



## Investigation of the Factors Affecting on Probability of Company Acquisition (Focusing on Refining and Petrochemical Companies)

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### ABSTRACT

Business expansions along with number of new companies being engaged in variety of industries aimed at getting bigger market share, underscored the role of corporate governance within the financial sphere. One of the important issues in corporate governance is acquisition.

Due to the significant impact of companies in refining and petrochemical sectors on capital market and whole economy, their corporate governance should be addressed accordingly.

In this study, the relation between acquisition and aspect of the company, in firms listed in Tehran stock exchange or Iranian farabourse<sup>1</sup>, has been investigated for the period 2009-2014. Size (logarithm of total assets), management efficiency (operational profit to total assets), efficient financial structure (Current debt to cash) and incorrect valuation (price to book value) are among factors affecting on acquisition a company. In this study we found that the type of company (refinery and petrochemical) does not effect on acquisition. With the investment policy of firms, they can choice appropriate target for acquisition when considering the size of target compared with firm size, management efficiency, efficient financial structure and the price to book value ratio of the target company.

### Keywords:

Acquisition, Financial ratios, Refinery and Petrochemical companies



## 1. Introduction

Regarding their status in markets and commercial cycles, firms seek to make decisions around their corporate governance and policies. Respecting their positions and upcoming plans, every firm may want to stay in this operational level, then the firm would maintain the existing status, or if its operational status is critical, they would attempt to shrink their activities and the firm with regards to market status, or if the conditions of the firm are favorable, the firm would attempt to expand its activities. In this case the firm enters into a new market with other products, or it would attempt to reach its goals by utilizing policies to expand the firm size. One of these policies is acquisition of target companies. Among corporate governance discussions, merger and acquisition are somehow related with investment activities.

Regarding that a definite and fixed model has not formed for this concept, it is necessary to identify models with high explanation power. Since the literature relating acquisition in every firm is applicable with given objectives for improving activities, and hence it is possible to help efficiency, effectiveness, and power of gaining value for the firms and shareholders, this discussion becomes more and more meaningful. Also in Iran little research has been made in this regard, and a comprehensive survey on major transactions made is required due to helpfulness of this issue in growth and improvement of among firms.

Processes and activities linked with acquisition are among considered strategies for firms in discussions related to ownership and governance. Acquisition is a growth strategy that is acquiring shares of firms in order to govern their shares and management in line with gaining value added and more wealth. In an acquisition process, a firm would purchase required amount of target company's shares in order to have adequate influence in that company and somehow manage it.

This study seeks to examine factors affecting probability of acquiring firms based on variables extracted from financial statements and other relevant information including price trend of stocks transactions.

The anticipation made in this study may help predicting objectives of acquisition, based on the concept linked with corporate governance and issues related to acquisition processes. Examination of

variables effective on the proposed acquisition of major transactions by the purchaser finds significant importance. Factors such as profit drive of the managers, their domineering drive, size of target firms, and other related factors affect the process of proposed acquisition by the acquirer.

Regarding the importance of refinery, and petrochemical firms within the Iranian capital market and the effect of their changes on the market's index and volume, attention is paid to identify firms that might be targets of acquisition. Therefore, examining possibility of acquisition of the firms that are active in this sector of economy, gains special importance. In addition to what has been discussed so far, respecting article 44 of the constitution on privatization, by identifying acquisitions taken place, factors effective on the possibility of acquiring the firms, appropriate decisions may be taken for the method of acquisition for these firms.

## 2. Literature Review

Merger and acquisition are among forms of investment from external sources and solutions related with firm growth strategies. Although interactions of acquisition process take place in relation with decisions on other methods of external investment, internal development, change and redesign of structures and provision of financial resources and after evaluation different method as mentioned earlier, board of directors make a decision (Copeland et al., 2004). Existing studies within financial literature have been conducted focusing on prediction of different objectives of acquisition, reasons behind firm's acquisition, and that how acquisitions are effective on performance of the firms (Kim and Arbel, 1998).

Acquisition targets must be evaluated in terms of acquisition time and its effects on target market, firm size, customer volume and activities available in the target firm, their income combination, and local and geographical conditions. In making decisions about acquisition, usually the amount of assets, expenses exerted on the acquirer until it controls the target firm, liquidity and profitability are among discussions effective on decision-making (Bacon, Shin and Murphy, 1994).

There are numerous theories and descriptions to formulate merger and acquisition. They may be divided into three general categories (Berkovitch and Narayanan, 1993).

