Studying the effect of human force efficiency on stock return in firms enlisted in Tehran Stock Exchange

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ARTICLE INFO

ABSTRACT

Objective: Since the goal of most organizations is to create value for the stockholders and this is realized in firms enlisted in Stock Exchanges in the form of stock return, it seems absolutely necessary to absorb the attention of managers to the issue of human force efficiency to recognize the effect of human force efficiency in achieving this goal and in recognizing the probable obstacles. The goal of the present research is to assess the effect of human force efficiency on stock return in firms enlisted in Tehran Stock Exchange. **Methodology:** To do so, 83 firms enlisted in Stock Exchange during the time period between 2004 and 2013 from among 15 different industries were selected to test the hypotheses. To analyze the variables we have used a multiple regression method of cross sectional and time series data to determine the relationship between independent and dependent variables. **Results:** Results of the estimation of pooled data regression showed that pooling data method has been an appropriate method to estimate the model. Results of regression and correlation analysis showed that there has not been a meaningful relationship between human force efficiency and firms' stock return in Tehran Stock Exchange. Also there has not been a difference between users' firms and capital firms regarding this issue. **Conclusion:** Then, the effect of industry type on this relationship was tested and it was concluded that in 6 industries this relationship was negative and in 4 there has been a positive relationship while in 5 industries there was not any relationship observed.

1. Introduction

The goal of establishing any entity, organization, or business firm is to gain income and continue its survival. To achieve this goal, organizations try to reduce their costs and increase their earnings by increasing the efficiency of manufacturing factors. One of the most important production factors in any organization is its human force. Efficiency is considered as the ratio of outputs of the data or return in its simplest form. Workforce efficiency is calculated by dividing the added value into average number of employees working in a firm. This index shows that how much of value added has been created by each of human forces (Jegadeesh and Titman, 1993).

On the other hand, stock return is one of the basic criteria for decision making in bourse. Stock return has information content in itself and most potential and current investors use it in financial analysis and predictions. Therefore, the return of investment in manufacturing companies and investment firms is highly important. But return is often used to introduce investment return in an asset during a time period that is called maintenance period return and it refers to the changes in prices and cash flows resulted from the asset during the investment period. This amount of changes is expressed in percentage that shows the return percent of the invested money and it is called investment return rate. Return rate is a very important factor in financial decision makings in order to invest; thus, in the present study we are going to investigate about the effect of human force efficiency on stock return in firms enlisted in Tehran Stock Exchange.

1.1 Theoretical foundations of the research

Efficiency is one of important indexes in economic growth in each country. Of course, one of the main problems in economic structure in Iran is efficiency. Therefore, studying and measuring efficiency in different economic sections can represent the production capacity of different parts in addition to expressing the economic performance of our country. Human force is the main factor in creating and improving efficiency; human force decides on the best method to improve quality and leads any type of efforts to improve efficiency. Due to the fact that human force is the only source for organization that is rare and cannot be copies by the rivals easily, it creates a constant competitive advantage for the organization. On the other hand, one of the goals of management in new era is to create more value for the stockholders. In fact, managers in organization try their best to optimize firm value. Thus, they invest in fields that are sure resources to create value. In this regard we should convince management that human force efficiency plays a crucial role in creating value for the organizations because the empowerment programs for human force have a direct effect on efficiency. Also, most scholars believe that creating higher efficiency is a type of human-oriented issue and it depends on human forces section of organizations (Nasirpour, 2003). As it was pointed out earlier, one of the most important goals in any organization is to promote efficiency especially regarding workforce. In our country efficiency has been ignored due to several different reasons such as lack of a dominant culture and correct outlooks towards efficiency in the society. Although there have been some actions done such as the establishment of national efficiency organization and some emphases in third development program regarding efficiency enhancement, we have a long way to go to achieve a desirable status and should dare to do fundamental and effective things to improve (Etemadi et al., 2009). Capital is among the most important and effective factors in development of any country. A country that has started to develop and tries to achieve industrialization through the establishment of industries demands capital to develop and continue this trend.

