

## ARTICLE

# STUDYING FIRMS' STOCK LIQUIDITY OVER FIRMS LIFE CYCLE: AN EMPIRICAL EVIDENCE FROM IRANIAN STOCK MARKET

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## ABSTRACT

Capital market in any country is the main source of financing and known as a suitable place for investment. One thing that is attractive for investors on the stock exchange is factors affect the liquidity of stock. So, the important question targeted in this research is the relationship between firms' life cycle and stock liquidity. The analysis is based Tehran Stock Exchange firms. In this study, separating companies to the growth, maturity and stagnant by using four factors: sales growth, capital expenditures, dividend rate and firm age and Anthony and Ramesh method in accordance with the methodology of the park and Chen were conducted. To measure stock liquidity trade-based measure was used. To test the hypotheses, the central index comparison testing of more than two independent populations was used. The analysis shows that the stock liquidity of firms which are at growth stage and maturity stage are alike, and they are higher than stagnant firms.

## INTRODUCTION

Financial reports are the most important outputs of an organizational accounting system. The purpose of financial reporting is providing the useful information for business decisions [25]. Stock liquidity can be deemed as a factor which is important for both investors and management. Information feedback from stock liquidity to firm managers and stakeholders is one mechanism responsible for better firm performance for firms with higher stock liquidity. One of the most attractive matters for investors in stock markets is the awareness of the factors affecting the liquidity of shares.

Liquidity is the power of conversion securities to cash at the lowest level of costs of exchange [2]. Due to integral investment risk, investors expect capital returns. So for investors, risk and investment return awareness is of particular importance. Illiquidity of financial assets is in fact a risk which investors anticipate to earn capital return due to. Thus, the desire is to investigate this issue coming from the fact that one of the main concerns of speculators and shareholder is liquidity of stock that many investors prefer one with high liquidity.

The power of stock liquidity indicates the success of firms in disclosing of the financial and nonfinancial information which can lead to being the market price close to their intrinsic value. Because of the nature of the risk aversion, investors try to select stocks having high capabilities of liquidity due to sell them as soon as possible and at low cost and with minimal changes at necessary condition. Financial markets, on the one hand, provide the possibility of combination the money market instruments and capital and the optimal allocation, to facilitate accessing cash; and on the other hand, by improving the mechanisms and regulations, they make safer and more attractive exchange markets for people to reinvest their capital in the production processes which leads to boom in production and make more profit for them. This is not possible except in the presence of conditions such as high power of stock liquidity.

Life cycle theory suggests that a company possesses various risk characteristics and different economic attributes through its life cycle stages [6]. These living systems at each stage of their life cycle have certain behavioral patterns to overcome the issues and problems faced with.

In this research, the effects of the firms' life cycle on predicting stock liquidity in listed firms in Tehran stock Exchange are being investigated empirically.

## LITERATURE REVIEW

### Theoretical bases of firm's life cycle

The concept of life cycle is a term which is well known in the accounting literature in recent decades. Life cycle theory posits that, the economic and financial characteristics of a company are influenced by the stage of its lifecycle. The most common classification for lifecycle of companies includes: introduction, growth, mature and stagnant [20-3-7]. Companies, among the stages of lifecycle, face different types of environments, accept various policies, and do different performances. Introduced firms suffer from lack of established customers and knowledge deficits about potential revenues and costs, both of which results in negative operating cash flows [17]. In addition, firms in introduction stage are not financed by financial

### KEY WORDS

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institutions. Firms in growth stage have more investment chances so they need more external funds. In mature stage, companies have less opportunity for growth, but they have more excess cash flow. At the end of lifecycle, in stagnant stage, companies have confined growth opportunities and become less profitable. In some cases, firms may be regenerated by investing in their product lines and technology. Firms face reduction in investment chances and increase in cash flow from growth to stagnant.

Anthony and Ramesh (1992) use dividend payout, sales growth, capital expenditure, and age to find the relationship between corporate lifecycle and stock market response. They find that a monotonic decline exists in the sales growth and capital investment from the growth to the stagnant stages. DeAngelo et al. (2006), used the ratio of retained earnings to equity as a proxy of lifecycle, find that firm life cycle can explain firms' dividend payout. Owen and Yawson (2010) acclaim that there exist life cycle effects both in firms' seasoned equity offerings and takeover activities. Additionally, the degree of industrial concentration will change in different lifecycle stages and affect the speed of information dissemination. Chay and Suh (2009) suggest that cash flow uncertainty has influence on firms' payout policies. Firms' cash flow uncertainties are probably different among lifecycle stages and may influence their repurchasing decisions. Pashley and Philippatos (1990) use group analysis to determine which lifecycle stage a company belongs to. Group analysis uses one or multiple variables to maximize the homogeneity of companies within the groups and to maximize the heterogeneity between the groups. Compared with Anthony and Ramesh's (1992) method, group analysis is stricter in determining the stage of firms in lifecycle.