The pattern related to earning profit related to acquisition theories is as shown in the table below (Berkovitch and Narayanan, 1993):

**Table 1- Pattern of taking benefit related to acquisition theories:**

Motive	Benefit of acquirer	Benefit of target firm	Total Benefit
Efficiency and (or) synergy	+	+	+
Hubris (winning and paying high price)	-	+	0
Agency problem and mistakes	-	+	-

The first column relates with merger and acquisition motives based on price changes that may be positive, negative, or neutral. By value changes we mean changes in the price of firms' stocks following changes in their ownership. Total benefit may be positive as a result of improvement in efficiency, synergy, or increase in market power. Hubris theory posed by Roll (1986) indicates that the total benefit is null (zero), because the acquirer pays an amount higher than the real price. The total benefit may be negative due to agency problem or mistakes.

Empirical suggestions and theories explaining the reasons behind acquisition include profitability (Hogarty, 1970), scale economics (Silbertson, 1972), power and market share (Sullivan, 1977; Thomadakis, 1976), information signals (Bradley, Desai, and Kim, 1983), and management efficiency (Jensen and Ruback, 1983). Researchers clearly point out financial synergies produced by acquisition as a strong motive in acquiring the firms (Gahlon and Stover, 1979).

The literature of existing study indicate within discourses of firm control that factors such as inefficient management (that accompany with criteria such as reduced profitability) and imbalance in resources and firm growth play part in occurrence of acquisition. Motives and reasons of acquisition vary in different times, industries, and firms. Sometimes these benefits oppose with each other and lead to making decisions about acquisition in managerial levels (Jensen and Ruback, 1983). Instability in proportions between time junctures and different industries lead to utilization of different proportions within the industries. These hypotheses are as follows:

- 1) Managerial inefficiency: this hypothesis indicating that management of firms directed inefficiently, unable to maximize their market value, would be substituted, being acquired by more efficient firms in order to gain capital profit. Although merger is not the only way to improve management, but it is a simple and common way to be used by other companies (Brealey and Myers, 1988). Criteria of performance, profitability, and assets turnover are addressed, and if these indices are low in a firm, they would be a possible target for acquisition.
- 2) Capital expenditure related to the activity: high level of capital expenditures related to a firm's total assets may be a sign of proportionate allocation of resources for consistence and improvement of physical facilities or management's commitments to future growth by real allocation of resources for investment in capital projects (Dietrich and Sorensen, 1984).
- 3) Proportion of price to income (P/E ratio): Profitability of a firm with low P/E proportion is a value for the acquirer to make profit fast. Palepu (1986) considers proportion of price to income (P/E) as an independent variable in times of economic turbulences in order to make decisions about acquisition. In the view of assets value, the proportion with market value less than proportion to book value is valued less, and when the stock's market value is less than the firm stocks' book value, they would be more often posited as options among acquisition targets (Moyer, 1994).
- 4) Assets that have been valued less than their value: based on the hypothesis of firms with low proportion of market value to book value, when the value of a firm's assets is priced below the real extent, the possibility of acquisition increases (Moyer et al., 1994).
- 5) Imbalance between resources and growth: the hypothesis of firms with low resources and high growth is studied by Myers and Majluf (1984). Two types of companies are targets of acquisition for gaining synergy and more profitability: the first category includes firms with high liquidity but have no possibility for growth (Jensen, 1986). The second category includes those firms with low liquidity but high potential of fast growth (Levine and Aaronovitch, 1981).
- 6) Dividend ratio: Firms with less dividend ratio are largely targeted for acquisition. Having a high paid

