Default Risk and Momentum Effect: Some Evidence from Tehran Stock Exchange

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Abstract

The purpose of this paper is to analyze the relationship between default risk and momentum effect using data from companies listed on Tehran Stock Exchange.To calculate default risk,we used Black-Scholes-Merton (BSM) option pricing model. To describe momentum effect, by determining the formation period to be 6 months, and the holding period to be 3,6, or 12 months, we firstlyexamined the profitability of short term (3/6), midterm (6/6), and long term (12/6) momentum strategies and found that during 2010-2015 time period, only midterm momentum strategy is profitable.Then,we showedthere is no relationship between default risk andmomentum effect.

KeyWords: *Momentum effect, Default risk, Asset valuation, Tehran Stock Exchange.*

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1.Introduction

Momentum effect, ascontinuation of mid-term returns, has been seen during last two decades and different periods of time. There are some evidence of this effect in the USA (Jegadeesh and Titman, 1993, 2001), Europe (Rouwenhorst, 1998), Asia (Hameed andKusnadi, 2002) and Latin America (Muga and Santamaria, 2007a). Despite of the widespread evidence, the origin of its formation has always been controversial; a number of experts have based their explanations on risk, and the others have tried to explain the effect in terms of the theory ofbehavioral finance. On the other side, a number of new studies claim that a key variable to present a satisfying explanation for momentum effect is default risk. Using data of the USA's stock market, Avramov et al. (2007) suggest that momentum strategies lead to significant earnings only on the stocks with low credit ratings. However, conducting several studies in the UK's stock market, Agrawal and Taffler (2008) conclude that momentum effect is a direct consequence of under-reaction of the market to insolvency risk.Although these two mentioned studies consider momentum effect from different aspects, both of them believe that its origin is high default risk stocks.

Avramov et al., (2007) used credit ratings and showed that momentum effect is considerable only in stocks with low credit rating. However, a company's default risk can change significantly before any rising or falling in its credit rating.Considering merely credit rated stocks, makes the sample biased, at least regarding company's size; therefore, it affects the results significantly. It is essential to consider a significant relationship between momentum effect and size reported by previous researches (for example Hong et al., 2000). Agrawal and Taffler (2008) used Altman's Z score, which is exclusively based on accounting data as a dummy variable for indentifying companies with financial insolvency and companies with good financial health. In addition to this simplification, using accounting data to estimate a company's default risk might have many important shortcomings. This kind of information is based onprevious data, which cannot specify the vision correctly. Also, since these models do not consider asset volatility, companies with equal accounting ratios provide similar levels of default risk. Moreover, these two researchers used a measure without any significant relationship with size or book to market ratio, in spite of several empirical evidence indicating an association between momentum effect and these two characteristics of stock. As a matter of fact, many studies have used various concepts such as information uncertainty (Jiang et al., 2005; Zhang, 2006),stocksthat are hard to value or to arbitrage (Baker and Wurgler, 2006), or stocks attracting limited attention(Aboody et al., 2010), so that they can demonstrate some of stock’s characteristics (such as size, book to market ratio, volatility, stock market cycle, etc.) do not help returns continuation, which is a factor of momentum effect (Abinzano et al., 2014).

In order to analyze the relationship between default risk and momentum effect, the present study has applied a measure based on the Black-Scholes-Merton (BSM) option pricing model, where a firm’s default risk is derived from the market prices of its stock (Black and Scholes, 1973; Merton, 1974). This method solves a number of problems related to default risk criterion, used in the mentioned studies. According to the results, high default risk is a feature ofalosers’ portfolio, while default risk ofawinners’ portfolio is moderate-to-low. The findings indicate default risk cannot be a key factor in describing momentum factor. This study makes several contributions to the literature. First of all, we test whether momentum effect is exclusive to financially distressedor insolventfirms. Secondly, the BSM model is used as a measure of default risk which includes much less constraints about the sample and covers future expectations of stock effectively. Thirdly, liquidity enters in the analysis as an additional variable and a robustness test will be performed, and finally, the source of profits earned by momentum strategy is explained.

