INSTITUTIONAL OWNERSHIP AS AN ADDITIONAL FACTOR TO DESCRIBE STOCK RETURNS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

ECENUR UĞURLU YILDIRIM

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
IN
THE DEPARTMENT OF BUSINESS ADMINISTRATION

MARCH 2018

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name : Ecenur Uğurlu Yıldırım

Signature :

ABSTRACT

INSTITUTIONAL OWNERSHIP AS AN ADDITIONAL FACTOR TO DESCRIBE STOCK RETURNS

Uğurlu Yıldırım, Ecenur

Ph.D., Department of Business Administration
Supervisor: Assist. Prof. Dr. İlkay Şendeniz Yüncü

March 2018, 184 pages

After the development of asset pricing models, empirical studies have shown that there are inconsistencies between these theoretical models and empirical findings. Due to these inconsistencies, asset-pricing researchers have started to examine a broader set of factors that might affect asset market behavior. As the institutional investors are huge players in the financial markets, and their importance in stock market has increased in last years, it is crucial to understand the impact of institutional investors on stock prices and on the efficiency of the market (Chen et al., 2015). In this paper, we basically hypothesize that, institutional investor variable might be a proxy for some systematic risk factor, such as asymmetric information risk, noise trader risk, or agency problem, that should be incorporated in to the asset-pricing model. 4320 firms listed on NYSE, NASDAQ and AMEX traded between January 1980 and December 2016 with complete data for size, price, book value, market value and institutional ownership are used as a sample for the analysis. Methodology similar to Fama- French (1993) paper is employed. In addition to market, size and book-to-market factors, a new variable, called IMI (institutional minus individual), which is mimicking portfolio for institutional ownership, is included to the Fama-French 3-factor model, and tested whether this new factor has a significant impact on required return of stocks. In the second part, the literature on the relation between one of the most well-known anomalies, momentum, and institutional investors is re-visited. The success of Carhart's 4-factor model, and the model with Carhart's 4-factor and IMI, in terms of explaining the returns are investigated. Overall, it can be said that, including IMI to the Carhart's 4-factor model performs better than all other models that are tested. This model captures the common variations in returns better than Fama-French 3-factor, Carhart's 4-factor and other models that are examined. Consistent with the literature, the new 5-factor model improves mispricing mostly in portfolios including stocks with low institutional ownership. When we test the empirical relationship between IMI and possible risk factors it proxies to, information asymmetry is found significantly related to IMI. Therefore, it can be concluded that IMI most likely proxies to asymmetric information risk.

Keywords: Asset pricing, Institutional ownership, Stock market, Stock returns, Risk factors

ÖZ

HİSSE SENEDİ GETİRİLERİNİ AÇIKLAMADA YENİ BİR FAKTÖR OLARAK KURUMSAL YATIRIMCILAR

Uğurlu Yıldırım, Ecenur

Doktora, İşletme Bölümü
Tez Yöneticisi: Yrd. Doç. Dr. İlkay Şendeniz Yüncü

Mart 2018, 184 sayfa

Varlık fiyatlama modelleri geliştirildikten sonra, ampirik çalışmalar, bu teorik modeller ile ampirik bulgular arasında tutarsızlıklar olduğunu göstermiştir. Bu tutarsızlıklar nedeniyle, varlık fiyatlandırma araştırmacıları varlık piyasası davranışını etkileyebilecek daha geniş bir dizi faktörü incelemeye başlamıştır. Kurumsal yatırımcılar, finansal piyasalarda büyük oyuncular olduğundan ve son yıllarda hisse senedi piyasasındaki önemleri arttığından, kurumsal yatırımcıların hisse senedi fiyatı ve piyasa etkinliği üzerindeki etkilerini anlamak çok önemlidir (Chen ve ark., 2015). Bu çalışmada, kurumsal yatırımcı değişkeninin, varlık fiyatlama modeline dahil edilmesi gereken bir değişken olduğu ve asimetrik bilgi riski, gürültücü yatırımcı riski veya temsilci problemi gibi bazı sistematik risk faktörlerinin vekili olabileceği hipotezi sunulmuştur. Çalışmamızda, NYSE, NASDAQ ve AMEX'de Ocak 1980 ile Aralık 2016 arasında işlem gören, analiz için büyüklük, fiyat, defter değeri, pazar değeri ve

kurumsal yatırımcı oranları ile ilgili eksiksiz veriler içeren şirketler kullanılmıştır. Örneklemden, finansal firmalar ve hisse senedi fiyatı 2 doların altında olan firmalar çıkartılmıştır. 4320 adet firma örneklemimizi oluşturmaktadır. Fama-French (1993) makalesine benzer bir metodoloji kullanılmaktadır. Çalışmamızın ilk bölümünde, market, büyüklük ve değer faktörlerine ek olarak, kurumsal yatırımcı oranını temsil eden, IMI (kurumsal eksi bireysel) adı verilen, yeni bir değişken, Fama-Frnech 3 faktör modeline dahil edilmiş ve bu yeni faktörün hisse senedi getirileri üzerinde önemli bir etkisi olup olmadığı incelenmiştir. İkinci bölümde ise, en çok incelenen anomalilerden olan momentum anomalisi ve kurumsal yatırımcı oranı arasındaki ilişkiyi içeren literatür gözden geçirilmiştir. Carhart'ın 4 faktörü ve IMI'den olusan 5 faktörlü modelin, hisse senedi getirilerini açıklama açısından başarıları olduğu görülmüştür. Genel olarak, IMI'nin Carhart'ın 4 faktörlü modeline dahil edilmesinin, test edilen diğer tüm modellerden daha iyi performans gösterdiği açıklanmıştır. Bu model, getirilerin ortak varyasyonlarını, Fama-French 3 faktör modelinden, Carhart'ın 4 faktör modelinden ve incelenen diğer modellerden daha iyi yakalamaktadır. Literatürle uyumlu olarak, yeni 5 faktörlü modelin, çoğunlukla kurumsal yatırımcı oranı düşük portföylerde yanlış fiyatlamayı iyileştirdiği saptanmıştır. IMI ve olası risk faktörleri vekilleri arasındaki ampirik ilişkiyi test ettiğimizde, asimetrik bilgi vekili ile IMI arasında anlamlı bir ilişkili bulunmuştur. Bu nedenle, IMI'nin asimetrik bilgi riskine vekil olabileceği belirtilmiştir.

Anahtar Kelimeler: Varlık fiyatlama, Kurumsal yatırımcılar, Hisse senedi piyasası, Hisse senedi getirileri, Risk faktorleri

To My Family

ACKNOWLEDGEMENTS

It is my pleasure to acknowledge the roles of several individuals who were instrumental to completion of my Ph. D. Research.

First and foremost, I would like to express my gratitude to my thesis advisor Asst. Prof. Dr. İlkay Şendeniz Yüncü, who I truly enjoyed working in a research environment that stimulates original thinking and initiative, which she created. Besides my advisor, I would like to thank the rest of my thesis committee: Prof. Dr. Nuray Güner, Assoc. Prof. Dr. Başak Tanyeri, Asst. Prof. Dr. Burze Yaşar, and Assoc. Prof. Dr. Adil Oran for their insightful comments and encouragement. I woul also like to present special thanks to Assoc. Dr. Engin Küçükkaya and Prof. Dr. Özlem Özdemir for their valuable suggestions and supports.

These acknowledgements would not be complete without mentioning my friends Özge Dinç Cavlak, Barış Kocaarslan, Beyza Mina Ordu Akkaya, Naz Sayarı, and Bahadır Tevfik Güler who have always been there for me in my most desperate hours.

My deepest appreciation belongs to my parents, my brother, and my husband for their endless patience and understanding.

Finally, the financial support given by TÜBİTAK is gratefully acknowledged.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Asset pricing theory and the empirical verification of the suggested models have been the focal point of a hot debate in finance literature in last decades. After the development of asset pricing models, empirical studies have shown that there are inconsistencies between these theoretical models and empirical findings. Due to these inconsistencies, asset-pricing researchers have started to examine a broader set of factors that might affect asset market behaviour (Aslan et al., 2011). In efficient market hypothesis, it is assumed that investors are rational and stock prices react only to new important information about the stock. However, empirical studies have shown that market participants might not be fully rational, and individual investors might have psychological biases. Although in traditional finance theory arbitrageurs are expected to keep assets at their “correct price” by absorbing the demand shocks via sophisticated investment strategies, DeLong et al. (1990) present in their theoretical paper that this perfect arbitrage can be broken down. Moreover, empirical studies also demonstrate the fact that these break-downs have crucial impact on the prices of stocks (see Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Gompers and Metric, 2001).

The market environment, participants, and regulations have changed since the development of these asset pricing models. Now, most of the players in the stock market are institutional investors (over 55%). As the institutional investors are huge players in financial markets and their importance in stock market has been increased in last years, it is crucial to understand the impact of institutional investors on stock prices and on the efficiency of the market (Chen et al., 2015). In this paper, we basically hypothesize that, institutional investor variable might proxy to some systematic risk factor, such as asymmetric information risk, noise trader risk, or agency problem, that should be incorporated to the asset-pricing model. Additionally, as Fama (2008) claims, anomalies observed in the empirical studies might not be because of the inefficiency of the market, but it is because of the inappropriate asset pricing models that is insufficient to include all systematic risk factors. Therefore, inclusion of a factor that represent institutional ownership might capture this risk and the anomalies observed in empirical studies might disappear. Theoretical and empirical studies that present why these risks are systematic and cannot be diversified away are summarized below. Moreover, why this new factor should capture these risks is also explained.

After summarizing the literature on the institutional ownership, its effect on asset prices and why it should be considered as a proxy for systematic risk factor, it will be empirically tested whether there is a significant relationship between new factor and expected returns. The aim of this paper is to suggest a variable that mimics portfolio for institutional ownership, which might proxy for systematic risk factor, and empirically test whether it has explanatory power on asset prices. We try to find out whether the inclusion of a new variable, which represents institutional ownership, to the Fama-French 3-factor model makes other factors' predictive power to disappear or not. It will be examined whether the inclusion of this new variable causes better fit of the empirical data to the asset pricing model. As in Fama and French (1993) paper, we employ Black et al. (1972)'s time series regression approach. We regress monthly stock returns on the market portfolios returns, and mimicking portfolios for size and book-to-market equity. In addition to them, we also include mimicking portfolio for institutional investment amounts to the regression. Slopes in this time series regression give us the factor loadings.

When studying two crucial asset-pricing subjects, employing time-series regressions are appropriate (Fama and French, 1993). These subjects are:

i) Variables, which are associated with the average returns, should be proxy for sensitivity to shared risk factors in returns, if there is a rational asset pricing. As the slopes and R square values present whether proxies for risk factors capture shared variation in stock returns that are not described by other factors, time series regressions show direct proof on this subject.

ii) As a dependent variable and explanatory variable, time series approach employs excess returns. If asset-pricing model is well-specified, the regression model gives intercepts which are not significantly different from 0. By this way, formal test of the success of common factors describing the cross section of average returns is done by examining the estimated intercepts of the model.

In the first part of our time-series regressions, in addition to Fama-French (1993) explanatory variables, which are returns on a market portfolio of stocks and two mimicking portfolios related to size and book-to-market equity, we also use mimicking portfolio for the institutional ownership (IMI) as an explanatory variable. Our analyses mainly show that, most of the time, portfolios that are created to mimic risk factors linked to size, book-to-market and institutional ownership capture strong common variation in returns. Therefore, we not only support the findings of Fama-French (1993) that states size and book-to-market proxy for some common risk factors in stock returns, we also include that institutional ownership may be another proxy for a common risk factor.

In the second part, we put momentum into the picture. In their 1996 paper, Fama and French confess the inability of their 3-factor model in explaining the cross-sectional variation in momentum arranged portfolio returns. In 2008, Fama and French present that momentum sorts of stocks yield strong positive average returns for all size groups. Average returns tend to increase from the low to the high momentum arranged portfolios. Carhart (1997) examines this phenomena and states that the persistence in mutual fund performance does not reflect better stock picking talent, instead it is mostly because of the sensitivity to common factors. He suggests four-factor model in line with a model of market equilibrium with four risk factors by including momentum factor that seize Jegadeesh and Titman’s (1993) one-year momentum anomaly to the Fama and French 3-factor model. Therefore, we examine if the Carhart 4-factor model beats our suggested 4-factor model, as momentum factor might capture the impact of IMI factor. Our results propose that, on the bottom line, there are at least five factors, which are market, size, BE/ME, momentum, and institutional ownership, in explaining the excess returns.

In the third part, in order to make more inference about which risk IMI proxies for, we investigate the relationship between these risks and IMI, empirically. Results show that, there is a significant relationship between IMI and bid-ask spread. Therefore, it can be proposed that IMI proxies to information asymmetry risk.

This thesis proceeds as follows. The following section briefly explains the existing literature on asset-pricing models and the impact of institutional ownership on asset prices. In the third section, data and methodology are presented. Fourth and fifth sections discuss the empirical results. The robustness of our interpretation that states five common risk factors describe the cross-section of expected stock returns is checked in the sixth section. In the seventh section, the possible risk factors that are candidates to be proxied by IMI are tested. The final section concludes the thesis and gives some interpretation and applications.

CHAPTER 2

LITERATURE REVIEW

In last decades, the belongings of institutional investors like banks, insurance companies, mutual funds and pension funds have shown rapid increase, and become almost 70 percent of the shares of US firms (Bogle, 2010). Although it has slightly dropped in last years, it is still over 55%. As they possess and manage huge share of US equities, institutional investors are considered as one of the most crucial market participants by managers, directors, and regulators (Parrino et al., 2003; Graham et al., 2005). Traditional asset pricing theories assume that retail investors, who try to optimize their consumption and investment over their life, determine the prices in financial markets. However, recently, households constitute only small portion of the trading volume. Unlike retail investors, portfolios of institutional investors are affected by compensation-persuaded incentives or implicit motivations occurring because of the expectedness of capital inflows into the money management business (Basak and Pavlova, 2013). Therefore, ignoring the institutional investors motivations and preferences in making investment decision might make the traditional asset pricing models insufficient in determining required returns.

In recent years, the price effect of institutional herding, which is the institutions' imitation of each others' trade, receives attention in finance literature. Nofsinger and Sias (1999) explain the difference between herding of individual and institutional investors. While the individual investors herd due to systematic but irrational reactions to trends or sentiment, herding of institutional investors occurs because of agency problems, features of securities, trends, or the way in which information is seized in the market. Lakonishok et al. (1992) state that institutions cause long-run price volatility as it destabilizes stock prices by moving away the prices from their fundamental values. As institutions have greater holdings and greater trades than individuals, in general, fluctuations in institutional demand have larger impact on stock prices. In addition to this, interrelated trading across institutional investors or herding might exaggerate the price destabilization. Nofsinger and Sias (1999) present that feedback trading, which includes the correlation between herding and lag returns, is generally limited to the small firms. However, they state that over the same period, strong positive correlation between returns of large firms and changes in institutional ownership is still observed. As this relation does not come from positive feedback, Nofsinger and Sias (1999) explain the relation between changes in institutional ownership and returns of large firms with the price effect of institutional herding. Although numerous theoretical papers claim this herding and feedback trading of institutional investors cause the destabilization of stock prices, empirical studies present that herding and feedback trading by institutional investors are not as high as expected (see Grinblatt et al., 1995; Wermers, 1999; Voronkova and Bohl, 2005). Unlike Lakonishok (1992), Dasgupta et al. (2011) state that institutional herding has a stabilizing impact on prices as recent studies have shown that there is a positive relation between the direction of institutional herding and future stock returns. Therefore, they claim that institutional trading drives prices toward equilibrium rate.

In traditional theories, arbitrageurs, who employ sophisticated trading strategies to maintain the asset prices in their "correct" level, absorb the demand shocks. However, some studies have shown that sometimes, perfect arbitrage can be broken down (see DeLong et al., 1990; Shleifer and Vishny, 1997). Gompers and Metric (2001) claim that there are basically two reasons why there is difference between individuals' and institutions' investment decisions. The first reason is that, institutions are more informative about the historical return patterns and believe them to be usable anomalies. Share prices and demand of uninformed investors to risky assets decrease because of an increase in information asymmetry. In traditional asset pricing models, if the market is efficient, then information is already included into the prices and therefore there is no need to take this new information into consideration. However, if asset prices are repeatedly revised to reflect new information, in other words if efficiency is dynamic, then efficiency is a process. The market microstructure theory has shown that there is an important connection between the private information and an asset's bid and ask trading prices, however, there are a few studies that show these kinds of information actually influence asset-pricing fundamentals. If this is the case, one cannot distinguish how asset prices become efficient from asset returns (Easley et al., 2002). The reduction of prices is due to the increase in the exposition of uninformed investors to more liquidity risk because of raise in information asymmetry (Easley and O'Hara, 2004). Second reason is that, institutions might have different risk and return preferences, and might think that differences in historical returns across stocks are because of differences in risk. Nagel (2005) states that one of the reasons behind the return predictability might be the variation in rational expected returns across companies, and the other reason might be the mispricing which causes overpriced companies to earn low future returns and vice versa. As mentioned above, if mispricing continues to exist in the presence of sophisticated professional investors, there has to be some limits to arbitrage. Nagel (2005) states that short-sale constraint is one of these limits to arbitrage, and therefore, it is expected to observe predictability among stocks with low institutional ownership. They use institutional ownership as a proxy for short-sale constraint and state that cross-sectional stock return anomalies can be explained by this variable. They present that the underperformance of low book-to-market, high volatility and high turnover stocks are more observed in low institutional ownership stocks. Studies indicate that there is a positive correlation among institutional demand over following quarters and there is a positive relation between the institutional demand and returns over the following year (Sias, 2004). Moreover, studies have shown that stocks heavily held by mutual funds in a given period outperform stocks heavily sold by mutual funds in same period in following 6 months (Wermers, 1999).

Chung and Wang (2014) state that there might be particular firm characteristics that institutional investors may favour, which might relate institutional ownership to a leverage of firm. While some researches present that large and safe stocks are desired by institutional investors (see Del Guercio, 1996; Gompers and Metric, 2001; Chung and Wang, 2014), some others state that over time the preference of institutions have transformed from large and safe stocks to small and risky ones (see Bennett et al., 2003, Chung and Wang, 2014). Gompers and Metric (2001) state that institutions differ from individuals in terms of the demand for stock characteristics, like they prefer to invest in larger, more liquid stocks, and stocks that have had relatively low returns during previous year. On the other hand, empirical studies show that pension fund managers operate as feedback traders particularly on buy side. Moreover, they generally take positions in stocks of small firms with high past performance (Jones et al., 1999).

Unless the demand and supply curves for stocks are perfectly elastic, the demand shifts resulting from institutional investors will affect stock market prices and returns. In order to show the effect of demand changes on prices, Gompers and Metric (2001) present that level of institutional ownership forecasts returns. Extant papers show that institutional investors have strong impact on stock markets. Xavier et al. (2006) propose a theory claiming that in relatively illiquid markets, the movements in markets are because of the trades by large institutional investors. Even if there is no change in fundamentals, this kind of trades might create significant spikes in returns and trading volume. Gompers and Metric (2001) have shown that institutional trading varies positively with future stock returns. They state in their study that, the empirical findings about the disappearance of the small firm effect, which is the stock premium on small firms, might be due to the fact that institutional investors have demand for large companies' stocks. Likewise, Zheng et al. (2015) present that holdings of institutional investors, which is the percentage as the number of shares possessed by institutions divided by the estimated public float, have strong predictive power in future stock returns. Puckett and Yan (2013) state that the interim trading performance of institutional investors is positive and persistence because of their trading skills. Field and Lowry (2009) find that newly publicly firms with lower institutional ownership perform worse over several horizons than firms that have higher institutional ownership. They show that companies with the lowest institutional ownership have significantly negative abnormal returns over the one-quarter, one year and two-year time periods. Similarly, Boehmer et al. (2006) presents that one year holding period returns of IPOs are positively related with the percentage of the institutional investors, even after controlling for heterogeneity across IPOs. In other studies, Lakonishok et al. (1992) and Cohen et al. (2002) present that institutional ownership and stock returns are contemporaneously correlated. Barinov (2017) has shown that the difference in aggregate volatility risk can explain why several anomalies are stronger among the stocks with low institutional ownership. He states that institutions tend to stay away from the stocks with extremely low and extremely high levels of firm-specific uncertainty, as they want to hedge against aggregate volatility risk or exploit their competitive advantage in gaining and processing information. He ranked firms according to their institutional ownerships and finds that CAPM and Fama-French (1993) alphas of the strategies are larger in the lowest institutional ownership quintile. He finds that the difference in the alphas between highest and the lowest institutional ownership quintiles is significantly positive.

Studies also show that short-term reversals might also be related to institutional investors. In their empirical study, Dasgupta et al. (2011) have shown that stocks with greater than average institutional ownership present significant return reversals related to a persistent institutional trading.

As it is mentioned, empirical studies mostly demonstrate that there is a relationship between institutional ownership and asset returns and volatilities. Theoretically, the difference between the information level of institutional and individual investors, their level of rationality and the agency problems are presented as a reason behind the influence of the amount of institutional ownership on asset prices. The next sections summarize these theoretical papers.

2.1 Information Asymmetry

One of the main assumptions of CAPM is that individuals have common beliefs, and assets are priced consistent with these beliefs. In equilibrium, investors are rewarded with greater expected returns for holding market risk. On the other hand, holding idiosyncratic risk has no compensation, as it can be diversified away. Investors are only rewarded for holding systematic risks in traditional asset pricing models like CAPM. According to these models, since the price of stock always reflect all relevant information, information asymmetry should not be priced (Ghoul et al., 2013). Nonetheless, Easley et al. (2002) state that if the dynamic of new information arrives, this static perception of market efficiency is hard to hold. Moreover, trading with informed investors creates information risk for uninformed ones for stocks with different level of public and private information. Therefore, it is still controversial topic whether information asymmetry risk can initiate price disequilibrium so influences the cost of equity, or whether it can be diversified away (see Ghoul et al., 2013; Hughes et al., 2007; Core et al., 2008).

According to Wang (1993), information asymmetry might affect required return in two different ways. First, risk premium is asked by uninformed traders as they are trading with informed ones, which is the positive effect. Second, consistent with Grossman and Stiglitz (1980), prices become more informative as a result of informed investors trading, which decreases the uncertainty so have negative effect on required return. Therefore, these two opposing effects' consequence is vague. Studies about this topic is also controversial. While Easley and O'Hara (2004) present model that shows adverse selection caused by private information produces equilibrium differences in asset returns and premium is required by uninformed traders for the companies with higher private information especially in finite economy, some other studies, like Hughes et al. (2007), claim that cost of equity should not be affected by information asymmetry as by possessing well-diversified portfolios, information asymmetry risk can be eliminated in large economies. Easley et al. (2002) present a model that shows if investors have different information, which is not completely revealed in equilibrium, we end up with different situation. In case of asymmetric information, although the assumption of rationality of investors still holds, these investors come to different beliefs about security as long as all information is not fully exposed. Though investors have common priors, investors with private information will also have better beliefs, and by this way they can accurately realize expected excess returns on some securities, and construct better portfolios. As a result, existence of private information leads to expected excess returns to some assets. They claim that private information can cause a raise in required expected returns (Easley et al., 2002). Another theoretical study presented by Jones and Slezak (1999) states that changes in the variance of news and liquidity shocks in time have different impact on agents' portfolio holdings, thus affect asset returns. Easley and O'Hara (2004) state in their paper that compared with the informed traders, uninformed one's portfolios always contains a larger amount of stocks with bad news and smaller amount of stocks with good news. This information risk cannot be removed by obtaining more stocks. Because of this, in order to tolerate this information risk, uninformed investors demand reward. Although it is expected that investors can arbitrage away any higher asset premium, Easley et al. (2002) show if asymmetric information risk exists, the risk stays in equilibrium even though all investors know it is there. It is stated that stocks with little information will have higher expected returns, as these securities are riskier than stocks with more information for traders. Moreover, they claim that this risk is different from the market risk, presented by beta, so it has impact on measured excess returns. Inclusion of different explanatory in regression cannot eliminate the direct relationship between expected return and the probability of informed trading, so the risk of private information is crucial determinants of required returns. An important point in this paper is that they try to answer the question of why private information has a significant large positive effect on asset returns in an efficient capital market. It is expected that, unless it is a systematic risk, the arbitrageurs' actions should eliminate any kind of proposed influence on the market. Easley et al. (2002) state that, this is not hold for asymmetric information factor, since in a world with asymmetric information; investors with better information always have advantageous over uninformed investors. This disadvantage of uninformed investors might cause this investors' portfolio holding too much of the stock in bad times, and too little of the stock in good times. As the uninformed traders do not know the appropriate weights of each asset to hold, holding many stocks is unable to remove this effect. In this point of view, as it cannot be diversified away, asymmetric information risk is systematic risk like market risk. In their model, the informed investors will not simply trade the effect away as they are also confronting risk in holding the asset. These informed traders are also risk-averse, and therefore there will be always a premium to hold the risky asset. However, informed traders can modify the composition of their holdings to integrate new information. So, private information raises risk to the uninformed ones. Therefore, Easley and O'Hara (2004) assert that information risk is a systematic risk as the risk premia persuaded by information asymmetry stay even in markets with large amount of assets. They conclude their paper by stating firms can decrease their cost of capital by reducing the amount of private information, or by raising the diffusion of firm across traders.

In sum, papers mentioned above claim that asset returns can be affected by asymmetric information. If there are informed traders in the market, because of the adverse selection risk, higher bid-ask spread will be asked by risk-neutral market maker (Easley and O'Hara, 1987). In a usual market, whereas informed investors make transactions according to the private information that is not presently reflected in price, uninformed ones make transaction for other reasons than private information (Choi et al., 2013). In order to recuperate their lost for coping with informed traders, uninformed ones are inclined to raise their bid-ask spreads (Brockman and Chung, 2000). Because of this logic, in the literature, the bid-ask spread is used as a proxy for information asymmetry among traders (see Demsetz, 1968; Bagehot, 1971; Choi et al., 2013).

Although the number of analysts following a stock is used as a usual proxy for informed trading, Easley et al. (1998) present that as the structure of trading contains more noise traders if more analysts exist, this proxies is not suitable for measuring informed trading. One of the most common proxy for the information asymmetry is the probability of informed trading (PIN) developed by Easley et al. (1996). In their 2002 paper, Easley et al. claim that private information affects the price evaluation of investors, and so influences the risk of holding that asset and the cross-sectional asset returns. As private information cannot be observed directly, they employ structural market microstructure model to develop a measure of the probability of information-based trading (PIN) in individual stocks. They conclude that the higher the probabilities of information-based trading, the higher will be the rates of return, so the probability of information-based trade is priced in asset returns. They basically hypothesized that if the risk of information-based trading for stock is higher, the required return for that security should also be higher, so the coefficient of PIN should be positive, when it is regressed by rate of return. Empirical studies have shown that there is a significant positive relationship between PIN measure and average stock returns, which supports uninformed traders required reward for holding stocks with more information asymmetry (see Easley et al., 2002; Easley et al., 2010). Additionally, empirically they verify this hypothesis, as they find PIN, their proxy for information-based trading, dominates all other variables, including market risk. They conclude that the impacts of information might be more pervasive and crucial, and asset-pricing models have thus far considered.

In Aslan et al. (2011) modify Easley et al. (2002) paper by defining the relationship between firm characteristics as captured by accounting and market data and a company's probability of private information-based trade (PIN) as anticipated from trade data. By this way, they can determine what types of firms have high information risk. They state that information risk arises when some traders have better information than other investors about prospects of company. They find that the impact of their modified proxy for information-based trading is robust to the addition of explanatory factors like beta, size, book-to-market, and momentum. They, as Easley and O'Hara (2004) conclude that in rational expectations equilibrium, assets with more private and less public information should have higher expected returns. Aslan et al. (2011) show that smaller, younger firms, firms with more insider holdings, companies with higher institutional holdings are more likely to have greater information risk.

O'Neill and Swisher (2003) expand Easley et al. (1996) by exploring whether differences in institutional ownership and their trade associated with the level of informed trading and the asymmetric information costs it causes. Following these studies, it can be inferred that institutions might have information advantage over individual investors, which affect the required rate of returns on equity. However, in the literature there is no consensus on this topic. While institutions sometimes are considered as liquidity traders, not informed traders like insiders which is why inverse relationship between bid-ask spread and institutional ownership is expected (Kini and Mian, 1995), other studies, like Fehle (2004), state that there might be positive relation between bid-ask spread and institutional holdings for some kinds of institutions like banks and investment management firms, as they have privilege in accessing private information. O'Brein and Bhushan (1990) state that information asymmetry decreases with high institutional holdings as companies with high institutional holdings' analyst coverage is greater which causes information diffusion. Heflin and Shaw (2000) claim that the U.S. companies with higher block ownership have greater bid-ask spreads as these block shareholders might have access to private information due to their role as a monitor for corporate operations. On the other hand, they might also decrease information asymmetry as they might assist to decrease agency cost by monitoring the actions of management and applying long-run investment perspective which enhance information environment and information transparency (Hope et al., 2009). Empirically, while Sarin et al. (2000) finds that higher institutional holdings are related to the wider spreads, other empirical studies like Tinic (1972) and Hamilton (1978) present inverse relationship between holdings of institutional investors and bid-ask spread. In other study, Agarwal (2007) states that there is U-shaped relation between institutional ownership and stock liquidity as information advantage of institutional investors might have impact on stock liquidity negatively via adverse selection and positively via information efficiency channels. Carleton et al. (1998) state that institutional investors are expected to have advantage to reach management and inside information. Studies have shown that institutional investors have tendency to monitor managers as they have long investment horizons and focused share holdings (see Shleifer and Vishny, 1986; Chen et al., 2007; Ramalingegowda and Yu, 2012). Lev (1988) states that marginal cost of obtaining information is lower for institutional investors.

Empirical studies also support the view that generally institutional traders are more sophisticated relative to individual ones (see Hand,1990; Utama and Creadey, 1997). In the literature, there are many studies that show institutional investors are more informative than individual investors. Main drivers of institutional investments are superior information gathering and processing skills. They have superior information as they have greater access to information and they have more resources to process this information. As they can directly communicate with publicly traded firms and brokerage firms, and as they use professionals and technologies, they have superior information processing and gathering skills than individual investors (Hendershott et al., 2015). Since institutional investors require lower average cost to get and process information because of economies of scale, these investors are generally believed informed traders. As a result, in assessing information and monitoring the firms, these institutional investors can be more efficient than small, individual investors (O’Neill and Swisher, 2003). Lang and McNichols (1997) show that there is a direct relation between institutional holdings or changes in these holdings and earning performance. Empirical studies support the view that there is information asymmetry between institutional and individual investors. Badrinath et al. (1995) present that returns of stocks with high institutional ownership lead returns of stocks with low institutional investors. Boehmer and Kelley (2009) claim there is a linkage between institutional investors and more efficient pricing. Irvine et al. (2007) state a significant raise in institutional trading and profitable buying five days before the public release of analysts' initial reports containing positive recommendations. Hendershott et al., (2015) find that institutions, in general, are able to foresee information before it becomes public news. Therefore, they claim that institutions are generating value relevant information for stocks and support the claims based on institutional holdings and institutional trading increase price efficiency. Additionally, their results support the view that news decreases the informational asymmetry. Institutional investors are seemed to have tendency for particular stock characteristics like large firm size, which cause twisting impact on institutions' involvement to price efficiency (Gompers and Metric, 2001). Studies have shown that cost of equity capital might increase as volatility of stock return is raised by institutional ownership (see Potter, 1992; Sias, 1996).