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- profit is a sign of sacrificing future investment opportunities and less future net cash flow (Dietrich and Sorensen, 1984).
- 7) Activities related to merger and acquisition in industries: industries important to the economy and firms with high volume of transactions are more attractive for acquisition, creating more opportunities for merger and acquisition (Rodrigues and Stevenson, 2013).
  - 8) Creation of turbulence and crisis in the industry: this hypothesis was raised according to Goert's theory of economic turbulence (1969), based on the presumption that acquisitions and their procedures take place at times of economic shocks such as technology changes, industry structure, and environmental regulations.
  - 9) Inefficient financial structure and financial leverage: Firms with high leverage increase acquisition process more. Stein (1988) showed through theory that the possibility of acquisition in a firm is inversely related with the firm's financial leverage. According to Jensen and Meckling (1976), managers who try to minimize the risk of bankruptcy, tend to reduce financial leverage. If this leverage indicated lack of proper management, then it would affect decisions on firm's acquisition.
  - 10) Size: this hypothesis is divided into two parts: small size firms may become targets for acquisition, because in case of acquirer's possibility for future growth, they would acquire more easily, with fewer resources. On the other hand, it is a positive relation between size and possibility of acquisition, because managers prefer big scale activities over small scale ones. As studied by Asquith et al. (1983), the value of acquisition target firm is usually 10 percent less than the value of the acquirer. The theory related to growth maximization suggests that managers prefer big size acquisitions over small size ones. High degree of acquisition increase at mid-1980s indicates targeting acquisition process in big scales (Hughes, 1989).
  - 11) Liquidity: high degree of liquidity may indicate inefficient allocation of assets and presence of a potential for gaining proportionate profit. Acquisition of a firm may be a means of allocating these common resources of the acquirer for alternative method of profit payment to shareholders and its levied taxes (Hasbrouck, 1985).
  - 12) The volume of stocks exchange in the market: when a firm has a proper extent of stock exchange volume regarding its expansion and size, it may pose less transactional risk in merger and acquisition due to increase in marketability of the stocks and their exchange (Dietrich and Sorensen, 1984).
- Many studies have tried to identify acquisition targets. Logit analysis was used to predict the probability of acquisition with regards to different features of each industry. Many studies were conducted by Stevens (1973), Hampel and Melicher (1974), Harris et al. (1982), Wansley and Lane (1983) and Palepu (1986) to identify the most important features for acquisition and affecting their function. They examined firm acquisition in different industries during 1960s.
- Zanakis and Zopounidis (1997) found in a study conducted on acquired firms in Greece between 1983 and 1990, that the factor of leverage has been effective on decision making.
- Prediction with high explanation power was obtained in this study. Based on Logit equation, 66.96 correct predictions at significance level of 99 percent were reached. In this study, 4 variables were significant at confidence level of 99 percent and higher. In this study, firms whose management have proper sales gain capacity in return for their assets, low proportion of dividend, low financial leverage, high volume of stocks trading in the market and lower market value (size) compared with the acquirer, are largely targeted for acquisition.
- In their study, Bacon, Shin, Neil and Murphy (1994) examined 42 examples of acquisition during 1942 to 1988 among firms being active in non-financial sector in the field of rural electricity power. In the final Logit analysis, criteria of liquidity, efficiency and firm leverage have been effective on acquisition of the firm, where at confidence level of 99 percent they have been able to correctly classify 70 percent of the sample under question.
- In their study, with regards to the existing financial literature, Kim and Arbel (1998) have examined hypotheses on size, inefficient management, financial leverage, liquidity, imbalance among resources, growth opportunity, related capital expenditure, dividend ratio, the volume of stocks trade in the

market, and valuation below real value of the assets about their effect on a firm being targeted for acquisition in hospitality industry.

The model that has been used is binominal Logit analysis to predict acquisition targets. In this study, acquired firms in hospitality industry (restaurants, hotels with and without sports facilities) counting up to 69 cases have been examined together with 192 non-acquired firms between 1980 and 1992 using Logit analysis. In previous studies, Dietrich and Sorensen (1984) could provide acquisition prediction with a success coefficient of 70-90 percent. Kim and Arbel (1998) found that firms with low price to earning proportion (P/E ratio), high imbalance between resources and firm growth, big size of acquirer compared to acquisition targeted firm, and high capital expenditure proportion have been largely targeted for acquisition (at a confidence level of 99 percent). Criteria of inefficient management, financial leverage, liquidity, dividend payment and the volume of stocks trade in the market have been insignificant at a confidence level of 90 percent too.

In an examination made by Martin (1996), high proportion of market price to book value of the assets makes acquirers to pay acquisition amount through capital, where a better growths perspective may be imagined. Results show that the amount of leverage in the year before acquisition is significantly in negative relation with the amount of transaction that is paid in cash.

Stulz (1998) theoretically showed that the possibility of acquisition has a negative relation with the proportion of the target firm's financial leverage, and firms with high obsolete debt capacity are more attractive for acquisition.

Almeida, Campello, and Hackbarth (2011) examined relation between organization's liquidity and assets allocation in 2011. Their model showed that those firms with undesirable financial conditions are appropriate acquired by active firms in their industry.

Between 1990 and 2009, acquisition of the firms through private negotiations and in friendly method and cash payment increased through obtaining block transactions of minor stocks (block transaction of minor stocks refers to those block transactions where through acquiring a firm, more than 5 percent of its stocks and less than 50 percent of its stocks are created. Acquisitions made through purchasing more

than 50 percent of the target firm stocks are known as major block transactions (Liao, 2014)).

Liao's study (2014) examined acquisitions through minor stocks blocks between 1990 and 2009. The researcher concluded that acquisition target firms had financial limitations.

A sample consisting 8,277 cases of acquisition transactions between 1990 and 2009 has been examined in this study. The overall conclusion about acquisition targets in minor block transactions has been that they were smaller in size, had more leverage, lower profitability, higher proportion of market value to book value, and little growth in sales.

After searching in national study about acquisition topic, no research has been done in this topic.