Using internal investments is one of financing resources for this capital. The higher the level of investment in a country there would be created more facilities for capital supply. If the income level in the society is distributed justly, the deposit amount would be influenced and following that investment would be dominated. Another resource for this capital is financial markets. Since bourse is a type of financial market, it plays an important role in capital financing. Bourse is considered as one of the important foundations of capital distribution in capitalist, industrialized, and business economies in a way that the establishment of big industrial, financial, and business firms in developed industrial countries can be carried out through it and this has caused capitals (small or big deposits) to be directed towards investment. The operations and exchanges in long-term capital market have been carried out very lawfully and definitely and we can use it to properly administer economic policies of the governments and also bourse directs a considerable part of country resources towards commodity production and services optimally. Regarding what was pointed out, it can be stated that bourse is" the beating heart of economy in countries" (Khaki, 1997).

Firms should know that one of their main weapons to achieve price and quality advantages in competing against others is the earnings gained through efficiency. On the contrary to the fact that efficiency has been considered as one of the most critical effective factors in competitiveness of manufacturing firms, many researchers believe that efficiency has not been prioritized and those who affect production processes have forgotten it (Blundell et al., 1999) One of the reasons of this position is a lack of common agreement about the real meaning of this term. Although this term is utilized extensively, it is often misunderstood and this results in ignoring efficiency, or even decision making against it (Huselid et al., 1997). Cho (1988) believed that although the concept of efficiency has been present from long ago, a considerable number of individuals that make decisions on a daily basis to improve the efficiency of industrial units, they cannot respond to the simple question of the nature of efficiency. Cho et al., (2006) suggested that the decision makings related to efficiency improvement is often carried out based on personal ideas instead of a common and public viewpoint. We can conclude regarding the importance of the above discussion that human force efficiency is considered as a very important factor in stock return in firms enlisted in Tehran Stock Exchange.

1.2 Research literature

The literature for local and international researches could be presented as follows:

Amri and Abdoli (2012) studied the relationship between corporate governance mechanisms and stock return in firms enlisted in New Zealand bourse. they investigated about the effects of corporate governance levels on risk durability of stock return of firms and their results showed that board and investors' equity have had a meaningful relationship with stocks' non-systematic risk levels.

Arthur and Cook (2004) studied the growth of energy efficiency in manufacturing industries in Turkey based on private and public sectors and concluded that the reduction of efficiency of industries in this country arises from business constrains. Results of this study showed that while the overall efficiency growth of energy in private and public industries of Turkey have been the same, the amount of using the resources and production factors in governmental industries would be more than private resources.

Delaney and Huselid (1996) compared the real efficiency of works and real wages in industries within 16 countries in a research paper entitled: "efficiency and wages in manufacturing industries in member Islamic countries" and showed that 9 countries including Bangladesh, Cameron, Egypt, Zambia, Indonesia, Malaysia, Pakistan, and Turkey have had both reduced wages and reduced efficiency and in Tunisia the real wages were reduced and efficiency increased and in Afghanistan and Algeria and Morocco, Senegal, and Somalia both real wages and real efficiency were reduced.

Crook et al. (2011) calculated and compared the efficiency of workforce and energy efficiency in small industries and big fabric industries, machinery, equipment power, transportation, and tools by using production function method and concluded that workforce and energy in big industries have had a higher level of efficiency compared to small industries due to the use of equipment technology and advanced organization.

Regarding the fact that this research is being carried out in Iran for the first time, the results of the similar researches were as follows:

Pourzamani et al. (2010) studied about the effective factors on stock return in firms newly enlisted in Tehran Stock Exchange. Factors such as: firm size, firm age, price to income ratio, leverage ratio, primary supply of stocks' percentage, market return, and the exchanges of market during return investigation period, were measured (assessed). The results of studying 7 variables showed that the leverage ratio and primary supply of stocks' percentage during 6 periods being investigated did not have any relationship with return and additionally, in different time periods the different factors affecting return are changing.

Amri and Abdoli (2012) concluded in his research on efficiency management that: there would be no improvements without measurement and every organization should determine its current performance first to start to create any improvement in order to achieve efficiency and if it is not predetermined, regarding the lack of a basis or index, we cannot recognize whether enhancement has been carried out or not, unlike many efforts to do so.