Nagel (2005) and Cohen et al. (2002) also state that institutional investors are sophisticated, and in terms of IPOs, they have certain advantages over individual investors as they have links to venture capitalists and underwriters. Chemannur et al. (2009) claim that institutions can earn superior returns around seasoned equity offerings as they have private information. Furthermore, they show that institutional investors are capable of finding and getting more allocations in SEOs that have better long-run stock returns. While trading, they follow the same direction of their private information and they outperform the naive buy-and-hold trading strategy. Likewise, existing literature presents that institutions get more allocations in IPOs with better long-run performance by retaining valuable private information about IPO firms (Boehmer et al., 2006). Moreover, in addition to the better knowledge of institutional investors, Nagel (2005) claims that institutional ownership might be proxy for the speed of information diffusion as it is correlated with analyst coverage, which is again a sign of information asymmetry since it implies some parties obtain information timelier.

In case of information asymmetry, investors tend to herd on actively traded stocks. Less informed investors incline to follow the sophisticated institutional investors instead of processing the financial information by themselves, which causes the deviation of stock prices from their fundamentals and put fundamental risk on stock prices. Herding is considered more widespread among institutions than among individuals as institutions have more information about each other's' trades than individuals, which causes to extrapolate information about the quality of each other's' investment and consequently herd (Shiller and Pound, 1989; Banerjee, 1992; Bikhchandani et al., 1992). Another reason that institutions herd more than individuals is the exogenous signals that they react are more correlated. This herding behaviour influences both short-term future returns and long-term stock returns (see Zheng et al., 2015; Lakonishok et al., 1992). By employing the number and intensity of institutional ownership as a proxy for competition among institutional investors, Akins et al. (2012) present that if the competition is high, then the pricing of information asymmetry is low.

Finally, it can be pronounced that, although researches present there is a relationship between informational environment and institutional ownership, these studies are not well-defined in terms of whether institutional traders cause changes in the informational environment or whether these investors have a tendency to invest in companies with specific informational quality (see Healy et al., 1999, Healy and Palepu, 2001; Roberts and Whited, 2012; Boone and White, 2015).

Following the studies above, we can state that asymmetric information can be considered as systematic risk factor that is expected to be priced. However, unlike these studies, we claim that another variable showing institutional ownership, might be better proxy for asymmetric information. Because in the literature, large body of studies present indication against the soundness of PIN as an information asymmetry proxy (see Aktas et al., 2007; Duarte and Young, 2009). Moreover, some other proxies for information asymmetry, like abnormal accruals in accounting earnings, analysts earning forecast dispersions, and the information disclosure level, are also employed in order to investigate whether information risk is important for cost of equity capital of firms (see Botosan and Plumlee, 2002; Bhattacharya et al., 2003; Francis et al., 2004; Aboody et al., 2005; Ghoul et al., 2013). While these measures also find significant positive impact of information asymmetry risk on required return of equity capital, as PIN, these measures are also criticized by other studies which claim these proxies are revealed simultaneously with other factors associated with equity pricing (Ghoul et al., 2013). As the literature contains large body of theoretical and empirical studies that present institutional traders are informed ones, the new systematic factor that is suggested in this paper might be proxy for information asymmetry. Therefore, in this paper, it is examined whether the institutional ownership as a percent of number of shares outstanding has significant impact on excess returns, which might show firms with private information require higher excess return as the theory states.

2.2 Investor Rationality

As it is mentioned above, in efficient market hypothesis it is assumed that investors are rational and stock prices react only to new fundamental information about the stock. However, empirical studies have shown that market participants might not be fully rational, and small individual investors might have psychological biases. In the literature, it is commonly stated that while individual investors are mostly unsophisticated investors, who trade mainly for reasons that are not associated with information (see Odean, 1999; Barber and Odean, 2008; Barber et al., 2009, Ramalingegowda and Yu, 2012), institutional investors are sophisticated traders that are more crucial than individual investors in terms of setting price in capital markets (see Hand, 1990; Chan and Lakonishok, 1995; Sias et al., 2006). Some existing studies state that individual investors, who are less sophisticated and less experienced than professionals, might drive process away from their fundamental values. Delong et al. (1990), for example, have shown that individual investors trade based on noise or sentiment. In their paper, Delong et al. (1990) present a model of asset pricing model on the idea that the unpredictability of the view of not-fully rational investors, noise traders in other words, make resale price risk on the asset they trade. These noise-traders' expectations about asset returns are affected by sentiment, which is stochastic and unpredictable. This additional risk, created by noise traders, is called "noise-trader risk". If many assets are subject to fluctuations of same noise-trader sentiment, this risk is undiversifiable, and it will be priced in equilibrium. In other words, not fully rational investors can add some independent systematic risk, which is a unique systematic risk factor that we cannot capture in traditional asset pricing models. Therefore, assets subject to noise trader risk will generate higher expected returns than securities that are not subject to such risk. Relative to their fundamental values, these assets will be under-priced. Massive theoretical and empirical literature state that institutional investors are rational relative to the individual investors. Individual investors are more prone to such sentiments and are affected from psychological biases. Barber and Odean (2000) find that individual investors consistently misinterpret information available to them, and they inexplicably buy stocks that grab their attention, which leads to poor subsequent returns. On the other hand, professional investors are less likely to show such tendencies. Field and Lowry (2009) claim that, the excess returns obtained by institutional investors are not due to obtaining private information, but it is because of institutions using readily available public information to their advantage, while individual investors seem to either underweight or misinterpret such information. Cook et al. (2003) offer evidence that investor sentiment has negative impact on long-run returns. As Nagel (2005) state, financial markets include both rational and some irrational investors, and institutional investors are inclined to belong the rational group. They present a model that states cross-sectional predictability observed in literature is because of mispricing, which cannot be eliminated by sophisticated investors due to short sale constraints. Lakonishok (1992) states that institutional herding might have stabilizing effect on prices. Institutions might increase the efficiency of the market by expediting the adjustments of prices to new fundamental information or by opposing the same irrational moves in individual investor sentiment. In the literature, some other studies have shown that institutional investors, who are considered as rational and can assess the fundamentals better as they can reach different news reports and analyses, oppose changes in individual investors' sentiment. These institutional investors only herd, if they receive correlated information and interpret them similarly. Moreover, these studies claim that negative-feedback strategies, like buying (selling) securities that have decreased (increased) too far, are followed by these rational institutions (Lakonishok, 1992).

To sum up, studies have shown that the assumption of rationality in traditional asset pricing models makes these models fail empirically, because individual investors are not fully rational. Therefore, stocks with high institutional investors should be affected by the irrational investments less. So, cross-sectional pricing anomalies should be focused among stocks with low institutional investors. Then, we hypothesize that, putting an additional factor representing the rationality of investors should correct these mispricing and cross-sectional anomalies. Moreover, Lee et al. (1991) state that size effect can be explained by investor sentiment, as smaller stocks, which have highest individual ownership, co-move with closed-end fund discounts which is considered as a proxy for investment sentiment. Inclusion of new factor that represents the amount of institutional ownership might capture the role of size-factor, since it is expected to be more of a direct proxy for investor sentiment. Therefore, inclusion of additional variable representing percentage of institutional investor on this stock is expected to be proxy for systematic risk caused by noise traders.

2.3 Agency Problem

In traditional asset pricing models, it is assumed that investors directly invest their wealth in markets. However, as mentioned above, in last few decades, institutional holdings, rather than individual investments, rose sharply. There is a potential agency problem when financial institutions control huge amount of stocks, as the last decision makers are not the owners. In asset pricing models, on the other hand, agency problems are not considered. In the literature, researchers try to explain anomalies by assuming market incompleteness, transaction costs and other kind of frictions. Though these explanations help us to account for some of the anomalies, some of them remain unexplained. This brings behavioural models of asset pricing into the scene. Unlike neo-classical approach, this approach does not assume all investors are rational. Instead it allows some of them be not fully rational. In this model, arbitrage by rational investors is limited by some imperfections like "agency problem" (Allen, 2001). Institutional investors can have positive or negative impact in terms of agency problem. In one hand, by monitoring the manager's action, they can help reduce the agency problem in firms. A large body of studies claim that the quality of corporate decision making and the managerial efficiency can be improved by institutional shareholders, as these investors have incentive to monitor managers actively because of their massive stock holdings (see Demsetz, 1983; Shleifer and Vishny, 1986). Additionally, some other studies present that bad-performing companies on the watch-list of institutions perform enhancement in profitability and share prices (see Opler and Sokobin. 1997; Smith, 1996). A massive research states that debt level of a firm is affected by the level of institutional ownership. One reason for this is that as institutional investors can play a monitoring role, the cost of debt monitoring can be reduced by substituting debt. Moreover, institutional investors and debt might perform complementary role in order to decrease the agency cost between managers and shareholders (Chung and Wang, 2014). In empirical studies, while Michaely and Vincent (2013) show that firms' debt levels are decreased by institutional ownership, La Porta et al. (2000) present that in order to limit the discretion of managers, institutional investors might persuade firm to increase its leverage. Therefore, by monitoring and reducing leverage, increase in the portion of institutional investors in a firm is expected to decrease the riskiness of firm. On the contrary, bunch of other studies argue that institutional investors might be unable to monitor and identify problems (Taylor, 1990). As the managers of funds are rewarded on short-term performance measures, they hesitate to take long-run perspective, so they have less incentive to monitor (Coffee, 1991).

On the other side, institutional investors might subject to another kind of agency problem, which causes herding. Herding is observed more among institutions than individuals. One of the reason why herding is more widespread among institutions than individuals is that as money managers are assessed against each other, they prefer to hold the same stocks as other money managers, to prevent falling behind others by applying a unique investment strategy (Scharfstein and Stein, 1990). According to Lakonishok (1992), money managers are hesitated to follow fundamental strategies like contrarian investment strategies, since pay-offs of these strategies are realized in long-term, which causes money managers to seem to have bad performance in short-term and put their jobs at significant risk. Because of these, they tend not to follow fundamental strategies but follow short-term strategies, which causes destabilization in stock prices. Basak and Pavlova (2013) find that compared with individual investors, institutional ones raise the portion of index stocks in their portfolio in order to prevent falling behind when the index doing well, because relative performance is important for them as their year-end payment depends on it. Allen (2001) suggests that occurrence of the bubbles might be explained by the existence of agency problems in financial institutions. Due to limited liability, institutions make risky investment decisions, and they are willing to pay more than discounted cash-flows for an asset. Therefore, risky assets become attractive and bubble can occur. He states that the relation between financial assets and asset pricing is not yet well understood. Financial institutions should be incorporated into asset pricing models. In addition to numerous empirical studies, the 2007-2008 financial crisis has shown that institutions have a crucial impact on asset prices. However, there are not much theoretical studies about the equilibrium in case of the existence of professional money management (Basak and Pavlova, 2013). In 1993, Brennan tries to launch institutional traders into asset pricing model, and demonstrates that expected returns are produced by 2 factors in equilibrium, which are market and index. Some other studies demonstrate that institutional limitations are mostly severe in crises times which triggers raise in Sharpe ratio of stock and conditional volatility, and imitating other patterns spotted during bad states of world (see Gomez and Zapatero, 2003; cornell and Roll, 2005; Petajisto, 2009; Basak and Pavlova, 2013). Basak and Pavlova (2013) demonstrates that the portion of stock market index that is invested by institutional investors is higher than individual investors, which means institutions result in bearing more risk than the individual investors. Additionally, the paper indicates that the volatility of the index is also affected by institutional investors, as they have an impact on the level of the index. As they demand riskier portfolios compared with individual investors, in the existence of institutional investors, the volatility of index is raised. This supports the empirical studies that claim in bad state of the economy, the stock market volatility raises (see Schwert, 1989; Mele, 2007). Likewise, Basak and Pavlova (2016) demonstrate that without institutions, supply and demand risks settle the commodity prices. However, when the institutions come into the picture, the volatility of storable commodities raise as additional risk, which is 'falling behind the market', appears.

The factor that we propose, might fill the gap that Allen (2001) stresses out, as it incorporates institutional holdings into the asset-pricing model. Gompers and Metric (2001) also state that although individuals have some control over the final investment choices of their agent institutions, this control is not perfect, and it is expected for different incentives to result in different demand patterns between the two groups. Therefore, not employing any factor representing institutional ownership into the asset-pricing model might cause inaccurate information about the fundamental value of stock, and we might think that there is mispricing and the existence of an anomaly, although it is due to the incapability of asset pricing model that we use.

In terms of agency problem risk, the relationship between the factor that represents institutional ownership and the required rate of return is not clear at this point. If the increase in institutional ownership reduces agency problem by monitoring the actions of managers, it is expected that there is a negative relationship between institutional ownership and required rate of return as the firm is less risky. On the other hand, if the firm is preferred by institutions as it is riskier and fund managers invest them to increase their personal wealth, then it is expected to observe positive relationship between the amount of institutional ownership and the required return.

Under the light of these theoretical and empirical studies, it is expected that the factor of institutional ownership, which will be described in the following section, should be included to the traditional asset-pricing models. It might be proxy to the asymmetric information risk, noise-trader risk, agency problem risk that cannot be diversified away. Although the effect of this new proxy on required rate of return on equity is not clear, it is expected that it will be negative, meaning that there is negative relation between expected return and proportion of institutional investors due to information asymmetry risk, noise trader risk or agency problem risk. This new proxy might capture the role of SMB or HML factors in Fama- French 3 factor models. As mentioned above, size factor might be proxy to the investor sentiment, which might be represented by institutional holding factor better.

Next section will give information about the data that will be used and the methodology of this study.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Data

In this paper, time-series regression analyses are used to explain the cross-section of average returns with the premiums for the common risk factors in returns. Data used to calculate the institutional ownership variables is obtained from quarterly institutional ownership data of Thomson Financial 13F database. Holdings are reported quarterly on the SEC's form 13F; in which all common-stock positions higher than 10,000 shares or $200,000 must be disclosed. The five types of institutional investors in the database are (1) bank, (2) insurance company, (3) investment company (mutual fund), (4) investment advisor, and (5) other. The first three categories are self-explanatory; the investment advisor category includes most of the large brokerage firms; the "other" category includes pension funds and university endowments. We do not make any distinction from these categories and include all of them as institutional investors in our analyses.

Data on stock returns, stock prices, share outstanding and trading volumes, book values, and risk-free rates are from DATASTREAM.

Non-financial firms listed on NYSE, NASDAQ and AMEX traded between January 1980 and December 2016 with a complete data for size, price, book value, monthly value and institutional ownership are used as a sample for the analysis. Following Fama and French (1992), we exclude financial firms as high leverage which is usual for these companies might have different definition for nonfinancial ones. After excluding the financial firms and the firms with stock prices less than $2 at the end of each quarter, 4320 firms listed on NYSE, NASDAQ and AMEX is included to the data set. Sample period employed in this study is from January 1980 through December 2016. Our sample begins from 1980 as data on institutional investors is available after this date.

Book value is defined as the addition of value of the equity of the shareholders and balance-sheet deferred takes minus preferred stock's book value. Market values is the multiplication of price of firm's stock on an exact date, times the number of outstanding shares of that firm on same exact date. Book-to-market equity (BE/ME) is found by dividing book common equity for the fiscal year ending in calendar year t-1 by the market value at the end of calendar year t-1. In order to include a firm to our sample, the firm has to have stock prices for December of year t-1 and June of year t. Moreover, they need to have book equity for year t-1.

Summary statistics of the data that are used are given in Appendix A on a yearly basis. Figure 1, Figure 2, and Figure 3 present the monthly averages of institutional ownership as a percent of total shares outstanding, monthly averages of market sizes, and monthly averages of book-to-market equities of firms used in our sample, respectively. As it is mentioned above, the institutional ownerships are huge players in financial markets and the importance of them in stock market has been increased in last years (Chen et al., 2015). Figure 1 shows the monthly average of firms' value of institutional ownership portion in total outstanding shares for the period January 1980 to December 2016. In Figure 1, you can see the institutional ownership percent in total shares outstanding has been increased in last 30 years. Now, most of the players in the stock market is institutional investors (over 55%). Figure 2 demonstrates the monthly average of firms' market values, which is price times number of outstanding shares for the period January 1980 to December 2016. As can be seen from the graph, there is an increasing trend for the averages of market value. Moreover, it can be said that market value and institutional ownership move in same direction mostly. At Figure 3, monthly averages of book-to-market values of firms in our sample can be seen. Unlike size and institutional ownership, there is a decreasing trend in book-to-market equity on average for the period January 1980 to December 2016.

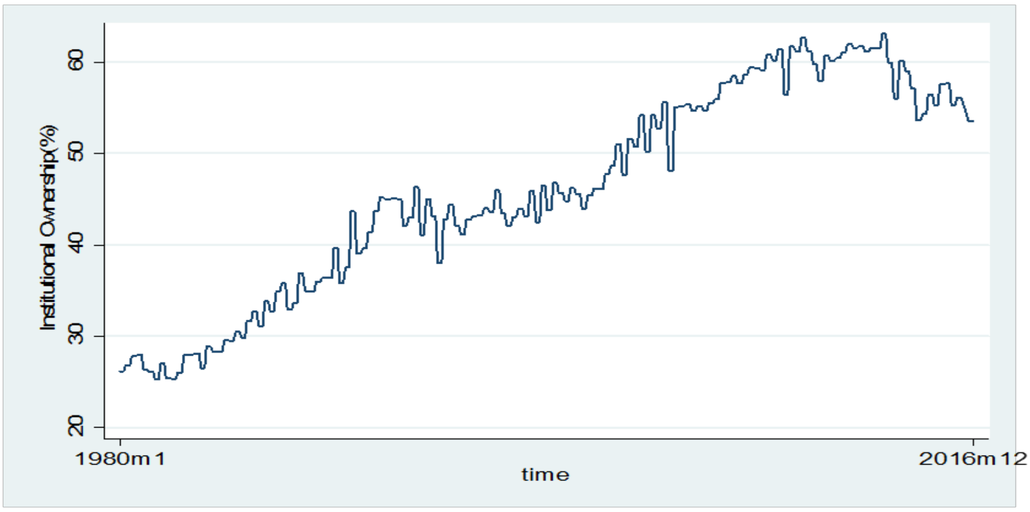

Figure 1. Monthly Averages of Institutional Owners (% of outstanding shares) of Firms: January 1980- December 2016

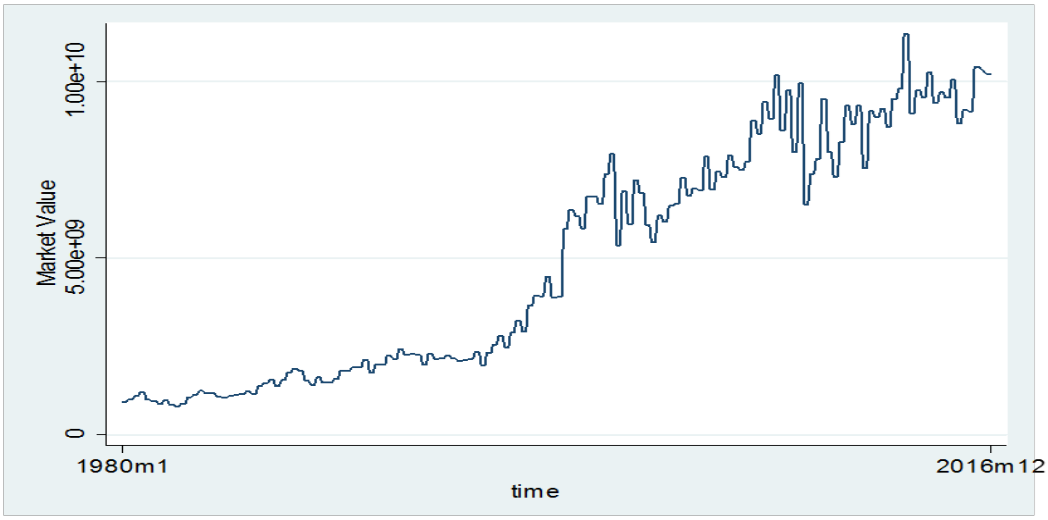

Figure 2. Monthly Averages of Market Values of Firms: January 1980- December 2016

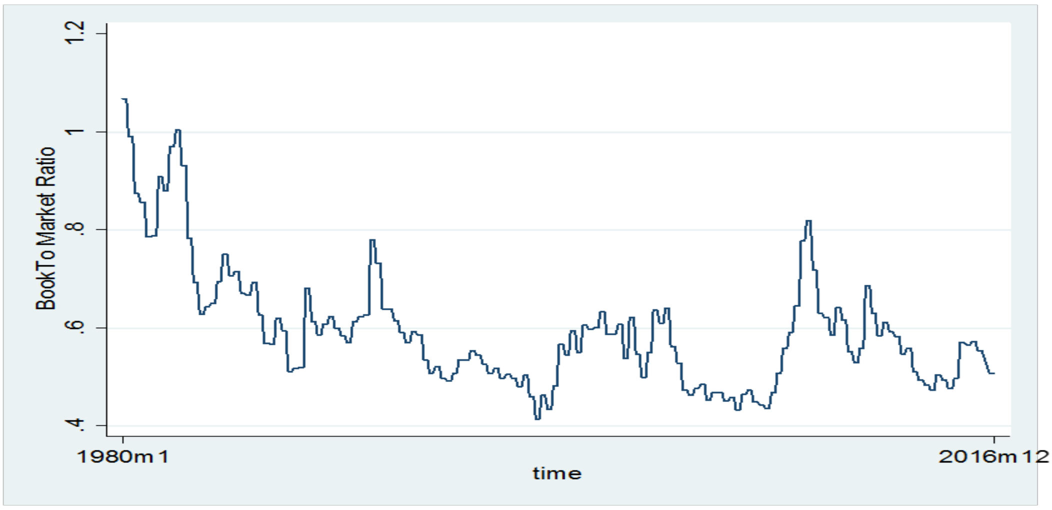

Figure 3- Monthly Averages of Book-to-Market Values of Firms: January 1980- December 2016

3.2 Methodology

In this study, our aim is to test whether including mimicking portfolio for institutional ownership to the asset pricing models helps us to explain the returns better or not. In order to do this, we put additional variable, which is proxy for some systematic risk factor related to the institutional ownership, to the Fama-French 3 factor, and see if it has additional explanatory power on stock returns. Time-series regression analyses are employed as in Fama and French (1993).

Before explaining the methodology that we follow to find variables in analyses, we will give brief introduction about the methodology that Fama and French employed in their 1993 paper.

As explanatory variables, they use market factor, Small-minus-Big (SMB), and High- minus- Low (HML). Market factor is the one-factor used in Capital Asset Pricing Model (CAPM), which is the difference between return on market portfolio and risk- free rate. Return on market portfolio, R_{Mt} , is calculated by Fama and French by taking the value- weighted percent monthly return on all stocks in the 25 size-BE/ME portfolios plus the negative-BE stocks excluded from the portfolios Risk- free rate, R_f, one-month Treasury bill rate. The second risk factor is size factor (SMB) which is the mimicking portfolio return for the common size factor in returns of stock. SMB is calculated by taking the difference between the returns on small stock portfolios and the returns on big stock portfolios. The last risk factor in Fama-French 3-factor model is the HML, which is the mimicking portfolio return for the book- to -market equity factor in stock returns. HML is the difference between returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks. The details of how these mimicking portfolios are calculated are given below.

In June of each year from 1963 to 1991, all NYSE, AMEX and NASDAQ stocks in their sample are ranked on size, which is price times number of outstanding shares. The median of NYSE size is used to split stocks as small (S) and big (B). Likewise, all stocks in their sample are divided into three book-to-market equity groups according to the divisions for the bottom 30%, middle 40%, and top 30% (low (L), medium (M), high (H) accordingly) of the ranked values of BE/ME of NYSE stocks in the sample. Then, Fama- French came up with 6 portfolios by intersecting these groups (S/L, S/M, S/H/ B/L, B/M, and B/H). After forming these portfolios, they calculate the excess return of each portfolio in every month by getting the monthly value-weighted average of excess returns of the individual stocks in these portfolios, which is the difference between individual stock return and risk-free rate in that month. for every month, they calculate the SMB by subtracting the equally-weighted average returns on the three big-stock portfolios from the equally-weighted average returns on the three small-stock portfolios as follows;

$$SMB = [(S/L + S/M + S/H) - (B/L + B/M + B/H)]/3$$

Likewise, HML is calculated by taking difference of the average returns on the two high BE/ME portfolios and the average returns of the two low BE/ME portfolios as follows;

$$HML = [(S/H + B/H) - (S/L + B/L)]/2$$

For six portfolios as mentioned above, the value-weighted returns are calculated for each month from July of year t to June t+1, and portfolios are rearranged in June t+1.

The returns to be explained are found as follows in Fama and French (1993). Monthly excess returns on 25 portfolios that are constructed on size and book-to-market, are employed as dependent variable in time-series regressions. Constructing these 25 portfolios is similar to forming 6 size-B/M portfolios. Stocks are sorted by size and book-to-market percentile independently in June of every year t. Then separate this stocks into 5-size quintiles and 5-book to market quintiles independently according to the NYSE breakpoints. By intersecting them, they end up with 25 portfolios. After that, value-weighted monthly returns of these 25 portfolios are found from July t to June t+1. They repeat this procedure for every year. The excess returns on these 25 portfolios from January 1963 to December 1991 are the dependent variables for stocks in the time-series regressions. The average risk premiums for the common factors in returns are only the average values of the explanatory variables in time-series regression.

The three-factor that Fama-French came up with is as follows:

$$R_{it} - R_{ft} = \propto_{it} + b_{it}(R_{Mt} - R_{ft}) + s_{it}(SMB) + h_{it}(HML) + \varepsilon_{it} \quad \text{(eq. 1)}$$

where R_i is the security i's return, R_f is the return of risk free rate, R_M is the market return. Market return is calculated by Fama and French by taking the value- weighted percent monthly return on all stocks in the 25 size-BE/ME portfolios plus the negative-BE stocks excluded from the portfolios. Left-hand side of the equation is the excess return of portfolio i. On the right-hand side, the first risk factor is the market risk, and b_{it} represents the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio containing small stocks and on portfolios containing big stocks. h_{it} represents the sensitivity of stock i to the difference in returns on portfolio containing high book-to-market (BE/ME) stocks and on portfolio containing low book-to-market stocks. SMB and HML are common risk factors explained above. They run this time-series regression for each 25 quintiles and examine the change in the sign and significance of the coefficients, intercepts and R^2 values.

They basically conclude that there are three common stock-market factors in explaining average returns on stocks, which are market factor, and factors linked to company's size and BE/ME. Their findings give better fit to empirical data in terms of explaining common variation in stock returns and cross-section of average returns.

3.2.1 Explanatory Variables

As mentioned previously, we follow the same procedure with Fama and French (1993) in this paper. However, as we use mimicking portfolio for the institutional ownership as an explanatory variable in our time-series regressions in addition to Fama-French (1993) explanatory variables, which are returns on a market portfolio of stocks and two mimicking portfolios related to size and book-to-market equity, the quintiles that we end up will differ from Fama and French (1993). The procedure that we follow is explained below.

In order to calculate SMB and HML, we follow the similar procedure with Fama-French (1993). In June of each year from 1980 to 2016, all NYSE, AMEX and NASDAQ stocks in our sample are ranked on size, which is price times number of outstanding shares. The median of this sample is then employed to split all stocks into two groups that are small (S) and big (B).

Similarly, all stocks in our sample are divided into three book-to-market equity groups according to the divisions for the bottom 30%, middle 40%, and top 30% (low, medium, high accordingly) of the ranked values of BE/ME for all stocks in our sample. In here, BE/ME value is the ending in year t-1 book value of equity for the fiscal year divided by market value of the equity in December of the year t-1. As in Fama and French (1993) we exclude negative book value firms.

New proxy will also be calculated with similar logic. However, unlike Fama and French, we divide our sample in terms of institutional ownership (as a % of total outstanding shares) as well. First, stocks will be ranked according to their institutional holding percentages; and be divided into 3 as we did in BE/ME, based on breakpoint for top 30 percent, middle 40 percent and bottom 30 percent of the percentages (institutional (I), average (A), retail (R)) of institutional ownerships. Then, we intersect these portfolios and come up with 18 different portfolios for each quarter, as (S/H/I, S/H/A, S/H/R, S/M/I, S/M/A, S/M/R, S/L/I, S/L/A, S/L/R, B/H/I, B/H/A, B/H/R, B/M/I, B/M/A, B/M/R, B/L/A, B/L/A, B/L/R). To clarify, as an example, S/L/I portfolio includes the stocks in small size groups that are also in the high institutional ownership group and also in the low book-to-market equity group. For each portfolio, equally-weighted monthly averages are calculated by taking the average of excess returns, r_{it}-r_{ft}, of each stock in the portfolio for that month. Despite of the fact that Fama and French (1993) used value-weighted returns while constructing six size-BE/ME portfolios, they admitted (Fama and French 1996) that equal-weighted returns do better job than value-weighted returns in explaining returns by three-factor model. Lakonishkok et al. (1994), and Munesh and Segal (2001) also recommend using equally-weighted portfolios to investigate the relationship between risk factors and stock returns. Now, SMB will be calculated for our sample as taking the equally weighted average returns on 9 big-stock portfolios from the average returns on the 9 small-stock portfolios as follows;

$$SMB = [(S/H/I + S/H/A + S/H/R + S/M/I + S/M/A + S/M/R + S/L/I + S/L/A + S/L/R) - (B/H/I + B/H/A + B/H/R + B/M/I + B/M/A + B/M/R + B/L/I + B/L/A + B/L/R)]/9$$

Likewise, HML is calculated by taking difference of the average returns on the 6 high BE/ME portfolios and the average returns of the 6 low BE/ME portfolios as follows;

$$HML = [(S/H/I + S/H/A + S/H/R + B/H/I + B/H/A + B/H\,/R) - \ (S/L/I + S/L/A + S/L/R + B/L/I + B/L/A + B/L\,/R)]/6$$

Finally, the explanatory variable that we suggest, let's call IMI (institutional minus individual) is the difference between equally-weighted average returns of high institutional holding portfolios and the equally-weighted average returns of low institutional holding portfolios, or retail holdings in other words. This factor will show whether the average excess returns increase with the increase in institutional investor or not. The monthly difference in returns between portfolios of high institutional ownership stocks and those of low institutional ownership (in other words high individual ownership) stocks will give you the new factor, which is institutional minus individual. It will be calculated as follows;

$$IMI = [(S/H/I + S/M/I + S/L/I + B/H/I + B/M/I + B/L\,/I) - \ (S/H/R + S/M/R + S/L/R + B/H/R + B/M/R + B/L\,/R)]/6$$

By this way, we can separate the effect of size and book-to-market and the effect of institutional ownership. Not considering this might cause wrong interpretations. For example, SMB is supposed to mimic the common risk factor in returns link to size. As SMB is calculated by taking the difference between the returns on small stock portfolios and the returns on big stock portfolios with about the same weighted-average institutional ownership and same weighted average BE/ME, it is expected to be mainly free from the impact of institutional ownership and book-to-market equity and concentrating on the dissimilar return actions of small and big stocks.