With regards to the background of the study and the history of international studies, research on estimation of factors effective on opportunity of firms acquisition and manner of its modeling in Iran capital market have not been done. As mentioned earlier, when a company was target for acquisition, one way to acquire this company could be buy appropriate shares of the company in block trading, in this study we focus on block trading for identify acquisition targets. On the other hand, concentration of refinery and petrochemical industry firms is among innovations of the study.

According to the literature review, in this study, efforts are made to identify factors effective on possibility of acquiring a firm. We will also examine the firms of this area with regards to the importance of refinery, and petrochemical firms in Tehran Stock Exchange and the economy of Iran. Hypothesis show in the following:

- Different aspect of company (which is mentioned follow), affecting on making decision about acquisition a company.
  - 1) Firm liquidity has direct relation with acquisition a company.
  - 2) Financial leverage has inverse relation with acquisition a company.
  - 3) Size of a company has inverse relation with acquisition a company.
  - 4) Management efficiency has inverse relation with acquisition a company.
  - 5) Growth sources has inverse relation with acquisition a company.
  - 6) Dividend payout has inverse relation with acquisition a company.

- 7) Trading volume of company's stock has direct relation with acquisition a company.
- 8) Correct valuation of firm's has inverse relation with acquisition a firm.
- 9) Efficient financial structure has inverse relation with acquisition a company.
- 10) Percentage of the transaction value was paid in cash has direct relation with acquisition a company.
- 11) Companies in the petrochemical and refinery fields are target for acquisition more than companies active in other industries.

### 3. Methodology

Methodology: This is an analytical, quantitative, comparative, applied and development study.

This study include the following domain:

- 1) Time scope of this study covered 6 years-early 2009 to early 2014.
- 2) Local scope of this study is firms underwritten in Tehran stock exchange or Iranian Farabourse firms having block trading.
- 3) Subject scope of this study is examined factors affecting on acquisition of a company.

Population in this study included all of the listed company in Tehran stock exchange or Iranian Farabourse having block trading within years of time scope of the study. We faced limitation for access to block trading data and we used filter for population studied as follows:

- 1) All of the block trading happened in time scope of the study, when the buyer was a legal entity (not a person).
- 2) All of the block trading where more than one percent of the company's stock was traded.
- 3) All block trading data, where information about transaction and type of premium payment was available.

According to these filters, the number of companies in population of the study was 265 data. In this study we used cross-sectional data and the number of observations was 265.

Quantitative data collection by stock exchange company's website, data bank of securities and exchange organization, comprehensive distributors information system (Codal network). In the meantime, data on block trading, their price and date of certainty have been received from the Tehran securities

exchange technology Management company. Eviews and Excel software have been used to analyze data and obtain quantitative values of the variables.

To determine the probability of acquisition of a company, the Logit model will be used. Considering the traits of the function used in the Logit model, we will express the possibility of the acquisition of a firm which is a value between zero to one.

Acquisition probability =  $f(x_1, x_2, x_3, \dots, x_{10}, D, \text{paid premium of block trading})$

The data of the mentioned models will be cross-sectional, and the observations in specific times (on the occasion of the acquisition) in the companies.

As the acquisition of a company has only two states (acquisition, or not acquisition) and the dependent variable is on the left side of the equation, then it cannot be estimated by the multivariate regression models and OLS. If a company is acquired, we consider the possibility of the acquisition as one; otherwise, this variable would be zero. To estimate the models that only a specific value would appear on their left side (in the acquisition case, one or zero), we needed to Logit model and limited dependent variable model (LDVM).

To study the question whether the refinery and petrochemical companies are more being acquired, separate studies in model were necessary. Therefore, the dummy variable was used in the model which only gets two values of (1) (refinery and petrochemical companies), and (0) (other companies).

ADF test: Using in researches is with this pre-assumption that examined process must be stationary. Therefore, before using the variables in studying the model, their stability or instability must be tested. Stability of the variables is determined by using the unit root tests (Brooks, 2008, p327). In this research, to study the stability of the variables, ADF test was implemented for the variables.

Limited dependent variable model: It solves the restriction of the LPM. Considering this definition, Logit models have an "S" shape rather than a straight line. Logistic function F for any stochastic variable, Z, is:

$$F(Z_i) = \frac{e^{z_i}}{1 + e^{z_i}} = \frac{1}{1 + e^{-z_i}}$$

Function F has cumulative logistic distribution, and the estimation of the logistic model is:

$$P_i = \frac{1}{1 + e^{-(\beta_1 + \beta_2 x_2 + \dots + \beta_k x_k + u)}}$$

As the model is not linear, it cannot be estimated by OLS and the Maximum likelihood (ML) which is based on iteration is implemented. In this research, because the dependent variable-the probability of acquisition a company- was qualitative data, acquisition show by two values, the value of (1) was for acquisition of the company, and, otherwise, it would be (0). So, the Logit model was used to study the acquisition probability.

