of approximately 31 percent of the descriptive variables.

Moreover, results of testing the third hypothesis states the significance of the unexpected net operating assets with a negative impact. In other words, a significant and negative relationship exists among unexpected net operating assets and future stock return. In this model, the impact factor of unexpected net operating assets is approximately -0.057. The adjusted determining factor of the third model indicates a determining ability of approximately 30 percent of the descriptive variables.

Accordingly, the hypothesis indicating the presence of a significant relationship among net operating assets and future stock return has been approved. Hence, it could be generally concluded that a significant relationship is present among net operating asset criteria (actual, expected and unexpected levels) and future stock return; the direction of which is positive for the actual and expected net operating assets and negative for the unexpected level. In other words, actual and expected net operating assets contain a positive informative content such that an increase in these levels of net operating assets leads to an increase in stock return in future periods; however, the unexpected net operating assets which are in fact the deviation of actual levels from expected net operating assets contain negative informative content; such that any increase in them would result in a reduction in future stock returns. As can be observed from the results, the highest determining ability is indicated by the model that evaluates future stock returns based on actual net operating assets; following in rank are models presented for the expected and unexpected net operating assets. It can be concluded that future stock return reacts more intensely to actual net operating assets as compare to the expected and unexpected levels. In other words, stock return fluctuations are more

a function of actual levels of net operating assets. It should be noted however that actual and expected net operating assets have a direct relationship with future stock return while the same relationship is reversed. The other point worthy of mention is the role of the impact factor in various levels of net operating assets. Results indicate that from the impact factor point of view, actual net operating assets contain the highest impact factor and models for the expected and unexpected levels are next in rank. This approach can also help to understand better the role that actual net operating assets play in future stock returns.

Moreover, evidence from studies on the role of control variables suggest that variables such as asset return, asset growth, earnings to price ratio per share, and the book to market value ratio per share offer a positive and significant impact. However, no evidence was found on the significance of variables such as leverage, risk and cash flow to market price per share. In the major conclusion section, the variable leverage is not significant. The importance of this issue is because of the obverse conflict with MM II theory. Based on some studies, leverage has a significant effect on stock return; it means that leverage can predict future stock return, but in this research no evidence was found about that. As result indicates, leverage has a positive effect on future stock return, but this effect is not significant and meaningful. So, although it is expected that leverage can predict future stock return, but this relationship is not significant statistically.

The interesting aspect of this model is the absence of a significant impact by risk on future stock return; although absent, based on risk and return interactions, a significant relationship was expected. The reason may be due to the fact that relationships between risk and return could only be taken into consideration at certain periods in time, while in the present research the impact of risk at a certain period in time has been studied on future stock return, or in other words, a period of time in the future. The same justification can be used for leverage and the cash flow to price ratio per share.

Table 5. The relationship between net operational assets and future stock return

Dependent variable :R_{t+1}							
Model (1)				**Model (2)**			
Method: Panel EGLS (Cross-section weights)				**Method: Panel Least Squares**			
Periods included: 5				**Periods included: 5**			
Cross-sections included: 185				**Cross-sections included: 184**			
Total panel (unbalanced) observations: 902				**Total panel (unbalanced) observations: 857**			
Variables	**Coefficient**	**t-Statistic**	**Prob.**	**Variables**	**Coefficient**	**t-Statistic**	**Prob.**
C	-0.155106	14.04704	0.0000	C	-0.462697	-4.231813	0.0000
$NOA_{i,t}$	0.221273	6.385339	0.0000	$NOA_{i,t}$	0.451273	2.163904	0.0318
				$ROA_{i,t}$	0.541655	2.065380	0.0393
				$AG_{i,t}$	0.104084	3.517923	0.0005
				$LEV_{i,t}$	0.023844	0.148828	0.8817
				$BETA_{i,t}$	0.053472	0.633129	0.5269
				$ETP_{i,t}$	0.283687	2.551957	0.0109
				$CTP_{i,t}$	0.021609	0.464162	0.6427
				$BTM_{i,t}$	1.140344	4.051483	0.0001
R-squared			0.192840	R-squared			0.421902
Adjusted R-squared			0.181201	Adjusted R-squared			0.391861
Durbin-Watson stat			2.000222	Durbin-Watson stat			2.261947
F-stat			9.012945	F-stat			15.83921
Prob.(F-stat)			0.002755	Prob.(F-stat)			0.000000
Jarque-Bera Stat			83.48384	Jarque-Bera Stat			1709.376
Prob.(Jarque-Bera Stat)			0.000000	Prob.(Jarque-Bera Stat)			0.000000
F -Stat (Chow Test)			0.716854	F -Stat (Chow Test)			1.332033
Prob.(F-stat)			0.9968	Prob.(F-stat)			0.0060
χ2 -Stat (Hausman Test)			-	χ2 -Stat (Hausman Test)			90.056532
Prob.(χ2-stat)			-	Prob.(χ2-stat)			0.0000