Likewise, HML is supposed to mimic the common risk factor in returns linked to book-to-market ratio. As HML is calculated by taking the difference between the returns on high BE/ME stock portfolios and the returns on low BE/ME stock portfolios with about the same weighted-average institutional ownership and same weighted average size, it is expected to be mainly free from the impact of institutional ownership and size, and concentrating on the different return actions of high BE/ME and low BE/ME firms. Similarly, IMI is supposed to mimic the common risk factor in returns linked to institutional ownership. As IMI is calculated by taking the difference between the returns on high institutional ownership stock portfolios and the returns on low institutional ownership stock portfolios with about the same weighted-average book-to-market equity and same weighted average size, it is expected to be mainly free from the impact of book-to-market and size, and concentrating on the different return behaviours of high institutional ownership and low institutional ownership firms.

In order to test the evidence of this procedure, as in Fama-French (1993) we look at the correlation between the 1980-2016 monthly mimicking returns for these factors. At Table 1, you can see the correlation of the explanatory variables used in the analyses. In order to make comparison with the Fama and French (1993), we also put the correlation of our explanatory variables with their explanatory variables that are obtained from their website. First of all, we see that correlation between SMB we obtained and SMB they obtained is almost 70%, and the correlation between HML we obtained and HML they obtained is almost 66%. There are basically two reasons of the correlations lower than 1. First, we do not have the exact same sample. Second, and most important, instead of forming portfolios based on just size and BE/ME, we also divide stocks according to their institutional ownership. Therefore, even if we used same sample, stocks may end up in different portfolios based on their institutional ownership level.

Monthly factors that we find, and monthly factors given in the Fama and French web-site is demonstrated in Figure 4, Figure 5, and Figure 6. As it can be seen from the graphs, our explanatory returns have similar patterns with the Fama-French's. Moreover, immediately after of both 2001s and 2008 recessions, the gap between the value stocks and growth stocks returns increases. This finding supports Galsband (2012), who proposed that stocks with high BE/ME values have greater sensitivities to downside risk than growth ones.

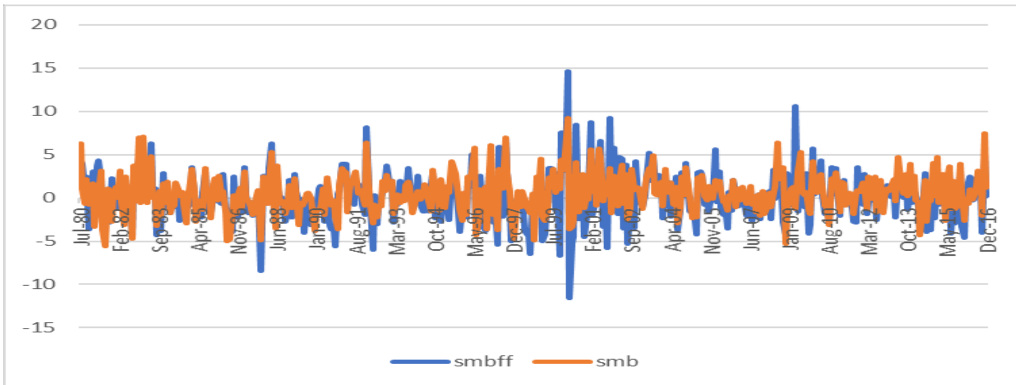

Figure 4. Monthly Values of Mimicking Portfolios for Size: January 1980-December 2016

SMB is the difference in returns on a portfolio containing small stocks and on portfolios containing big stocks. SMB*ff* is the difference in returns on a portfolio containing small stocks and on portfolios containing big stocks obtained from Fama-French website.

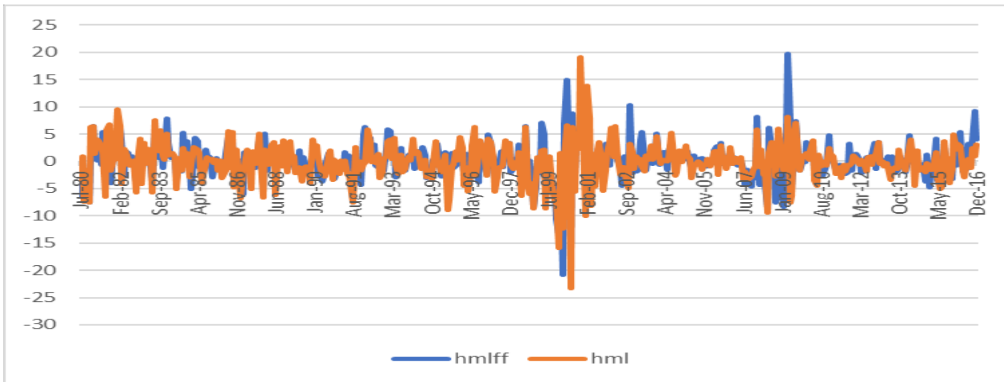

Figure 5. Monthly Values of Mimicking Portfolios for BE/ME: January 1980- December 2016

HML is the difference in returns on portfolio containing high book-to-market (BE/ME) stocks and on portfolio containing low book-to-market stocks. HML*ff* is the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio containing low book-to-market stocks obtained from Fama-French website.

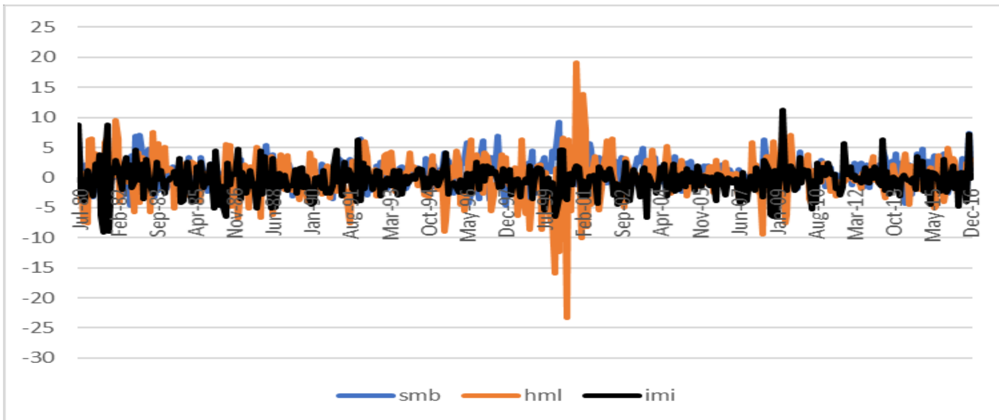

Figure 6. Monthly Values of Mimicking Portfolios: January 1980- December 2016

SMB is the difference in returns on a portfolio containing small stocks and on portfolios containing big stocks. HML is the difference in returns on portfolio containing high book-to-market (BE/ME) stocks and on portfolio containing low book-to-market stocks. IMI is the mimicking portfolio returns of institutional ownership percentages.

Correlations of our explanatory variables are shown in the Table 1- Panel B. While there is a positive correlation between market factor and SMB and IMI, the correlation is negative between market factor and HML. Sign of the correlation is same with the Fama-French factors. However, while the correlation between market factor and SMB is higher for Fama-French factors, the correlation between market factor and HML is lower than our findings when Fama- French factors are used. It can be inferred from this result that taking the institutional ownership into consideration while forming portfolios help us to reduce correlation between SMB and RMRF. Additionally, results show that while the correlation between SMB and HML is -0.08 in Fama and French (1993) paper, the correlation is much higher in our factors, which is -0.2765. However, as shown in the same table Panel C, correlation between SMB*ff* and HML*ff* for Fama-French factors for our time period, 1980 to 2016, is raised from -0.08 to -0.1732. Therefore, we can say that negative correlation between these factors have been increased over time.

The table also shows the correlations of the IMI factor with other explanatory variables. It can be seen that while it has positive correlations with all other explanatory variables, the correlation is very low with HML. Low correlation suggests that the variables are orthogonalized, which is a required property in asset-pricing models. The highest correlation is between IMI and market return, which supports Basak and Pavlova (2013) that find compared with individual investors, institutional ones raise the portion of index stocks in their portfolio to prevent falling behind when the index is doing well, because relative performance is important for them as their year-end payment depends on it. From this perspective, we expect that we will find positive relations between our new factor, IMI, and excess returns, as Basak and Pavlova (2013) demonstrates that the portion of stock market index that is invested by institutional investor is higher than the individual investors, which means institutions result in bearing more risk than the individual investors. Although the correlations are not very low, similarity between correlations of Fama-French's explanatory variables and correlations of our explanatory variable is a promising result that we are on the right path.

Table 1. Correlations between explanatory variables: July 1980- December 2016, 438 months

Panel A:

	SMB	SMB*ff*
SMB	1	
SMB*ff*	0.7022	1

	HML	HML*ff*
HML	1	
HML*ff*	0.6567	1

Panel B

	RMRF	SMB	HML	IMI
RMRF	1			
SMB	0.0948	1		
HML	-0.3508	-0.2765	1	
IMI	0.365	0.2651	0.0607	1

Panel C

	RMRF*ff*	SMB*ff*	HML*ff*
RMRF*ff*	1		
SMB*ff*	0.2549	1	
HML*ff*	-0.1559	-0.1732	1

RMRF is the excess market return, obtained by market portfolio rate of return(R_M)., which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f). Which is one-month Treasury bill rate. SMB is the difference between the returns on small stock portfolios and the returns on big stock portfolios in our sample. HMLis the difference between returns on portfolio containing high book-to-market (BE/ME) stocks and on portfolio containing low book-to-market stocks in our sample. IMI is the difference between equally-weighted average returns on high institutional holding portfolios and the equally-weighted average returns of low institutional holding portfolios in our sample. Variables with *ff* on their right are the factors that are obtained by Fama and French

3.2.2 The Returns to be Explained

The returns to be explained, which is dependent variable will be found as follows. 125 portfolios used in time series regressions as dependent variables are constructed according to size, BE/ME, and institutional ownership in order to decide whether the portfolios SMB, HML and IMI catch common factors in stock returns linked to the size, book-to-market equity, and institutional ownership.

Constructing these 125 portfolios is similar to forming 18 size-BE/ME-institutional ownership portfolios. 4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, 125 portfolios are obtained. After this, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. The excess returns on these 125 portfolios from July 1980 to December 2016 are the dependent variables for stocks in the time-series regressions.

Using same regression setup to form both returns to be explained and three explanatory returns, which are SMB, HML, and IMI, might raise questions in the validity of the results. However, as stated in Fama and French (1993), portfolios used as dependent variable are formed by employing much finer size, BE/ME, and institutional ownership sorts than the explanatory variables. Therefore, the methodology we use do not give spurious results.

While exploring the role of factors in stock returns, we follow 5 steps in this section. First, we examine the success of simple CAPM, by regressing excess stock returns on market return, RM-RF. Then, we examine Fama-French 3-factor model by regressing dependent variables on RM-RF, mimicking returns for size (SMB), and mimicking returns for BE/ME (HML). In the next step, we introduce mimicking returns for institutional ownership (IMI), and include IMI to the CAPM and use RM-RF and IMI as explanatory variables. Furthermore, we test the success of 3 mimicking factors, RM-RF, HML, and IMI, in explaining the stock market returns. Finally, we test our final four-factor model, by employing market return, and mimicking returns for size, BE/ME, and institutional ownership as explanatory variables.

Our final model will be as follows;

$$R_{it} - R_{ft} = \propto_{it} + b_{it}(R_{Mt} - R_{ft}) + s_{it}(SMB) + h_{it}(HML) + i_{it}(IMI) + \varepsilon_{it}$$

where the R_{it} is the equally-weighted monthly returns on portfolio i among 125 portfolios explained above, and the dependent variable is the monthly excess returns for July 1980 to December 2016. R_{mt} is the market portfolio rate of return, Rft is one-month T-bill rate. SMB, HML and IMI are the monthly mimicking risk factors, as mentioned above. And b_{it}, s_{it}, h_{it}, and i_{it} are the sensitivities of excess return on portfolio i to the common risk factors. $\propto_{it}$ is the intercept term, which needs to be not significantly different from zero in order to say that asset pricing model is successful in describing the stock returns. As a dependent variable and explanatory variable, time series approach employs excess returns. If asset-pricing model is well-specified, the regression model gives intercepts which are not significantly different from 0. By this way, formal test of the success of common factors describing the cross section of average returns is done by examining the estimated intercepts of the model.

Additionally, while evaluating the success of asset-pricing models, the slopes and R^2 values are direct indicators of if the risk factors used in time-series regressions capture common variation in stock returns. Therefore, in our analyses, we interpret the slopes, R^2 values, and intercepts of the models, and compare them among each other, and also with findings of Fama and French (1993).

Descriptive statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016 is given in Table 2. In Table 2 Panel A, averages of annual averages of firm size can be seen. Values increases from the lowest to the highest size quintiles. At Panel B, the average of annual BE/ME ratios for portfolios are presented. Values increases from the lowest to the highest BE/ME quintiles, as expected. In Panel E, the average of annual averages of institutional ownership ratios for the portfolio are shown. Values increases from the lowest to the highest institutional ownership quintiles, as expected. Panel C and Panel D show the average of annual percent of market value in portfolio and the average of annual number of firms in the portfolio respectively. Although in Fama and French (1993) paper, portfolios in the highest size quintile has the highest value of stocks but the fewest stocks and vice versa, we do not observe such outcome in our data except for the portfolios with the lowest institutional ownership. In fact, we observe the opposite outcome for the high institutional ownership portfolios. The reason for this inconsistency is that, although Fama and French use median NYSE size to split all stocks instead of using median of the entire sample, which leads to small group including an uneven number of stocks as most AMEX and NASDAQ stocks are smaller than NYSE median. As we thought this may lead to a bias as small groups contains more AMEX and NASDAQ stocks since most AMEX and NASDAQ stocks are smaller than the NYSE median, and these stocks have different characteristics, this may affect the results, so we prefer to use the median of all stocks that our sample includes to split the stocks into small and big groups.

Table 2. Descriptive Statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

Panel A: Average of annual averages of firms' market value (in millions)						
		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	117.183	190.635	189.431	214.643	260.179
	2	104.617	167.933	198.803	197.594	207.944
1	3	102.328	133.240	169.358	198.780	214.683
	4	86.816	140.539	164.811	188.858	194.249
	5	77.811	118.511	145.088	169.509	152.725
	1	369.407	400.878	471.997	466.350	552.800
	2	386.908	390.516	434.855	471.205	474.101
2	3	417.960	368.474	367.227	461.961	469.015
	4	366.224	367.850	394.193	453.009	461.119
	5	393.778	404.811	350.830	407.862	475.724
	1					
	2	1079.725	942.328	997.243	1123.225	1133.466
3	3	1132.488	988.103	958.169	1076.724	1115.526
	4	1015.827	870.043	957.216	1016.336	1111.531
	5	1111.826	995.678	971.660	1114.368	1088.644
	1	2605.370	2499.695	2745.367	3142.254	3497.326
	2	3163.952	2920.692	2930.609	3096.162	3304.631
4	3	3563.706	3049.952	2857.607	3049.673	2960.423
	4	3404.388	2989.725	2991.753	2899.765	3013.324
	5	3880.482	3362.204	2863.895	2854.414	2695.457
	1	47185.016	44971.768	62876.452	26246.106	14529.106
	2	44933.214	64521.599	49847.107	24185.605	11880.157
5	3	43512.352	44300.381	41165.445	20261.956	10597.883
	4	37947.825	37587.448	26506.200	15945.384	9191.215
	5	40295.704	17653.820	16767.972	13925.916	8262.691

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we obtain 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. A firm’s market value is its price times the number of outstanding share in time t. The descriptive statistics are calculated in June of every year that portfolios are constructed. 1980-2016, and then averages across the 37 years.

Table 2. (Cont'd) Descriptive Statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

Panel B: Average of annual BE/ME ratios for portfolio

		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	0.171	0.190	0.180	0.185	0.131
	2	0.351	0.347	0.370	0.366	0.370
1	3	0.492	0.497	0.507	0.502	0.489
	4	0.684	0.678	0.676	0.709	0.728
	5	1.179	1.098	1.071	1.065	1.157
	1	0.163	0.198	0.203	0.193	0.212
	2	0.355	0.370	0.367	0.353	0.353
2	3	0.496	0.516	0.529	0.493	0.505
	4	0.699	0.686	0.676	0.699	0.705
	5	1.209	1.093	1.056	1.043	1.049
	1	0.169	0.177	0.207	0.205	0.183
	2	0.365	0.356	0.358	0.341	0.354
3	3	0.489	0.510	0.512	0.484	0.484
	4	0.694	0.705	0.689	0.678	0.682
	5	1.157	1.083	1.019	0.960	1.018
	1	0.189	0.208	0.204	0.205	0.188
	2	0.371	0.347	0.341	0.348	0.347
4	3	0.482	0.502	0.495	0.503	0.496
	4	0.664	0.646	0.680	0.686	0.677
	5	1.204	1.107	1.056	1.079	1.038
	1	0.191	0.157	0.165	0.178	0.200
	2	0.338	0.339	0.320	0.338	0.357
5	3	0.491	0.491	0.475	0.483	0.504
	4	0.732	0.672	0.660	0.691	0.697
	5	1.149	1.138	0.954	0.926	1.033

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. BE/ME of portfolio at formation period t is calculated as dividing the sum of book equity for the firm in the portfolio for year ending in calendar year t-1 by market equity at the end of calendar year t-1. The descriptive statistics are calculated in June of every year that portfolios are constructed. 1980-2016, and then averages across the 37 years.

Table 2. (Cont'd) Descriptive Statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

Panel C: Average of % of market value in portfolio						
		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	0.013	0.021	0.021	0.024	0.029
	2	0.012	0.019	0.022	0.022	0.023
1	3	0.011	0.015	0.019	0.022	0.024
	4	0.010	0.016	0.018	0.021	0.022
	5	0.009	0.013	0.016	0.019	0.017
	1	0.041	0.045	0.053	0.052	0.062
	2	0.043	0.044	0.049	0.053	0.053
2	3	0.047	0.041	0.041	0.052	0.053
	4	0.041	0.041	0.044	0.051	0.052
	5	0.044	0.045	0.039	0.046	0.053
	1	0.113	0.107	0.107	0.116	0.139
	2	0.121	0.106	0.112	0.126	0.127
3	3	0.127	0.111	0.107	0.121	0.125
	4	0.114	0.098	0.107	0.114	0.125
	5	0.125	0.112	0.109	0.125	0.122
	1	0.292	0.280	0.308	0.352	0.392
	2	0.355	0.327	0.329	0.347	0.370
4	3	0.399	0.342	0.320	0.342	0.332
	4	0.382	0.335	0.335	0.325	0.338
	5	0.435	0.377	0.321	0.320	0.302
	1	5.289	5.041	7.048	2.942	1.629
	2	5.037	7.232	5.588	2.711	1.332
5	3	4.877	4.966	4.614	2.271	1.188
	4	4.254	4.213	2.971	1.787	1.030
	5	4.517	1.979	1.880	1.561	0.926

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. A firm's market value is its price times the number of outstanding share in time t. The descriptive statistics are calculated in June of every year that portfolios are constructed. 1980-2016, and then averages across the 37 years.

Table 2. (Cont'd) Descriptive Statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

Panel D: Average of annual number of firms in portfolio

		Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5
	1	124.54	51.11	14.86	3.41	1.51
	2	101.16	63.08	27.89	13.65	4.32
1	3	141.11	96.41	38.03	19.62	8.51
	4	166.65	124.54	66.00	32.38	16.08
	5	273.03	223.59	117.95	59.19	32.19
	1	85.24	96.84	59.95	42.27	28.19
	2	55.27	105.81	75.68	54.41	47.24
2	3	50.27	107.35	97.30	86.08	61.81
	4	58.05	109.62	116.00	94.68	74.27
	5	67.54	109.03	101.97	79.73	69.05
	1	72.19	88.65	88.14	66.54	60.51
	2	35.81	78.14	89.76	88.11	83.24
3	3	43.00	88.76	93.14	101.03	109.35
	4	50.32	75.30	97.08	91.57	99.41
	5	39.51	63.30	79.95	61.92	67.57
	1	57.49	57.54	90.59	103.73	129.46
	2	39.57	57.84	105.19	135.08	162.03
4	3	36.76	68.11	83.03	109.84	127.24
	4	34.43	69.81	65.68	98.89	106.59
	5	40.38	39.24	49.89	68.03	66.73
	1	74.62	66.65	153.30	155.84	147.97
	2	63.41	42.43	112.11	175.19	130.43
5	3	52.51	39.00	86.27	110.68	87.24
	4	54.92	39.19	73.68	77.11	54.70
	5	49.70	31.49	40.78	45.46	35.35

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. The descriptive statistics are calculated in June of every year that portfolios are constructed. 1980-2016, and then averages across the 37 years.

Table 2. (Cont'd) Descriptive Statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

Panel E: Average of annual institutional ownership ratios for portfolio

		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	13.673	41.251	55.931	61.275	66.028
	2	18.119	40.112	60.418	69.495	80.570
1	3	19.306	39.228	56.560	68.051	81.530
	4	18.624	39.663	56.258	69.642	81.394
	5	14.094	43.459	59.503	68.304	77.077
	1	15.373	39.370	54.502	66.228	69.509
	2	20.030	41.101	58.983	71.544	77.734
2	3	17.851	40.145	56.306	68.625	80.494
	4	20.282	38.427	59.612	69.889	80.371
	5	12.562	40.557	60.810	69.335	75.209
	1	15.866	37.801	52.527	69.497	67.968
	2	21.480	38.314	57.134	69.972	78.590
3	3	19.891	39.918	54.811	70.185	79.220
	4	20.480	40.447	58.821	69.097	79.192
	5	10.866	41.757	59.897	70.078	74.740
	1	15.132	37.628	56.017	67.049	70.345
	2	19.056	37.699	56.663	71.191	77.804
4	3	20.406	38.064	55.207	67.930	79.965
	4	17.342	40.980	55.880	71.040	79.014
	5	12.220	43.196	61.047	68.812	70.524
	1	15.000	36.409	53.455	64.564	66.635
	2	17.848	37.493	54.872	68.170	79.135
5	3	17.512	38.922	55.962	70.720	79.516
	4	15.172	41.556	58.389	69.747	79.199
	5	9.119	41.777	59.010	66.773	69.882

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. The descriptive statistics are calculated in June of every year that portfolios are constructed. 1980-2016, and then averages across the 37 years.

In Table 3, averages of the excess returns on 125 stock portfolios formed on ME, BE/ME, and institutional ownership is shown. It can be observed that the highest size quintiles have lower returns than the lowest size quintiles, which is consistent with the literature that states there is an inverse relation between size and expected returns. However, we cannot observe such trend either for BE/ME or institutional ownership quintiles.

Table 3. Dependent Variables: Excess returns on 125 portfolios constructed on ME, BE/ME, and institutional ownership (in%)

Deependent Variables: Excess returns on 125 portfolios constructed on ME, BE/ME, and institutional ownership (in %)

		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	1.443	2.283	1.424	1.248	5.165
	2	2.147	2.376	2.020	1.172	1.197
1	3	1.953	2.063	2.021	1.326	0.959
	4	1.786	1.686	1.644	1.461	1.043
	5	2.092	1.797	2.217	2.109	2.141
	1	1.296	1.508	1.552	1.292	0.636
	2	1.990	1.380	0.806	0.752	0.414
2	3	2.107	1.192	0.899	1.325	1.015
	4	1.587	1.323	1.363	1.358	1.003
	5	1.321	1.645	1.447	1.448	1.330
	1	1.581	1.087	0.899	1.228	1.440
	2	0.985	1.344	1.168	1.435	1.070
3	3	0.934	0.831	1.142	1.174	1.290
	4	0.861	1.214	0.971	0.837	0.851
	5	1.110	1.206	1.203	1.605	0.931
	1	0.587	1.043	0.945	0.881	1.117
	2	0.704	0.530	1.042	1.210	1.109
4	3	1.175	1.082	1.188	1.012	1.084
	4	0.840	1.250	0.968	1.086	0.975
	5	1.596	1.336	1.658	1.429	1.167
	1	0.839	0.387	1.198	0.843	0.737
	2	0.438	0.720	1.040	0.734	0.888
5	3	0.799	1.070	0.687	1.019	0.950
	4	0.631	0.474	0.738	0.700	0.742
	5	1.137	0.726	1.123	1.423	1.641

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. The descriptive statistics are calculated in June of every year that portfolios are constructed. 1980-2016, and then averages across the 37 years.

CHAPTER 4

RESULTS

In asset-pricing tests, there are two parts. In the first part, we found that four explanatory variables, RM-RF, SMB, HML, IMI, seize the common variation in stock returns. In the second part, by exploring the intercepts found in time-series regressions, we state the cross-section of average returns of stocks are described by the average premiums for the mimicking portfolios. After giving the results of common variation in returns, we display the findings of cross-section of average returns in the models that are examined.

4.1 Common Variation in Returns

While evaluating the success of asset-pricing models, the slopes and R^2 values are direct indicators of the fact that risk factors used in time-series regressions capture common variation in stock returns. Therefore, in this section, we apply time series regression analyses and compare the slopes of factors and adjusted R^2 values with findings of Fama and French (1993). While exploring the role of factors in stock returns, we employ 5 different asset pricing models.

4.1.1 One-factor model (RMRF)

Table 4 presents the time-series regression analyses results of the one-factor model (CAPM). When we investigate the adjusted R^2 values of the one-factor model, we found that market allows much variation in stock returns that can be described by factors other than market factor. In line with the results of Fama and French (1993), the only adjusted R^2 values near 70 percent are the big and low BE/ME stocks portfolios. Especially for small and high BE/ME portfolios, adjusted R^2 values are the smallest ones, which suggests that there is a room for other factors. Apart from Fama and French, taking institutional ownership into consideration presents another interesting finding. Portfolios with low adjusted R^2 are not only stocks with small size and high BE/ME, but also stocks with high institutional ownership. These results, together, indicate that small size, high BE/ME, and high institutional ownership portfolios are the ones for which the size, book-to-market, and institutional ownership factors, SMB, HML, and IMI, work best at showing marginal descriptive power.

Although Fama and French (1993) found higher adjusted R^2 values for the market model than we do, they also state there is room for other factors. The reason that we found lower R^2 might be the time differences in our sample. After the introduction of CAPM, investors might trade according to this model and follow other trading strategies to beat the market, which might result in the reduction of the explanatory power of one-factor model.

Table 4. Regressions on excess returns (in %) on the excess stock market return, RMRF: July 1980 to December 2016

R(t)-RF(t)=∝+b(RM(t)-RF(t)+ε(t)

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					t(b)				
1	1	0.926**	1.433**	0.781**	1.166**	2.370**	12.27	12.81	6.1	4.81	2.57
	2	0.826**	0.964**	1.332**	1.328**	1.491**	11.72	11.01	9.45	7	5.58
	3	0.831**	0.982**	0.929**	1.048**	1.251**	13.45	12.23	7.46	8.27	7.36
	4	0.680**	0.869**	0.940**	1.186**	1.717**	15.24	15.12	13.45	9.27	10.15
	5	0.618**	0.809**	0.960**	0.953**	0.796**	15.97	18.79	14.52	11.03	7.51

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5
		R^2				
1	1	0.258	0.3316	0.136	0.181	0.106
	2	0.238	0.222	0.221	0.176	0.217
	3	0.292	0.261	0.124	0.2	0.214
	4	0.346	0.349	0.316	0.201	0.281
	5	0.368	0.447	0.325	0.243	0.143

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					t(b)				
2	1	1.035**	1.098**	1.535**	1.088**	1.303**	14.51	14.31	12.92	10.96	9.26
	2	1.233**	1.268**	1.235**	1.047**	1.013**	13.65	18.53	16.99	11.07	11.15
	3	0.835**	1.079**	1.137**	1.115**	1.029**	8.81	18.52	17.67	16.33	13.23
	4	0.770**	0.819**	0.974**	1.162**	1.155**	12.73	15.14	17.29	14.53	14.65
	5	0.732**	0.830**	0.938**	1.043**	1.178**	10.72	14.27	17.06	13.38	14.74

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5
		R^2				
2	1	0.325	0.324	0.301	0.254	0.245
	2	0.304	0.447	0.41	0.243	0.252
	3	0.154	0.439	0.416	0.395	0.327
	4	0.27	0.345	0.405	0.351	0.363
	5	0.214	0.323	0.399	0.295	0.361

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					t(b)				
3	1	1.226**	1.275**	1.197**	1.434**	1.250**	14.51	21.22	19.12	19.11	13.85
	2	1.033**	1.088**	1.180**	1.190**	1.112**	10.43	16.63	20.96	16.48	15.1
	3	0.914**	0.923**	0.951**	1.197**	1.115**	11.38	16.84	19.1	20.92	20.61
	4	0.651**	0.776**	0.929**	0.963**	0.983**	12.09	13.9	18.75	17.9	16.8
	5	0.815**	0.894**	0.944**	1.124**	1.158**	10.87	14.79	16.75	14.42	15.88

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5
		R^2				
3	1	0.325	0.508	0.455	0.461	0.354
	2	0.225	0.394	0.501	0.398	0.359
	3	0.265	0.393	0.455	0.507	0.496
	4	0.266	0.306	0.446	0.429	0.407
	5	0.22	0.346	0.397	0.338	0.389

Table 4 (Cont'd). Regressions on excess returns (in %) on the excess stock market return, RMRF: July 1980 to December 2016

Size quintile 4

BE/ME Quint	Institutional Ownership Quintile					Institutional Ownership Quintile				
	1	2	3	4	5	1	2	3	4	5
	b					t(b)				
1	1.205**	1.050**	1.313**	1.213**	1.181**	13.24	13.81	21.78	18.67	23.64
2	0.925**	0.963**	1.015**	1.100**	1.167**	13.92	18.25	22.59	24.27	25.71
3	0.733**	0.899**	1.057**	1.170**	1.132**	10.48	14.64	22.09	23.97	23.03
4	0.626**	0.669**	0.905**	0.956**	1.153**	9.92	12.02	17.66	17.33	20.15
5	1.035	0.702**	1.007**	1.111**	1.207**	13.45	8.79	14.3	19.15	18.05

4	Institutional Ownership Quintile				
	1	2	3	4	5
	R^2				
1	0.304	0.315	0.524	0.445	0.561
2	0.359	0.461	0.545	0.574	0.602
3	0.238	0.33	0.535	0.568	0.55
4	0.235	0.283	0.418	0.407	0.485
5	0.363	0.193	0.341	0.474	0.434

Size quintile 5

BE/ME Quint	Institutional Ownership Quintile					Institutional Ownership Quintile				
	1	2	3	4	5	1	2	3	4	5
	b					t(b)				
1	1.145**	1.195**	1.123**	0.987**	1.076**	15.09	17.21	28.25	26.43	30.7
2	1.028**	1.163**	0.965**	1.064**	1.079**	11.93	14.16	20.9	34.09	28.79
3	0.824**	0.898**	0.792**	1.093**	1.079**	12.54	13.28	13.89	22.37	24.61
4	0.804**	0.729**	0.616**	0.921**	0.872**	11.33	11.92	11.56	17.17	16.62
5	0.868**	0.769**	0.708**	0.996**	1.147**	9.61	10.9	9.45	18.78	15.46

5	Institutional Ownership Quintile				
	1	2	3	4	5
	R^2				
1	0.393	0.439	0.665	0.615	0.685
2	0.283	0.348	0.528	0.733	0.657
3	0.293	0.338	0.339	0.536	0.583
4	0.284	0.321	0.274	0.404	0.392
5	0.249	0.239	0.2	0.457	0.363

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

4.1.2 SMB-HML-IMI

Table 5 shows the time-series regression analyses results in which SMB, HML, and IMI are employed as explanatory variables in explaining excess stock returns. R^2 values drop dramatically and the highest R^2 value is 47 percent. As it is expected, portfolios that have stocks with small size and high institutional ownership have the highest R^2 values. Moreover, particularly for the portfolios in the larger size and lower institutional ownership quantiles, SMB-HML-IMI leave common variation in stock returns that is received by the market portfolio in Table 4. Another important finding is that, the coefficient of IMI is mostly significant (117 out of 125). The returns of portfolios that are not significantly affected by the IMI are portfolios generally with low institutional ownership, and low BE/ME stocks. Furthermore, IMI is the explanatory variable that has the highest number of significant coefficients, where SMB has 83 out of 125 significant coefficients, and HML has 73 out of 125 significant coefficients. Moreover, consistent with Fama and French (1993), coefficients of SMB decrease monotonically from portfolios with the lowest size to portfolios with the highest size, and coefficients of HML increase monotonically from the portfolios with the lowest BE/ME to the highest BE/ME. Finally, coefficients of IMI, with some exceptions, increase monotonically from portfolios with the lowest to the highest institutional ownership quintiles.