Hypothesis: Regarding the literature of this study, the following variables are examined in the study model.

#### **a. Dependent variable**

Acquisition in a firm: regarding that if firms are acquired in block trading taken place, zero or one values are considered (value one for acquisition).

#### **b. Independent variables**

In this study, controlling variables are referred to as firm features. These features are used under the title of descriptive variables in this study:

- 1) Liquidity (x1): in this study, by this variable we mean examining current and quick ratio as liquidity index.
- 2) Financial leverage (x2): in this study, by financial leverage two proportions of long-term debt to the total capital of the firm and total debts to the capital were used for examination.
- 3) Firm size (x3): to examine this variable in the models, net sale and total assets (both in the form of natural logarithm) were used in the study.
- 4) Managerial efficiency (x4): proportions of return on equity, assets return, operational profit to total assets, capital expenditure to operational profit, total assets turnover, inventory to income, inventory to capital expenditure, and proportion of net profit per every stock divided by market value of each stock were used as a measure for managerial efficiency.
- 5) Growth resources (x5): to examine this variable, the average percentage of sales growth throughout the past three years,

proportion of capital expenditure to total assets, capital expenditures to income and current assets (in the form of natural logarithm) were used.

- 6) The policy of profit distribution (x6): the dividend ratio and dividend yield (dividend to price) were the indices of this variable.
- 7) The volume of traded stocks (x7): the index of this variable proportionate to stocks flow, the volume of the firm's stocks transactions in the last year ending up to the date of transaction leading to acquisition was used.
- 8) Correct valuation (x8): the proportion of market value (upon acquisition) to the book value of the stocks and the market value of the stocks to the total assets of the firm were the indices of this variable.
- 9) Efficient financial structure (x9): the index related to the efficient financial structure, the interest coverage ratio, the current debt to the cash, the average percentage of increase (decrease) of the current debt during the past three years and the working capital to total assets were used.
- 10) The method of premium payment (x10): the percentage of cash payment of transaction value was used to examine this variable in the model as the index.
- 11) Company type (D): we used the dummy variable into models for companies in the petrochemical and refinery fields. In this research, this variable was one (1) for the mentioned companies and zero for the rest.
- 12) Premium in block trading: to define this variable, the percentage of block trading's price difference with the price of minor transactions of the transaction day (the end price of the stocks) was used.

Table (2) which is presented at the end of this article shows variables and ratios used in model and analysis results.

## **4. Result**

Table (3-1) and (3-2) shows data descriptive statistics. For all the variables in this study descriptive statistics' parameters are demonstrated. (Numbers are inserted with 2 decimals):

**Table 3.1. Descriptive statistics variables**

	Mean	Median	Maximum	Minimum	Std. Dev.
Acquisition	0.10	0.00	1.00	0.00	0.30
Assetturn	0.77	0.56	4.72	0.01	0.96
Capexp_Income	0.06	0.02	2.58	-4.69	0.38
Capexp_OP	0.58	0.11	33.32	-2.29	2.77
Capexp_Tasset	0.03	0.01	0.35	-0.40	0.06
Cashpercpay	0.62	0.50	1.00	0.03	0.38
Currdgro	0.34	0.19	5.99	-0.39	0.57
Currd_Cash	59.16	24.72	963.01	0.39	109.82
Currenr	1.76	1.13	64.30	0.31	4.15
D_equ	3.86	1.38	27.48	-11.82	5.87
Dividendr	0.63	0.64	7.50	0.00	0.58
Dividendyield	0.10	0.10	0.35	0.00	0.08
Incomegro	0.29	0.17	2.87	-0.92	0.47
Intcovr	84767.67	6.51	5423433.00	-5.14	670872.50
Inv_capexp	80.45	3.61	11971.98	-86.94	777.49
Workingcap_Tasset	0.05	0.07	0.97	-1.22	0.28
Tradingvol	0.23	0.14	1.09	0.00	0.22
ROE	23.57	22.94	153.91	-140.22	28.80
ROA	9.76	8.95	50.15	-37.56	13.15
Quickr	1.48	0.86	64.30	0.09	4.17
Premium	0.43	0.24	2.84	-0.13	0.48
Petro_dum	0.16	0.00	1.00	0.00	0.37