Ri,t+1: Future stock return; NOAi,t: Net operational assets; ROAi,t: Return on Assets (operational income to assets ratio); AGi,t: Asset growth (changes of assets in two consecutive years); LEVi,t: Leverage (liabilities to assets ratio); BETAi,t: Systematic risk; ETPi,t: Earnings to Price ratio; CTPi,t: Cash to Price ratio; BTMi,t: Book value to Market value ratio

An interpretation of results indicates that in the earnings to price ratio per share, book to market value per share and the cash flow to price ratio per share, three fundamental variables namely income/earnings, book value and cash flow have been studied, from which only earnings and book value have been able to play a role in determining future stock return; and nearly no part played by cash flows. The findings can be considered a confirmation of results obtained in researches on the relevancy of value. Value relevance is a topic where in the relevancy of an accounting value is estimated in determining a company's market value; it provides, in fact, a theoretical framework for market evaluation based on fundamental accounting variables (book value and earnings) as well as other information which may be deemed relevant in predicting an entity's value. The objective for this analysis is to evaluate whether or not book values and earnings/income impact the market value of an entity; according to the Olson Model (1995), recognized as the best model so far to formulate value relevance, and the relationships between accounting values and company worth, company value (market value of shares) is a function of two fundamental variables namely income/earnings and book value. In the present research a similar result was reached indicating significance between the two fundamental variables: earnings and book value in determining future stock return. This is important mainly because stock return is another means of reflecting fluctuations in market price of shares. Moreover, results indicated that an increase in profitability and growth of assets may result in an increase in future stock return. This means that for every unit of increase in assets and earnings resulting from the utilization of assets, a pattern of increase is observed for future stock return. Another conclusion that can be made from testing the hypotheses is that all significant variables within a model have followed a uniform pattern; in other words all significant descriptive variables have had a positive impact on future stock returns.

Table 6. The relationship between expected net operational assets and future stock return

Dependent variable :R_{t+1}							
Model (1)				**Model (2)**			
Method: Panel EGLS (Cross-section weights) **Periods included: 5** **Cross-sections included: 185** **Total panel (unbalanced) observations: 902**				**Method: Panel Least Squares** **Periods included: 5** **Cross-sections included: 184** **Total panel (unbalanced) observations: 857**			
Variables	**Coefficient**	**t-Statistic**	**Prob.**	**Variables**	**Coefficient**	**t-Statistic**	**Prob.**
C	-0.155353	14.54508	0.0000	C	-0.466283	-2.575027	0.0102
$ENOA_{i,t}$	0.239807	4.816755	0.0000	$ENOA_{i,t}$	0.139032	2.106199	0.0401
				$ROA_{i,t}$	0.662840	2.190318	0.0100
				$AG_{i,t}$	0.110251	2.818320	0.0329
				$LEV_{i,t}$	0.015514	0.085086	0.9322
				$BETA_{i,t}$	0.054874	0.537572	0.5911
				$ETP_{i,t}$	0.282863	2.374104	0.0179
				$CTP_{i,t}$	0.025652	0.544455	0.5863
				$BTM_{i,t}$	1.138987	8.520635	0.0000
R-squared			0.135628	R-squared			0.390153
Adjusted R-squared			0.124180	Adjusted R-squared			0.311605
Durbin-Watson stat			1.999283	Durbin-Watson stat			2.081649
F-stat			11.91946	F-stat			13.15339
Prob.(F-stat)			0.000581	Prob.(F-stat)			0.000000
Jarque-Bera Stat			5441.950	Jarque-Bera Stat			1720.256
Prob.(Jarque-Bera Stat)			0.000000	Prob.(Jarque-Bera Stat)			0.000000
F -Stat (Chow Test)			0.729120	F -Stat (Chow Test)			1.330661
Prob.(F-stat)			0.9952	Prob.(F-stat)			(0.0061)
$\chi 2$ -Stat (Hausman Test)			-	$\chi 2$ -Stat (Hausman Test)			90.516331
Prob.($\chi 2$-stat)			-	Prob.($\chi 2$-stat)			0.0000

Ri,t+1: Future stock return; ENOAi,t: Expected net operational assets; ROAi,t: Return on Assets (operational income to assets ratio); AGi,t: Asset growth (changes of assets in two consecutive years); LEVi,t: Leverage (liabilities to assets ratio); BETAi,t: Systematic risk; ETPi,t: Earnings to Price ratio; CTPi,t: Cash to Price ratio; BTMi,t: Book value to Market value ratio