2.Literature Review and Background of the Study

The reversal-momentum strategies are a set of irregularities explored in academic research. The momentum strategies focus on the association between stock relative returns and market relative returns in thepast period. The simple rule of momentum strategy is as follows: a stock with better or weaker performance in the past, will continue this process in the future. Therefore, a momentum strategy creates a portfolio which purchases past winner stocks and sells past loser stocks. For the first time, Jegadeesh and Titman (1993) reported about the momentum strategy achieving abnormal returns in a long period of time. Jegadeesh and Titman (1993) created portfolios which purchased stocks with better performance (winner stocks) in the last 3, 6, 9 and 12 months and sold stocks with weaker performance (loser stocks) in the last 3, 6, 9 and 12 months, but the periods of holding them were different. Jegadeesh and Titman

(1993) set the holdingperiod as 3, 6, 9 or 12 months and repudiated the existing portfolios at the end of each period in accordance with their performance in that period. They also used the overlapping strategies approach. According to their observationsin the period of 1965-1989, selecting stocks on the basis of their performance in the last 6 months and holding them for the next 6 months created in average %12.01 excess returns in a year. A substantial finding was that the average of winners' or losers' portfolios market value in the period of 1965-1989 was less than the market average. This proved momentum for smaller stocks or firms was stronger.

In the next period of time (i.e. 1990-1998), Jegadeesh and Titman (2001) remove stocks with the price of less than $ 5 at the beginning of the holding period and stocks belonging to the least deciles of market value (i.e. the smallest stocks) from their analysis, so that they could neutralize the effect of small stocks. Their findings suggested that the average return of momentum strategy was %1.39 for each month. They also studied the momentum of the period from 1965 to 1998 and observed that the average excess return was %1.23 for each month (annually %14.76). Therefore, the momentum, observed in the period of 1965-1989 has not been due to the sample size or the time period. Momentum strategies profitability in long-term periods,as well as in different markets has also been examined. Rouwenhorst (1998) continued the approach of Jegadeesh and Titman (1993) and analyzedmomentum for an international portfolio including 12 European markets. Using deciles to identify winner and loser stocks on the basis of their past performance, he reported momentum strategies profitability of the European mentioned markets as approximately %1 for every month from 1980 to 1995. This results in the cases of either small or big stocks works quite similar, and indicates the fact that Jegadeesh and Titman's (1993) findings have not been got accidently. In fact, the correlation between the USA's market and European markets shows the momentum factor is common among different markets. Moskowitz and Grinbelatt (1999) investigated total profitability of momentum strategies in different industries. Their findings argued that the profitability of momentum strategies in a particular industry is the source of fulfillment of a major part of total profitability of momentum strategies in a market. According to their research, even after applying factors of firm size and book to market ratio in terms of Fama-French three-factor model, momentum still exists and shows off. Grinbelatt and Moskowitz (1999) then adjusted momentum strategies in accordance with the type of industry and showed that the profitability of these strategies (after the adjustment) reduced significantly. Unlike Jegadeesh and Titman's findings (1993), their studies arguedthat industry-based strategies were profitable both for small and big stocks and there was no significant relationship between them. Griffin et al., (2003) studied momentum strategies of forty different countries and found that using these strategieswas profitable in North America and Latin America and Europe, and they were not profitable in Asia. Glaser and Weber (2003) investigated the relationship between turnover and momentum strategies in German stock market and concluded that momentum strategies were more profitableamonghigh-turnover stocks. According to the research of Avramov et al., (2016) in the USA, Japan and EU member states, increasing liquidity raises momentum strategies profitability significantly. Stambaugh et al.,(2012) and Antoniou et al.,(2013) believe that liquidity has a significant effect on profitability of momentum strategies. Also, Saali (2014) indicates that momentum strategies are more profitable amongmore liquid stocks. Wang and Xu (2015) reported that falling-or-rising market and its volatility are related with momentum strategies profitability. Stivers and Sun (2010) provided some evidence suggesting that momentum is a procyclical phenomenon. Chava and Purnanandam (2010) argue a positive cross-sectional relationship between stock return and default risk. Li and Xia (2015) report that increasing liquidity empowers stock market information efficiency, facilitatesimplementation of corporate governance and reduces default risk. According to the findings of Chen and Lee (2013) inTaiwan’s stock market, a part of stock returns can be attributed to default risk. They also conclude that book to market ratio has a more significant role in describing default risk and stock returns, comparing to liquidity effect. Kang and Kang (2009) investigated the relationship between default risk and stock return in the Korea Exchange. Their results demonstrate that even after controlling risk premium, firm’s size and book to market ratio in Fama-French three-factor model, as well as momentum effect in Carhart four-factor model, a significant part of stock returns can be attributed to default risk factor.Mahajan et al., (2012) studied the relationship between aggregate economy-wide default risk and momentum strategies. According to their findings,first of all, default shock factor explains a significant part of momentum strategies earnings.Secondly, winners have potentially higher risk than losers during periods of high default shocks. Studying stock exchangesof fourEuropeancountries including France, Spain, Britain and Germany,Abinzano et al., (2014) analyzed the role of default risk in momentum phenomenon and proved that there was no relationship between the two variables.