Alipour et al. (2009) carried out a study entitled: "prioritizing effective organizational factors in promoting efficiency of human forces in small industries", and emphasized on the important of small industries in economic development of countries and since the most important factor in reduction or increase of organization efficiency is the efficiency of human forces, the future efforts of managers should focus on increasing efficiency of human forces. In this research the effective factors in promoting efficiency of human forces were recognized through the study of models posed and through interviews with the scholars and the amount of effective organizational factors in promoting efficiency of human forces was recognized through Freedman's test and finally a model was achieved using the results of the test.

1.3 Hypotheses development

Regarding what was pointed above and research questions, the hypotheses of this research were proposed in the form of 3 major hypotheses as follows:

1.3.1 First hypothesis

There has been a meaningful relationship between efficiency of human forces and stock return in user industries and capital industries in Tehran Stock Exchange.

1.3.2 Second hypothesis

There has been a meaningful relationship between efficiency of human forces and stock return in different industries in Tehran Stock Exchange.

1.3.3 Third hypothesis

There has been a meaningful relationship between efficiency of human forces and stock return in firms enlisted in Tehran Stock Exchange.

2. Materials and methods

The present research is correlation type regarding method and considering the goals it is an applied research. Additionally, due to the fact that historical information has been used in testing the hypotheses, it can be categorized as a subgroup of quasi-experimental researches. Also regarding the knowledge type this research is experience-oriented, its inference system is inductive and its type of study has been field-library study using historical information in form of post-incidental data. Below the calculation type of each of the variables has been presented:

2.1 Hypotheses test model

$R = \beta_0 + \beta_1 EFF + \beta_2 SIZE + \beta_3 LEV + \beta_4 EMP + \beta_5 GDP + \beta_6 INF + \beta_7 SGH + \beta_8 IND + \varepsilon$ (1)

Where,

R = stock return

EFF = human force efficiency

SIZ = firm size

LEV = leverage

EMP = employment growth rate

GDP = gross domestic production

INF = inflation

SGH = stock price index growth

IND = industry size factor

β_0 = latitude form base

β_1 to β_8 = regression coefficients

ε = model interference

2.2 Dependent variable

Stock return can be calculated by using the following equation:

(2)

$$r_{it} = \frac{(P_t - P_{t-1}) + D_t}{P_{t-1}} \times 100$$

Where,

P_t = stock price at the end of period t

P_{t-1} = stock price at the start of period t or at the end of period t-1

D_t = benefits resulting from stock ownership that has been appropriated to the stockholder within period t. Benefits resulting from ownership may be paid to the stockholders in different forms and the most important ones are as follows:

1- Cash earnings, 2- increasing capital through deposits (reward stocks), 3- increasing capital through the claims and cash inputs, 4- stock dissolution, 5- stock integration

For state 1, we can use the following formula to calculate return rate for each share and for states 2 & 3, the calculation formula for return rate we shall have:

(3)

$$r_{it} = \frac{D_t + P_t(1 + \alpha + \beta) - (P_{t-1} + C\alpha)}{P_{t-1} + C\alpha}$$

Where,

D_t = cash dividend

α = the percentage of capital increase from claims and cash input

β = the percentage of capital increase from deposits

C = nominal amount paid by the investor to increase capital from cash input (and claims)

Of course if the occurrence time of each of states above is before payment (assembly meeting), or if the extraordinary general assembly (regarding capital increase) is held before common general assembly (regarding dividend), the formula would change into:

(4)

$$\frac{[(D_t + P_t)(1 + \alpha + B] - (P_{t-1} + C\alpha)}{P_{t-1} + C\alpha} \times 100$$

Also the monthly return per share would be as follows:

(5)

$$R_i = \frac{DPS}{P_0} + \frac{(1 + \alpha)P_1 - P_0 - C}{P_0}$$

Where,

DPS = dividend per share

P_0 = share price at the start of the month

P_1 = share price at the end of the month

α = the percentage of capital increase

C = cash input when capital is increased for one share

The average monthly return can be calculated using the geometric average method shown below:

(6)

$$\bar{R}_i = \left[\prod_{i=1}^{N} (1 + R_i) - 1 \right]^{\frac{1}{N}}$$

2.3 Independent variable

The independent variable in this research is human force efficiency. The formula for human force efficiency is as follows: (Etemadi et al., 2009).