### Theoretical bases of liquidity

The Liquidity is the lifeblood of financial markets. Its adequate provision is critical for the smooth operation of an economy [14]. There is an emerging research literature dealing with stock liquidity. The security exchange markets have also recognized the importance of liquidity and plan the introduction and public communication of liquidity measures [15]. Becker-Blease and Donna (2006) studied the relationship between stock liquidity and investment opportunities, and found a positive relation between changes in capital expenditure and stock liquidity changes. Fang et al., (2008) studied stock market liquidity impact on firm value; they investigated that liquidity increases firm performance by increasing the incentive impact of managerial pay-for-performance contracts. Still, in the literature there are very few descriptions of what liquidity really is and liquidity measures with a quantitative comparison is completely missing.

Liquidity may be grouped to five different levels: [18]

- 1- The ability to trade at all. At this level there is at least one bid and one quote that make a trade possible
- 2- The ability of buying or selling a certain amount of an asset with influence on the quoted price. If it is possible to trade, the next issue concerns the price impact of trading. In a liquid market, it is possible to trade shares with little effect on the quoted price.
- 3- The ability of buying or selling financial asset without influence on the quoted price. The more liquid a market becomes, the smaller is the effect on the quoted price. Thus, as the liquidity increases, eventually a point will be reached where there is no more price impact for a certain amount of shares.
- 4- The ability of buying and selling a financial asset at about the same price at the same time.
- 5- The ability of executing a transaction from points 2 to 4 immediately. [Fig. 1]



Fig. 1: Levels of liquidity.

Liquidity itself is not observable and therefore, has to be proxied by different liquidity measures. As Baker (1996) states, different liquidity measures lead to conflicting results when evaluating the liquidity of a financial market. To get an overview, liquidity measures are separated into two broad categories: trade-based and order-based measured. However there is some correlation between proxies within these categories, there is little relation between the categories.

Trade-based measures have been used in previous literature include trading volume, trading value, the number of trades and the turnover ratio. As they are simple to calculate using readily available data and

have widespread approval particularly among market professionals, these measures are attractive. They point out what people have traded in the past [2].

Order-based measures regards the appearance of automated trading systems has brought accessing to more detailed data allowing for new order book liquidity measures to be calculated. They more accurately capture the ability to and the cost which are associated with trading immediately [2].

The bid-ask spread shows the cost an investors must incur to trade immediately. If investors want to purchase (sell) a stock, they must cross the spread and hit the existing ask (bid) orders. However this method is useful for small investors, because of calculating the cost as a percentage of the stock price, liquidity may be compared across stocks with different prices; it has to consider the market impact and opportunity costs of trading, which is required an analysis of the volume of orders available at each price step, to prevent of underestimating the true cost of trading.

## RESEARCH METHODOLOGY AND VARIABLE MEASUREMENT

### Data and sample selection

Our sample is based on the firms of Tehran Stock Exchange. We exclude financial firms, holding and leasing firms, and firms lacking enough information.

### Clustering firms by life cycle (independent variable)

In this study the firms are divided into growth, maturing and decline terms by the four variables; based on the methodology of Park and Chen (2006) as follows:

- 1- At first, value of each variables such as sales growth ( ), capital expenditures ( ), the ratio of divided profit ( ) and age (longevity) for every year –company must be calculated.
- 2- Based on each variable of the four ones, firms' years are divided into five categories and according to the statistical category from one to five by virtue of the following [Table 1]

**Table 1:** how to separate the firms in quintiles (classes) lifecycle

Categories	Capital Expenditure	Sales growth	Divided profit ratio	Age
First	1	1	5	5
Second	2	2	4	4
Third	3	3	3	3
Forth	4	4	2	2
Fifth	5	5	1	1

Then for each year – company, the composite scores will acquire and according to the following conditions, company classified in to growth, maturity and recession categories (The introduction stage was ignored, because the transaction (Purchase and sale) was inactive or the new firms did not participated in the Tehran stock exchange):

- 1) If total score is between 16 and 20, the stage is growth.
- 2) If total score is between 9 and 15, the stage is mature.
- 3) If total score is between 4 and 8, the stage is recession.

Calculation method of variables in the life cycle model is as follows:

$SG_{i,t}$ : This variable indicates the rate of company sale growth in the year of t and can be calculated as follow:

$$SG_t = \frac{(S_t - S_{t-1})}{S_{t-1}} \quad (1)$$

$CEV_{i,t}$ : Capital expenditure of company that can be calculated as follow:

$$CEV_{i,t} = (\text{excess of fixed asset in the period} / \text{market value of company}) * 100 \quad (2)$$

$DP_{i,t}$ : divided profit of company

$$DP_{i,t} = \frac{DPS_{i,t}}{EPS_{i,t}} \times 100 \quad (3)$$

Which DPS is divided profit of each share and EPS is the profit of each share.