**Table 3.2. Descriptive statistics of variables**

	Mean	Median	Maximum	Minimum	Std. Dev.
P_BV	1.87	1.44	8.94	-1.94	1.54
OP_Tasset	0.13	0.12	0.51	-0.24	0.13
Nprof_MV	0.13	0.16	0.92	-0.81	0.17
MV_Tasset	0.80	0.59	3.84	0.03	0.72
Longd_equ	0.19	0.08	2.24	-1.91	0.36
Log(Tasset)	15.42	15.17	20.47	10.07	2.42
Log(Income)	14.48	13.95	19.08	9.42	2.30
Log(Currasset)	14.85	14.29	20.34	9.73	2.50
Inv_Income	0.24	0.12	2.92	0.00	0.43

**Table 4. Variables' stationary test**

Unit root test (ADF Analysis) Exogenous variables: Individual effects				
Number of observation: 265				
Method	Statistic	P-value	Cross-sections	observation
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t	-43.6343	0.0000	33	8321
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-45.9511	0.0000	33	8321
ADF-Fisher Chi-square	1863.45	0.0000	33	8321
PP-Fisher Chi-square	2559.8	0.0000	33	8427



Acquisition variable has an average of 0.1 and this means 10 percent of analyzed companies are acquired.

Unit Root Test: As shown in table (4) null hypothesis is related to having a unit root. P-value in table (4) shows there's no evidence reject null hypothesis so it gives us the result that tested variables are stationary.

Logit model: According to definition of Logit function and estimating type there is no need for classic assumptions necessary for OLS to be valid, and estimation is done using iteration and Maximum Likelihood. For this purpose we use the early model for the following estimation:

Acquisition = g(Premium, CurrentR, QuickR, LongD\_Equ, D\_Equ, Income, TAsset, ROE, ROA, OP\_TAsset, Assetturn, Inv\_Income, Inv\_CapExp, Nprof\_MV, CapExp\_Income, CapExp\_TAsset, IncomeGro, CapExp\_OP, CurrAsset, DividendR, DividendYield, TradingVol, P\_BV, MV\_TAsset, IntCovR, CurrD\_Cash, CurrDGro, WorkingCap\_TAsset, Cashpercpay, Petro\_dum)

According to the model presented above, early estimation of model is described in table (5).

Positive and negative coefficients of each variable, are in order a sign for straight relation and inverse relation to changes of each variable changes and probability of acquisition a company<sup>2</sup>. We must keep in mind that with Logit definition the bigger a positive coefficient gets the dependent value, here the acquisition probability, is more probable and the exact opposite with the negative coefficients. This changes in acquisition variable according to change of an independent variable are taken place with other variables being fixed and the resulted dependent variable can be any value between 0 and 1. This value shows acquisition probability.

According to lack of a linear relation, there is no way to explain the similar coefficients on multivariate regression by OLS, so for each company we must determine the values and use them in model so the value on left side of equation be limited to values between 0 and 1.

According to table (5) which is result of early model, only variables' coefficients that are meaningful are as such: Premium, Currentr, Longd\_equ, D\_equ, Log (tasset), Capexp\_income, Log(currasset)

**Table 5. Logit acquisition model**

Method: ML-Binary Logit , Dependent Variable : Acquisition , Included observation : 192 after adjustments				
Variable	Coefficient	Std. Error	z-Statistic	P-value
Constant	9.279024	6.082382	1.525557	0.1271
Premium	1.67348	0.797016	2.099682	0.0358
Currentr	1.18444	0.580267	2.041198	0.0412
Longd_equ	3.294666	1.297079	2.540066	0.0111
D_equ	-0.984544	0.457676	-2.151181	0.0315
Log(Income)	5.735052	3.052837	1.878597	0.0603
log(Tasset)	-11.45936	4.011433	-2.856674	0.0043
ROE	-0.046588	0.029361	-1.586736	0.1126
ROA	0.229123	0.117925	1.942966	0.052
OP_Tasset	-10.88268	6.851271	-1.588418	0.1122
Assetturn	-5.60091	3.477503	-1.610612	0.1073
Inv_Income	-0.130146	2.347769	-0.055434	0.9558
Inv_Capexp	0.000645	0.000648	0.996743	0.3189
Nprof_MV	-2.622457	5.256441	-0.498904	0.6178
Capexp_Income	8.215208	3.636387	2.259168	0.0239
Capexp_Tasset	6.264263	9.873028	0.634482	0.5258
Incomegro	1.254395	1.760507	0.712519	0.4761
Capexp_OP	-0.112349	0.162855	-0.689871	0.4903
Log(Currasset)	5.424866	2.473897	2.192842	0.0283