Table 5. Regressions of excess stock returns (in %) on the mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factors: July 1980 to December 2016

R(t)-RF(t)=∝+ s*SMB(t) + h*HML(t) + i*(IMI) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5	1	2	3	4	5
				s					t(s)		
	1	0.866**	0.376	0.863**	2.572**	1.850	5.14	1.34	2.72	4.62	1.48
	2	1.168**	1.012**	1.415**	0.781*	0.709	7.62	5.18	4.29	1.93	1.27
	3	0.809**	1.236**	0.814**	0.575**	0.566	5.62	6.76	3.16	2.03	1.5
	4	0.551**	0.856**	0.791**	0.914**	0.910**	4.97	6.18	4.53	3.05	2.33
	5	0.451**	0.781**	0.868**	1.229**	1.622**	4.57	7.05	5.65	6.61	8.09
				h					t(h)		
	1	-0.588**	-0.887**	-0.251	-1.206**	-3.800**	-5.6	-4.37	-1.33	-3.1	-3.28
	2	-0.375**	-0.452**	-0.061	-0.094	-1.057**	-3.93	-3.85	-0.28	-0.3	-2.57
	3	-0.265**	-0.074	-0.332**	-0.396**	-0.290	-2.95	-0.67	-2.1	-2.22	-1.23
	4	-0.147**	-0.111	0.009	-0.415**	-0.039	-2.2	-1.27	0.09	-2.31	-0.14
	5	-0.078	-0.047	-0.054	-0.198*	0.285**	-1.27	-0.68	-0.56	-1.72	2.27
1											
				i					t(i)		
	1	0.106	1.291**	0.397	0.921*	2.251*	0.72	5.09	1.58	1.81	1.88
	2	0.029	0.407**	1.103**	1.095**	1.907**	0.22	2.35	3.85	2.84	2.97
	3	0.324**	0.506**	0.864**	1.021**	1.823**	2.55	3.05	3.81	4.05	4.96
	4	0.237**	0.452**	0.597**	1.129**	1.585**	2.41	3.59	3.89	4.32	4.21
	5	0.162*	0.396**	0.828**	0.804**	0.895**	1.86	4.05	6.11	4.81	4.72
				R^2							
	1	0.1681	0.1699	0.0815	0.395	0.3556					
	2	0.1981	0.1501	0.1386	0.0781	0.1995					
	3	0.1446	0.1601	0.0993	0.108	0.1719					
	4	0.1116	0.1583	0.114	0.1264	0.1046					
	5	0.0829	0.1843	0.1906	0.2183	0.2473					

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5	1	2	3	4	5
				s					t(s)		
	1	0.973**	0.879**	1.271**	1.243**	0.691**	5.79	4.83	4.7	5.63	2.19
	2	0.936**	0.786**	0.505**	0.692**	0.566**	4.62	4.5	2.81	3.34	2.99
	3	0.731**	0.571**	0.544**	0.540**	0.855**	3.59	3.74	3.35	3.12	4.85
	4	0.394**	0.644**	0.624**	0.709**	0.766**	2.71	4.86	4.45	4	4.34
	5	0.354**	0.698**	0.582**	0.949**	0.791**	2.3	5.15	4.33	5.44	4.26
				h					t(h)		
	1	-0.532**	-0.504**	-1.236**	-0.228	-1.196**	-5.08	-4.54	-7.44	-1.58	-6.71
	2	-1.004**	-0.744**	-0.726**	-0.059	-0.706**	-7.84	-7.02	-6.63	-0.47	-5.78
	3	-0.275**	-0.350**	-0.239**	-0.234**	-0.047	-2.17	-3.81	-2.45	-2.27	-0.44
	4	-0.122	-0.080	-0.070	0.107	-0.064	-1.34	-0.99	-0.83	0.95	-0.59
	5	0.063	0.062	-0.032	0.100	0.073	0.66	0.74	-0.4	0.94	0.65
2											
				i					t(i)		
	1	-0.069	0.571**	0.543**	0.975**	1.989**	-0.47	3.5	2.24	5.02	7.44
	2	0.220	0.605**	0.921**	1.334**	0.886**	1.21	4.05	5.65	7.32	4.93
	3	0.254	0.675**	1.058**	0.995**	1.388**	1.4	5	7.38	6.58	8.83
	4	0.382**	0.545**	0.876**	1.529**	1.389**	2.97	4.66	7.05	9.14	8.31
	5	0.626**	0.489**	0.950**	1.240**	1.716**	4.56	4.06	7.99	7.92	10.33
				R^2							
	1	0.1671	0.1675	0.2454	0.2078	0.3214					
	2	0.225	0.2321	0.2063	0.1803	0.1934					
	3	0.0661	0.1521	0.1835	0.1627	0.2664					
	4	0.0594	0.1387	0.1863	0.2394	0.2282					
	5	0.0793	0.1238	0.2082	0.2285	0.289					

Table 5 (Cont'd). Regressions of excess stock returns (in %) on the mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factor: July 1980 to December 2016

		Institutional Ownership Quintile						Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5		1	2	3	4	5
				s						t(s)		
	1	0.291	0.175	0.299*	0.285	0.663**		1.5	1.12	1.89	1.51	3.39
	2	0.009	0.571**	0.242	0.646**	0.223		0.04	3.49	1.64	3.68	1.24
	3	0.661**	0.325**	0.344**	0.204	0.102		3.29	2.33	2.6	1.36	0.71
	4	0.078	0.289**	0.480**	0.493**	0.429**		0.59	2.15	3.77	3.64	3.01
	5	0.243	0.082	0.024	0.040	0.343*		1.37	0.54	0.16	0.22	1.87
				h						t(h)		
	1	-1.087**	-1.012**	-0.695**	-0.803**	-0.829**		-8.96	-10.38	-7.04	-6.96	-6.72
	2	-0.688**	-0.546**	-0.575**	-0.639**	-0.473**		-4.27	-5.32	-6.23	-5.92	-4.47
	3	0.137	-0.069	-0.147*	-0.267**	-0.312**		1.11	-0.8	-1.79	-2.83	-3.52
	4	-0.071	-0.013	-0.239**	-0.037	-0.125		-0.85	-0.16	-3.01	-0.45	-1.45
	5	0.088	0.107	0.013	0.136	0.184		0.77	1.1	0.15	1.21	1.61
3												
				i						t(i)		
	1	0.509**	0.643**	0.988**	1.470**	1.430**		2.97	4.66	7.08	8.67	7.7
	2	0.672**	0.553**	1.093**	0.983**	1.146**		3.02	3.84	8.37	6.4	7.27
	3	0.679**	0.784**	0.780**	1.437**	1.258**		3.89	6.36	6.69	10.6	10.02
	4	0.444**	0.673**	0.767**	1.029**	1.225**		3.79	5.67	6.83	8.47	9.4
	5	0.361**	0.728**	0.993**	1.639**	1.441**		2.37	5.31	7.75	10.27	8.77
				R^2								
	1	0.2024	0.2576	0.2246	0.2532	0.291						
	2	0.0794	0.1593	0.234	0.2314	0.1729						
	3	0.0866	0.1238	0.1441	0.2532	0.2262						
	4	0.0439	0.1002	0.186	0.2079	0.2353						
	5	0.0252	0.0775	0.1391	0.2255	0.1923						

		Institutional Ownership Quintile						Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5		1	2	3	4	5
				s						t(s)		
	1	-0.317	0.020	0.129	-0.123	-0.233*		-1.43	0.11	0.77	-0.73	-1.71
	2	-0.311*	-0.278**	-0.021	-0.237*	-0.034		-1.74	-1.97	-0.16	-1.82	-0.25
	3	0.133	0.034	-0.006	-0.252*	-0.148		0.78	0.22	-0.05	-1.82	-1.1
	4	-0.151	-0.362**	0.103	0.044	-0.207		-0.94	-2.61	0.77	0.31	-1.45
	5	-0.202	-0.178	-0.178	-0.133	-0.055		-0.97	-1.01	-1.02	-0.85	-0.31
				h						t(h)		
	1	-1.058**	-0.826**	-0.760**	-0.728**	-0.712**		-7.7	-7.18	-7.56	-7.28	-8.39
	2	-0.321**	-0.471**	-0.251**	-0.499**	-0.533**		-2.91	-5.38	-3.11	-6.15	-6.44
	3	-0.058	-0.116	-0.349**	-0.326**	-0.366**		-0.55	-1.2	-4.21	-3.9	-4.52
	4	-0.135	0.081	-0.211**	0.058	-0.092		-1.44	0.93	-2.53	0.67	-1.03
	5	0.004	0.123	-0.034	-0.022	-0.377**		0.04	1.09	-0.31	-0.23	-3.37
4												
				i						t(i)		
	1	0.051	0.681**	0.944**	1.166**	1.209**		0.27	4.11	6.43	7.92	10.06
	2	0.742**	1.052**	0.898**	1.094**	1.129**		4.59	8.28	7.58	9.52	9.63
	3	0.531**	0.664**	0.987**	1.354**	1.392**		3.46	4.88	8.37	11.06	11.54
	4	0.187	0.699**	0.845**	0.974**	1.658**		1.29	5.6	7.16	7.77	13.16
	5	0.916**	0.539**	1.154**	1.270**	1.075**		4.89	3.2	7.3	9.19	6.78
				R^2								
	1	0.1335	0.1577	0.204	0.2087	0.2736						
	2	0.0725	0.1942	0.1398	0.2182	0.2421						
	3	0.0415	0.0611	0.1782	0.2341	0.2639						
	4	0.0107	0.0947	0.1347	0.137	0.295						
	5	0.0726	0.0388	0.1213	0.1826	0.1205						

Table 5 (Cont'd). Regressions of excess stock returns (in %) on the mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factors: July 1980 to December 2016

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5	1	2	3	4	5
		s					t(s)				
	1	-0.202	-0.399**	-0.484**	-0.476**	-0.494**	-1.05	-2.22	-3.85	-4.36	-4.53
	2	-0.667**	-0.568**	-0.536**	-0.345**	-0.462**	-3.28	-2.73	-4.12	-3.16	-4.03
	3	-0.145	-0.411**	-0.274*	-0.665**	-0.397**	-0.87	-2.41	-1.88	-4.9	-3.18
	4	-0.628**	-0.493**	-0.028	-0.519**	-0.202	-3.55	-3.32	-0.23	-3.7	-1.56
	5	-0.168	-0.275	-0.351*	-0.177	-0.306*	-0.79	-1.65	-1.87	-1.29	-1.76
		h					t(h)				
	1	-1.069**	-1.006**	-0.759**	-0.666**	-0.754**	-9.24	-9.12	-9.78	-10.09	-11.52
	2	-0.532**	-0.831**	-0.247**	-0.461**	-0.406**	-4.3	-6.38	-3.05	-6.67	-5.7
	3	-0.314**	-0.230**	-0.003	-0.446**	-0.349**	-3.06	-2.18	-0.04	-5.03	-4.49
	4	-0.215**	0.029	0.225**	-0.123	-0.044	-2.01	0.32	2.99	-1.37	-0.56
	5	0.137	0.082	0.237*	-0.183**	-0.045	1.05	0.79	1.91	-2.11	-0.41
5		i					t(i)				
	1	0.613**	0.886**	0.923**	0.887**	0.885**	3.57	5.67	7.83	9.17	9.11
	2	0.397**	0.756**	1.076**	1.093**	1.179**	2.24	4.04	8.9	11.02	11.57
	3	0.459**	0.998**	0.983**	1.147**	1.165**	2.95	6.51	7.63	9.53	10.48
	4	0.677**	0.782**	0.599**	0.784**	1.055**	4.2	5.75	5.47	6.38	9.21
	5	0.587**	0.588**	0.865**	1.109**	1.549**	2.92	4.08	5.18	8.82	9.95
		R^2									
	1	0.4703	0.2187	0.2641	0.2731	0.3055					
	2	0.0609	0.1231	0.1797	0.272	0.2601					
	3	0.0422	0.1145	0.1368	0.2011	0.2179					
	4	0.0745	0.1256	0.1221	0.0932	0.1692					
	5	0.0427	0.0519	0.0823	0.1651	0.1949					

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB).h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

4.1.3 Three-factor model (RMRF- SMB- HML)

In Table 6, regression results of Fama- French 3-factor model are presented. We use explanatory variables that are calculated according to our sample, and aim to compare these results with Fama and French (1993) paper. By this way, we can show that we are on the right path and our other results, which include IMI as an explanatory variable, are also promising. Providing the strong coefficients on SMB and HML for stocks, including these variables to the regression analyses causes a large increase in adjusted R^2 values. The amount of increases in percent are shown in Table 9. While in one factor model regressions only 19 out of 125 R^2 are greater than 50 percent, and in regressions which include only SMB, HML, and IMI as an explanatory variable none of the adjusted R^2s are greater than 50 percent, in Fama- French three- factor model, 33 out of 125 are greater than 50 percent. Therefore, so far, this model explains the stock returns better than other two models. In this model, as well, R^2 values are lower than R^2 that Fama and French found. As we mentioned above, the reason that we found lower R^2 might be the time differences in our sample. Studies have shown that, in recent years, the explanatory power of Fama-French 3-factor model on variations of stock returns has been reduced (Xu, 2001). However, the important thing is that, using three- factor instead of one-factor improves the adjusted R^2 values. It is important to note that, as can be seen in Table 9- Panel A, the adjusted R^2 values increase most in portfolios with small size and high institutional ownership stocks.

Another important finding is about the impact of including SMB and HML to the model on market βs, the coefficient of RMRF, for stocks. We only take the averages of significant market βs, as the other ones are not statistically significantly different from 0. While the averages of significant market βs for the portfolios of stocks in smallest ME and lowest BE/ME quintile is 1.34 and the average of significant market βs for the portfolios of biggest ME and highest BE/ME quintile is 0.89 in one- factor model, the averages of the significant market βs for three- factor model is 0.92 and 1.02, respectively. So, including SMB and HML to the one- factor model makes low βs increase toward 1 and high βs decrease toward 1, it converges the βs for stock toward the 1.0. The reason of this tendency is the high correlation between market and SMB or HML (Fama and French, 1993).

Table 6 also shows that, 80 percent (100 out of 125) of slopes of SMB are significantly different from 0. Coefficients that are not significantly different from zero are portfolios including stocks with big size. In these portfolios, as we mentioned above, the market factor explains most of the common variation in returns. As in Fama and French (1993), except for low size- low institutional ownership quintiles, the slopes on SMB decreases monotonically from smaller to higher size portfolios, which suggests that coefficients on SMB for stocks are associated with size. It is also presented that, 76 percent (95 out of 125) of slopes of HML are significantly different from 0. Coefficients that are not significantly different from zero are generally portfolios of stocks with low BE/ME. In these portfolios, as we mentioned above, the market factor explains most of the common variation in returns. As in Fama and French (1993), the coefficients on HML increase monotonically from strong negative values for the smallest BTM quintiles to strong positive values for the largest BE/ME quintiles, which suggests that coefficient on HML for stocks are associated with book-to-market equity.

Findings above are promising as they are in line with Fama-French (1993) results. It indicates that we are on the right path in terms of calculating dependent and explanatory variables.

Table 6. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), and mimicking returns for size (SMB) and BE/ME (HML) factors: July 1980 to December 2016

$R(t)-RF(t)=\propto+b*(RM(t)-RF(t))+ s*SMB(t) + h*HML(t) +\varepsilon(t)$

Size Quintile	BE/ME Quintile	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					t(b)				
	1	0.819**	1.329**	0.743**	0.787**	1.357	10.93	11.99	5.81	3.72	1.55
	2	0.752**	0.892**	1.326**	1.296**	1.261**	11.07	10.16	9.55	6.9	4.4
	3	0.814**	1.020**	0.897**	1.038**	1.304**	13.25	13.11	7.05	8.18	7.59
	4	0.700**	0.885**	0.989**	1.138**	1.805**	15.57	15.93	14.36	8.66	10.68
	5	0.648**	0.856**	1.025**	0.951**	0.924**	16.68	21.98	16.15	11.53	9.53
		s					t(s)				
	1	0.900**	0.692**	1.012**	2.717**	2.633**	6.31	3.04	3.81	5.46	2.23
	2	1.177**	1.141**	1.664**	1.078**	0.900*	9.1	6.8	5.87	3.07	1.7
	3	0.916**	1.397**	1.086**	0.920**	1.327**	7.83	9.32	4.61	3.62	4.07
	4	0.633**	0.978**	0.949**	1.154**	1.312**	7.41	9.11	6.81	4.24	4.02
	5	0.505**	0.911**	1.142**	1.473**	1.854**	6.82	12.28	9.44	9.34	10.33
1											
		h					t(h)				
	1	-0.237**	-0.482**	0.035	-0.905**	-3.103**	-2.44	-2.71	0.2	-2.38	-2.49
	2	-0.060	-0.047	0.469**	0.199	-0.554	-0.68	-0.43	2.28	0.7	-1.32
	3	0.105	0.392**	0.103	0.051	0.331	1.31	3.91	0.66	0.31	1.44
	4	0.176**	0.273**	0.412**	0.088	0.726**	3.1	3.71	4.6	0.51	3.09
	5	0.207**	0.347**	0.453**	0.286**	0.741**	4.11	6.87	5.49	2.71	6.13
		R^2									
	1	0.343	0.373	0.181	0.436	0.295					
	2	0.371	0.305	0.296	0.203	0.246					
	3	0.378	0.388	0.166	0.235	0.27					
	4	0.419	0.455	0.395	0.239	0.328					
	5	0.433	0.597	0.448	0.383	0.365					

Size Quintile	BE/ME Quintile	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					t(b)				
	1	0.950**	1.045**	1.268**	1.010**	1.130**	13.4	13.61	11.02	10.61	8.36
	2	1.043**	1.162**	1.160**	1.123**	0.915**	11.95	17.43	15.73	11.85	10.11
	3	0.823**	1.093**	1.202**	1.184**	1.076**	8.41	18.54	18.67	17.1	14.08
	4	0.812**	0.880**	1.065**	1.290**	1.248**	12.96	16.52	19.63	17	16.58
	5	0.822**	0.926**	1.040**	1.176**	1.295**	11.83	16.68	19.82	15.99	16.99
		s					t(s)				
	1	0.949**	1.062**	1.350**	1.399**	1.330**	7.03	7.17	5.95	7.27	4.55
	2	1.005**	0.988**	0.803**	1.094**	0.822**	5.95	7.61	5.65	5.97	4.88
	3	0.837**	0.800**	0.901**	0.853**	1.136**	4.62	7.14	7.36	6.41	7.43
	4	0.520**	0.834**	0.920**	1.114**	1.155**	4.36	8.22	8.92	7.73	8.11
	5	0.550**	0.884**	0.903**	1.335**	1.248**	4.23	8.58	9.05	9.4	8.1
2											
		h					t(h)				
	1	-0.144	-0.011	-0.696**	0.139	-0.569**	-1.56	-0.12	-4.58	1.06	-3.27
	2	-0.561**	-0.207**	-0.142	0.473**	-0.284**	-4.87	-2.41	-1.51	3.92	-2.46
	3	0.079	0.184**	0.379**	0.379**	0.443**	0.64	2.47	4.67	4.37	4.47
	4	0.254**	0.351**	0.472**	0.710**	0.521**	3.11	5.21	6.9	7.26	5.66
	5	0.455**	0.484**	0.507**	0.716**	0.704**	5.16	6.96	7.66	7.6	7.05
		R^2									
	1	0.407	0.401	0.415	0.353	0.344					
	2	0.415	0.533	0.463	0.313	0.322					
	3	0.192	0.496	0.487	0.458	0.421					
	4	0.304	0.443	0.516	0.467	0.469					
	5	0.27	0.447	0.52	0.444	0.478					

Table 6 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), and mimicking returns for size (SMB) and BE/ME (HML) factors: July 1980 to December 2016

$$R(t)-RF(t)=\propto+b^*(RM(t)-RF(t))+s^*SMB(t)+h^*HML(t)+\varepsilon(t)$$

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.043**	1.128**	1.132**	1.377**	1.157**	12.26	18.98	17.7	17.83	13.2
	2	0.966**	1.036**	1.154**	1.121**	1.112**	9.41	15.67	19.97	15.52	14.39
	3	0.999**	1.008**	1.014**	1.245**	1.170**	12.49	18.32	20.34	21.43	21.16
	4	0.698**	0.860**	0.955**	1.064**	1.051**	12.43	15.18	19.42	20.66	17.97
	5	0.900**	1.030**	1.074**	1.297**	1.313**	11.72	17.21	19.21	16.94	18.58
				s					t(s)		
	1	0.459**	0.387**	0.625**	0.742**	1.078**	2.83	3.42	5.13	4.98	6.44
	2	0.170	0.760**	0.604**	0.946**	0.563**	0.83	6.02	5.48	6.75	3.77
	3	0.817**	0.584**	0.602**	0.605**	0.528**	4.91	5.57	6.34	5.39	4.95
	4	0.203**	0.512**	0.734**	0.814**	0.756**	1.82	4.74	7.84	8.19	6.67
	5	0.313**	0.313**	0.367**	0.576**	0.711**	2.12	2.7	3.43	3.79	4.97
3				h					t(h)		
	1	-0.604**	-0.480**	-0.129	-0.081	-0.243**	-5.47	-6.22	-1.55	-0.81	-2.17
	2	-0.298*	-0.062	0.011	-0.078	0.103	-1.96	-0.71	0.14	-0.83	1.08
	3	0.554**	0.426**	0.350**	0.320**	0.295**	5.1	5.96	5.41	4.16	4.1
	4	0.233**	0.410**	0.233**	0.510**	0.398**	3.11	5.57	3.64	7.73	5.31
	5	0.456**	0.601**	0.563**	0.787**	0.777**	4.43	7.57	7.73	7.8	8.2
				R^2							
	1	0.392	0.571	0.494	0.495	0.443					
	2	0.233	0.446	0.533	0.464	0.379					
	3	0.334	0.456	0.513	0.544	0.529					
	4	0.281	0.365	0.514	0.536	0.477					
	5	0.254	0.424	0.472	0.425	0.483					

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.064**	0.940**	1.253**	1.167**	1.141**	11.44	12.06	19.91	16.95	21.68
	2	0.952**	0.955**	1.082**	1.113**	1.167**	13.75	17.19	23.33	23.16	24.57
	3	0.782**	0.981**	1.100**	1.260**	1.186**	10.78	15.36	22.04	24.95	23.04
	4	0.673**	0.763**	0.967**	1.120**	1.296**	10.11	13.93	18.21	20.82	22.95
	5	1.164**	0.817**	1.123**	1.267**	1.253**	15.03	10.08	15.55	22.5	17.9
				s					t(s)		
	1	-0.296	0.186	0.447**	0.282**	0.167*	-1.6	1.21	3.71	2.14	1.67
	2	-0.158	-0.015	0.261**	0.125	0.340**	-1.1	-0.14	2.91	1.36	3.75
	3	0.242*	0.249**	0.331**	0.204**	0.297**	1.66	2.04	3.51	2.12	3.01
	4	-0.109	-0.181	0.402**	0.372**	0.319**	-0.79	-1.61	3.98	3.64	2.94
	5	0.048	-0.007	0.117	0.285**	0.273**	0.3	-0.04	0.83	2.64	2.02
4				h					t(h)		
	1	-0.630**	-0.421**	-0.131	-0.111	-0.121*	-5.1	-4	-1.64	-1.27	-1.77
	2	0.079	-0.037	0.291**	0.070	0.061	0.84	-0.49	4.9	1.12	1
	3	0.264**	0.355**	0.210**	0.347**	0.240**	2.77	4.29	3.29	5.45	3.66
	4	0.154*	0.403**	0.294**	0.633**	0.604**	1.8	5.41	4.18	9.33	8.18
	5	0.542**	0.475**	0.487**	0.486**	0.235**	5.29	4.6	5.04	1.98	2.54
				R^2							
	1	0.344	0.348	0.544	0.452	0.567					
	2	0.361	0.459	0.57	0.575	0.613					
	3	0.251	0.355	0.552	0.594	0.565					
	4	0.243	0.355	0.449	0.505	0.5531					
	5	0.415	0.232	0.378	0.559	0.442					

Table 6 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), and mimicking returns for size (SMB) and BE/ME (HML) factors: July 1980 to December 2016

R(t)-RF(t)=∝+b*(RM(t)-RF(t))+ s*SMB(t) + h*HML(t) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quint	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	0.990**	1.085**	1.067**	0.946**	1.018**	13.05	15.52	26.11	24.05	27.92
	2	1.020**	1.097**	1.033**	1.077**	1.135**	11.41	12.91	22.16	32.63	28.99
	3	0.840**	0.955**	0.907**	1.141**	1.149**	12.11	13.67	15.69	22.39	25.13
	4	0.880**	0.839**	0.742**	1.022**	0.998**	12.1	14.25	14.85	18.93	18.84
	5	0.989**	0.884**	0.827**	1.076**	1.300**	11.01	12.5	10.98	19.55	17.25
		s					t(s)				
	1	-0.031	-0.144	-0.239**	-0.178**	-0.209**	-0.2	-1.03	-3	-2.37	-3.08
	2	-0.508**	-0.370**	-0.254**	-0.041	-0.087	-3.03	-2.16	-2.77	-0.64	-1.19
	3	-0.020	-0.161	-0.044	-0.268**	-0.027	-0.15	-1.14	-0.37	-2.77	-0.31
	4	-0.489**	-0.316**	0.169*	-0.270**	0.130	-3.33	-2.71	1.75	-2.61	1.3
	5	-0.043	-0.077	-0.115	0.128	0.182	-0.25	-0.57	-0.72	1.23	1.29
5											
		h					t(h)				
	1	-0.620**	-0.507**	-0.259**	-0.173**	-0.227**	-6.16	-5.53	-4.9	-3.49	-5.05
	2	-0.111	-0.360**	0.230**	0.038	0.184**	-1.02	-3.14	3.76	0.88	3.7
	3	0.060	0.206**	0.425**	0.145**	0.246**	0.66	2.23	5.63	2.09	4.24
	4	0.187**	0.404**	0.566**	0.359**	0.475**	1.98	5.46	9.09	5	7.04
	5	0.520**	0.477**	0.585**	0.325**	0.613**	4.72	5.31	5.06	4.57	6.25
		R^2									
	1	0.454	0.48	0.684	0.626	0.703					
	2	0.297	0.362	0.561	0.732	0.669					
	3	0.29	0.351	0.395	0.55	0.599					
	4	0.325	0.418	0.411	0.455	0.453					
	5	0.309	0.296	0.259	0.48	0.415					

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

4.1.4 RMRF-IMI

In Table 7, the time series regression analyses for the model that includes market factor and IMI factor is employed as explanatory variables are shown. We examine this model in order to find out whether SMB and HML are still necessary after the inclusion of IMI to the one- factor model. As we did for the previous analyses, we first interpret the R^2 values of the model. Only 19 out of 125 R^2 values are greater than fifty percent, which is higher than CAPM and a model with SMB, HML, IMI factors. As can be seen from Table 9- Panel B, all of the R^2 values are greater than one- factor model's R^2 values, and the most raise occurs for high institutional ownership portfolios (31 percent on average). Therefore, we can say that, even including just IMI to the one- factor model captures the common variation in returns better than CAPM itself, especially for stocks with high institutional ownership. On the other hand, when we compare R^2 values of model with market factor and IMI with the R^2 values of the three-factor model in Table 9- Panel C, we see that almost in every quintile, R^2 values are smaller for the model with market factor and IMI. Especially for the small size portfolios, the averages of R^2 values of RMRF and IMI model are much smaller than the R^2 values of the three-factor model. However, R^2 averages have shown that, except for the smallest institutional ownership decile, as the institutional ownership quintile increase from lowest to the highest, the spread between R^2 values of 3-factor model and model with market factor and IMI decreases. However, overall, it can be said that the one- factor model plus IMI factor leaves common variation in stock returns that is received by the other factors, as SMB and HML.

As in the previous models, in this model the market factor captures most of the common variations in returns, as well. Except one of the coefficient, slopes of market factors are statistically significantly positive.

As we see from the Table 7, the significance of the coefficients of IMI decrease if market factor is included to the model. However, still 60.8 percent (76 out of 125) of the coefficients of IMI are statistically significantly different from zero, and almost all of them increase monotonically from strong negative values to the strong positive values from lowest institutional ownership quintiles to the highest ones. It is mostly significant in high institutional ownership quintiles.