Ghalibaf Asl et al.,(2010) studied profitability of earnings momentum and price momentum strategies in Tehran Stock Exchange, and evaluated the effect of abnormal returns, standardized unexpected earnings, price/earnings ratio, book to market ratio,as well as firm’s size on the returns of these strategies from 2004 to 2008. The results indicatedthat price momentum strategy in periods of 3, 6 and 12 months, and earnings momentum strategy in periods of 3 and 6 months were profitable in Tehran Stock Exchange, however, the profitability of earnings momentum strategies in a 12-month period was not confirmed. Also in the periods of 3 and 6 months, independent variables of the model were able to explain excess return of price momentum, however, in the period of 12 months, some other factors except the mentioned independent variables were affecting excess returns of price momentum. Researching on 96 companies listed onTehran Stock Exchange from 2001 to 2010, Hakkak and Akbari (2012) proved that applying momentum strategy in a period of 6 months was not profitable. Yahyazadehfar and Lorestani (2012) examined the effect of the trading volume on momentum and reversal strategies profitability in Tehran Stock Exchange and concluded that momentum strategy was profitable in the case of high or medium trading volume, in the period of 3 months. Tehrani et al., (2013) investigated the relationship between momentum strategies’returns and stock liquidity in Tehran Stock Exchange and came to this conclusion that stock liquidity had no impact on the returnsof momentum portfolios. Ebrahimi Kordlar and Mohammadi Shad (2014)studied the association between default risk and earnings response coefficient. Using reverse regression of abnormal returns and unexpected earnings, they reported a significant and negative relationship between these two variables. As a result, default risk is important not only for creditors, but also for investors, and affects the level of their reaction to the good and bad news of accounting earnings.

2.1.Description of Findings on Momentum

We can describe the momentum effect using following two approaches: Risk-based approach and behavioral approach. Risk-based approach has been introduced and represented by Jegadeesh and Titman (1993).They analyzed the momentum as a reward for risk tolerance. They examined the Beta (sensitivity coefficient) of their momentum strategies, in the form of capital asset pricing model. Nevertheless, their findings showthat the factor causing momentum is not the market risk, because the Beta of capital asset pricing model is not significantly different from the Beta of market, or in other words, momentum strategies are not riskier than market portfolio (Helinka, 2008). The second approach is based on behavioral models. Generally, momentum strategies are not profitable, because the market has not responded to the market immediately, and thus there is no overreacting or underreacting in stock price. These types of behavioral models are in seek for a psychological basis to explain the phenomenon of over-reaction and under-reaction (resulting from the investor's behavior). Daniel et al., (1998) consider the momentum as a consequence of investors' overestimations of their abilities, which finally leads to initial overreaction. If the investor underestimated his/her abilities, he/she would underestimate his/her prediction error, leading to price over-reaction in the stock market. Barberis et al., (1998) regarded stock price over-reaction or under-reaction as a result of the investors' prejudicial (biased) look to the stock market. Investors consider the company's earnings as a mean-reversing pattern or as a trending pattern. For example, a set of positive unexpected information can convince the investor that he/she has been within the trending pattern. Negative unexpected information, released after positive unexpected information, makes the investor assured of existenceof the mean-reversing pattern. Moreover, making their decisions, the investors consider stability and strength, rather than the significance level of statistical information. Company announcements are examples of news with low strength and high level of statistical significance that are underreacted by the investors. A series of media announcements, representing a positive image of the company's status, are examples of news with high strength and low level of statistical significance, which are overreacted by the investors. Hong and Stein (1999) offered another behavioral approach. They described two groups of investors:the news watchers and the momentum traders. Although the first group's decisions are made regarding news and information about the companies,the second group makes decisions on the basis of recent performance of the stock price. According to the main assumption of Hong and Stein (1999), information is released slowly among the investors. In particular, negative informationreleased gradually is leading to under-reaction of the stock price. The news watchers get initial information and underreact to it. However, if they see and perceive any possibility in increasing earnings, demand for buying stock and its price will be risen.The momentum traders consider rises in stock price and attempt to buy the stock, resulting in overreaction to stock price. This approach also predicts that momentum for a less analyzed stock with less released information is more obvious. Thus, according to this view, since smaller companies are not in the media spotlight, they are more vulnerable faced with momentum phenomenon. Information, especially negative information about small firms is usually released in a slow and gradual manner among the investors, and provides the possibility of benefiting from momentum strategies (Hong et al., 2000).