(7)

$$\text{Efficiency} = log \frac{sale}{employ}$$

Where, Efficiency = human force efficiency. Sale = firm sales, Employ = the number of employees.

2.4 Control variables

In this research there have been 7 control variables considered.

2.5 Leverage

Different methods are used to calculate financial leverage and here we are going to deal with an overall formula to calculate it:

Financial leverage = book value of total debts / book value of net assets.

2.6 Firm size

To calculate size, we used criteria such as the logarithm of total assets or sales. But due to the inflation conditions and the unrelated figures, we have used stock's market value at the end of the period as the basis for identifying firm value and finally have used its logarithm in order to eliminate the measurement index as the variable of firm size.

2.7 Employment rate growth

Employment growth is the percentage of changes in employment rate during the intended periods multiplied by 100, where employment rate equals the ratio of the working population to total active population (employed and unemployed) multiplied by 100. Since in Iran the ratio of unemployment is calculated more clearly we have used this variable and defined employment rate based on it (Pourzamani et al., 2010).

Unemployment rate = the number of unemployed / work force

Unemployment rate – 1 = employment rate

Employment rate is the percentage of changes of employment rate during the intended periods:

Employment growth = current period employment rate – previous period employment rate / previous period employment rate

2.8 Gross domestic production

Gross domestic production is calculated by the sum of goods value and final services produced in a country that is realized during certain periods. In this research, gross domestic production has been considered to be fixed and was estimated using the following production method:

The rate of gross domestic production using fixed prices = the value of goods and final services produced in a country after the elimination of the effect of changes of prices in products (Pourzamani et al., 2010).

2.9 Inflation

Inflation is a status through which the general level of prices increases permanently and gradually. By inflation rate in this research we mean the index of goods and consumption services' costs that have been extracted from Central Bank of Islamic Republic of Iran during one month time intervals.

2.10 The growth of stock price index

For total stocks index, the sum of the multiplication of the last price into capital of total firms should be divided by the base number and multiplied by 100 to gain overall index that could be calculated due to the Lospierr's price index as follows: (Pourzamani et al., 2010):

Price index = current value of stocks / base stock value * 100

2.11 Industry size

The attractiveness of an industry considered both based on a part of firms in the main industry that have had varied activities and based on the main industry's sales share of the firm that is considered by the variation proponents were used.

To use size in this research we have used market equity (ME) of industry portfolio (Pourzamani et al., 2010).

3. Discussion and results

3.1 Data analysis

The following table represents the results of descriptive statistics of 830 year-firms among research variables:

Table 1. Results of descriptive statistics

Variable name	Symbol	Mean	Median	Std. Dev.	Maximum	Minimum	Skewness	Kurtosis
Labor productivity	EFF	5.77	5.69	0.603	7.73	4.25	0.420	3.63
Occupation Growth rate	EMP	108.28	88.5	124.5	896	85.9	6.04	37.5
Gross domestic product	GDP	267517	2861	1547	4726	2	-0.537	2.04
Agent Industry	IND	2.25	4.46	2.84	6.97	219	0.87	2.016
Inflation	INF	18.077	15.2	9.18	106	1.9	1.50	11.9
Lever	LEV	0.65	0.63	0.26	1.98	0.10	0.76	4.82
Company Size	SIZ	5.89	5.81	0.62	7.98	4.01	0.28	3.68
Growth of stock price index	SGH	62466	172	4627	965	945	17.1	327.3
Return on equity	RET	241.3	12.8	1884	346	0.003	16.29	275

Regarding the descriptive statistics we can divide the indexes above into central tendency indexes, dispersion, and other indexes. Central tendency indexes were average and median. Dispersion indexes were standard deviation and other indexes were minimum, maximum, skewness, and pulling. Results of testing the hypotheses were as the table below.

The type of access to F Limer test in EViews software was as follows:

Table 2. Results of F Limer test for stock return model

Statistics	Statistics	Prob
Cross-section F	0.3697	0.9495
Cross-section Chi square	3.3942	0.9466

Results of the table above showed that the null hypothesis was approved and it shows the lack of divergence of planes in %5 level. And in fact it shows the appropriateness of pooling data method to estimate the model.

3.2 Testing research hypotheses

Testing the hypotheses was carried out as follows:

3.2.1 Testing first hypothesis

There has been a meaningful relationship between efficiency of human forces and stock return in user industries and capital industries in Tehran Stock Exchange.