Table 7. Regressions of excess stock returns (in %) on the excess stock market return (RMRF) and mimicking returns for institutional ownership (IMI) factor: July 1980 to December 2016

R(t)-RF(t)=∝+b*(RM(t)-RF(t))+ i*IMI(t) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	1.010**	1.386**	0.744**	0.914**	1.615	12.57	10.71	5.35	3.09	1.53
	2	0.890**	0.968**	1.227**	1.262**	1.256**	11.77	10.33	7.66	5.79	4.3
	3	0.843**	0.974**	0.825**	0.990**	1.001**	12.65	11	6.26	7.01	5.65
	4	0.701**	0.884**	0.944**	1.110**	1.613**	14.62	13.81	12.09	7.7	8.66
	5	0.653**	0.798**	0.864**	0.854**	0.638**	15.73	17.17	12.28	9.32	5.59
		i					t(i)				
1	1	-0.397**	0.177	0.160	0.960	2.063	-2.78	0.72	0.69	1.47	1.42
	2	-0.305**	-0.017	0.401	0.242	1.241*	-2.27	-0.1	1.36	0.62	1.88
	3	-0.059	0.032	0.519**	0.238	1.303**	-0.5	0.19	2.32	0.94	3.79
	4	-0.100	-0.066	-0.013	0.315	0.475	-1.17	-0.56	-0.9	1.15	1.33
	5	-0.168**	0.052	0.461**	0.492**	0.721**	-2.27	0.63	3.68	2.97	3.4
		R^2									
	1	0.2723	0.3347	0.141	0.2066	0.1629					
	2	0.249	0.2241	0.2278	0.1808	0.2487					
	3	0.2942	0.2632	0.1378	0.206	0.2715					
	4	0.3495	0.3512	0.3181	0.2069	0.2889					
	5	0.3769	0.4484	0.3469	0.2619	0.1749					
		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	1.172**	1.101**	1.644**	0.979**	1.065**	15.63	13.36	12.48	8.96	6.94
	2	1.349**	1.290**	1.208**	0.853**	0.973**	14.03	17.5	15.51	8.34	9.76
	3	0.864**	1.060**	1.037**	1.030**	0.830**	8.52	16.95	15.26	14.17	9.99
	4	0.780**	0.782**	0.883**	0.956**	0.989**	11.96	13.48	14.87	11.28	11.9
	5	0.671**	0.797**	0.826**	0.868**	0.924**	9.25	12.82	14.43	10.79	10.99
		i					t(i)				
2	1	-0.651**	-0.018	-0.466*	0.458**	1.009**	-4.87	-0.12	-1.89	2.29	3.51
	2	-0.572**	-0.107	0.141	0.811**	0.178	-3.26	-0.82	0.98	4.42	0.97
	3	-0.143	0.089	0.491**	0.414**	0.861**	-0.81	0.79	4.03	3.18	5.49
	4	-0.050	0.184*	0.444**	0.913**	0.784**	-0.43	1.78	4.17	5.74	5.06
	5	0.306**	0.162	0.548**	0.884**	1.106**	2.4	1.5	5.35	5.98	6.9
		R^2									
	1	0.3612	0.3257	0.3095	0.2671	0.2815					
	2	0.323	0.4491	0.4132	0.2823	0.2555					
	3	0.1574	0.4411	0.4382	0.4117	0.3807					
	4	0.2722	0.3514	0.4495	0.4039	0.4053					
	5	0.226	0.3281	0.4373	0.3516	0.4334					

Table 7 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF) and mimicking returns for institutional ownership (IMI) factor: July 1980 to December 2016

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.303**	1.333**	1.145**	1.321**	1.125**	14.37	20.69	17.02	16.68	11.62
	2	1.109**	1.107**	1.101**	1.122**	1.015**	9.85	15.68	18.37	14.48	13.2
	3	0.912**	0.864**	0.897**	1.046**	0.990**	10.05	14.72	16.83	17	17.72
	4	0.672**	0.720**	0.868**	0.850**	0.837**	11.17	12.02	16.41	15.24	13.33
	5	0.844**	0.860**	0.854**	0.905**	1.005**	10.4	13.19	14.4	11.2	12.63
				i					t(i)		
3	1	-0.366**	-0.275**	0.249**	0.570**	0.604**	-2.27	-2.39	2.08	3.92	3.31
	2	-0.314	-0.090	0.378**	0.325**	0.524**	-1.41	-0.72	3.54	2.33	3.77
	3	0.012	0.283**	0.256**	0.633**	0.607**	0.07	2.71	2.7	5.55	6.08
	4	-0.085	0.264**	0.289**	0.568**	0.635**	-0.77	2.48	3.07	5.55	5.36
	5	-0.129	0.164	0.447**	0.993**	0.660**	-0.92	1.38	4.2	6.77	4.36
				R^2							
	1	0.3341	0.5151	0.462	0.4815	0.3751					
	2	0.231	0.3961	0.5163	0.4075	0.383					
	3	0.268	0.4049	0.4651	0.542	0.5369					
	4	0.2691	0.3172	0.4586	0.4692	0.4471					
	5	0.2237	0.3503	0.4228	0.4072	0.4196					
		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.425**	1.109**	1.300**	1.149**	1.104**	15.22	13.11	20.08	16.57	20.83
	2	0.958**	0.912**	0.971**	1.035**	1.093**	13.01	15.58	20.26	21.47	22.73
	3	0.753**	0.882**	0.993**	1.053**	1.000**	9.64	13.23	13.32	20.98	19.54
	4	0.735**	0.648**	0.844**	0.871**	0.953**	10.65	10.54	15.4	14.95	16.99
	5	1.039**	0.716**	0.928**	0.993**	1.157**	12.08	8.06	11.82	16.54	16.11
				i					t(i)		
4	1	-1.067**	-0.255	0.061	0.314**	0.366	-6.3	-1.58	0.52	2.51	3.88
	2	-0.151	0.224**	0.220**	0.311**	0.355**	-1.05	2	2.5	3.63	4.15
	3	-0.085	0.079	0.303**	0.575**	0.612**	-0.57	0.67	0.67	6.39	6.51
	4	-0.489**	0.098	0.287**	0.420**	0.963**	-3.6	0.83	2.91	4.03	9.55
	5	-0.020	-0.060	0.330**	0.592**	0.245*	-0.12	-0.35	2.25	5.49	1.87
				R^2							
	1	0.369	0.3212	0.5249	0.4539	0.577					
	2	0.3637	0.4681	0.5527	0.5877	0.6182					
	3	0.2407	0.3322	0.5478	0.6056	0.5906					
	4	0.2498	0.2862	0.43	0.4293	0.5765					
	5	0.3648	0.1858	0.3505	0.5117	0.4398					

Table 7 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF) and mimicking returns for institutional ownership (IMI) factor: July 1980 to December 2016

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	1.290**	1.221**	1.163**	0.972**	1.069**	15.48	16.39	26.55	24.22	28.61
	2	1.122**	1.267**	0.922**	1.022**	0.996**	12.43	13.95	18.16	29.62	25.88
	3	0.894**	0.855**	0.717**	1.041**	0.994**	12.44	11.36	11.36	19.77	21.86
	4	0.852**	0.690**	0.557**	0.913**	0.769**	10.69	10.36	10	15.73	14.14
	5	0.884**	0.756**	0.690**	0.915**	0.975**	8.95	9.96	8.01	15.8	12.74
		i					t(i)				
5	1	-0.623**	-0.129	-0.180**	0.076	0.037	-3.87	-0.95	-2.12	1.05	0.55
	2	-0.479**	-0.450**	0.191**	0.179**	0.412**	-3.13	-2.6	1.97	2.8	6.07
	3	-0.328**	0.186	0.328**	0.242**	0.420**	-2.35	1.31	1.31	2.57	5.24
	4	-0.204	0.182	0.317**	0.037	0.519**	-1.32	1.46	3.2	0.37	5.36
	5	-0.075	0.060	0.072	0.352**	0.831**	-0.4	0.46	0.43	3.31	6.09
		R^2									
	1	0.4199	0.4425	0.6698	0.6166	0.6855					
	2	0.3042	0.36	0.5343	0.738	0.6844					
	3	0.3049	0.3427	0.3537	0.5436	0.6086					
	4	0.2902	0.3285	0.2962	0.4057	0.4318					
	5	0.2517	0.2412	0.2032	0.472	0.4164					

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

4.1.5 Four-factor Model (RMRF-SMB-HML-IMI)

In Table 8, the regression analyses results of the four-factor model (RMRF, SMB, HML, and IMI) are revealed. As we did in previous parts, we start with interpretation of adjusted R^2 values. By looking at Table 9- Panel D and Panel E, it can be seen that adjusted R^2 values of four-factor model are higher than both CAPM and 3-factor model. 38 out of 125 R^2 values are greater than fifty percent, which is the greatest amount in models that are so far examined. Especially for small size and high institutional ownership portfolios, the raise from CAPM to four-factor R^2 values is almost 90 percent. Although the increase of adjusted R^2 values from three-factor model to four-factor model is not as high as increase of adjusted R^2 values from CAPM to four-factor model, in all quintiles, rises are observed. Especially for both lowest and the highest institutional ownership quintiles, employing four-factor model captures stock return variations better than Fama- French 3-factor model. When the mimicking for institutional ownership is included to the regression as a 4^{th} factor, we found that four explanatory variables, RM-RF, SMB, HML, IMI, seize common variation in stock returns. The highest improvement happens for low size and low institutional ownership quintiles. This finding is in line with Lee (1991) who affirms that small stocks with the highest individual ownership subject to investor sentiment more than others. Therefore, it is expected that including IMI to the model works well in stocks subjects to investor sentiment most.

The slopes of market factor, except in one quintile, are statistically significantly positive. Moreover, an important finding about the impact of including IMI to the model on market βs, the coefficient of RMRF, for stocks is examined. We only take the averages of significant market βs, as the other ones are not statistically significantly different from 0. While the average of significant market βs for the portfolios of stocks in smallest ME and lowest BE/ME quintile are 1.34 and 0.92 and the average of significant market βs for the portfolios of highest ME and highest BE/ME quintile are 0.89 and 1.02 in one- factor model and three-factor model respectively, the average of the significant market βs for four- factor model is 0.99 in both smallest ME- lowest BE/ME and highest ME- highest ME/ME quintiles. So, including IMI to the one- factor and three-factor models make βs converge toward the 1.0. As Fama and French (1993) state, the reason of this tendency is the high correlation between market and IMI and SMB and RMRF.

Results show that, as in Fama and French (1993) paper, the joint variation in stock returns that are forgone by HML, RM-RF, and IMI is captured by the mimicking return for the size, SMB. However, the amount of common variation captured by SMB is lower than three-factor model due to IMI. As shown in equation 5, when IMI is regressed on SMB and HML, the R^2 value is ten percent and most of the common variation is captured by SMB (with 6.81 t-statistics). SMB has almost 74 percent (92 out of 125) slopes that are statistically significantly different from zero, and as in three-factor, the coefficients that are not statistically significantly different from 0 are mostly in big size quintiles. In general, the slopes on SMB decline monotonically from smaller to bigger size quintiles in every BE/ME and institutional ownership quintiles.

Likewise, as in Fama and French (1993) paper, the joint variation in stock returns that are forgone by SMB, RM-RF, and IMI is captured by the mimicking return for the book-to-market equity, HML. Almost 77 percent (96 out of 125) of the slopes of HML are statistically significantly different from zero, the coefficients that are not statistically significantly different from 0 are mostly in small book-to-market equity quintiles. The slopes on HML raise monotonically from smaller to bigger BE/ME quintiles in most of the size and institutional ownership quintiles. We mostly find strong negative values for the lowest book-to-market equity quintiles, and strong positive values for the greatest BE/ME quintiles.

Finally, the joint variation in stock returns that are forgone by SMB, HML, and RM-RF, is captured by the mimicking return for the institutional ownership, IMI. Almost 60 percent (74 out of 125) of the slopes of IMI are statistically significantly different from 0. Most of the insignificant coefficients are in the small size quintiles (especially quintiles of small size with high institutional ownership). As we mentioned in one-factor model interpretation, CAPM works best for high size with high institutional ownership quintiles. The reason of the not significant IMI coefficients in small size with high institutional ownership quintiles might be that market factor captures the common variation in returns and the high correlation between IMI and RMRF. Moreover, in line with Lee (1991), we expect that our 4-factor model works best for the stocks with the highest individual ownership (lowest institutional ownership) stocks as they expose to investor sentiment more, and IMI is mimicking portfolio for institutional ownership. The slopes on IMI raise monotonically from smaller to bigger institutional ownership quintiles in every size and BE/ME quintile. There are strong negative values for the lowest institutional ownership quintiles, and strong positive values for the highest institutional ownership quintiles.

Table 8. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factors: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	0.976**	1.346**	0.818**	0.818**	0.679	12	10.44	5.68	3.19	0.66
	2	0.917**	0.969**	1.373**	1.355**	1.079**	12.53	10.03	8.55	6.19	3.51
	3	0.904**	1.142**	0.830**	1.020**	1.118**	13.39	13.07	5.94	6.89	5.93
	4	0.790**	0.994**	1.085**	1.108**	1.815**	16.15	15.94	13.89	7.3	9.48
	5	0.749**	0.934**	1.011**	0.934**	0.886**	17.96	22.03	14.34	10.16	8.05
				s					t(s)		
	1	1.112**	0.716**	1.176**	2.758**	2.005	7.54	2.92	3.88	5.16	1.57
	2	1.399**	1.249**	1.720**	1.152**	0.761	10.55	7.06	5.75	3.04	1.43
	3	1.037**	1.536**	0.992**	0.901**	0.990**	8.47	9.86	3.99	3.39	2.79
	4	0.755**	1.096**	1.051**	1.128**	1.323**	8.52	9.91	7.3	4.03	3.89
	5	0.640**	1.016**	1.123**	1.451**	1.821**	8.47	13.22	8.79	8.73	9.84
1											
				h					t(h)		
	1	-0.110	-0.475**	0.113	-0.897**	-3.466**	-1.1	-2.63	0.6	-2.33	-2.72
	2	0.074	0.022	0.495**	0.233	-0.551	0.83	0.19	2.35	0.8	-1.32
	3	0.178**	0.473**	0.039	0.035	0.211	2.15	4.59	0.24	0.2	0.9
	4	0.250**	0.342**	0.473**	0.070	0.734**	4.29	4.56	5.13	0.39	3
	5	0.289**	0.410**	0.441**	0.270**	0.712**	5.67	7.92	5.13	2.41	5.62
				i					t(i)		
	1	-0.638**	-0.068	-0.298	-0.128	1.749	-4.46	-0.26	-1.12	-0.22	1.23
	2	-0.670**	-0.322*	-0.176	-0.217	1.024	-5.21	-1.88	-0.59	0.52	1.55
	3	-0.365**	-0.470**	0.279	0.066	0.855**	-3.08	-2.96	1.17	0.24	2.27
	4	-0.365**	-0.415**	-0.364**	0.112	-0.043	-4.24	-3.66	-2.54	0.4	-0.12
	5	-0.409**	-0.316**	0.057	0.072	0.147	-5.58	-4.24	0.46	0.44	0.75
				R^2							
	1	0.370	0.371	0.182	0.430	0.303					
	2	0.407	0.309	0.295	0.200	0.256					
	3	0.390	0.399	0.167	0.232	0.285					
	4	0.440	0.471	0.404	0.238	0.328					
	5	0.470	0.612	0.447	0.381	0.365					
		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.191**	1.113**	1.452**	0.967**	0.818**	16.08	13.14	11.25	9.06	5.36
	2	1.215**	1.242**	1.156**	0.985**	0.881**	12.82	16.94	14.13	9.18	8.57
	3	0.930**	1.140**	1.159**	1.157**	0.920**	8.64	17.48	16.24	15.01	10.87
	4	0.883**	0.919**	1.045**	1.155**	1.142**	12.78	15.56	17.36	13.57	13.51
	5	0.813**	0.985**	0.992**	1.080**	1.108**	10.65	16.1	17.1	13.36	13.04
				s					t(s)		
	1	1.273**	1.150**	1.571**	1.354**	0.916**	9.48	7.43	6.66	6.8	3.03
	2	1.223**	1.098**	0.797**	0.955**	0.789**	7.05	8.07	5.35	5.04	4.51
	3	0.977**	0.864**	0.842**	0.819**	1.003**	5.14	7.32	6.52	5.85	6.53
	4	0.617**	0.887**	0.894**	0.990**	1.053**	4.92	8.28	8.19	6.72	7.21
	5	0.538**	0.960**	0.838**	1.211**	1.059**	3.9	8.89	7.97	8.2	6.79
2											
				h					t(h)		
	1	0.051	0.046	-0.579**	0.110	-0.841**	0.57	0.45	-3.72	0.82	-4.62
	2	-0.421**	-0.144	-0.146	0.381**	-0.308**	-3.57	-1.61	-1.47	3.07	-2.56
	3	0.170	0.224**	0.344**	0.358**	0.354**	1.32	2.87	4.04	3.91	3.56
	4	0.311**	0.384**	0.456**	0.617**	0.439**	3.68	5.43	6.35	6.15	4.58
	5	0.448**	0.534**	0.467**	0.634**	0.581**	4.84	7.35	6.75	6.48	5.75
				i					t(i)		
	1	-0.978**	-0.289*	-0.722**	0.171	1.185**	-7.51	-1.89	-3.03	0.87	4.01
	2	-0.720**	-0.324**	0.019	0.499**	0.130	-4.22	-2.54	0.13	2.65	0.7
	3	-0.428**	-0.194*	0.175	0.104	0.608**	-2.32	-1.69	1.39	0.77	3.994
	4	-0.291**	-0.158	0.080	0.518**	0.421**	-2.39	-1.52	0.75	3.31	2.73
	5	0.035	-0.236**	0.194*	0.406**	0.718**	0.26	-2.25	1.9	2.79	4.54
				R^2							
	1	0.474	0.404	0.428	0.352	0.380					
	2	0.438	0.539	0.462	0.324	0.322					
	3	0.200	0.498	0.488	0.458	0.443					
	4	0.312	0.444	0.516	0.481	0.479					
	5	0.270	0.453	0.523	0.453	0.504					

Table 8 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factors: July 1980 to December 2016

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.130**	1.194**	1.094**	1.258**	1.023**	12.02	18.19	15.42	14.89	10.45
	2	1.055**	1.112**	1.089**	1.084**	1.015**	8.95	15.19	17.06	13.52	12.15
	3	1.087**	1.003**	1.012**	1.124**	1.059**	11.83	16.41	18.27	17.26	17.64
	4	0.755**	0.854**	0.943**	1.003**	0.950**	11.81	13.58	17.26	17.71	14.39
	5	0.990**	1.056**	1.023**	1.109**	1.220**	11.74	15.85	16.61	13.29	15.26
				s					t(s)		
	1	0.576**	0.475**	0.574**	0.590**	0.931**	3.38	4	4.47	3.82	5.39
	2	0.265	0.862**	0.516**	0.898**	0.434**	1.25	6.49	4.47	6.11	2.81
	3	0.901**	0.578**	0.599**	0.475**	0.378**	5.25	5.21	5.97	4.11	3.43
	4	0.265**	0.504**	0.718**	0.736**	0.650**	2.28	4.42	7.25	7.11	5.55
	5	0.437**	0.346**	0.291**	0.345**	0.622**	2.82	2.84	2.56	2.23	4.24
3											
				h					t(h)		
	1	-0.534**	-0.427**	-0.160*	-0.180*	-0.354**	-4.65	-5.33	-1.84	-1.76	-3.03
	2	-0.257*	0.001	-0.042	-0.108	0.018	-1.67	0.01	-0.54	-1.1	0.19
	3	0.608**	0.422**	0.348**	0.245**	0.204**	5.44	5.65	5.15	3.13	2.78
	4	0.268**	0.405**	0.223**	0.459**	0.330**	3.48	5.27	3.34	6.69	4.28
	5	0.528**	0.623**	0.518**	0.653**	0.722**	4.97	7.5	6.82	6.42	7.45
				i					t(i)		
	1	-0.352**	-0.267**	0.155	0.498**	0.544**	-2.13	-2.32	1.24	3.28	2.97
	2	-0.356	-0.304**	0.263**	0.152	0.430**	-1.53	-2.36	2.35	1.07	2.91
	3	-0.329*	0.019	0.008	0.457**	0.456**	-1.93	0.18	0.08	3.86	4.31
	4	-0.212*	0.022	0.048	0.254**	0.385**	-1.84	0.2	0.5	2.49	3.18
	5	-0.366**	-0.108	0.215*	0.740**	0.360**	-2.51	-0.9	1.95	4.96	2.43
				R^2							
	1	0.397	0.576	0.495	0.506	0.455					
	2	0.236	0.452	0.538	0.465	0.390					
	3	0.339	0.455	0.513	0.560	0.548					
	4	0.286	0.364	0.514	0.542	0.489					
	5	0.263	0.424	0.476	0.457	0.490					

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.289**	0.992**	1.255**	1.087**	1.037**	12.93	11.19	17.97	14.3	18.09
	2	0.991**	0.889**	1.064**	1.038**	1.094**	12.62	14.12	20.71	19.68	20.98
	3	0.842**	1.005**	1.053**	1.141**	1.050**	10.17	14.19	19.04	20.92	18.77
	4	0.835**	0.757**	0.939**	1.084**	1.096**	11.13	12.22	15.87	18.18	18.72
	5	1.237**	0.894**	1.071**	1.181**	1.221**	13.83	9.58	12.95	19.17	15.76
				s					t(s)		
	1	-0.003	0.238	0.450**	0.168	0.029	-0.02	1.5	3.52	1.21	0.27
	2	-0.117	-0.079	0.238**	0.025	0.242**	-0.79	-0.69	2.53	0.26	2.56
	3	0.296**	0.283**	0.270**	0.042	0.130	1.97	2.19	2.73	0.43	1.3
	4	0.020	-0.189	0.363**	0.323**	0.059	0.15	-1.6	3.39	2.99	0.55
	5	0.128	0.058	0.065	0.159	0.233	0.77	0.36	0.44	1.4	1.65
4											
				h					t(h)		
	1	-0.444**	-0.388**	-0.129	-0.179**	-0.204**	-3.56	-3.59	-1.54	-1.97	-2.92
	2	0.107	-0.078	0.276**	0.009	0.003	1.1	-1.03	4.43	0.14	0.04
	3	0.304**	0.375**	0.172**	0.248**	0.142**	3.07	4.34	2.58	3.82	2.15
	4	0.272**	0.398**	0.271**	0.603**	0.442**	3.09	5.13	3.71	8.48	6.15
	5	0.597**	0.531**	0.455**	0.572**	0.209**	5.54	4.9	4.56	7.5	2.17
				i					t(i)		
	1	-0.937**	-0.206	-0.010	0.329**	0.418**	-5.26	-1.24	-0.08	2.44	4.15
	2	-0.163	0.260*	0.077	0.303**	0.295**	-1.07	2.21	0.83	3.26	3.22
	3	-0.232	-0.100	0.187*	0.485**	0.539**	-1.5	-0.8	1.94	5.05	5.37
	4	-0.609**	0.026	0.115	0.148	0.821**	-4.29	0.22	1.1	1.41	7.93
	5	-0.275	-0.285*	0.195	0.358**	0.131	-1.61	-1.65	1.29	3.24	0.94
				R^2							
	1	0.385	0.349	0.543	0.459	0.583					
	2	0.362	0.464	0.570	0.584	0.621					
	3	0.254	0.355	0.555	0.616	0.592					
	4	0.283	0.353	0.449	0.506	0.610					
	5	0.418	0.236	0.379	0.569	0.442					

Table 8 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factors: July 1980 to December 2016

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.111**	1.068**	1.079**	0.896**	0.974**	12.73	13.86	23.17	20.67	24.49
	2	1.117**	1.176**	0.984**	1.023**	1.030**	11.43	12.15	18.65	27.47	24.95
	3	0.938**	0.913**	0.848**	1.060**	1.051**	11.99	11.39	12.93	18.9	21.46
	4	0.945**	0.824**	0.726**	1.019**	0.902**	11.17	12.35	13.26	17.01	15.79
	5	1.085**	0.913**	0.814**	1.007**	1.128**	10.7	11.59	9.32	16.28	14.01
				s					t(s)		
	1	0.091	-0.166	-0.227**	-0.246**	-0.270**	0.56	-1.13	-2.73	-3.13	-3.8
	2	-0.376**	-0.293*	-0.306**	-0.098	-0.230**	-2.14	-1.65	-3.21	-1.49	-3.11
	3	0.092	-0.203	-0.101	-0.377**	-0.161*	0.64	-1.39	-0.83	-3.71	-1.84
	4	-0.437**	-0.332**	0.149	-0.273**	0.001	-2.89	-2.74	1.48	-2.5	0.01
	5	0.045	-0.036	-0.131	0.052	-0.049	0.25	-0.25	-0.78	0.48	-0.34
5											
				h					t(h)		
	1	-0.535**	-0.523**	-0.251**	-0.215**	-0.265**	-5.13	-5.43	-4.54	-4.16	-5.66
	2	-0.015	-0.309**	0.194**	0.005	0.097*	-0.13	-2.6	3.06	0.12	1.96
	3	0.136	0.174*	0.388**	0.084	0.165**	1.43	1.81	4.97	1.18	2.79
	4	0.234**	0.390**	0.550**	0.357**	0.397**	2.36	4.94	8.3	4.77	5.76
	5	0.604**	0.505**	0.580**	0.281**	0.488**	5.14	5.26	4.94	3.84	4.96
				i					t(i)		
	1	-0.449**	0.074	-0.050	0.204**	0.187**	-2.73	0.53	-0.57	2.68	2.71
	2	-0.395**	-0.306*	0.192*	0.201**	0.440**	-2.37	-1.69	1.92	2.97	6.14
	3	-0.397**	0.159	0.228*	0.322**	0.411**	-2.64	1.06	1.87	3.25	4.84
	4	-0.239	0.062	0.070	0.011	0.402**	-1.5	0.5	0.71	0.11	4.03
	5	-0.383**	-0.114	0.051	0.266**	0.725**	-2	-0.83	0.3	2.39	5.13
				R^2							
	1	0.464	0.479	0.684	0.631	0.707					
	2	0.301	0.366	0.565	0.737	0.695					
	3	0.301	0.351	0.399	0.560	0.619					
	4	0.327	0.417	0.410	0.454	0.472					
	5	0.316	0.296	0.257	0.486	0.449					

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 9. Differences in adjusted R^2 values for the regression models (in%)

Panel A: Incerase/Decrease from one- factor model (RMRF) to Three-Factor Model (RMRF-SMB-HML)

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	32.95	12.48	33.09	140.88	178.30	
	2	55.88	37.39	33.94	15.34	13.36	
1	3	29.45	48.66	33.87	17.50	26.17	*44.93*
	4	21.10	30.37	25.00	18.91	16.73	
	5	17.66	33.56	37.85	57.61	155.24	
	1	25.23	23.77	37.87	38.98	40.41	
	2	36.51	19.24	12.93	28.81	27.78	
2	3	24.68	12.98	17.07	15.95	28.75	*27.98*
	4	12.59	28.41	27.41	33.05	29.20	
	5	26.17	38.39	30.33	50.51	32.41	
	1	20.62	12.40	8.57	7.38	25.14	
	2	3.56	13.20	6.39	16.58	5.57	
3	3	26.04	16.03	12.75	7.30	6.65	*15.09*
	4	5.64	19.28	15.25	24.94	17.20	
	5	15.45	22.54	18.89	25.74	24.16	
	1	13.16	10.48	3.82	1.57	1.07	
	2	0.56	-0.43	4.59	0.17	1.83	
4	3	5.46	7.58	3.18	4.58	2.73	*7.99*
	4	3.40	25.44	7.42	24.08	14.04	
	5	14.33	20.21	10.85	17.93	1.84	
	1	15.52	9.34	2.86	1.79	2.63	
	2	4.95	4.02	6.25	-0.14	1.83	
5	3	-1.02	3.85	16.52	2.61	2.74	*11.74*
	4	14.44	30.22	50.00	12.62	15.56	
	5	24.10	23.85	29.50	5.03	14.33	
AVERAGES		*17.94*	*20.13*	*19.45*	*22.79*	*27.43*	

Panel B: Incerase/Decrease from one-factor model (RMRF) to model with CAPM and IMI

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	5.87	0.33	1.29	9.20	30.11	
	2	3.71	0.00	2.06	0.78	11.13	
1	3	0.14	0.00	9.63	1.28	24.77	*5.58*
	4	0.58	0.14	0.00	1.57	1.73	
	5	2.00	0.11	6.25	7.12	19.79	
	1	10.73	0.00	2.11	4.30	13.78	
	2	5.59	0.20	0.32	15.22	0.75	
2	3	0.90	0.18	5.03	3.73	15.89	*6.78*
	4	0.11	1.38	10.52	14.42	11.19	
	5	4.92	1.11	9.22	18.46	19.53	
	1	2.39	1.26	1.16	4.06	5.57	
	2	1.85	-0.05	2.77	1.95	6.04	
3	3	0.00	2.56	1.97	6.57	8.03	*4.22*
	4	0.41	3.12	2.62	8.96	9.53	
	5	0.72	0.86	6.07	19.84	7.23	
	1	20.63	1.32	0.06	1.79	2.61	
	2	0.58	1.19	1.21	2.17	2.50	
4	3	0.29	0.21	2.26	6.51	7.28	*3.77*
	4	5.27	0.46	2.67	5.22	18.57	
	5	0.03	0.16	2.46	7.68	1.06	
	1	6.30	0.29	0.56	0.16	0.04	
	2	6.70	3.33	0.89	0.67	4.11	
5	3	3.43	0.97	3.79	1.30	4.28	*3.00*
	4	1.36	1.51	7.44	0.05	9.76	
	5	0.20	0.21	0.20	3.03	14.30	
AVERAGES		*25.21*	*22.53*	*21.28*	*25.37*	*31.01*	

Table 9 (Cont'd). Differences in adjusted R^2 values for the regression models (in%)

Panel C: Incerase/ Decrease from Three-Factor Model (RMRF-SMB-HML) to Model with (RMRF-IMI)

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	-21.60	-11.50	-26.26	-54.35	-52.05	
	2	-33.60	-27.59	-24.82	-15.24	-6.92	
1	3	-23.02	-32.86	-19.98	-15.37	-3.42	*-24.29*
	4	-17.28	-23.45	-20.44	-16.10	-14.12	
	5	-13.77	-25.25	-23.13	-32.41	-52.81	
	1	-12.12	-19.52	-26.29	-25.43	-19.87	
	2	-22.99	-16.32	-11.44	-11.28	-22.17	
2	3	-20.34	-11.69	-10.63	-11.02	-10.51	*-16.83*
	4	-11.85	-21.30	-13.49	-14.30	-14.46	
	5	-18.23	-27.28	-16.45	-21.55	-10.18	
	1	-15.63	-10.32	-7.23	-3.37	-16.20	
	2	-3.43	-12.04	-3.78	-13.09	-0.03	
3	3	-21.15	-12.00	-10.07	-1.00	0.73	*-9.69*
	4	-6.17	-14.08	-11.47	-13.01	-7.05	
	5	-13.60	-18.15	-11.14	-5.17	-13.86	
	1	5.85	-9.03	-4.01	-0.50	1.17	
	2	-0.90	1.12	-3.56	1.75	0.42	
4	3	-6.56	-7.77	-1.28	1.51	3.94	*-4.38*
	4	0.00	-20.50	-5.04	-15.54	3.65	
	5	-13.18	-22.29	-8.46	-8.93	-1.41	
	1	-8.50	-8.61	-2.49	-1.82	-2.78	
	2	0.36	-2.04	-5.40	0.52	1.91	
5	3	3.08	-3.95	-11.53	-1.74	1.06	*-7.59*
	4	-12.35	-22.51	-28.76	-11.52	-5.56	
	5	-20.42	-20.13	-23.44	-2.48	-0.67	
AVERAGES		*-12.30*	*-15.96*	*-13.22*	*-11.66*	*-9.65*	

Panel D: Incerase/Decrease from one- factor model (RMRF) to four-factor model (RMRF-SMB-HML-IMI)

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	43.41	11.88	33.82	137.57	185.85	
	2	71.01	39.19	33.48	13.64	17.97	
1	3	33.56	52.87	34.68	16.00	33.18	*47.90*
	4	27.17	34.96	27.85	18.41	16.73	
	5	27.72	36.91	37.54	56.79	155.24	
	1	45.85	24.69	42.19	38.58	55.10	
	2	44.08	20.58	12.68	33.33	27.78	
2	3	29.87	13.44	17.31	15.95	35.47	*31.53*
	4	15.56	28.70	27.41	37.04	31.96	
	5	26.17	40.25	31.08	53.56	39.61	
	1	22.15	13.39	8.79	9.76	28.53	
	2	4.89	14.72	7.39	16.83	8.64	
3	3	27.92	15.78	12.75	10.45	10.48	*16.95*
	4	7.52	18.95	15.25	26.34	20.15	
	5	19.55	22.54	19.90	35.21	25.96	
	1	26.64	10.79	3.63	3.15	3.92	
	2	0.84	0.65	4.59	1.74	3.16	
4	3	6.72	7.58	3.74	8.45	7.64	*10.65*
	4	20.43	24.73	7.42	24.32	25.71	
	5	15.15	22.28	11.14	20.04	1.84	
	1	18.07	9.11	2.86	2.60	3.21	
	2	6.36	5.17	7.01	0.55	5.78	
5	3	2.73	3.85	17.70	4.48	6.17	*13.30*
	4	15.14	29.91	49.64	12.38	20.41	
	5	26.91	23.85	28.50	6.35	23.69	
AVERAGES		*23.42*	*21.07*	*19.93*	*24.14*	*31.77*	

Table 9 (Cont'd). Differences in adjusted R^2 values for the regression models (in%)

Panel E: Incerase/Decrease from three- factor model (RMRF-SMB-HML) to Four-factor Model (RMRF-SMB-HML-IMI)							
		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	7.87	-0.54	0.55	-1.38	2.71	
	2	9.70	1.31	-0.34	-1.48	4.07	
1	3	3.17	2.84	0.60	-1.28	5.56	*2.16*
	4	5.01	3.52	2.28	-0.42	0.00	
	5	8.55	2.51	-0.22	-0.52	0.00	
	1	16.46	0.75	3.13	-0.28	10.47	
	2	5.54	1.13	-0.22	3.51	0.00	
2	3	4.17	0.40	0.21	0.00	5.23	*2.71*
	4	2.63	0.23	0.00	3.00	2.13	
	5	0.00	1.34	0.58	2.03	5.44	
	1	1.28	0.88	0.20	2.22	2.71	
	2	1.29	1.35	0.94	0.22	2.90	
3	3	1.50	-0.22	0.00	2.94	3.59	*1.61*
	4	1.78	-0.27	0.00	1.12	2.52	
	5	3.54	0.00	0.85	7.53	1.45	
	1	11.92	0.29	-0.18	1.55	2.82	
	2	0.28	1.09	0.00	1.57	1.31	
4	3	1.20	0.00	0.54	3.70	4.78	*2.47*
	4	16.46	-0.56	0.00	0.20	10.23	
	5	0.72	1.72	0.26	1.79	0.00	
	1	2.20	-0.21	0.00	0.80	0.57	
	2	1.35	1.10	0.71	0.68	3.89	
5	3	3.79	0.00	1.01	1.82	3.34	*1.44*
	4	0.62	-0.24	-0.24	-0.22	4.19	
	5	2.27	0.00	-0.77	1.25	8.19	
AVERAGES		*4.53*	*0.74*	*0.40*	*1.21*	*3.52*	

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year.