**Stock liquidity (dependent variable)**

This study follows the various studies such as Marshall (2006), Chan and Faff (2003), Baker and Stein, (2003) and Datar et al., (1998) to measure the stock liquidity which is trade-based measure calculated as follows:

$$LI = \frac{\text{Number of Traded Shares of Company}}{\text{Total issued shares}} \quad (4)$$

**Methodology**

This research aims to examine correlation of more than two set of data. To do this, firstly, considering normality of data related to stock liquidity will be examined. For this purpose, hypothesis testing method will be used. Hypothesis testing methods include Kolmogorov-Smirnov test and Shapiro-Wilk. If the distribution of data is normal, a parametric test called ANOVA should be used. If P-Value of test is less than 0.05 means researcher claim must be confirmed and then post hoc tests such as Duncan, Tukey and LSD should be done.

But if the distribution of data is not normal data, non-parametric test Kruskal - Wallis (Kruskal-Wallis) will be used. In this way, if the P-Value of test is less than 0.05, post hoc test will be also used to compare population mutually. The suitable post hoc test in SPSS is Mann-Whitney U. To evaluate the relationship between independent and dependent variables, firstly, the sample will be divided into three categories, which are growth, maturity and stagnant, by using the variables of sales, dividends, changes in capital expenditures and the company's age and then the liquidity in these three categories will be examined and our hypotheses will be tested.

**DESCRIPTIVE STATISTICS**

**Table 2:** Statistical indicators of sales growth

Year	Sample quantity	Mean	The lowest observation	The Most observation
2012	153	87.231	-82.15	914.16
2013	153	39.364	-85.56	412.85
2014	153	41.401	-93.45	501.563

The statistical analysis of sales growth in the three-year period shows that the average rate of growth experiences a fluctuation from 41.401 to 87.231 in this period [Table 2].

**Table 3:** Statistical Indicators of capital expenditures

Year	Sample quantity	Mean	The lowest observation	The Most observation
2012	153	1.231	-21.32	93.22
2013	153	0.910	-10.12	34.23
2014	153	-0.12	-76.32	43.84

According to [Table 3] the highest amount of capital expenditures occurred in 2012 (an increase of 1.231 million Rials) and lowest in 2014 (a reduction of 0.12 million Rials). This table also indicates that the year 2014 was facing a sharp drop in capital expenditures.

**Table 4:** Statistical Indicators of the company's life

Year	Sample quantity	Mean	The lowest observation	The Most observation
2012	153	35.12	3	77
2013	153	36.12	4	78
2014	153	37.12	5	79

The above [Table 4] shows that the youngest company was founded in 2008 and the oldest company has been exploited in 1934.

**Table 5:** Statistical indicators of divided profit Ratio

Year	Sample quantity	Mean	The lowest observation	The Most observation
2012	153	53.142	0	69.203
2013	153	56.374	0	71.853
2014	153	51.568	0	69.549

[Table 5] shows the descriptive statistics of the ratio of the divided profit in the period of three years. Proximity of the descriptive statistics in three years, indicating a relatively similar distribution for this change.

**Table 6:** Statistical indicators of liquidity

year	Sample quantity	Mean	The lowest observation	The Most observation
2012	153	0.171	0.000	1.91
2013	153	0.1245	0.000	1.21
2014	153	0.0943	0.000	1.01

According to [Table 6], it can be understood that the average rate of firms' stock liquidity decreased annually in the studied time frame. In its lowest observed value, the liquidity is about zero which means very low number of any stocks buying and selling for some of the sample firms.

The following table presents firms liquidity distribution in the sample used in this study based on differentiate of the company's life cycle which consists of periods of growth, maturity and recession.

**Table 7:** Statistical Indicators of liquidity

Indicators Stage	Mean	The lowest observation	The Most observation
growth	0.0901	0.000	1.98
maturity	0.1382	0.000	2
Recession	0.0563	0.000	1.21

According to the [Table 7], it is found that indicators of liquidity in maturity period is longer than the period of growth and in growth periods is bigger than of recession in average.

**Table 8:** Shapiro – Wilk Testing Statistics

Liquidity Variable at Stage	Degree of freedom	P-Value
Growth	142	0
Maturity	189	0
Recession	119	0

According to the above [Table 8] the P-Value for each of the three floors of life cycles stock liquidity in the data sample are non-normal.