3.DatabaseandDefaultRiskMeasure

3.1.Database

All data needed for this research are obtained from Tehran Stock Exchange's website,Codal system and Rahavard Novin software. The research has been conducted in the period of April 19th, 2010 to July 21st, 2014, and the companies listed on Tehran Stock Exchange have been considered as the population. The sample includes firms that had been listedonthe exchange before 2007, their fiscal year ended March 19th, and they had no trading halt for more than 6 months. Insurance companies, investment companies, holding companies, banks and credit institutions has been omitted from the sample, because their unusual capital structure might deviate default risk data in the research. Also, companies with lack of informingand reporting,not offering full data needed for calculating values of the variables, have not been analyzed. Although omitting some listed companies of financial industry represents a kind of biased sample, it does not make a problem in the analysis process, because according to Muga and Samantaria (2007b), momentum strategies'profits in financial industry are not considerable and significant. As such, we studied the annual data of a sample of 61 companies listed on Tehran Stock Exchange.Availability of the data related to short and long-term debt and market value has a significant effect on the sample, as well. This research aligned with other studies (e.g. Crouhy et al., 2000; Crosbie and Bohn, 2003; Vassalou and Xing, 2004), considers the nominal value of debt equal to the sum of short-term debt and %50 of long-term debt. In order to obtain a homogeneous risk-free rate of return for the entire period of the study, we used the information on the Central Bank of the Islamic Republic of Iran's website and the effective interest rate of bonds (or participation certificates).

3.2. Measuring Corporate Default Risk

Default risk, which can be defined as uncertainty about a company's ability to meet its obligations and repayits debts, has been estimated by different measures. The most common of them are accounting-based measures such as Altman's Z-score (Altman, 1968) or Ohlson'sO-score (Ohlson, 1980), credit ratings, debt differentials, and market-based measures based on the BSM model (Abinzano et al., 2014). Nevertheless, according to Hillegeist et al., (2004), there are several reasons to question the effectiveness of those measures of default risk that uses accounting data. First of all, companies' financial statements are prepared to measure the past performance, and they might not offer much information about the future prospects. Moreover, a company provides its accounting statements on the basis of going concern principle, assuming the company will never go bankrupt. Another major drawback of these measures is their failure to consider asset volatility, which leads them to conclude that firms with similar ratios will have exactly the same bankruptcy probability. However, volatility is an essential variable in predicting default risk, because it reveals the possibility of company's assets insufficiency to cover its obligations. *Ceteris paribus*, the higher the volatility of a company's asset value, the greater its default risk. In addition, the use of credit rating as a measure for calculating default risk might be problematic. First of all, a company's credit worthiness can change significantly before readjustment of its credit rating. Secondly, the use of credit rating to determine default risk implies that two companies with similar credit rating will have similar default risk. Nevertheless, as Crosbie and Bohn (2003) haveshown, the bonds belonging to a same credit class might have different default rates. Furthermore, it cannot be ignored that there is no available credit rating for some market stocks, particularly the small ones, and that this can lead to a size-biased sample. An alternative for the mentioneddefault risk estimating methods is a measure using company's market share prices and is used in the Moody's KMV model and in studies of Vassalou and Xing (2004), Byströmet al., (2005), Byström(2006), Bottazzi et al.,(2011), Li and Xia (2015). These series of studies start from Merton's (1974) proposal, which considers a company's equity value as a European call option on its assets value and uses the Black-Scholes model (1973) to calculate the value. The proposed measure for estimating default risk in this study is shown in Equation (1) (Li andXia, 2015):