Interpreting the explanatory power of models to common variation in stock returns, and the significance of the explanatory variables in models, we can assert that including IMI to the asset pricing model is necessary. Findings suggest that IMI helps us to improve the asset pricing models especially for portfolios including the lowest institutional ownership, in which noise trader risk is the greatest, and for portfolios including the highest institutional ownership, in which the private information and/or agency problem risk is probably the greatest. Due to limited liability, institutions make risky investment decisions, and they are willing to pay more than discounted cash-flows for an asset (Allen, 2011). In terms of agency problem risk, the relationship between factor that represents institutional ownership and the required rate of return was not clear at the beginning. If the increase in institutional ownership reduces agency problem by monitoring the actions of managers, it is expected that there is a negative relationship between institutional ownership and required rate of return as the firm is less risky. On the other hand, if the firm is preferred by institutions as it is riskier and fund managers invest them to increase their personal wealth, then it is expected to observe positive relationship between the amount of institutional ownership and the required return. Our empirical analyses, so far, in line with the theoretical suggestions of Allen (2001) that states, increase in the institutional investors on a stock make it riskier, as they have limited liabilities and tend to make riskier investments to increase their profits. According to Lakonishok (1992), money managers are hesitated to follow fundamental strategies like contrarian investment strategies, since pay-offs of these strategies are realized in long-term, which causes money managers to seem to have bad performance in short-term and put their jobs at significant risk. Because of these, they tend not to follow fundamental strategies but follow short-term strategies, which causes destabilization in stock prices and make the stocks with high institutional ownership as a percent of total outstanding shares riskier.

An Orthogonalized Market Factor: We regress monthly returns of RM-RF on SMB, HML, and IMI for the data period of July 1980 to December 2016, in order to find out whether the multiple common factors in stock returns are all in the market return. Coefficients and t-values obtained from the regression are shown in equation 2. R^2 value of this regression is 0.2871, which states the market factor has an explanatory power besides SMB, HML, and IMI. Moreover, this R^2 value is lower than the R^2 value that Fama and French (1993) found. So, it can be said that, calculating factors by using portfolios constructed by taking not only size and book-to-market equity into the consideration, but also taking institutional ownership into the consideration distinguishes market factor from other explanatory variables better than calculating factors by using portfolios constructed by taking only size and book-to-market equity into the consideration. The t-statistics are shown in parentheses. It can be inferred from the strong slope on IMI that it captures most of the common variation in excess market portfolio returns. As mentioned above, the reason of the reduction in the significance of IMI in explaining the common variation in stock returns in time-series analyses when the market factor is included to the model might be due to this significant slope of IMI in explaining market factor returns. Basak and Pavlova (2016) state institutional investors tend to invest in the index in order to not fall behind the market. This finding is in line with this study.

$$\begin{aligned} RM - RF = {} & 1.0849 - 0.2646SMB - 0.5085HML + 0.7554IMI \\ & (5.72) \qquad (-3.09) \qquad (-9.89) \qquad (10) \end{aligned} \qquad \text{(eq. 2)}$$

It is important to note that, while the coefficient of SMB is statistically significantly positive in Fama and French (1993) paper, in our analysis, adding IMI to the regression makes its slope statistically significantly negative. In order to check whether it is due to adding IMI to the model or whether there is some error, we also check the regression result in absence of IMI; and show results in equation 3.

$$RM - RF = 0.6123 + 0.0004SMB - 0.4249HML$$
$$(3.01) \qquad (0.00) \qquad (-7.56)$$

(eq. 3)

As can be seen from the results, the sign of the coefficient of SMB turns positive, as in Fama and French (1993). However, it is not statistically significantly different from zero. Signs and t-statistics of the slopes of constant term and the HML is in line with Fama and French (1993). However, when the factors obtained from Fama and French website is used, we end up with significant positive SMB slope, which is shown in equation 4. It can be said that, constructing portfolios by using size, BE/ME, and institutional investors unlike Fama and French that use only size and BE/ME reduces the role of size in explaining the common variation in market factor, which makes market factor more independent.

$$(RM - RF)ff = 0.6277 + 0.3931SMBff - 0.1368HMLff$$
$$(3.09) \qquad (5.44) \qquad (-2.33)$$

(eq. 4)

In equation 5, the results of the regression analysis, in which IMI is regressed on SMB and HML, is showed. SMB and HML together capture only small portion of the common variation in IMI returns. The R^2 value is ten percent, which means IMI differs from SMB and HML. Between SMB and HML, size has higher t-statistic which suggests that it captures the common variation in excess returns more than HML does. This result also supports our previous finding about the decrease in the significance of SMB in four-factor model with the introduction of IMI to the three-factor model.

$$IMI = -0.6256 + 0.3508SMB + 0.1106HML$$
$$(-5.37) \qquad (6.81) \qquad (3.44)$$

(eq. 5)

The common variation in stock returns for various asset pricing models, and the significance of explanatory variables indicate that 4-factor model is better than Fama-French 3-factor. Furthermore, regressing IMI on other factors shows that this factor has common variation that cannot be explained by SMB and HML. However, another important thing in asset pricing theory and the validation of asset pricing models is the explanation of the cross-section of average returns. In the next part, the explanation of the cross-section of average stock returns by 5 models examined above will be studied.

4.2 The Cross-Section of Average Stock Returns

As a dependent variable and explanatory variables, time series approach employs excess returns. If asset-pricing model is well-specified, the regression model gives intercepts which are not significantly different from 0. By this way, formal test of the success of common factors describing the cross section of average returns is done by examining the estimated intercepts of the model. In this part, we interpret the coefficients found in the analyses, and compare models according to these intercepts.

4.2.1 One-factor Model (RMRF)

Table 10- Panel A presents the constant terms of one-factor model. Almost 45 percent (56 out of 125) of the constants are significantly different from zero. For asset-pricing models, it is not a good sign, since it means factors that are employed are incapable of explaining excess returns sufficiently, and there are other factors that have significant effect on excess returns. As in Fama-French (1993), in one- factor model, time-series regression analyses show that the intercepts present the size effect of Banz (1981). The smallest size portfolios have greater intercepts than the biggest size portfolios. Additionally, it is observed that, generally, as the BE/ME quintile increases, constants become more significant, so one-factor model performs poor for high BE/ME portfolios than low BE/ME portfolios.

For institutional ownership quintiles, we cannot talk about trend in constants, however, for small stocks with low institutional ownership, significant constants suggest that there are other factors that explain the excess returns. It can be inferred from these results that market factor leaves room for other factors that are linked to size, BE/ME, and institutional ownership in explaining the cross-sectional variation in average returns. Moreover, our results are in line with Barinov (2017) that states that intercepts of CAPM are greater in the lowest institutional ownership quintile.

4.2.2 SMB-HML-IMI

Table 10- Panel B displays the constant terms of model that has SMB, HML, and IMI as explanatory variables. Unlike CAPM, most of the constants are significantly different from zero (117 out of 125). These results support our previous findings that size, BE/ME, and institutional ownership are not sufficient to explaining the cross-sectional variation in average returns, and market factor is required.

4.2.3 Three-factor Model (RMRF-SMB-HML)

Table 10- Panel C demonstrates the constant terms of Fama-French 3-factor model. Only 31 percent of the intercepts are significantly different from 0, which means this model is better than CAPM, and model with size, BE/ME, and IMI in explaining the differences in average returns across stocks. However, interesting point is that, although the intercepts in the smallest size quintiles are smaller than one-factor model, as expected, portfolios with small size and low institutional ownership still have significant constants. This finding is in line with Lee (1991) who states that small stocks with the lowest institutional ownership subject to investor sentiment more than others. Therefore, without including IMI, the model gives significant intercepts for portfolios with high investor sentiments. Moreover, our results are in line with Barinov (2017) that states the intercepts of Fama-French 3-factor are greater in the lowest institutional ownership quintile. Therefore, it is expected that, explanatory variable related to institutional ownership is required to explain average stock returns better.

4.2.4 RMRF-IMI

Table 10- Panel D demonstrates the constant terms of a model that employs RMRF and IMI as explanatory variables. Although it leaves less room than CAPM for other factor to explain the average stock returns (46 out of 125 of intercepts are significantly different from zero), it performs worse than 3-factor model. Again, the best performance is for the biggest size quintiles and the worse performance is for the smallest size quintiles. The number of the significant constants of the smallest size portfolios are more than the number of the significant constants of the biggest size portfolios.

4.2.5 Four-factor Model (RMRF-SMB-HML-IMI)

Finally, Table 10- Panel E shows the constant terms of four-factor model, which employs RMRF, SMB, HML and IMI as explanatory variables. Among the models that we investigate, in line with the previous findings, constant terms demonstrate that four-factor model explains the average returns better than any other factors. Only 29.6 percent (37 out of 125) of the intercepts are significantly different from 0. Moreover, unlike CAPM and 3-factor model that leave the cross -sectional variation in average returns for the portfolios including stocks with small size and the lowest institutional investors, four-factor model capture most of the variation, since the number of significant intercepts of four-factor model for these portfolios are lower than the other models, which is consistent with Lee et al. (1991) that is mentioned above. In every 125 quintiles, four-factor model has lower intercepts than the other models that are examined.

Table 10. Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

Panel A: R(t)-RF(t)=∝+b(RM(t)-RF(t)+ε(t)						
		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	0.821**	1.120**	1.132**	1.001	2.453
	2	1.592**	1.788**	0.742	-0.247	-0.552
1	3	1.394**	1.359**	1.407**	0.518	-0.054
	4	1.347**	1.033**	1.075**	0.820	-0.037
	5	1.677**	1.253**	1.572**	1.507**	1.333**
	1	0.601*	0.808**	0.368	0.379	-0.338
	2	1.171**	0.638**	0.055	-0.020	-0.517
2	3	1.512**	0.495*	0.164	0.308	0.356
	4	1.070**	0.780**	0.734**	0.473	0.095
	5	0.829**	1.050**	0.841**	0.783**	0.499
	1	0.756**	0.230	0.094	0.313	0.363
	2	0.215	0.548*	0.374	0.717**	0.391
3	3	0.321	0.211	0.503*	0.274	0.525**
	4	0.387	0.693**	0.346	0.223	0.146
	5	0.480	0.622**	0.572**	0.812**	0.189
	1	-0.177	0.259	0.089	0.086	0.324
	2	0.063	-0.073	0.395*	0.471**	0.324
4	3	0.694**	0.475*	0.461**	0.256	0.307
	4	0.494*	0.778**	0.367	0.468*	0.175
	5	0.970**	0.771**	0.870**	0.699**	0.365
	1	0.053	-0.297	0.422*	0.205	-0.021
	2	-0.256	-0.085	0.295	-0.066	0.100
5	3	0.231	0.510*	0.221	0.263	0.162
	4	0.142	-0.019	0.382*	0.047	0.110
	5	0.596	0.242	0.707**	0.623**	0.894**

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 10 (Cont'd). Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

*Panel B: R(t)-RF(t)=∝+ s*SMB(t) + h*HML(t) + i*(IMI) +ε(t)*						
		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	0.949**	2.580**	1.103*	0.200	1.779
	2	1.478**	1.939**	1.652**	1.052	1.455
1	3	1.621**	1.563**	1.875**	1.212*	1.366*
	4	1.576**	1.383**	1.496**	1.446**	1.095
	5	1.907**	1.536**	2.096**	1.538**	1.230**
	1	0.673*	1.227**	0.911	0.902*	1.067*
	2	1.439*	1.187**	0.821**	1.018**	0.125
2	3	1.779**	1.144**	1.038**	1.136**	1.217**
	4	1.523**	1.195**	1.393**	1.612**	1.113**
	5	1.387**	1.481**	1.534**	1.469**	1.734**
	1	1.518**	1.154**	1.085**	1.629**	1.437**
	2	1.238**	1.167**	1.444**	1.472**	1.382**
3	3	0.955**	0.986**	1.276**	1.663**	1.723**
	4	1.016**	1.347**	1.014**	1.003**	1.110**
	5	1.160**	1.489**	1.639**	2.352**	1.480**
	1	0.570	1.182**	1.219**	1.381**	1.688**
	2	1.144**	1.073**	1.415**	1.758**	1.557**
4	3	1.332**	1.337**	1.594**	1.707**	1.745**
	4	0.993**	1.832**	1.262**	1.484**	1.786**
	5	2.182**	1.710**	2.287**	2.050**	1.611**
	1	1.002**	0.854**	1.760**	1.436**	1.305**
	2	0.914**	1.176**	1.814**	1.349**	1.576**
5	3	1.038**	1.742**	1.276**	1.844**	1.605**
	4	1.238**	1.163**	1.047**	1.292**	1.286**
	5	1.520**	1.142**	1.643**	1.963**	2.446**

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB).h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 10 (Cont'd). Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

Panel C: R(t)-RF(t)=∝+b(RM(t)-RF(t))+ s*SMB(t) + h*HML(t) +ε(t)*						
		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	0.949**	0.816*	0.495	-0.433	-0.011
	2	0.991**	1.159**	-0.092	-0.915	-0.716
1	3	0.917**	0.574*	0.779	-0.180	-0.958
	4	1.000**	0.508**	0.553*	0.216	-0.823
	5	1.404**	0.763**	0.957**	0.570	0.000
	1	0.122	0.261	-0.272	-0.360	-1.082*
	2	0.673*	0.183	-0.370	-0.574	-1.068*
2	3	1.069*	0.062	-0.343	-0.173	-0.227
	4	0.789**	0.316	0.206	-0.134	-0.637**
	5	0.492*	0.559**	0.318	0.033	-0.135
	1	0.559	0.062	-0.219	-0.063	-0.262
	2	0.157	0.144	0.063	0.240	0.104
3	3	-0.039	-0.116	0.172	-0.055	0.230
	4	0.292	0.404*	-0.045	-0.241	-0.297
	5	0.336	0.454*	0.343	0.538	-0.158
	1	-0.056	0.155	-0.137	-0.045	0.245
	2	0.162	-0.067	0.235	0.402*	0.146
4	3	0.558*	0.475*	0.270	0.111	0.124
	4	0.552*	0.910**	0.115	0.203	-0.004
	5	0.941**	0.815**	0.812**	0.486**	0.217
	1	0.041	-0.230	0.563**	0.316*	0.116
	2	0.035	0.078	0.449**	-0.045	0.132
5	3	0.242	0.608**	0.218	0.392*	0.158
	4	0.412	0.240	0.313	0.169	0.001
	5	0.641	0.205	0.680**	0.546**	0.737**

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 10 (Cont'd). Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

Panel D: R(t)-RF(t)=∝+b(RM(t)-RF(t))+ i*IMI(t) +ε(t)*

Size Quintile	BE/ME Quintile	Institutional Ownership Quintile 1	2	3	4	5
	1	0.592*	1.224**	1.208**	1.445	2.650
	2	1.416**	1.778**	1.010	-0.094	0.173
1	3	1.360**	1.378**	1.703**	0.662	0.753
	4	1.290**	0.991**	1.066**	1.012*	0.225
	5	1.580**	1.283**	1.837**	1.742**	1.690**
	1	0.226	0.798**	0.073	0.670	0.337
	2	0.847**	0.575*	0.129	0.521	-0.414
2	3	1.429**	0.544**	0.440	0.538*	0.885*
	4	1.042**	0.884**	0.983**	1.020**	0.567*
	5	1.001**	1.143**	1.149**	1.272**	1.213**
	1	0.546	0.072	0.238	0.629*	0.728*
	2	0.025	0.495	0.592**	0.897**	0.667**
3	3	0.329	0.374	0.651**	0.674**	0.866**
	4	0.331	0.845**	0.513**	0.537**	0.523**
	5	0.402	0.715**	0.833**	1.415**	0.607*
	1	-0.813**	0.099	0.123	0.261	0.534**
	2	-0.027	0.062	0.516**	0.650**	0.529**
4	3	0.641**	0.520*	0.639**	0.578**	0.665**
	4	0.233	0.843**	0.529**	0.704**	0.727**
	5	0.958**	0.736**	1.085**	1.031**	0.504
	1	-0.335	-0.369	0.318*	0.247	-0.001
	2	-0.520	-0.365	0.414*	0.047	0.330**
5	3	0.036	0.621**	0.413	0.404*	0.396**
	4	0.028	0.081	0.549**	0.069	0.401*
	5	0.555	0.275	0.748**	0.839**	1.353**

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 10 (Cont'd). Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

Panel E: R(t)-RF(t)=∝ + b(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*IMI(t) +ε(t)*

		Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5
	1	-0.111	0.763	0.225	-0.515	0.987
	2	0.483	0.909**	-0.236	-1.101	-0.077
1	3	0.640**	0.214	0.997*	-0.127	-0.198
	4	0.724**	0.181	0.269	0.298	-0.853
	5	1.094**	0.523**	1.000**	0.619	0.096
	1	-0.619**	0.051	-0.844	-0.231	-0.041
	2	0.147	-0.061	-0.357	-0.170	-0.975**
2	3	0.743*	-0.085	-0.211	-0.095	0.218
	4	0.568**	0.196	0.266	0.244	-0.317
	5	0.519*	0.380	0.465*	0.329	0.424
	1	0.292	-0.141	-0.102	0.300	0.144
	2	-0.113	-0.092	0.263	0.352	0.401
3	3	-0.296	-0.102	0.178	0.305	0.570**
	4	0.122	0.421	-0.009	-0.056	-0.005
	5	0.060	0.376	0.511*	1.104**	0.113
	1	-0.752*	0.000	-0.144	0.203	0.563**
	2	0.044	0.121	0.291	0.632	0.370*
4	3	0.386	0.251	0.414*	0.477**	0.538**
	4	0.148	0.931**	0.204	0.315	0.606**
	5	0.719*	0.608	0.967**	0.763**	0.313
	1	-0.298	-0.176	0.526**	0.471**	0.254
	2	-0.259	-0.149	0.599**	0.113	0.458**
5	3	-0.058	0.727**	0.382	0.641**	0.463**
	4	0.250	0.284	0.360	0.178	0.299
	5	0.377	0.113	0.717*	0.750**	1.266**

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

In line with the results of Fama- French (1993), our results show that the number of significant constant terms is less for three-factor model than one-factor model. However, when we also include mimicking portfolios for institutional ownership to the regression model, number of the intercepts that are significantly different from zero of the 4-factor model is even less than the number of significant intercepts of the 3-factor model. Therefore, we can conclude that 4 factor model looks like doing better job than 3-factor model and 1-factor CAPM in explaining the cross section of average returns.

CHAPTER 5

IMI AND MOMENTUM

Empirical studies display some patterns in average stock returns, which are believed as anomalies as they cannot be clarified by asset pricing models such as CAPM (Fama and French, 2008). One of the most noticeable anomalies documented in the finance literature is momentum anomaly, which is the overperformance of stocks that have performed well recently over that have not. In their 1993 paper, Jegadeesh and Titman investigate the success of relative strength strategy, which is a trading strategy based on buying past winners and selling past losers. They state abnormal returns observed in the contrarian strategy are due to the systematic risk and size effect. However, buying past winners and selling past losers, on the other hand, generates significant abnormal returns. They conclude that there is a momentum effect in stock returns. Stocks that have performed well recently will generate higher returns than those that have not. According to Jegadeesh and Titman (1993), profits of relative strength strategies are not due to systematic risk factors. In fact, they are because of delayed price reactions to firm specific information. They claim that these results are indicators of the stock market inefficiency.

In their 1996 paper, Fama and French admit the inability of their 3-factor model in explaining the cross-sectional variation in momentum arranged portfolio returns. They show that 3-factor model does not describe the continuation of the short-term stock returns. In 2008, Fama and French revisit momentum anomaly in average stock returns. They show that momentum sorted stocks yield strong positive average returns for all size groups. Average returns are inclined to increase from the lowest to the highest momentum arranged portfolios. Microcaps have the strongest abnormal momentum returns. Additionally, cross-sectional regression analysis presents that momentum has strong explanatory power on returns for all size groups.

However, Carhart (1997) examines this phenomena in different perspective. He investigates the mutual fund performances' persistence, and states that the persistence in mutual fund performance does not reflect better stock picking talent, instead it is mostly because of the sensitivity to common factors. He presents that momentum accounts for hot-hands effect in mutual fund performance. He employs four-factor model in line with a model of market equilibrium with four risk factors by including momentum factor that seize Jegadeesh and Titman's (1993) one-year momentum anomaly to the Fama and French 3-factor model. He finds that 4-factor model describes considerable variation in stock returns and pricing error in 4-factor model is less than pricing error in CAPM and 3-factor model. The evidence is consistent with market efficiency and momentum is consistently priced in market. Unlike Chan et al (1996) that claim momentum anomaly is an indication of market inefficiency since it indicates the slow reaction to information, Carhart states that it is an additional risk factor that is priced in the market. Carhart (1997) finds that CAPM is insufficient in describing relative returns. There are no differences between top and bottom decile betas, therefore intercept terms repeat as much scatterings as simple returns. Moreover, abnormal returns are related to size, since he finds positive abnormal returns for top decile funds while observing negative abnormal returns for bottom-decile funds. However, patterns observed in one-factor model is clarified by 4-factor model. He shows that bottom decile portfolios contain less small stocks than top deciles. Additionally, he displays that while there is a strong positive relation between top decile portfolios and momentum factor, the relation turns to strong negative for bottom decile funds.

Observed anomalies should appeal arbitrage activity since there is a room for large and robust abnormal returns. Major candidates for such an arbitrageur role are institutional investors since they are considered as well-informed, sophisticated investors and construct great part of the market (Calluzzo et al., 2015). As mentioned by Sias (2007), there are plenty of reasons like overreaction/ underreaction to information and agency problems that institutional investors to follow momentum trade. Additionally, institutional investors have a great role in setting equilibrium price since they compose most of the trading volume. Sias states that such behaviours of institutional investors might support the momentum or reversal patterns in stock returns. However, there is no consensus about this issue in the empirical studies. While some papers claim that institutions do not follow momentum strategy (see Gompers and Metric, 2001), some others state that they perform momentum trading (see Bennett et al., 2003, Sias, 2007). Falkenstein, (1996) and Gompers and Metrick (2001) present inverse relation between the portion of institutional investors and lag returns while Bennett et al. (2003) present that there is a positive relation between changes in the proportion of shares held by institutional investors and lag returns, which suggests momentum trading.

In this part of our study, we try to figure out whether the new factor, representing institutional investors, can bring explanation to momentum anomaly. After comparing Carhart's 4-factor model with our 4-factor model in terms of power of explaining the cross-sectional variation in returns, we will examine the significance of IMI's impact on momentum-sorted portfolios.

5.1 Momentum as A Risk Factor

In this study, momentum factor (MOM) for July 1980 to December 2016 is obtained from the web site of Gene Fama and Ken French. MOM, which is the factor-mimicking portfolio for one-year return momentum, is formed by taking the difference between equally-weighted average returns of all firms in NYSE, AMEX, and NASDAQ at the top 30 percent past returns and the equally-weighted average of all firms in NYSE, AMEX, and NASDAQ at the bottom 30 percent past returns. Portfolios are re-arranged monthly.

The correlations between MOM and other explanatory variables are presented in Table 11-Panel A. It is important to remind that, SMB and HML are not same with Fama and French factors, since we sort stocks not only by size and BE/ME, but also by institutional ownership. From the table, it can be seen that, except size, momentum factor is negatively correlated with other factors. The correlation between momentum factor and size is almost 0, which is a good sign in terms of orthogonality. Although the negative correlation of MOM with other variables are not as close to 0 as SMB, they are not very high. Especially, if we compare the correlation coefficients in Table 11-Panel B, in which the correlation between Fama and French factors that sort stocks only by size and BE/ME, we observe that the correlation coefficient between HML*ff* and MOM is almost 60 percent. It indicates that MOM and HML*ff* are not orthogonal, which violates the assumption of asset pricing theory. Asset pricing theory states that variables must be independent (Ross, 1976). Results in Table 11 indicate that factors that we construct fit this assumption better than factors constructed by Fama and French. The reason behind the correlation between MOM and SMB turns from negative to positive is the fact that SMB that we calculate is isolated from the effects of the institutional investment percentages. The negative correlation between IMI and MOM also verifies this statement.

Table 11. Correlation between momentum and other explanatory variables: July 1980- December 2016

Panel A

	RMRF	SMB	HML	IMI
MOM	-0.133	0.081	-0.248	-0.204
Panel B				
	RMRF*ff*	SMB*ff*	HML*ff*	
MOM	-0.133	-0.071	-0.591	

RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. SMB is the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks. HML is the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks IMI is the mimicking portfolio returns of institutional ownership percentages MOM is difference in returns on a portfolio contains past years' winners and portfolio contains past years' losers.

5.2 Common Variation in Returns

In this part, results of the time-series regression analyses of two models are presented. First, Carhart 4-factor model is applied, in which RMRF, SMB, HML, and MOM are employed as explanatory variables. Then 5-factor model that employs RMRF, SMB, HML, MOM, and IMI as explanatory variables is tested. In both regressions, 125 portfolios formed by sorting stocks by size, book-to-market and institutional ownership independently in June of every year t from 1980 to December 2016, are used as dependent variables. Details of constructing these portfolios and obtaining the returns to be explained are described in previous section. We do not calculate MOM by using our data, instead we employ the momentum factor that Fama and French display in their website.

Our final model will be as follows;

$$R_{it} - R_{ft} = \propto_{it} + b_{it}\left(R_{Mt} - R_{ft}\right) + s_{it}(SMB) + h_{it}(HML) + i_{it}(IMI) + m_{it}(MOM) + \varepsilon_{it} \tag{eq. 6}$$

where the R_{it} is the equally-weighted monthly returns on portfolio i among 125 portfolios that explained above, and the dependent variable is the monthly excess returns for July 1980 to December 2016. R_{mt} is the market portfolio rate of return, R_{ft} is one-month T-bill rate. SMB, HML and IMI are the monthly risk factors, as mentioned above. MOM is the momentum factor. And b_{it}, s_{it}, h_{it}, i_{it}, and m_{it} are the sensitivities of excess return on portfolio i to the common risk factors. $\propto_{it}$ is the intercept term

5.2.1 Carhart 4-factor Model (RMRF-SMB-HML-MOM)

At Table 12, the regression results of the Carhart's 4-factor model can be seen. As in the previous models, the greatest part belongs to market factor in explaining the cross-sectional variations. Additionally, almost all coefficients of market factor are significantly different from 0. When examining the t-values, it can be seen that size has the second part in explaining the cross-sectional variations in expected returns. Over 80 percent of the coefficients of SMB are significantly different from 0. With some exceptions in the smallest size quintiles, as size increases, the coefficients of SMB decrease. They turn from strongly positive values to strongly negative values. The third largest part in explaining the cross-sectional variation in returns is in HML, as can be inferred from the t-values. While the coefficients of HML are strongly significantly negative in the lowest BE/ME quintiles, it becomes significantly strongly positive in the highest BE/ME quintiles. Finally, although it cannot explain the cross-sectional variations in returns as good as other variables, especially in highest size-highest institutional ownership quintiles the effect of MOM is significantly different from 0. For low institutional ownership quintiles, MOM has generally no significant effect on returns. For high institutional ownership quintiles, MOM has strongly negative coefficients, which is against the theory that claims institutional investors are momentum traders.

When we look at the number of adjusted R^2 values greater than 50 percent, we see that it is less than 4-factor that we propose (model with RMRF, SMB, HML, and IMI as explanatory variables). Carhart model shows, except for the portfolios in the lowest size quintiles, generally adjusted R^2 values increase as moving to higher institutional ownership quintiles. It suggests that inclusion of momentum factor improves the ability of explaining the variations in returns especially in portfolios with stocks that have higher institutional ownership. Nonetheless, for portfolios including low institutional ownership, including momentum factor to the Fama-French 3-factor model is not sufficient in explaining the common variation in returns.