After determining the kind of data distribution, the Kruskal-Wallis H testing is used to compare the liquidity index in three stages of life cycle.

### STATISTICAL INFERENCE (HYPOTHESIS TESTING)

The Kruskal-Wallis H test (sometimes also called the "one-way ANOVA on ranks") is a rank-based nonparametric test that can be used to determine if there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable. It is

considered the nonparametric alternative to the one-way ANOVA, and an extension of the Mann-Whitney U test to allow the comparison of more than two independent groups.

It is important to realize that the Kruskal-Wallis H test is an omnibus test statistic and cannot determine which specific groups of independent variable are statistically significantly different from each other; it only determines that at least two groups were different.

The results of the Kruskal–Wallis H test for the levels of stock liquidity in three stages in the life cycle of selected sample (three independent populations) are shown in [Table 9]

**Table 9:** Results of Kruskal–Wallis H test

Variable	$\chi^2$ statistics	Degree of freedom	P-Value
Liquidity of stocks	9.472	2	0.0054

That is, at least, the average of one sample has a significant difference compared to others (p-value <0.05). But based on our hypothesis, we must compare each pairs of cycle's stage to accept or reject the hypothesis for understanding which populations' mean are not equal.

The Mann-Whitney U test is used to compare differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed. If the continuous does not exist for using the parametric tests, i.e., variables are not normal and constant, this test will be used. Z statistics would be used if the members be greater than 10 (in SPSS, adjusting to Z is done automatically). Results of Mann-Whitney U test for each of the hypotheses in this study is as follows:

**First hypothesis:** The firms' stock liquidity at growth and maturity stages has a significant difference.

Results of Mann – Whitney U test for the amount of stock liquidity at growth and maturity stages of the life cycle for selected sample are presented in [Table 10].

**Table 10:** Results of Mann-Whitney U Test for the first hypothesis

Variable	Z statistics	U statistics	P-Value
Liquidity of stocks	-0.176	11896	0.573

According to the [Table 11] the stock liquidity at growth stage and maturation are not significantly different.

**Second hypothesis:** the rate of firms' stock liquidity at growth and recession stages has a significant difference.

**Table 11:** Results of Mann-Whitney U test for second hypothesis

Variable	Z statistics	U statistics	P-Value
Liquidity of stocks	-1.934	7190	0.032

According to the [Table 12] the stock liquidity at stages of growth and recession has a significant difference and by considering the table of descriptive statistics, liquidity in periods of maturity is greater than the recession.

**Third hypothesis:** The amount of firms' stock liquidity at maturation and recession stages has significant differences.

**Table 12:** Results of Mann – Whitney U for third hypothesis

Variable	Z statistics	U statistics	P-Value
Liquidity of stocks	-2.912	9809	0.006

Since the P-Value test is less than 0.05, hypothesis has been confirmed and there is a significant difference between these two periods of the life cycle. According to the table of descriptive statistics, this difference was due to higher average amount of liquidity in the period of maturity than stagnant.

## RESULTS AND DISCUSSION

Investors in exchange market try to gather information to predict the firms' stock liquidity. In the literature, there are many research studies on the effect of some factors on liquidity prediction, but this study uses firms' life cycle, as independent variable to investigate this relationship. For this purpose, a sample of 145 firms listed in Tehran stock exchange during 2012-2014 is used.

Also trade-based model has been used to calculate the liquidity of firms. The results show that the stock liquidity in Tehran exchange market is not significantly different throughout the growth and maturity stages, but while firms age and reach stagnant stage their stock has experience a decline in liquidity. The reduction of firm stock liquidity has a negative influence on firm performance from which firm managements want to prevent by paying more stock dividend leading to loss available internal financial resources while they cannot access external financial resources and finally miss investment opportunities. Reduction in capital expenditure at stagnant stage (as mentioned) can be considered as one of the main factor to this liquidity reduction. Thus, it is expected that managers choose the best dividend policy to increase their firm value after checking the firm life cycle. On the other hand, investors are able to make the best division to invest based on what stage corporate is. It can be considered that not only investors in Tehran stock market do not merely regard to stock dividend as opportunities for investment, but also other factors of firm life cycle are more attractive than stock dividend for them.

For future studies in this area it is suggested that researchers use another approach (order-based measures) to calculate stock liquidity, because some research studies believe that trade-based level fails to indicate the ability of investors to transact their financial assets immediately and the cost associated with this, which is the essence of liquidity [2].

To conclude, this paper shows that on one hand, there is no significant differences between the stock liquidity of firms at maturity stages and growth stages. On the other hand, there is a significant differences between the stock liquidity of firms at growth and stagnant and also between maturity and stagnant.

#### CONFLICT OF INTEREST

There is no conflict of interest.

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