In first hypothesis and in order to investigate about the existence of a meaningful difference or lack of the existence of a meaningful difference between human force efficiency and stock return among work firms and capital firms, first we should calculate the average median of the 10 years of the ratio of fixed assets to sales. This number was 0.427 in 15 industries. Then, the firms upper than the median were considered as capital firms and lower than the median were entitled as work firms.

Table 3. Industries isolated regarding industry nature

No.	Industry name	Industry nature	Industry average
1	Metal mine	Capital Firm	0.634
2	Foods except sugar	Capital Firm	0.504
3	Computer	Capital Firm	0.484
4	Chemical	Capital Firm	0.479
5	Coal	Capital Firm	1.321
6	Basic metals	Capital Firm	0.554
7	Tile and ceramic	Capital Firm	0.465
8	Sugar and cube sugar	Capital Firm	1.154
9	Machinery	Capital Firm	0.602
10	Electric tools	Work firm	0.111
11	Metal products	Work firm	0.172
12	Non-metal mines	Work firm	0.199
13	Automobiles	Work firm	0.191
14	Medicines	Work firm	0.158
15	Rubber	Work firm	0.281

After determining the nature of industry in each category, now it's time to test the efficiency of human force of capital firms with stock return in first stage and test the efficiency of human force with stock return in second stage.

Table 4. Results of regression model between human force efficiency and stock return in industry in isolated industries

Industry nature	Coefficients	Standard deviation	t statistic	Sig.	Identification coefficient
Capital firms	59.3	171.3	0.346	0.729	0.0002
Work firms	-5.770	17.34	-0.33	0.739	0.003

In table above the following hypothesis was tested for capital firms:

H_0 = There is not a meaningful relationship between human force efficiency and stock return in capital firms.

H_1 = There is a meaningful relationship between human force efficiency and stock return in capital firms.

In all hypotheses tests if the equation sig < α is correct, H_0 will be rejected. Regarding the meaningfulness level of capital industries that equals 0.729 and since in this research $\alpha = 0.05$, the equation sig < α does not exist and H_0 that shows a lack of meaningful relationship between human force efficiency and stock return in capital firms is accepted.

Also in the tables above we have two hypotheses below to test work firms:

H_0 = There is not a meaningful relationship between human force efficiency and stock return in work firms.

H_1 = There is a meaningful relationship between human force efficiency and stock return in work firms.

Regarding the meaningfulness level of work industries that equals 0.739 and since in this research $\alpha = 0.05$, the equation sig < α does not exist and H_0 that shows a lack of meaningful relationship between human force efficiency and stock return in work firms is accepted.

3.2.2 Testing second hypothesis

There has been a meaningful relationship between efficiency of human forces and stock return in different industries in Tehran Stock Exchange. Regarding the second hypothesis, the efficiency of human force of individual industries was tested regarding the stock return of the same industries. To do so, each industry was tested in the form of one file and in isolation considering stock return.

Table 5. Results of testing second hypothesis using different industries in isolation

No.	Industry name	Number of year-firms	Coefficient	Sig.	t statistic	Identification coefficient
1	Metal mine	50	813	0.49	0.69	0.009
2	Foods except sugar	80	-87	0.204	-1.27	0.020
3	Computer	20	61.3	0.345	0.96	0.049
4	Chemical	20	-228	0.002	-3.44	0.397
5	Coal	200	134	0.000	5.42	0.129
6	Basic metals	30	13.3	0.000	4.95	0.467
7	Tile and ceramic	10	492	0.321	0.312	0.003
8	Sugar and cube sugar	70	-211	0.003	-2.99	0.121
9	Machinery	100	-13.4	0.000	-4.49	0.171
10	Electric tools	40	-14	0.000	-7.86	0.619
11	Metal products	60	0.89	0.000	11.6	0.701
12	Non-metal mines	50	0.851	0.000	11.6	0.739
13	Automobiles	30	-59.3	0.008	-2.81	0.220
14	Medicines	40	0.78	0.728	0.35	0.003
15	Rubber	30	-1.88	0.000	-6.44	0.597

3.2.3 Testing third hypothesis

There has been a meaningful relationship between efficiency of human forces and stock return in firms enlisted in Tehran Stock Exchange.