5.2.2 5-factor Model (RMRF-SMB-HML-IMI-MOM)

Table 13 shows the time-series regression analyses results for 5-factor model, in which explanatory variables are RMRF, SMB, HML, IMI, and MOM. Overall, market factor has the highest t-values that indicates it has the biggest role in explaining the cross-sectional variations in returns. When we examine the sensitivities of portfolios to SMB factor, we see that their significance is less than the significance in Carhart's 4-factor model, but it is same with the significance in our 4-factor model (model with RMRF, SMB, HML, and IMI as risk factors). Almost 74 percent of the coefficients of SMB are significantly different from 0. Except in low BE/ME quintiles, as moving from lower size quintiles to higher size quintiles, the coefficients of SMB increase. As in Carhart's 4-factor model, most of the insignificant coefficients are in high size quintiles. Except the highest size quintile, t-values indicate that size has the second greatest part in explaining the cross-sectional variations in returns. In the highest size quintile, HML explains the second highest part in explaining the cross-sectional variations in returns, though it is slightly higher than MOM and IMI.

Table 12. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and momentum (MOM) factors: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + m*(MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	0.837**	1.392**	0.711**	0.821**	1.364	10.8	11.97	5.11	3.8	1.54
	2	0.741**	0.940**	1.212**	1.215**	1.146**	10.53	10.39	8.59	6.22	3.9
	3	0.791**	1.012**	0.894**	1.000**	1.316**	12.45	12.54	6.68	7.39	7.18
	4	0.687**	0.880**	0.908**	1.126**	1.661**	14.75	15.29	12.9	8.15	9.43
	5	0.636**	0.834**	1.011**	0.988**	0.909**	15.81	20.76	15.38	11.57	8.94
				s					t(s)		
	1	0.899**	0.710**	1.006**	2.649**	2.752**	6.3	3.13	3.78	5.24	2.07
	2	1.178**	1.134**	1.623**	1.055**	0.838	9.1	6.78	5.81	3.01	1.59
	3	0.918**	1.398**	1.086**	0.917**	1.332**	7.85	9.31	4.6	3.61	4.06
	4	0.635**	0.978**	0.934**	1.156**	1.351**	7.43	9.1	6.84	4.24	4.18
	5	0.506**	0.914**	1.143**	1.464**	1.853**	6.83	12.36	9.45	9.29	10.32
1											
				h					t(h)		
	1	-0.208**	-0.389**	0.014	-0.875**	-2.948*	-2.04	-2.1	0.08	-2.29	-2.01
	2	-0.078	0.026	0.100	0.058	-0.852*	-0.84	0.22	0.43	0.19	-1.86
	3	0.069	0.379**	0.099	0.009	0.332	0.82	3.58	0.61	0.05	1.44
	4	0.155**	0.265**	0.296**	0.390	0.514**	2.6	3.41	3.21	0.0718	2.09
	5	0.188**	0.312**	0.431**	0.341**	0.721**	3.54	5.9	4.97	3.09	5.66
				m					t(m)		
	1	0.067	0.213*	-0.072	0.221	0.278	0.91	1.75	-0.61	0.79	0.2
	2	-0.041	0.175**	-0.509**	-0.296	-0.576	-0.62	2.06	-3.27	-1.47	-1.58
	3	-0.084	-0.029	-0.009	0.096	0.030	-1.4	-0.38	-0.07	-0.83	0.18
	4	-0.050	-0.018	-0.270**	-0.037	-0.476**	-1.13	-0.33	-4.11	-0.29	-2.59
	5	-0.046	-0.082**	-0.052	0.127	-0.044	-1.2	-2.16	-0.83	1.62	-0.5
				R^2							
	1	0.340	0.377	0.193	0.430	0.279					
	2	0.369	0.309	0.318	0.207	0.257					
	3	0.379	0.386	0.164	0.234	0.266					
	4	0.419	0.454	0.419	0.238	0.343					
	5	0.434	0.601	0.447	0.385	0.363					
		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	0.937**	1.081**	1.277**	0.971**	0.955**	12.76	13.53	10.77	9.75	6.73
	2	1.085**	1.089**	1.079**	1.129**	0.885**	11.95	16.06	14.32	11.39	9.34
	3	0.879**	1.104**	1.158**	1.142**	1.030**	8.63	18.08	17.48	14.95	13.02
	4	0.810**	0.878**	1.052**	1.236**	1.198**	12.47	15.9	18.72	15.58	15.24
	5	0.742**	0.927**	0.991**	1.092**	1.184**	10.59	15.96	18.49	14.48	15.29
				s					t(s)		
	1	0.950**	1.057**	1.352**	1.394**	1.287**	7.03	7.15	5.95	7.25	4.49
	2	1.000**	0.986**	0.820**	1.095**	0.822**	5.93	7.73	5.87	5.96	4.89
	3	0.835**	0.799**	0.905**	1.092**	1.139**	4.62	7.12	7.44	7.61	7.48
	4	0.520**	0.834**	0.921**	1.116**	1.158**	4.36	8.21	8.93	7.78	8.18
	5	0.556**	0.884**	0.908**	1.345**	1.233**	4.38	8.57	9.22	9.64	8.24
2											
				h					t(h)		
	1	-0.164*	0.037	-0.679**	0.060	-0.746**	-1.7	0.36	-4.19	0.41	-4.19
	2	-0.505**	-0.324**	-0.254**	0.481**	-0.324**	-4.21	-3.63	-2.63	3.76	-2.67
	3	0.157	0.201**	0.312**	0.077	0.376**	1.21	2.57	3.67	0.76	3.62
	4	0.252**	0.349**	0.452**	0.640**	0.458**	2.93	4.91	6.28	6.26	4.76
	5	0.331**	0.485**	0.432**	0.603**	0.548**	3.66	6.61	6.28	6.23	5.37
				m					t(m)		
	1	-0.047	0.123	0.036	-0.128	-0.416**	-0.68	1.6	0.32	-1.3	-3.43**
	2	0.143	-0.260**	-0.286**	0.018	-0.091	1.64	-4.11	-3.97	0.21	-1.07
	3	0.177*	0.041	-0.161**	-0.197**	-0.150**	1.9	0.71	-2.57	-2.71	-2.11
	4	-0.005	-0.006	-0.048	-0.160**	-0.151**	-0.08	-0.12	-0.9	-2.2	-2.14
	5	-0.294**	0.002	-0.177**	-0.288**	-0.357**	-4.52	0.03	-3.5	-3.99	-4.9
				R^2							
	1	0.406	0.403	0.414	0.353	0.369					
	2	0.418	0.55	0.481	0.311	0.322					
	3	0.197	0.496	0.493	0.481	0.426					
	4	0.302	0.441	0.516	0.472	0.475					
	5	0.304	0.451	0.532	0.463	0.508					

Table 12 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and momentum (MOM) factors: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + m*(MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.006**	1.101**	1.111**	1.272**	1.061**	11.45	17.93	16.79	16.2	11.63
	2	0.908**	0.964**	1.136**	1.167**	1.109**	8.39	14.34	19	15.61	13.76
	3	0.932**	1.010**	0.989**	1.215**	1.153**	11.21	17.71	19.22	20.28	20.18
	4	0.712**	0.855**	0.950**	1.036**	1.037**	12.23	14.58	18.66	19.36	17.09
	5	0.878**	0.955**	1.020**	1.249**	1.257**	11.1	15.61	17.78	15.81	17.23
				s					t(s)		
	1	0.462**	0.389**	0.627**	0.756**	1.092**	2.86	3.45	5.15	5.2	6.62
	2	0.178	0.764**	0.605**	0.936**	0.563**	0.88	6.16	5.5	6.71	3.77
	3	0.814**	0.584**	0.604**	0.605**	0.531**	4.93	5.56	6.38	5.41	4.97
	4	0.206*	0.512**	0.734**	0.817**	0.757**	1.84	4.74	7.83	8.25	6.67
	5	0.311**	0.321**	0.375**	0.571**	0.708**	2.11	2.82	3.55	3.78	4.99
3											
				h					t(h)		
	1	-0.662**	-0.523**	-0.161*	-0.220**	-0.360**	-5.71	-6.47	-1.85	-2.18	-3.1
	2	-0.348**	-0.172*	-0.017	-0.010	0.099	-2.25	-1.93	-0.21	-0.1	0.98
	3	0.455**	0.429**	0.310**	0.270**	0.267**	3.99	5.71	4.57	3.34	3.53
	4	0.256**	0.403**	0.226**	0.472**	0.375**	3.24	5.21	3.37	6.87	4.72
	5	0.396**	0.500**	0.481**	0.708**	0.695**	3.45	6.15	6.38	6.66	7.03
				m					t(m)		
	1	-0.135	-0.100*	-0.076	-0.357**	-0.267**	-1.62	-1.72	-1.21	-4.74	-3.29
	2	-0.170	-0.260**	-0.064	0.156**	-0.011	-1.65	-4.09	-1.14	2.22	-0.15
	3	-0.208**	0.008	-0.092*	-0.109*	-0.064	-2.68	0.15	-1.9	-1.94	-1.18
	4	0.049	-0.016	-0.015	-0.095*	-0.052	0.91	-0.29	-0.31	-1.86	-0.91
	5	-0.098	-0.249**	-0.189**	-0.168**	-0.186**	-1.17	-4.23	-3.5	-2.27	-2.7
				R^2							
	1	0.394	0.573	0.495	0.519	0.458					
	2	0.237	0.466	0.534	0.470	0.377					
	3	0.346	0.455	0.517	0.544	0.530					
	4	0.281	0.363	0.514	0.539	0.478					
	5	0.254	0.447	0.486	0.431	0.491					

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	1.047**	0.898**	1.227**	1.119**	1.136**	10.76	11.09	18.84	15.8	20.83
	2	0.900**	0.939**	1.072**	1.109**	1.163**	12.38	16.24	22.16	22.27	23.62
	3	0.765**	0.995**	1.088**	1.203**	1.142**	10.06	15.05	21.14	23.63	21.64
	4	0.698**	0.747**	0.972**	1.083**	1.246**	10.05	12.98	17.64	19.57	21.5
	5	1.190**	0.815**	1.079**	1.195**	1.141**	14.66	9.53	14.43	20.82	16.21
				s					t(s)		
	1	-0.297	0.187	0.451**	0.289**	0.168*	-1.6	1.23	3.75	2.21	1.67
	2	-0.155	-0.016	0.262**	0.125	0.340**	-1.09	-0.14	2.93	1.37	3.75
	3	0.244*	0.247**	0.333**	0.207**	0.298**	1.66	2.02	3.53	2.16	3.06
	4	-0.114	-0.182	0.402**	0.376**	0.321**	-0.83	-1.62	3.98	3.7	2.99
	5	0.048	-0.006	0.115	0.299**	0.286**	0.3	-0.04	0.82	2.84	2.19
4											
				h					t(h)		
	1	-0.653**	-0.482**	-0.171**	-0.184**	-0.129*	-5.04	-4.39	-2.04	-2.02	-1.79
	2	0.014	-0.061	0.278**	0.064	0.054	0.14	-0.78	4.47	0.97	0.84
	3	0.242**	0.379**	0.192**	0.302**	0.171**	2.42	4.34	2.86	4.53	2.5
	4	0.190**	0.382**	0.301**	0.576**	0.527**	2.1	4.9	4.12	8.11	6.88
	5	0.580**	0.472**	0.416**	0.549**	0.084	5.25	4.35	4.08	7.31	0.91
				m					t(m)		
	1	-0.054	-0.143*	-0.096	-0.174**	-0.018	-0.59	-1.85	-1.55	-2.6	-0.35
	2	-0.148**	-0.054	-0.035	-0.014	-0.017	-2.21	-1	-0.74	-0.29	-0.36
	3	-0.051	0.054	-0.044	-0.106**	-0.157**	-0.73	0.86	-0.91	-2.16	-3.15
	4	0.078	-0.049	0.019	-0.137**	-0.179**	1.23	-0.92	0.36	-2.62	-3.26
	5	0.078	-0.006	0.925**	-0.237**	-0.379**	1.06	-0.07	-2.17	-4.44	-5.63
				R^2							
	1	0.343	0.352	0.545	0.459	0.567					
	2	0.369	0.459	0.570	0.574	0.612					
	3	0.250	0.355	0.552	0.597	0.574					
	4	0.244	0.354	0.447	0.512	0.563					
	5	0.415	0.230	0.384	0.578	0.480					

Table 12 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and momentum (MOM) factors : July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + m*(MOM) +ε(t)

Size Quintile	BE/ME Quint	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					t(b)				
	1	0.922**	0.978**	1.049**	0.938**	0.994**	11.69	13.75	24.74	23.01	26.61
	2	0.963**	1.001**	0.997**	1.045**	1.116**	10.32	11.53	20.63	31.04	27.73
	3	0.822**	0.881**	0.898**	1.119**	1.120**	11.35	12.27	14.83	21.23	23.91
	4	0.775**	0.894**	0.742**	0.984**	0.962**	10.55	14.34	13.99	17.66	17.74
	5	0.981**	0.794**	0.778**	1.057**	1.239**	10.21	11.21	9.91	18.65	16.13
		s					t(s)				
	1	-0.037	-0.134	-0.237**	-0.177**	-0.205**	-0.24	-0.99	-2.98	-2.36	-3.04
	2	-0.509**	-0.377**	-0.253**	-0.041	-0.084	-3.05	-2.23	-2.78	-0.66	-1.15
	3	-0.019	-0.156	-0.045	-0.268**	-0.023	-0.13	0.26	-0.38	-2.76	-0.27
	4	-0.474**	-0.321**	0.170*	-0.265**	0.137	-3.34	-2.77	1.75	-2.58	1.38
	5	-0.041	-0.063	-0.134	0.128	0.192	-0.23	-0.48	-0.84	1.23	1.38
5											
		h					t(h)				
	1	-0.716**	-0.639**	-0.285**	-0.187**	-0.266**	-6.8	-6.89	-5.14	-3.57	-5.65
	2	-0.187	-0.504**	0.183**	-0.015	0.153**	-1.63	-4.26	2.88	-0.33	2.95
	3	0.036	0.102	0.412**	0.115	0.199**	0.37	1.07	5.16	1.6	3.29
	4	0.036	0.469**	0.566**	0.282**	0.416**	0.37	6.03	8.67	3.63	5.92
	5	0.510**	0.342**	0.534**	0.292**	0.521**	4.34	3.75	4.54	3.89	5.17
		m					t(m)				
	1	-0.210**	-0.328**	-0.062	-0.031	-0.092**	-2.82	-4.97	-1.53	-0.82	-2.65
	2	-0.166**	-0.323**	-0.116**	-0.116**	-0.072*	-2.04	-3.97	-2.55	-3.67	-1.93
	3	-0.060	-0.233**	-0.030	-0.079	-0.110**	-0.87	-3.56	-0.52	-1.57	-2.52
	4	-0.327**	0.132**	0.001	-0.144**	-0.135**	-4.89	2.51	0.01	-2.52	-2.69
	5	-0.021	-0.323	-0.163	-0.072	-0.235**	-0.26	-5.01	-2.13	-1.37	-3.29
		R^2									
	1	0.465	0.511	0.686	0.625	0.707					
	2	0.303	0.387	0.568	0.740	0.671					
	3	0.289	0.372	0.394	0.556	0.604					
	4	0.370	0.428	0.409	0.461	0.461					
	5	0.306	0.339	0.267	0.481	0.429					

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). m_{it} is the sensitivity of excess return on portfolio i to the difference in returns on a portfolio contains past years' winners and portfolio contains past years' loosers. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

The coefficients of HML are strongly positive in the highest BE/ME quintiles, while they are strongly negative in the lowest BE/ME quintiles. The significance of this risk factor is less in 5-factor model than in Carhart's 4-factor model and the 4-factor model suggested in this paper, however, it is still the most significant third factor in the model.

Addition of momentum factor to the 4-factor model does not have major affect the impact of IMI factor. Almost 58 percent of the coefficients of IMI are still significantly different from 0, and they turn from strongly negative values in the lowest institutional ownership quintiles to strongly positive values in the highest institutional ownership quintiles. Therefore, we can say that, the effect of IMI is not captured by momentum factor, although some researches state institutional investors trade by following momentum strategy. Likewise, adding IMI to the Carhart's 4-factor model does not seize the part of momentum factor in explaining the cross-sectional variations in returns. In fact, the number of significant coefficients of momentum factor is more (58 out of 125 coefficients in 5-factor model and 57 out of 125 coefficients in Carhart's 4-factor model). Most of the significant coefficients are in the highest size quintiles as in Carhart's 4-factor model.

Finally, the number of the adjusted R^2 values greater than 50 percent is higher in 5-factor model than in Carhart's 4-factor model and in our 4-factor model. These results suggest that 5-factor model works better than all models examined in this thesis.

Table 13. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional ownership (IMI), and momentum (MOM) factors: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI) + m* (MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					t(b)		
	1	0.983**	1.388**	0.784**	0.847**	0.687	11.85	10.61	5.15	3.26	0.66
	2	0.900**	1.000**	1.290**	1.290**	0.990**	12.08	10.23	8.15	5.88	3.18
	3	0.880**	1.130**	0.830**	0.990**	1.130**	12.84	12.71	5.78	6.51	5.63
	4	0.770**	0.990**	1.020**	1.100**	1.690**	15.57	15.57	13.18	7.11	8.66
	5	0.730**	0.910**	0.990**	0.960**	0.880**	17.33	21.27	13.92	10.32	7.8
				s					t(s)		
	1	1.109**	0.703**	1.179**	2.684**	2.105	7.5	2.87	3.88	4.93	1.48
	2	1.400**	1.230**	1.730**	1.170**	0.710	10.6	6.96	5.89	3.1	1.35
	3	1.050**	1.540**	0.990**	0.910**	0.990**	8.57	9.88	3.98	3.41	2.78
	4	0.760**	1.100**	1.060**	1.130**	1.390**	8.61	9.93	7.57	4.03	4.11
	5	0.650**	1.030**	1.130**	1.430**	1.820**	8.57	13.43	8.81	8.61	9.84
1				h					t(h)		
	1	-0.098	-0.390**	0.092	-0.868**	-3.339**	-0.95	-2.1	0.48	-2.25	-2.23
	2	0.050	0.080	0.230	0.090	-0.820*	8	0.67	0.55	0.32	-1.81
	3	0.140	0.450**	0.040	0.000	0.210	1.6	4.19	0.25	0.01	0.91
	4	0.220**	0.320**	0.360**	0.060	0.540**	3.7	4.13	3.86	0.31	2.11
	5	0.260**	0.370**	0.420**	0.320**	0.700**	4.97	6.96	4.72	2.77	5.32
				i					t(i)		
	1	-0.631**	0.019	-0.315	-0.107	1.741	-4.38	0.07	-1.18	-0.18	1.21
	2	-0.690**	-0.290*	-0.350	-0.340	0.930	-5.32	-1.67	-1.18	-0.82	1.41
	3	-0.390**	-0.490**	0.280	0.030	0.850**	-3.27	-3.03	1.17	0.12	2.26
	4	-0.380**	-0.430**	-0.470**	0.100	-0.140	-4.41	-3.74	-3.31	0.36	-0.37
	5	-0.420	-0.340**	0.050	0.110	0.130	-5.77	-4.55	0.37	0.63	0.68
				m					t(m)		
	1	0.031	0.214*	-0.084	0.219	0.226	0.43	1.73	-0.71	0.78	0.17
	2	-0.080	0.160*	-0.540**	-0.330	-0.520	-1.23	1.87	-3.42	-1.6	-1.44
	3	-0.110*	-0.060	0.010	-0.090	0.020	-1.78	-0.76	0.07	-0.8	0.11
	4	-0.070	-0.050	-0.300**	-0.030	-0.490**	-1.64	-0.85	-4.63	-0.23	-2.61
	5	-0.070	-0.570	-0.050	0.130*	-0.030	-1.89	-2.71	-0.79	1.68	-0.39
				R^2							
	1	0.369	0.376	0.198	0.428	0.289					
	2	0.407	0.313	0.319	0.206	0.264					
	3	0.393	0.398	0.165	0.232	0.282					
	4	0.443	0.470	0.434	0.237	0.341					
	5	0.473	0.618	0.446	0.385	0.362					

Table 13 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional ownership (IMI), and momentum (MOM) factors: July 1980 to December 2016

		Institutional Ownership Quintile						Institutional Ownership Quintile				
	BE/ME Quintile	1	2	3	4	5		1	2	3	4	5
				b						t(b)		
	1	1.170**	1.140**	1.450**	0.950**	0.720**		15.52	13.16	11.08	8.72	4.63
	2	1.238**	1.179**	1.090**	0.998**	0.860**		12.78	16.13	13.29	9.12	8.18
	3	0.970**	1.147**	1.125**	1.081**	0.898**		8.81	17.24	15.56	12.73	10.45
	4	0.878**	0.915**	1.036**	1.124**	1.112**		12.46	15.2	16.88	12.95	12.96
	5	0.750**	0.982**	0.955**	1.017**	1.039**		9.87	15.64	16.34	12.5	12.28
				s						t(s)		
	1	1.280**	1.140**	1.570**	1.360**	0.940**		9.56	7.34	6.65	6.84	3.13
	2	1.212**	1.118**	0.836**	0.953**	0.796**		6.98	8.39	5.7	5.03	4.55
	3	0.963**	0.861**	0.858**	1.025**	1.014**		5.07	7.27	6.67	6.88	6.6
	4	0.619**	0.889**	0.898**	1.001**	1.066**		4.93	8.27	8.22	6.81	7.31
	5	0.568**	0.961**	0.855**	1.241**	1.074**		4.21	8.89	8.22	8.52	7.04
				h						t(h)		
	1	0.010	0.080	-0.580**	0.050	-0.950**		0.12	0.78	-3.54	0.33	-5.16
	2	-0.387**	-0.257**	-0.244**	0.404**	-0.341**		-3.18	-2.84	-2.44	3.11	-2.72
2	3	0.229*	0.235**	0.286**	0.039	0.312**		1.73	2.9	3.26	0.38	3.02
	4	0.303**	0.378**	0.440**	5701.000**	0.396**		3.44	5.15	5.89	5.49	4.01
	5	0.337**	0.529**	0.404**	0.544**	0.464**		3.6	7	5.68	5.46	4.53
				i						t(i)		
	1	-1.000**	-0.260*	-0.720**	0.120	1.030**		-7.65	-1.7	-3.01	0.59	3.46
	2	-0.695**	-0.391**	0.053	0.517**	0.104		-4.04	-3.11	-0.36	2.71	0.55
	3	-0.392**	-0.187	0.141	0.261*	0.568**		-2.11	-1.62	1.12	1.65	3.64
	4	-0.296**	-0.161	0.070	0.476**	0.378**		-2.42	-1.54	0.65	3.01	2.43
	5	-0.034	-0.239**	0.157	0.338**	0.610**		-0.26	-2.26	1.54	2.34	3.9
				m						t(m)		
	1	-0.100	0.110	-0.002	0.110	-0.340**		-1.58	1.37	-0.02	-1.12	-2.77
	2	0.098	-0.283**	-0.290**	0.054	-0.084		1.14	-4.49	-3.98	0.61	-0.98
	3	0.154*	0.030	-0.152**	-0.178**	-0.107		1.65	0.52	-2.43	-2.42	-1.51
	4	-0.022	-0.015	-0.044	-0.126*	-0.124*		-0.36	-0.29	-0.82	-1.73	-1.74
	5	-0.296**	-0.012	-0.169**	-0.267**	-0.312**		-4.52	-0.23	-3.31	-3.68	-4.3
				R^2								
	1	0.476	0.405	0.426	0.353	0.396						
	2	0.438	0.560	0.480	0.323	0.322						
	3	0.204	0.497	0.494	0.484	0.445						
	4	0.310	0.443	0.515	0.483	0.481						
	5	0.302	0.452	0.534	0.469	0.526						

Table 13 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional ownership (IMI), and momentum (MOM) factors: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI) + m* (MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	1.096**	1.169**	1.079**	1.181**	0.963**	11.48	17.54	14.93	13.96	9.71
	2	1.004**	1.050**	1.078**	1.123**	1.020**	8.32	14.4	16.58	13.79	11.92
	3	1.033**	1.005**	0.992**	1.109**	1.050**	11.16	16.12	17.63	16.8	17.18
	4	0.762**	0.851**	0.940**	0.984**	0.944**	11.74	13.26	16.88	17.03	14.07
	5	0.969**	0.994**	0.983**	1.083**	1.186**	11.36	14.91	15.83	12.78	14.68
		s					t(s)				
	1	0.591**	0.487**	0.581**	0.628**	0.969**	3.48	4.1	4.41	4.15	5.65
	2	0.290	0.889**	0.521**	0.876**	0.432**	1.37	6.83	4.5	5.97	2.79
	3	0.918**	0.577**	0.608**	0.482**	0.383**	5.41	5.19	6.07	4.17	3.46
	4	0.264**	0.506**	0.719**	0.745**	0.653**	2.26	4.43	7.25	7.2	5.57
	5	0.447**	0.375**	0.315**	0.352**	0.633**	2.89	3.14	2.8	2.28	4.34
		h					t(h)				
	1	-0.594**	-0.472**	-0.186**	-0.293**	-0.436**	-5	-5.69	-2.06	-2.83	-3.65
3	2	-0.308**	-0.104	-0.061	-0.042	0.025	-1.97	-1.14	-0.75	-0.41	0.24
	3	0.508**	0.426**	0.312**	0.211**	0.189**	4.41	5.48	4.46	2.6	2.47
	4	0.283**	0.399**	0.218**	0.431**	0.319**	3.52	5	3.15	6.1	3.95
	5	0.454**	0.531**	0.452**	0.601**	0.658**	3.92	6.32	5.8	5.66	6.58
		i					t(i)				
	1	-0.387**	-0.294**	0.139	0.414**	0.449**	-2.34	-2.54	1.11	2.76	2.44
	2	-0.415*	-0.369**	0.252**	0.189	0.434**	-1.78	-2.91	2.23	1.33	2.91
	3	-0.413**	0.021	-0.013	0.433**	0.447**	-2.42	0.2	-0.13	3.63	4.2
	4	-0.283*	0.019	0.045	0.233**	0.377**	-1.72	0.17	0.47	2.27	3.08
	5	-0.402**	-0.173	0.168	0.707**	0.304**	-2.72	-1.46	1.52	4.7	2.04
		m					t(m)				
	1	-0.156*	-0.117**	-0.068	-0.330**	-0.230**	-1.88	-2.01	-1.08	-4.39	-2.81
	2	-0.195*	-0.281**	-0.050	0.166**	0.018	-1.88	-4.44	-0.89	2.36	0.24
	3	-0.239**	0.009	-0.093*	-0.081	-0.040	-3.05	0.17	-1.9	-1.44	-0.74
	4	0.036	-0.015	-0.012	-0.081	-0.029	0.65	-0.27	-0.26	-1.56	-0.51
	5	-0.133	-0.259**	-0.178**	-0.123*	-0.163**	-1.58	-4.39	-3.27	-1.7	-2.35
		R^2									
	1	0.400	0.579	0.496	0.527	0.466					
	2	0.241	0.476	0.538	0.471	0.388					
	3	0.355	0.460	0.516	0.559	0.548					
	4	0.285	0.362	0.513	0.543	0.488					
	5	0.266	0.448	0.487	0.460	0.496					

Table 13 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional ownership (IMI), and momentum (MOM) factors: July 1980 to December 2016

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	1.259**	0.959**	1.234**	1.053**	1.039**	12.36	10.67	17.37	13.67	17.77
	2	0.950**	0.881**	1.057**	1.039**	1.094**	11.9	13.77	20.11	19.31	20.57
	3	0.826**	1.016**	1.046**	1.123**	1.023**	9.8	14.07	18.61	20.26	18.1
	4	0.843**	0.746**	0.944**	1.055**	1.068**	11.05	11.81	15.64	17.48	18.01
	5	1.251**	0.888**	1.042**	1.129**	1.134**	13.73	9.29	12.45	18.27	14.81
		s					t(s)				
	1	0.001	0.252	0.462**	0.187	0.028	0.04	1.6	3.62	1.35	0.27
	2	-0.097	-0.077	0.241**	0.024	0.242**	-0.66	-0.66	2.56	0.25	2.55
	3	0.304**	0.277**	0.274**	0.050	0.142	2.02	2.14	2.76	0.51	1.42
	4	0.015	-0.184	0.361**	0.336**	0.071	0.11	-1.56	3.37	3.13	0.66
	5	0.121	0.061	0.075	0.193*	0.276**	0.72	0.38	0.52	1.73	2.01
		h					t(h)				
	1	-0.489**	-0.449**	-0.165*	-0.238**	-0.202**	-3.79	-4.02	-1.9	-2.53	-2.78
4	2	0.045	-0.093	0.266**	0.011	0.003	0.45	-1.17	4.13	0.16	0.04
	3	0.278**	0.394**	0.159**	0.218**	0.094	2.73	4.38	2.3	3.24	1.37
	4	0.286**	0.381**	0.279**	0.554**	0.394**	3.14	4.76	3.71	7.55	5.32
	5	0.622**	0.521**	0.396**	0.491**	0.079	5.55	4.65	3.82	6.34	0.82
		i					t(i)				
	1	-0.972**	-0.259	-0.032	0.292**	0.420**	-5.41	-1.55	-0.26	2.16	4.13
	2	0.230	0.248**	0.069	0.303**	0.295**	-1.5	2.08	0.74	3.25	3.19
	3	-0.260*	-0.089	0.179*	0.467**	0.506**	-1.66	-0.7	1.85	4.85	5.03
	4	-0.595**	0.005	0.121	0.119	0.788**	-4.13	0.04	1.15	1.14	7.59
	5	-0.253	-0.294*	0.149	0.299**	0.034	-1.46	-1.68	0.98	2.73	0.25
		m					t(m)				
	1	-0.123	-0.162**	-0.098	-0.157**	0.006	-1.37	-2.07	-1.57	-2.34	0.11
	2	-0.166**	-0.036	-0.030	0.003	0.000	-2.45	-0.66	-0.64	0.07	0
	3	-0.071	0.049	-0.034	-0.080*	-0.125**	1.01	0.77	-0.69	-1.65	-2.56
	4	0.037	-0.049	0.025	-0.130**	-0.128**	0.58	-0.89	0.47	-2.47	-2.46
	5	0.060	-0.026	-0.142**	-0.218**	-0.377**	0.81	-0.33	-2	-4.07	-5.54
		R^2									
	1	0.387	0.354	0.544	0.464	0.582					
	2	0.371	0.463	0.570	0.584	0.620					
	3	0.254	0.355	0.554	0.617	0.597					
	4	0.281	0.353	0.449	0.512	0.614					
	5	0.417	0.234	0.384	0.585	0.480					

Table 13 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional ownership (IMI), and momentum (MOM) factors: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI) + m* (MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					t(b)				
	1	1.053**	0.982**	1.066**	0.891**	0.956**	12.01	12.8	22.56	20.17	23.76
	2	1.063**	1.103**	0.962**	1.003**	1.019**	10.66	11.49	17.99	26.85	24.31
	3	0.919**	0.864**	0.845**	1.046**	1.032**	11.57	10.76	12.64	18.29	20.8
	4	0.867**	0.867**	0.728**	0.990**	0.878**	10.49	12.76	12.82	16.33	15.17
	5	1.069**	0.840**	0.775**	0.997**	1.084**	10.24	10.84	8.71	15.9	13.34
		s					t(s)				
	1	0.106	-0.128	-0.219**	-0.244**	-0.261**	0.66	-0.9	-2.64	-3.1	-3.69
	2	-0.359**	-0.268	-0.295**	-0.090	-0.225**	-2.05	-1.54	-3.11	-1.37	-3.04
	3	0.105	-0.175	-0.100	-0.372**	-0.152*	0.74	-1.21	-0.82	-3.67	-1.73
	4	-0.392**	-0.355**	0.149	-0.256**	0.014	-2.7	-2.95	1.47	-2.35	0.14
	5	0.057	0.009	-0.138	0.057	-0.029	0.32	0.06	-0.82	0.52	-0.2
		h					t(h)				
	1	-0.633**	-0.636**	-0.275**	-0.223**	-0.296**	-5.91	-6.61	-4.82	-4.14	-6.13
	2	-0.091	-0.445**	0.159**	-0.038	0.079	-0.77	-3.71	2.44	-0.82	1.52
5	3	0.104	0.090	0.383**	0.063	0.131**	1.06	0.92	4.71	0.85	2.14
	4	0.095	0.446**	0.552**	0.286**	0.352**	0.97	5.51	8.08	3.6	4.93
	5	0.582**	0.384**	0.533**	0.258**	0.414**	4.78	4.01	4.48	3.37	4.11
		i					t(i)				
	1	-0.633**	-0.019	-0.072	0.200**	0.169**	-3.24	-0.14	-0.81	2.6	2.45
	2	-0.449**	-0.432**	0.155	0.170**	0.429**	-2.69	-2.41	1.55	2.52	5.97
	3	-0.434**	0.071	0.223*	0.309**	0.393**	-2.85	0.48	1.8	3.11	4.62
	4	-0.367**	0.129	0.071	-0.027	0.378**	-2.37	1.02	0.72	-0.25	3.78
	5	-0.411	-0.194	0.013	0.250**	0.688**	-2.09	-1.45	0.08	2.23	4.9
		m					t(m)				
	1	-0.532**	-0.329**	-0.067	-0.020	-0.083**	-3.32	-4.93	-1.63	-0.53	-2.39
	2	-0.195**	-0.355**	-0.105**	-0.105**	-0.049	-2.4	-4.33	-2.28	-3.31	-1.36
	3	-0.095	-0.228**	-0.013	-0.063	-0.089**	-1.37	-3.42	-0.22	-1.26	-2.08
	4	-0.352**	0.143**	0.006	-0.146**	-0.115**	-5.23	2.66	0.12	-2.53	-2.32
	5	-0.057	-0.334**	-0.162**	-0.056	-0.205**	-0.68	-5.16	-2.11	-1.07	-2.93
		R^2									
	1	0.479	0.510	0.685	0.630	0.711					
	2	0.316	0.395	0.569	0.743	0.696					
	3	0.303	0.371	0.398	0.561	0.622					
	4	0.379	0.429	0.408	0.460	0.478					
	5	0.315	0.341	0.265	0.486	0.459					

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). m_{it} is the sensitivity of excess return on portfolio i to the difference in returns on a portfolio contains past years' winners and portfolio contains past years' loosers. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

5.3 The Cross-Section of Average Stock Returns

Table 14 presents the intercept terms of the Carhart's 4-factor model and our 5-factor model regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership. As mentioned in the previous part, the intercepts of the regression models should not be different from 0, if asset-pricing model is well-stated. In order to examine the success of the common factors employed by the model in describing the cross-section of average returns, we need to examine the intercept terms.