Method: ML-Binary Logit , Dependent Variable : Acquisition , Included observation : 192 after adjustments				
Variable	Coefficient	Std. Error	z-Statistic	P-value
Dividendr	-0.09052	0.377368	-0.239871	0.8104
Dividendyield	-3.17143	6.477544	-0.489604	0.6244
Tradingvol	2.165858	1.7888	1.210789	0.226
P_BV	0.965771	0.500498	1.929621	0.0537
MV_Tasset	-3.246909	1.677177	-1.935936	0.0529
Intcovr	-1.40E-06	1.65E-06	-0.849812	0.3954
Currd_Cash	-0.012958	0.007695	-1.683892	0.0922
Currdgro	2.454972	1.692298	1.450673	0.1469
Workingcap_Tasset	-6.311732	3.251355	-1.941262	0.0522
Cashpercpay	1.868817	1.232903	1.515786	0.1296
Petro_dum	0.288676	1.231092	0.234487	0.8146

Binary Logit Results			
McFadden R-squared	0.40602	S.E. of regression	0.272216
S.D. dependent var	0.319351	LR statistic	55.50334
Mean dependent var	0.114583	Prob (LR statistic)	0.002163

Based on model's results we can say that many of variables entered in model are not meaningful and model needs correction. According to P-value presented for Petro\_dum variables we see that assumption based on acquisition effectiveness of a company which activities are in refinery and petrochemical areas is not acceptable and factor of this variable is not meaningful in the model. As said in Logit model, Mcfaden R-squared criterion is important. This criterion is equal to 40 percent and this means variables considered in this model are able to explain 40% of effective factors on acquisition. According to this that model is Logit and cross-sectional data in this study, according to financial literature and econometrics this value for this criterion is suitable.

P-value model shows meaningfulness of total equation. For reaching the final model with removing variables that are not meaningful, we try to improve factors and P-values of variables. According to estimations made with mixing different variables, for reaching the final model we see removal of following variables: Inv\_income, Dividendr, Petro\_dum, Dividendyield, Capexp\_tasset, Incomegro, Nprof\_mv, Capexp\_op, ROE, ROA, Mv\_tasset, Workingcap\_tasset, Inv\_capexp, Intcovr, Currentr, Currdgro, Cashpercpay, Tradingvol, Premium, Assetturn, Log(income), Longd\_equ, D\_equ, Log(currasset) and Capexp\_income, in result we have table (6) shows the model after correction.

Table 6 - Logit adjusted model

Dependent Variable: Acquisition				
Method: ML-Binary Logit (Quadratic hill climbing/Eviews legacy), Included observation: 238				
Variable	Coefficient	Std. Error	Z-Statistic	P-Value
Constant	5.190559	1.887586	2.749839	0.006
LOG(TASSET)	-0.468652	0.136601	-3.430799	0.0006
OP_TASSET	-5.333206	2.217343	-2.405224	0.0162
P_BV	0.248263	0.125702	1.975018	0.0483
CURRD_CASH	-0.01192	0.00604	-1.973494	0.0484

Binary Logit Regression results			
McFadden R-squared	0.178426	Hannan-Quinn criter.	0.652529
S.D. dependent var	0.317805	Prob(LR statistic)	0.000005
Akaike info criterion	0.623131	Mean dependent var	0.113445
Schwarz criterion	0.696077	S.E. of regression	0.299403
Sum squared resid	20.88664		

Negative coefficients show that with increase in these variables, value of dependent variable decreases. The bigger this coefficients get the resulted value for dependent variable smaller and closer to zero. In result operation profit to total assets and price to book value have the most and least effect on acquisition of a company. Positive coefficient of price to book value shows that company stock is more valuable and therefore its acquisition probability is bigger. Negative coefficient of total assets logarithm and current debt to cash ratio match to size and debt paying potential theories. Negative coefficient of operational profit to total assets shows that an efficient company doesn't need outside optimizing and there is less probability for acquisition.

McFadden R-squared criterion calculated is equal to 0.178 which show final Logit model with meaningful variables in it, have a suitable explaining power for acquisition. P-value gathered value for Logit model is 0.000005 which shows total meaningfulness of model.

According to lack of dummy variable in refinery and petrochemical companies in final model we can get that this variable and being included in this industry is not effective on a company acquisition.

Logit model results and variables coefficients show us that relation between logarithm of total asset, operational profit to total assets and current debt to cash is inverse with acquisition, on the other hand market price to book value ratio is directly related to acquisition. Four mentioned variables in order are related to size criterion, management performance, efficient financial structure and correct valuation of stock. Variable coefficients and results show that whenever the target company for acquisition is smaller, its management not effective and being a reason to improve performance, ineffective financial

structure and inability to pay back debts, more gap in comparing stock value with market price, there is the more chance to get targeted for acquisition.