$$(1)\ P_{def,it} = N\left(-\frac{\ln\frac{E_{it}+F_{it}}{F_{it}} + (t_{i,t-1} - \frac{\sigma v_{it}}{2})(T)}{\sigma v_{it}\sqrt{T}}\right)$$

$$\sigma v_{it} = \frac{E_{it}}{E_{it}+F_{it}}\sigma_{E_{it}} + \frac{F_{it}}{E_{it}+F_{it}}(0/05 + 0/25\sigma_{it})$$

Where:

E_{it} : Market value of company’s equity at the end of year *t*;

F_{it} : Face value of company’s debt at the end of year *t* (equivalent to the sum of short-term debt and %50 of long-term debt);

$t_{i,t-1}$: Company’spast annual return (calculated from monthly stock returns over the previous year);

σv_{it} : Approximate volatility of company’s assets at the end of year *t*;

$\sigma_{E_{it}}$: The stock return volatility for company during year *t* estimated using the monthly stock return from the previous year.

T: Maturity period (set to one year);

N (.): Cumulative standard normal distribution function.

Comparing to accounting-based models, the BSM model advantage is that it not only considers past information, but also regards investors’ expectations toward stocks performancein the future, using their market prices. This model takes into account asset return volatility as well (Abinzano et al., 2014). Hillegeist et al., (2004) compare the model in this respect with Altman’s Z-score (Altman, 1968) or Ohlson’s O-score (Ohlson, 1980), and find that the BSM model provides more information about default risk, thus, they recommendthe use of it instead of traditional accounting-based measures as a default risk proxy. Since this model discounts expected future cash flows, therefore, comparing to credit rating as a basis for measuring default risk, the BSM model has the advantage of no time lag between variation in credit worthiness and considering it in the process of risk measurement.

BSM is a company-specific model which calculates the value of a company based on its financial situation and capitalization, not on the basis of its credit rating, hence, it can present more finely tuned rankings.As the last advantage, the BSM model uses the least information and measures value forevery company, not just those which are credit rated. Finally we should say that by using the BSM model, it is possible to overcome some ofthe shortcomings related to credit spreads as a measure of default risk. We also should consider that it is usually easierto access a company's stock price data than itsdebt return data (Abinzano et al., 2014).

4.MomentumEffect,ResultsandPortfolioCharacteristics

First of all, we present the results of the applied momentum strategiesby using calendar time approach (refer to Jegadeesh and Titman, 1993) which is free of autocorrelation problems existed in time-event strategies. Momentum strategies are based on purchasing winner stocks in the past and selling loser stocks in the past. The winners' and losers' portfolios are determined according to their past information in six-month periods. Thus, from April 19th, 2010 to July 21st, 2014, the average return of the past six months has been calculated for the sample's stocks. Then, momentum strategies are set, in accordance with Jegadeesh and Titman's method (1993). These strategies select the stocks based on their performance during past J months, and hold them for K months (the strategy of J months/K months; J=6 and K= 3, 6, 12). At the end of every month t, the stocks are rated ascending on the basis of their past J months' performance. According to these ratings, we have five quintiles, and the socks belonging to them have similar weight. The highest 20 percent (the stocks with the worst performance in past J months) are included in the fifth quintile. The first quintile includes the loser stocks and the fifth quintile includes the winner stocks. Momentum strategy purchases the winners' portfolio and sells the losers' portfolio in each month t, and continues this process for K months. The difference between returns of thewinners'portfolio (W) and the losers' portfolio (L) determines the profitability of momentum strategy (WML). In order to identify the significance and insignificance of the returns, we use the paired t-test with independent samples. The described momentum strategies have been applied to iterate Jegadeesh and Titman's approach (2001). In order to analyze the association between default risk and momentum effect, we have used 3 strategies: short-term (3/6), mid-term (6/6) and long-term (12/6). Here, as well, we measured statistical significance level of each strategy through Paired t-test with independent samples. Table (1) represents monthly returns on momentum strategies for short-term (3/6), mid-term (6.6) and long-term (12/6).