3. CONCLUSION AND DISCUSSION

General findings indicate that in sample companies, future stock return is a function of net operating assets; in other words a significant relationship is present among net operating assets and future stock returns. Accordingly the hypothesis stating that a significant relationship exists between net operating assets and future stock returns has been confirmed. The point that is worthy to mention is the focus made on various levels of operating assets in determining future stock return. The present research shows that the relationship between actual and expected levels of net operating assets and future stock return is significant and direct; while this relationship between the unexpected levels and future stock return is significant yet inverse. This means that as actual and expected net operating assets increase, stock returns increase as well, yet with an increase in differences among these levels, a decrease is observed in future stock return; in other words, the deviance of expected amounts from actual net operating assets is followed by a decrease in future stock return. Overall, it is concluded that stock return in future periods can be predicted at different levels of net operating assets.

Findings on the significance of the relationship between net operational assets and stock return are compatible to those of researches made by Hirshleifer et al [10], Richardson et al [20], Papanastasopoulos et al [18], and Asgari and Bayi Lashaki [4]; and contrary to results from researched carried out by Shiri (2007). It should be noted however that results of the present research is not in accordance to researches performed Hirshleifer et al. [10], Papanastasopoulos et al. [18], concerning direction of the relationship between net operating assets and future stock return, as in these researches a negative significant relationship has been observed between net operating assets and future stock return. Results of the present research, however, indicate a positive and significant relationship between actual and expected net operating assets while a negative significant relationship exists only at the unexpected level of net operating assets and future stock return.

Table 7. The relationship between unexpected net operational assets and future stock return

Dependent variable :R_{t+1}							
Model (1)				**Model (2)**			
Method: Panel EGLS (Cross-section weights) **Periods included: 5** **Cross-sections included: 185** **Total panel (unbalanced) observations: 902**				**Method: Panel Least Squares** **Periods included: 5** **Cross-sections included: 184** **Total panel (unbalanced) observations: 857**			
Variables	**Coefficient**	**t-Statistic**	**Prob.**	**Variables**	**Coefficient**	**t-Statistic**	**Prob.**
C	-0.169073	-16.02774	0.0000	C	-0.454399	-2.505241	0.0125
$UNENOA_{i,t}$	-0.065244	-2.547457	0.0110	$UNENOA_{i,t}$	-0.057132	-3.001843	0.0069
				$ROA_{i,t}$	0.531461	1.991705	0.0418
				$AG_{i,t}$	0.106089	4.011694	0.0985
				$LEV_{i,t}$	0.014429	0.079255	0.9369
				$BETA_{i,t}$	0.053700	0.524158	0.6003
				$ETP_{i,t}$	0.282760	2.372190	0.0180
				$CTP_{i,t}$	0.025960	0.614943	0.5388
				$BTM_{i,t}$	1.139492	8.520247	0.0000
R-squared			0.113982	R-squared			0.342857
Adjusted R-squared			0.102263	Adjusted R-squared			0.299103
Durbin-Watson stat			1.985444	Durbin-Watson stat			2.261873
F-stat			5.412421	F-stat			7.881039
Prob.(F-stat)			0.020215	Prob.(F-stat)			0.000000
Jarque-Bera Stat			5338.481	Jarque-Bera Stat			1720.497
Prob.(Jarque-Bera Stat)			0.000000	Prob.(Jarque-Bera Stat)			0.000000
F -Stat (Chow Test)			0.739500	F -Stat (Chow Test)			1.338836
Prob.(F-stat)			0.9934	Prob.(F-stat)			0.0052
$\chi 2$ -Stat (Hausman Test)			-	$\chi 2$ -Stat (Hausman Test)			89.978883
Prob.($\chi 2$-stat)			-	Prob.($\chi 2$-stat)			0.0000

Ri,t+1: Future stock return; UNENOAi,t: Unexpected net operational assets; ROAi,t: Return on Assets (operational income to assets ratio); AGi,t: Asset growth (changes of assets in two consecutive years); LEVi,t: Leverage (liabilities to assets ratio); BETAi,t: Systematic risk; ETPi,t: Earnings to Price ratio; CTPi,t: Cash to Price ratio; BTMi,t: Book value to Market value ratio

In the present research a positive significant relationship exists between net operating assets and future stock return. Since net operating assets are considered among the most significant information extracted from the balance sheet, it is suggested to various stockholders, investors, financial analysts and other user groups to use this information for predicting future stock return and to make investment decisions with relative certainty. According to the findings, factors such as asset profitability, asset growth, and fundamental variables such as earnings and book value have also had a major role in determining future stock return and it is hence suggested that these variables be considered in decision makings as well.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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