Asquith (1983) says that acquisitions made are inverse relation with size of company and companies doing acquisition are usually around 10 percent bigger in aspect of total assets than the company target for acquisition (Negative sign on logarithm of total assets). Brealey and Myers (1998) believed that if companies' activities are correctly managed and there be no way to improve performance to have significant effect on profit, chance of acquisition decreases (Negative sign of operational profit to total assets). Stulz (1998) says that an efficient financial structure and inability to pay back debts due to high financial leverage, are in inverse relation with acquisition. This is for the reason that a company that cannot pay back its debts, delivers a negative financial leverage to the company that does acquisition and this is not a good point (Negative sign for current debt to cash proportion). Myer (1994) says that if a stock is not correctly valued and difference between company value and market price gets bigger, acquisition chance for achieving return increases (Positive sign on book value to market price of stock).

Table (7) comparative comparison on effective variables on a company acquisition with other studies.

**Table 7. Comparative study on result of factors affecting on acquisition a company**

Past study		Variable	Result of this study
Researcher	Result		
Rodrigues and Stevenson (2013)	Positive and significant	Size (Logarithm of total assets)	Negative and significant
Bacon, Shin and Murphy (1994)	Negative and significant	Management efficiently (Operational profit to total assets)	Negative and significant
Rodrigues and Stevenson (2013)	Negative and not significant	Efficient financial structure (Current debt to cash)	Negative and significant
Harford, Klasa and Walcott (2009)	Positive and significant	Incorrect valuation (Price to book value)	Positive and significant

## 5. Discussion and Conclusions

For decision making about merger and acquisition, boarder of companies and management must pay attention to different aspect of target companies. In this way, purpose of this study was investigate the relation between merger and acquisition and different aspect of company. Managers and decision makers must pay attention to size (logarithm of total assets), management efficiency (operational profit to total assets), efficient financial structure (Current debt to cash) and incorrect valuation (price to book value) are among factors affecting on acquisition a company for merger and acquisition activities. In this paper we found that the type of company (refinery and petrochemical) does not effect on acquisition.

We must pay attention to limitations in executing this research which are as follows:

- 1) There was only data about block trading done by legal entities with more value than 1% of company's share in this research. According to defined filters, studied population was included 265 block trading in companies during early 2009 till early 2014 in different industries. According small number of observations in each industry, it was not possible to analyze in each of them separately (any industries have a different factors that affect the acquisition).
- 2) According to growth and fall of stock market index in time of doing research and significant changes, we need to consider the features of the market.

According to research literature, methodology, tests done for analyzing hypothesis and results, gathered suggestions based on results are as following:

- 1) To investment companies and stakeholders' companies we suggest to pay attention to effective factors on deciding about acquisition of target company and consider them in their decision making model.
- 2) Government and privatization organization can pay attention to models in this research and effective factors in each model can be considered while doing a privatization operation and getting 44<sup>th</sup> constitution policies done.

Suggestions for future researches:

- 3) Doing similar research using other descriptive variables according to current literature about acquisition.
- 4) Analyzing acquisitions in each industry separately
- 5) Doing research by increasing time area and adjusting data according to index changes to have a better ability to extend results.

**Table 8. Abbreviations used for variables in models**

Petro_dum	: Dummy variable of refinery and petrochemical company
Acquisition	: Acquisition a company
Premium	: Premium paid in block trading
Cashpercay	: Percentage of transaction value paid in cash
CurrentR	: Current ratio
QuickR	: Quick ratio
LongD_Equ	: Long debt to equity
D_Equ	: Debt to equity
ROE	: Return on equity
ROA	: Return on assets
Assetturn	: Assets turnover
IntCovR	: Interest coverage ratio
WorkingCap_TAsset	: Working capital to total assets
Income	: Income
IncomeGro	: Percentage of growth in income
OP_TAsset	: Operational profit to total assets
Nprof_MV	: Net profit to market value
TAsset	: Total assets
CurrAsset	: Current assets
CurrDGro	: Percentage of growth in current debt
P_BV	: Price to book value per share
DividendR	: Dividend ratio
DividendYield	: Dividend to price per share (Dividend yield)
MV_TAsset	: Market value to total assets
Inv_Income	: Inventory to income
CurrD_Cash	: Current debt to cash
CapExp_TAsset	: Capital expenditure to total assets
CapExp_OP	: Capital expenditure to operational profit
Inv_CapExp	: Inventory to capital expenditure
CapExp_Income	: Capital expenditure to income
TradingVol	: Trading volume of shares

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#### Note

- <sup>1</sup>. Iran Fara Bourse Co. (IFB) also known as Farabourse is an over-the-counter market for securities and other financial instruments in Tehran, Iran which operates under official supervision of SEO (Securities and Exchange Organization).
- <sup>2</sup>. It should be noted that the estimate Logit model is based on the exponential function that the independent variables are included in the denominator. As a result of their relationship with the dependent variable, is direct.