According to the table, in the period of April 19th, 2010 to July 21st, 2014, among all three mentioned strategies, only the mid-term strategy, which uses a six-month period for formation and holding, is profitable. Average monthly returns on the mentioned strategy and its t-value on that specific period of time, have been %2.39 and 1.98, respectively. This table also offers that the average monthly returns on momentum strategies can be a figure between %-6.30 for the strategy (12/6) and %2.39 for the strategy (6/6).

Table (1) MomentumStrategies' Profitability

	K								
J	3			6			12		
6	W	L	WML	W	L	WML	W	L	WML
	%9.95	%10.36	-%0.41	%22.33	%19.94	%2.39*	%43.23	%49.53	-%6.30*

J: Formation period
K: Holding period
W: Average monthly returns on the winners' portfolios
L: Average monthly returns on the losers' portfolio
WML: Momentum strategy's return
***:** Significant at the confidence level of %95

Considering this return difference and previous evidence about the stock characteristics, Table (2) categorizes the portfolios on the basis of their sizes, book to market ratio, and the calculated default risk through BSM model (on average) for returns quintiles in the formation period J=6. As you can see, the first quintile's portfolio (losers) has the highest default risk and book to market ratio, and the smallest size. Nevertheless, the mentioned characteristics in different quintiles do not follow a general constant pattern. Size factor shows an identical pattern in all portfolios. The size variable in the losers' portfolio has been the least, then it has risen almost constantlyto its highest level in the winners' portfolio. Similar to default risk, book to market ratiodoes not follow a same pattern either, however, we can see the losers' portfolio has the highest default risk and the winners' portfolio has the least default risk. These results indicatethat in spite of observing a kind of regularity in the pattern of stock'scharacteristics in the momentum portfolio, the losers'portfolios' characteristics(seller party), which includesmaller stocks with higher default risk and book to market ratio, have the most transparency and vividness.

Table (2): The Characteristics of Momentum Portfolios

	First Quintile (Losers)	Second Quintile	Third Quintile	Forth Quintile	Last Quintile (Winners)
BSM	0.4711	0.4677	0.4238	0.4689	0.3316
Size	13.01	13.08	13.28	13.43	13.48
BTM	0.88	0.77	0.68	0.86	0.71

BSM: Average default risk
Size: Average size of companies (logarithm of market capitalization)
BTM: Average book to market ratio

5.Momentum and Default Risk

Here, we used BSM model as a measure for default risk. As mentioned above, this measure has much less restrictions and only needs removing stocks of companies active in the financial sector because of their unusual capital structure. Nevertheless, since these companies are usually in mid to high level, in terms of credit status and size, the removal of their stocks from the sample creates no problem in formation of momentum strategies (Muga and Santmaria, 2007b).

The data derived from BSM model calculations are used in sorting and placing stocks in quartiles, and the results of midtermmomentum strategy (6/6) are calculated to place in quintiles. If we consider default risk as a key variable, momentum profits shall be centralized in groups with higher default risk, and groups with less default risk shall not earn significant returns. According to Table (3), this prediction has not taken place, thus, we cannot conclude momentum effect generally is represented only in companies with high default risk.

Table (3): Momentum in the Sorted Groups based on Default Risk

	W	L	WML
First Quartile (The Lowest Default Risk)	%12.24	%4.81	%7.43*
Second Quartile	%10.81	%8.33	%2.48
Third Quartile	%15.74	%9.82	%5.92*

Last Quartile (The Highest Default Risk)	%11.14	%3.30	%7.84*

We can explain these findings through the relationships between BSM measure and the used variable in estimating uncertainties about assets' value. In fact, the momentum in companies with high informationuncertainty is more powerful, hence, the question comes to mind is whether the impact of default risk on momentum profitability stems from information uncertainty. In order to answer this question, we have evaluated the robustness of midtermmomentum strategy's(6/6) returns from the aspect of default risk, using 3×3 portfolios sorted separately on the basis of default risk and information uncertainty variables (book to market ratio and the company's size). According to findings (Table (4)), there is a strong relationship between momentum and default risk, however, the previous prediction indicating momentum profits are often included in stocks with higher BSM (higher default risk), has not been confirmed, hence, we can predict that default risk will not be a key variable beyond momentum effect.