Table 6. Results of regression model between human force efficiency and stock return in third hypothesis

Variable name	Symbol	Coefficient	Std. Dev.	T	0
Constant	C	178.3	678.1	0.263	0.792
Human resources efficiency	EFF	-219	226.3	-0.967	0.333
Occupation Growth rate	EMP	0.1109	0.56	0.196	0.8441
Gross domestic product	GDP	-9.40	4.83	-1.94	0.521
Agent Industry	IND	-2.9	2.49	-1.16	0.243
Inflation	INF	0.923	7.88	0.117	0.906
Lever	LEV	-867.7	2.49	-3.47	0.0005
Growth of stock price index	SGH	-3.87	0.000	-0.271	0.7861
size	SIZ	370.9	210.9	1.75	0.079
	F	P-Value	(D-W)	R	R
The regression model	3.050	0.0021	1.1197	R^2=0.02	Adj R^2=0.019

4. Conclusion

Conclusion of testing hypotheses using regression model:

1- **Durbin-Watson test:** Durbin-Watson statistic was 1.197 and thus to some extent there has not been correlation between error elements in models.

2- **The interpretation of adjusted identification coefficient:** the amount of adjusted identification coefficient equals 0.0288 and it shows that the utilized regression model could describe about %0.028 of changes in the dependent variable.

3- **The interpretation of F statistic:** since the meaningfulness level of F equals 0.0021, the meaningfulness of the model is approved in an assurance level of %95.

4.1 Results of F Limer test (pooled data test)

These results were extracted regarding the pooled data in the research that was carried out using F Limer test. Results showed that the null hypothesis was approved and there has not been divergence between the planes in %5 level and in fact the pooling data method has been recognized appropriate to estimate the model.

4.1.1 Results of testing the first hypothesis

The results showed that in none of the work firms and capital firms there has been a meaningful relationship between human force efficiency and stock

return. In other words, regarding the lack of a relationship between human force efficiency and stock return in work firms and capital firms, there has not been any difference and the industry nature could not create any differentiation.

4.1.2 Results of testing the second hypothesis

After testing the second hypothesis, from among 15 industries 5 industries did not have any type of meaningful relationship with stock return. 6 industries showed negative and meaningful relationship and 4 industries showed a positive and meaningful relationship with stock return.

Table 7. Results of the relationship between different industries and stock return

No.	Industry name	Relationship with stock return
1	Metal mine	lack of meaningful relationship
2	Foods except sugar	lack of meaningful relationship
3	Computer	lack of meaningful relationship
4	Chemical	meaningful and negative relationship
5	Coal	meaningful and positive relationship
6	Basic metals	meaningful and positive relationship
7	Tile and ceramic	lack of meaningful relationship
8	Sugar and cube sugar	meaningful and negative relationship
9	Machinery	meaningful and negative relationship
10	Electric tools	meaningful and negative relationship
11	Metal products	meaningful and positive relationship
12	Non-metal mines	meaningful and positive relationship
13	Automobiles	meaningful and negative relationship
14	Medicines	lack of meaningful relationship
15	Rubber	meaningful and negative relationship

4.2 Results of third hypothesis

Results of this table showed that except the control variable of leverage that has had a negative and meaningful relationship with stock return, all control variables and the dependent variable (human force efficiency) have had a lack of meaningful relationship with stock return. In other words, in this research there has not been a meaningful relationship found between human force efficiency and stock return.

The research suggestions are as follows:

1- It can be suggested to use all effective criteria on stock return and human force efficiency in researches and surveys in future.
2- It can be suggested that the researchers and students consider 'the effect of human force efficiency on firms' value', 'the effect of reporting the information related to human forces in firms on the decisions by investors', and also 'the relationship between human force quality and firms' value' in their future researches.
3- It can be suggested to pay attention to all aspects of human force efficiency regarding the qualitative criteria of human force efficiency such as experience, educational degree in future researches.

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How to Cite this Article:

Musavi M., Jafari A., Studying the effect of human force efficiency on stock return in firms enlisted in Tehran Stock Exchange, Uct Journal of Management and Accounting Studies 03 (2015) 92–100.