Table (4): IndependentSorting on the Basis of Default Risk and Companies' Characteristics

		Size			BTM		
		Small	Medium	Large	Low	Medium	High
BSM	Low	%3.44	%9.63*	%7.87*	%10.11*	%5.42*	%2.53
	Medium	%3.54	%8.89*	%7.48*	%10.28*	%4.98	%4.85
	High	%3.54	%8.76*	%5.34*	%12.17*	%7.56*	%2.13

The results represented in Table (4) indicatethat small companies, which were omitted from the sample of Avramov et al., (2007), might have the ability to influence default risk. Also, as we can see, returns on momentum strategies in companies with lower book to market ratio, apart from the level of default risk, is higher; therefore, the argument that default risk was not a key variable in describing momentum strategies, is confirmed. These findings indicate that default risk is not a latent factor beyond momentum effect.

6.TheRobustnessTest

This test applies liquidity as an additional conditional variable in the relationship between momentum and default risk. This variable has a random reciprocal relationship with default risk (Vassalou et al., 2005) and the potential to predictfuture return performance because, among stocks with high

default risk, higher returns should be expected from stocks with higher levels of illiquidity.
In this study, liquidity has been estimated using illiquidity measureintroduced by Amihud (2002). The measure equals to the average ratio of the absolute daily return to the tradingvalue on that day:

(2) $$ILQ_{i,t} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \frac{|r_{i,t}|}{RVol_{i,t}}$$

Where:
$D_{i,t}$: The number of trading days for stock i in month t;
$r_{i,t}$: Stock i's daily return on day t;
$RVol_{i,t}$: Stock i's daily trading value on day t.

The data related to illiquidity of momentum portfolios are represented in Table (5). The losers' portfolio includes the highest level of illiquidity and the winners' portfolio includes the highest level of liquidity. The relationship between this variable and momentum portfolios is relatively similar to the relations represented by default risk and the company's size.

Table (5): Liquidity and Momentum Portfolios

	First Quintile (Losers)	Second Quintile	Third Quintile	Forth Quintile	Last Quintile (Winners)
ILQ	48.33	35.33	22.17	18.55	10.14

ILQ: Illiquidity

Applying illiquidity factor in the process of decision-making for forming portfolio, provides some additional information, focusing on the multivariate role of momentum effect (Table 6). Once liquidity variable enters into the equation, the highest momentum no longer belongs to the stocks with the highest default risk, but it is seen in illiquid stocks with low default risk. Finally, we should consider that the returns on risk-neutral strategies, when conditionedon liquidity,are significant and substantial, and are not different from the returns on risk-neutral strategies without conditioning on any other variable or the ordinary strategies. Hence, the preceding section'sfinding that default risk provides no explanation for momentum effect, is confirmed.

Table (6): Independent Sorting on the Basis of Default Risk and Liquidity

	ILQ

		Low	Medium	High
BSM	Low	%7.23*	%9.06*	%10.63*
	Medium	%7.51*	%7.48*	%9.12*
	High	%3.56	%3.01	%2.86

7.Research Summary and Conclusion

According to the results, default risk is not a key variable in explaining momentum effect. The findings also show that the momentum phenomenon is more complex than it seems. In fact, although the losers' portfoliomight be in association with information uncertainty (Jiang et al., 2005; or Zhang, 2006), pricing or arbitrage problems (Baker and Wurgler, 2006) or the investors' limited attention (Aboody etal., 2010), the characteristics of the winners' portfolio (at least with respect to the company's size and default risk) are less vivid.

Regarding the fact that the consequences of momentum strategies implementation depend on the returns' difference between the winners' and the losers'portfolios, hence, there are no guarantees about the realization of their expected return. The main reasons for this phenomenon can be attributed to behavioral issues, such as stock market cycle factors (Cooper et al., 2004), or the evolution of the winners' and the losers' portfolios against their reference points (Muga and Santamaria, 2009), which can make the whole strategy conditional.

With respect to the above-mentioned statements, it seems that explaining the origin of momentum effect requires further studies.

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