Table 14- Panel A shows the intercept values of the Carhart 4-factor model and their t-values. 36 out of 125 portfolios have intercepts that are significantly different from 0. When we compare this result with the intercepts of our 4-factor model presented in Table 10, we observe that the number of significant coefficient decreases from 37 to 36, which might be seen as a success of Carhart's 4-factor model over our 4-factor model. However, when we look at the number of significant intercepts for the portfolios with the lowest institutional ownership, we observe that Carhart's model is not successful in explaining the cross-section of average stock returns for these portfolios. So, our 4-factor model outperforms Carhart's model for these portfolios.

In Table 14- Panel B, the intercept values and the t-values of 5-factor model, whixh has RMRF, SMB, HML, IMI, and MOM as risk factors, are demonstrated. It is interesting to note that, the number of intercepts that are significantly different from 0 is higher than Carhart 4-factor model and our 4-factor model. However, especially in explaining the cross-section of average returns in low institutional ownership quintiles, including IMI to Carhart's 4-factor model gives promising results.

Table 14. Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

Panel A: R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t)+ m* (MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
	1	0.326	0.673	0.541	-0.540	-0.188	1	1.36	0.91	-0.56	-0.06
	2	1.020**	1.028**	0.143	-0.750	-0.303	3.44	2.68	0.23	-0.94	-0.27
1	3	0.977**	0.594*	0.786	-0.119	-0.982	3.65	1.73	1.45	-0.21	-1.35
	4	1.035**	0.520**	0.742**	0.234	-0.591	5.28	2.14	2.53	0.4	-0.82
	5	1.437**	0.821**	0.993**	0.487	0.032	8.48	4.85	3.59	1.32	0.07
	1	0.156	0.176	-0.293	-0.278	-0.754	0.5	0.52	-0.58	-0.67	-1.26
	2	0.574	0.361	-0.186	-0.589	-1.006**	1.5	1.28	-0.59	-1.45	-2.59
2	3	0.931**	0.033	-0.230	-0.101	-0.135	2.24	0.13	-0.82	-0.31	-0.41
	4	0.793**	0.320	0.240	-0.020	-0.517	2.9	1.37	1.01	-0.06	-1.61
	5	0.721**	0.558	0.443**	0.233	0.127	2.46	2.36	1.96	0.74	0.38
	1	0.654*	0.133	-0.165	0.185	-0.059	1.77	0.51	-0.59	0.56	-0.16
	2	0.267	0.337	0.109	0.137	0.111	0.58	1.18	0.43	0.43	0.34
3	3	0.092	-0.122	0.237	0.020	0.274	0.26	-0.51	1.09	0.08	1.13
	4	0.258	0.415*	-0.035	-0.174	-0.262	1.05	1.68	-0.16	-0.77	-1.01
	5	0.397	0.612**	0.474*	0.654*	-0.034	1.19	2.36	1.96	1.96	-0.11
	1	-0.019	0.252	-0.073	0.079	0.258	-0.05	0.73	-0.26	0.27	1.12
	2	0.253	-0.034	0.259	0.412	0.158	0.81	-0.14	1.27	1.96	0.76
4	3	0.590*	0.290	0.301	0.186	0.239	1.85	1.04	1.39	0.85	1.07
	4	0.510*	0.945**	0.101	0.300	0.128	1.68	3.87	0.43	1.29	0.52
	5	0.888**	0.818**	0.925**	0.638**	0.480	2.52	2.3	2.86	2.63	1.62
	1	0.171	0.000	0.601**	0.338**	0.179	0.5	1	3.33	1.97	1.16
	2	0.169	0.283	0.537**	0.034	0.181	0.45	0.77	2.59	0.24	1.09
5	3	0.282	0.735**	0.236	0.450**	0.233	0.9	2.42	0.92	2.02	1.2
	4	0.586*	0.149	0.312	0.269	0.094	1.86	0.57	1.45	1.15	0.42
	5	0.649	0.446	0.770**	0.592**	0.895**	1.65	1.48	2.28	2.51	2.8

Table 14 (Cont'd). Intercepts from excess stock return regressions for 125 portfolios constructed on size, BE/ME, and institutional ownership: July 1980 to December 2016

Panel B: R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI) + m* (MOM) +ε(t)

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
	1	-0.127	0.687	0.264	-0.608	0.838	-0.38	1.29	0.41	-0.58	0.24
	2	0.520*	0.820**	-0.130	-1.030	0.240	1.74	2.03	-0.2	-1.19	0.2
1	3	0.690**	0.240	0.990*	-0.090	-0.210	2.51	0.68	1.75	-0.16	-0.27
	4	0.760**	0.200	0.400	0.300	-0.680	3.78	0.79	1.31	0.49	-0.9
	5	1.130**	0.570**	1.026**	0.550	0.110	6.59	3.32	3.52	1.44	0.26
	1	-0.560	0.000	-0.840	-0.190	0.090	-1.85	-0.01	-1.59	-0.45	0.14
	2	0.098	0.083	-0.221	-0.201	-0.936**	0.25	0.28	-0.66	-0.47	-2.29
2	3	0.650	-1016.000	-0.129	0.971	0.255	1.49	-0.38	-0.44	0.25	0.76
	4	0.579**	0.245	0.290	0.302	-0.251	2.03	0.84	1.16	0.89	-0.75
	5	0.696**	0.388	0.556**	0.464	0.568*	2.26	1.57	2.35	1.4	1.66
	1	0.376	-0.079	-0.065	0.468	0.248	0.97	-0.29	-0.22	1.36	0.63
	2	-0.032	0.067	0.290	0.269	0.392	-0.07	0.22	1.1	0.81	1.15
3	3	-0.211	-0.107	0.228	0.341	0.591**	-0.56	-0.42	1	1.29	2.37
	4	0.106	0.429	0.000	-0.015	0.001	0.41	1.65	-0.01	-0.06	0.03
	5	0.116	0.493*	0.597**	1.163**	0.179	0.34	1.82	2.35	3.39	0.56
	1	-0.693*	0.068	-0.096	0.287	0.560**	-1.67	0.19	-0.33	0.92	2.36
	2	0.097	0.134	0.306	0.630**	0.370*	0.3	0.52	1.43	2.89	1.71
4	3	0.409	0.226	0.432*	0.520**	0.604**	1.21	0.77	1.9	2.32	2.65
	4	0.138	0.949**	0.189	0.385	0.676**	0.45	3.64	0.77	1.57	2.8
	5	0.696*	0.619*	1.036**	0.857**	0.503	1.85	1.65	3.03	3.38	1.62
	1	-0.208	-0.013	0.552**	0.482**	0.298*	-0.58	-0.4	2.9	2.69	1.85
	2	-0.141	-0.017	0.649**	0.160	0.484**	-0.36	-0.04	2.96	1.07	2.88
5	3	-0.021	0.785**	0.387	0.678**	0.510**	-0.06	2.44	1.43	2.92	2.57
	4	0.351	0.234	0.357	0.250	0.360	1.07	0.86	1.6	1.02	1.55
	5	0.378	0.296	0.779**	0.774**	0.465**	0.92	0.93	2.17	3.12	4.22

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). m_{it} is the sensitivity of excess return on portfolio i to the difference in returns on a portfolio contains past years' winners and portfolio contains past years' losers. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

5.4 Comparison among R^2 values

As in previous section, we compare the changes in adjusted R^2 values of different models. Table 15 presents these results.

In Table 15- Panel A, the increase/decrease of adjusted R^2 values from Fama-French 3-factor to Carhart's 4-factor model is shown. According to the table, adjusted R^2 values are higher for Carhart's 4-factor model for all 125 quintiles. Especially for big size-high institutional ownership quintiles, Carhart's model explains the movements in returns better than Fama-French 3-factor model. On average, while the average of R^2 values for Fama-French 3-factor model is 0.4279, the average of R^2 values for Carhart's 4-factor model is 0.4356.

In Table 15- Panel B, the increase/decrease of adjusted R^2 values from Carhart's 4-factor model to our 4-factor model that includes RMRF, SMB, HML, and IMI as risk factors are displayed. According to the table, adjusted R^2 values are generally higher for our 4-factor model than Carhart's model. However; for big size- low institutional ownership quintiles, Carhart's model explains the movements in returns better than our 4-factor model. Still, our 4-factor model can explain the movements in returns better than Carhart's 4-factor model on average.

Table 15- Panel C presents the changes of adjusted R^2 values from Carhart's model to 5-factor model. As can be seen from the table, for almost all quintiles, 5-factor model offers higher R^2 values than Carhart's 4-factor model. While the average of R^2 values is 0.4454 for 5-factor model, the average of R^2 values is 0.4356 for Carhart model. Especially for low size and low institutional investor percentage portfolios, including IMI to the Carhart's 4-factor model yields superior R^2 values. As mentioned above, this finding is in line with the findings of Lee et al. (1991).

Finally, Table 15- Panel D displays the changes of adjusted R^2 values of two models that we construct, which are 4-factor model (Fama-French 3-factor model plus IMI) and 5-factor model (Carhart's 4-factor model plus IMI). Table shows that for all 125 quintiles, 5-factor model performs better than 4-factor model in terms of R^2 values. Particularly for the portfolios with low institutional ownership, including momentum factor to our 4-factor model improves the performance of the model.

Table 15. Differences in adjusted R^2 values for the regression models

Panel A: Difference between Three-Factor Model (RMRF-SMB-HML) and Carhart Model (RMRFF-SMB-HML-MOM)

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quint	1	2	3	4	5	*AVERAGES*
	1	-0.87	1.07	6.63	-1.38	-5.42	
	2	-0.54	1.31	7.43	1.97	4.47	
1	3	0.26	-0.52	-1.20	-0.43	-1.48	*0.88*
	4	0.00	-0.22	6.08	-0.42	4.57	
	5	0.23	0.67	-0.22	0.52	-0.55	
	1	-0.25	0.50	-0.24	0.00	7.27	
	2	0.72	3.19	3.89	-0.64	0.00	
2	3	2.60	0.00	1.23	5.02	1.19	*2.08*
	4	-0.66	-0.45	0.00	1.07	1.28	
	5	12.59	0.89	2.31	4.28	6.28	
	1	0.51	0.35	0.20	4.85	3.39	
	2	1.72	4.48	0.19	1.29	-0.53	
3	3	3.59	-0.22	0.78	0.00	0.19	*1.30*
	4	0.00	-0.55	0.00	0.56	0.21	
	5	0.00	5.42	2.97	1.41	1.66	
	1	-0.29	1.15	0.18	1.55	0.00	
	2	2.22	0.00	0.00	-0.17	-0.16	
4	3	-0.40	0.00	0.00	0.51	1.59	*0.87*
	4	0.41	-0.28	-0.45	1.39	1.79	
	5	0.00	-0.86	1.59	3.40	8.60	
	1	2.42	6.46	0.29	-0.16	0.57	
	2	2.02	6.91	1.25	1.09	0.30	
5	3	-0.34	5.98	-0.25	1.09	0.83	*2.70*
	4	13.85	2.39	-0.49	1.32	1.77	
	5	-0.97	14.53	3.09	0.21	3.37	
AVERAGES		*1.49*	*2.01*	*1.36*	*1.09*	*1.58*	

Table 15 (Cont'd). Differences in adjusted R^2 values for the regression models

Panel B: Increase/ Decrease from Carhart Model (RMRFF-SMB-HML- MOM) to Four-Factor Model (RMRF-SMB-HML-IMI)

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	8.82	-1.59	-5.70	0.00	8.60	
	2	10.30	0.00	-7.23	-3.38	-0.39	
1	3	2.90	3.37	1.83	-0.85	7.14	*1.37*
	4	5.01	3.74	-3.58	0.00	-4.37	
	5	8.29	1.83	0.00	-1.04	0.55	
	1	16.75	0.25	3.38	-0.28	2.98	
	2	4.78	-2.00	-3.95	4.18	0.00	
2	3	1.52	0.40	-1.01	-4.78	3.99	*0.70*
	4	3.31	0.68	0.00	1.91	0.84	
	5	-11.18	0.44	-1.69	-2.16	-0.79	
	1	0.76	0.52	0.00	-2.50	-0.66	
	2	-0.42	-3.00	0.75	-1.06	3.45	
3	3	-2.02	0.00	-0.77	2.94	3.40	*0.34*
	4	1.78	0.28	0.00	0.56	2.30	
	5	3.54	-5.15	-2.06	6.03	-0.20	
	1	12.24	-0.85	-0.37	0.00	2.82	
	2	-1.90	1.09	0.00	1.74	1.47	
4	3	1.60	0.00	0.54	3.18	3.14	*1.62*
	4	15.98	-0.28	0.45	-1.17	8.29	
	5	0.72	2.61	-1.30	-1.56	-7.92	
	1	-0.22	-6.26	-0.29	0.96	0.00	
	2	-0.66	-5.43	-0.53	-0.41	3.58	
5	3	4.15	-5.65	1.27	0.72	2.48	*-1.07*
	4	-11.62	-2.57	0.24	-1.52	2.39	
	5	3.27	-12.68	-3.75	1.04	4.66	
AVERAGES		*3.11*	*-1.21*	*-0.95*	*0.10*	*1.91*	

Panel C: Increase/Decrease from Carhart Model (RMRFF-SMB-HML-MOM) to Five-Factor Model (RMRF-SMB-HML-IMI-MOM)

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	8.53	-0.27	2.59	-0.47	3.58	
	2	10.30	1.29	0.31	-0.48	2.72	
1	3	3.69	3.11	0.61	-0.85	6.02	*2.55*
	4	5.73	3.52	3.58	-0.42	-0.58	
	5	8.99	2.83	-0.22	0.00	-0.28	
	1	17.24	0.50	2.90	0.00	7.32	
	2	4.78	1.82	-0.21	3.86	0.00	
2	3	3.55	0.20	0.20	0.62	4.46	*2.34*
	4	2.65	0.45	-0.19	2.33	1.26	
	5	-0.66	0.22	0.38	1.30	3.54	
	1	1.52	1.05	0.20	1.54	1.75	
	2	1.69	2.15	0.75	0.21	2.92	
3	3	2.60	1.10	-0.19	2.76	3.40	*1.60*
	4	1.42	-0.28	-0.19	0.74	2.09	
	5	4.72	0.22	0.21	6.73	1.02	
	1	12.83	0.57	-0.18	1.09	2.65	
	2	0.54	0.87	0.00	1.74	1.31	
4	3	1.60	0.00	0.36	3.35	4.01	*2.34*
	4	15.16	-0.28	0.45	0.00	9.06	
	5	0.48	1.74	0.00	1.21	0.00	
	1	3.01	-0.20	-0.15	0.80	0.57	
	2	4.29	2.07	0.18	0.41	3.73	
5	3	4.84	-0.27	1.02	0.90	2.98	*1.64*
	4	2.43	0.23	-0.24	-0.22	3.69	
	5	2.94	0.59	-0.75	1.04	6.99	
AVERAGES		*5.00*	*0.93*	*0.46*	*1.13*	*2.97*	

Table 15 (Cont'd). Differences in adjusted R^2 values for the regression models

Panel D: Increase/Decrease from Four-Factor Model (RMRF-SMB-HML-IMI) to Five- Factor Model (RMRFF-SMB-HML- IMI- MOM)							
		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGES*
	1	-0.27	1.35	8.79	-0.47	-4.62	
	2	0.00	1.29	8.14	3.00	3.13	
1	3	0.77	-0.25	-1.20	0.00	-1.05	*1.27*
	4	0.68	-0.21	7.43	-0.42	3.96	
	5	0.64	0.98	-0.22	1.05	-0.82	
	1	0.42	0.25	-0.47	0.28	4.21	
	2	0.00	3.90	3.90	-0.31	0.00	
2	3	2.00	-0.20	1.23	5.68	0.45	*1.71*
	4	-0.64	-0.23	-0.19	0.42	0.42	
	5	11.85	-0.22	2.10	3.53	4.37	
	1	0.76	0.52	0.20	4.15	2.42	
	2	2.12	5.31	0.00	1.29	-0.51	
3	3	4.72	1.10	0.58	-0.18	0.00	*1.29*
	4	-0.35	-0.55	-0.19	0.18	-0.20	
	5	1.14	5.66	2.31	0.66	1.22	
	1	0.52	1.43	0.18	1.09	-0.17	
	2	2.49	-0.22	0.00	0.00	-0.16	
4	3	0.00	0.00	-0.18	0.16	0.84	*0.75*
	4	-0.71	0.00	0.00	1.19	0.71	
	5	-0.24	-0.85	1.32	2.81	8.60	
	1	3.23	6.47	0.15	-0.16	0.57	
	2	4.98	7.92	0.71	0.81	0.14	
5	3	0.66	5.70	-0.25	0.18	0.48	*2.91*
	4	15.90	2.88	-0.49	1.32	1.27	
	5	-0.32	15.20	3.11	0.00	2.23	
AVERAGES		*2.01*	*2.29*	*1.48*	*1.05*	*1.10*	

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year.

Briefly, when we examine the entire results including significances of variables, intercepts, and R^2 values of models, we infer that 5-factor model is better than any other models studied in this paper. Including momentum factor does not seize the impact of IMI on explaining returns, if anything it improves the performance of the model.

CHAPTER 6

IMI: WHAT IS IT PROXY FOR

Theoretical studies and empirical findings in our study suggest that the possible risks that IMI proxies are asymmetric information risk, noise-trader risk, and agency problem risk that cannot be diversified away. To make more inference about which risk it is proxy for, in this section we will investigate the relationship between these risks and IMI, empirically.

Table 16. Summary statistics of proxies

	Observation	Mean	Stdandard Deviation	Minimum	Maximum
Bid-Ask Spread	438	0.147	0.035	0.091	0.407
Closed-end Fund	437	-1.701	5.839	-14.373	28.116
Compensation	300	13014.310	4262.205	4781.301	18275.950

Bid-ask spread is the monthly division of the difference between closing ask price and closing bid price to closing ask price. Closed-end fund is the monthly selling price discount/premium of the fund from its Net Asset Value. Compensation is the yearly total managerial compensation of firm.

6.1 Information Asymmetry Risk

Bid-ask spread, which is the division of the difference between closing ask price and closing bid price to closing ask price, is a widely used proxy to information asymmetry risk in the literature (Boone and White, 2015). Therefore, in order to make inference about whether IMI proxies to asymmetric information risk, in this section, we will examine the relationship between bid-ask spread and IMI, empirically.

Theoretical studies state that when they are trading with informed investors, uninformed ones extend their bid-ask spreads to recuperate their losses; therefore, bid-ask spread can be used as a proxy for asymmetric information risk (Lev, 1988). However, there is no consensus on the relationship between institutional holdings and its effects on bid-ask spreads in the literature. Studies have shown that higher bid-ask spreads are required by market makers if they trade securities with higher institutional investors (Glosten and Milgrom, 1985). Likewise, Easley and O'Hara (1987) display that because of the adverse selection risk, greater bid-ask spread is asked if there are informed traders. On the other hand, inverse relationship between institutional ownership and bid-ask spread is presented in some empirical studies (see Tinic, 1972; Hamilton, 1978; Jennings et al., 2002). Moreover, some other empirical studies, like Fabozzi (1979), are not able to find any significant relation between bid-ask spread and institutional ownership.

In this study, we employ bid-ask spreads of firms from Database. The data period is between July 1980 and December 2016. In Table 16, you can see the descriptive statistics of bid-ask spread. For the sample we employ, the average value of bid-ask spreads is 0.147 for the entire period. The correlation between IMI and bid-ask spread is displayed in Table 17. Sign of the correlation is negative, though it is not so high. In Table 18, average values of bid-ask spreads in 125 portfolios are shown. As it can be seen from the Table, the smallest size quintiles have higher bid-ask spreads than the biggest size quintile portfolios on average. As information asymmetry is expected to be high in the small size stocks, this finding is expected. On the other hand, the bid-ask spread is greater for the portfolios with the lowest institutional ownership than the highest ones. This finding is in line with Grossman and Stiglitz (1980), who claim prices become more informative as a result of informed investors trading. In order to find out, whether the difference between mean values of bid-ask spreads between the portfolios with the lowest institutional ownership and the portfolios with the highest institutional ownership, we employ t-test, and show its results in Table 19. According to this table, the mean values of bid-ask spreads for the portfolios with the lowest institutional ownership and the highest institutional ownerships are significantly different from zero. Which suggests that information asymmetry differs according to the level of institutional ownership, indeed.

Table 17. Correlation between IMI and bid-ask spread of portfolios: July 1980-December 2016

	IMI	Bid-Ask Spread
IMI	1.000	
Bid-Ask Spread	-0.072	1.000

Bid-ask spread is the monthly division of the difference between closing ask price and closing bid price to closing ask price. IMI is the mimicking portfolio returns of institutional ownership percentages (IMI)

Table 18. Averages of bid-ask spread for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGE*
	1	0.212	0.164	0.161	0.157	0.204	
	2	0.222	0.182	0.165	0.142	0.152	
1	3	0.218	0.177	0.176	0.137	0.175	0.179
	4	0.187	0.173	0.162	0.159	0.168	
	5	0.268	0.178	0.172	0.168	0.183	
	1	0.164	0.174	0.170	0.148	0.147	
	2	0.179	0.158	0.162	0.147	0.152	
2	3	0.145	0.155	0.151	0.144	0.142	0.151
	4	0.158	0.142	0.140	0.135	0.139	
	5	0.171	0.142	0.129	0.137	0.137	
	1	0.163	0.154	0.148	0.158	0.143	
	2	0.149	0.146	0.131	0.132	0.128	
3	3	0.134	0.133	0.124	0.118	0.121	0.132
	4	0.118	0.136	0.115	0.116	0.121	
	5	0.144	0.134	0.111	0.113	0.121	
	1	0.147	0.143	0.134	0.126	0.129	
	2	0.121	0.123	0.110	0.114	0.117	
4	3	0.128	0.125	0.108	0.114	0.112	0.120
	4	0.120	0.104	0.100	0.112	0.113	
	5	0.140	0.116	0.110	0.121	0.118	
	1	0.129	0.119	0.100	0.103	0.122	
	2	0.117	0.122	0.095	0.099	0.106	
5	3	0.103	0.122	0.094	0.099	0.106	0.108
	4	0.109	0.131	0.091	0.101	0.100	
	5	0.108	0.127	0.095	0.100	0.101	
	AVERAGE	0.196	0.161	0.134	0.128	0.128	

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios Bid-ask spread is the monthly division of the difference between closing ask price and closing bid price to closing ask price.

Table 19. Comparison of the mean values of bid-ask spreads between lowest and highest institutional ownership quintile portfolios

Lowest Institutional Ownership			Highest Institutional Ownership			Difference		
n	Mean	SD	n	Mean	SD	Mean	SE	t
438	0.196	0.059	438	0.128	0.04	0.068**	0.003	19.88

t-statistics results are displayed. n is the number of observations. Mean is the average bid-ask spreads of groups. SD is the standard deviation. **, represents significance at 5 percent.

6.2 Noise-Trader Risk

As it is mentioned above, theoretical studies and also our empirical findings make us intuitively believe that IMI can be proxy to noise-trader risk, as IMI has significant impact on returns for portfolios with low institutional ownership, in which the noise-trader risk is expected to be the highest. In this section, we try to test this empirically.

In the literature, one of the most widely accepted proxy to noise-trader risk is the discount in closed-end fund (Lee et al., 1991). In this analysis, the data for closed-end fund discount is obtained from Bloomberg L.P.. We have monthly selling price discount/premium of the fund from its Net Asset Value for the period July 1980 to December 2016. Table 16 shows the descriptive statistics of closed-end fund discount. In Table 20, the correlation between IMI and closed-end fund discount can be seen. There is very small but negative correlation between these two variables. This low correlation suggest that it is unlikely that IMI is proxy to noise-trader risk.

Table 20. Correlation between IMI and closed-end fund discount of Portfolios: July 1980- December 2016

	IMI	Closed-end fund
IMI	1.000	
Closed-end fund	-0.024	1.000

IMI is the mimicking portfolio returns of institutional ownership percentages. Closed-end fund is the monthly selling price discount/premium of the fund from its Net Asset Value.

6.3 Agency Problem Risk

To test whether the IMI is proxy for agency problem risk, we examine the relationship between total managerial compensation amount and the IMI. Core et al. (1998) state that agency problems are higher in the companies with weaker governance constructions, and for that kind of firms, managers get greater compensations. So, it is expected that the compensation level is related to the agency problem risk.

Data for yearly managerial compensation levels are obtained from Thomson database. Data is started from 1992. So, our sample period is from 1992 to 2016. Table 16 shows the descriptive statistics of the managerial compensation level. Numbers are displayed in thousands of digits for this variable. As shown in Table 21, there is positive correlation between IMI and the agency problem, as expected. Moreover, in Table 22, the average of managerial compensations for each portfolio can be seen. There is no trend in the compensation amounts in terms of institutional holdings. However, as the portfolio contains higher size stocks, its compensation level increases.

Table 21. Correlation between IMI and Managerial Compensation of Portfolios: July 1980- December 2016

	IMI	Compensation
IMI	1.000	
Compensation	0.024	1.000

Compensation is the yearly total managerial compensation of firm. IMI is the mimicking portfolio returns of institutional ownership percentages (IMI)

Table 22. Descriptive statistics for 125 portfolios constructed on size, BE/ME, and institutional ownership for the period between June 1980 and December 2016

Average of managerial compensations in portfolio (in thousands)							
		Institutional Ownership Quintile					
Size Quintile	BE/ME Quintile	1	2	3	4	5	*AVERAGE*
	1	2099.832	3914.867	4210.448	3950.992	2748.955	
	2	4048.068	3890.883	4628.959	3551.777	5884.721	
1	3	2762.700	3525.088	3516.106	3760.135	3441.020	3672.055
	4	2485.110	3917.072	4259.089	3888.918	3652.595	
	5	2323.861	3509.521	3742.189	4240.042	3848.434	
	1	5719.618	4151.015	4746.700	5293.304	5707.854	
	2	4572.344	4756.859	4933.998	5127.790	5848.096	
2	3	6650.374	4539.980	4763.135	5518.254	6309.176	5243.195
	4	4047.433	4156.383	5186.031	5852.655	5698.988	
	5	3666.149	5329.029	5572.230	6442.471	6490.021	
	1	3845.038	5441.068	7471.430	7356.808	8550.532	
	2	6793.846	5908.937	7397.001	8414.518	8159.454	
3	3	8257.733	5520.368	8657.620	8109.739	8935.935	7444.005
	4	8355.075	5459.895	7309.090	8784.487	8506.108	
	5	7500.897	6087.385	6895.795	8553.816	9827.555	
	1	8586.875	10386.523	10479.503	12642.861	13467.095	
	2	10415.778	9263.240	10500.978	12491.327	13996.813	
4	3	13663.500	8334.491	10868.617	13150.424	12756.712	11612.309
	4	8712.228	7823.702	12190.935	13701.245	14668.957	
	5	7750.587	12006.591	13494.113	14194.829	14759.792	
	1	33036.979	33905.740	36310.584	26655.782	25608.404	
	2	42113.619	44316.125	31412.493	28089.558	21794.548	
5	3	47556.229	33718.035	30316.682	28056.566	22985.056	29770.202
	4	32495.492	29433.625	26498.954	25556.316	21685.185	
	5	18421.143	24853.722	28625.842	26672.497	24135.863	
	AVERAGE	11835.220	11366.006	11759.541	11602.284	11178.715	

125 portfolios used in time series regressions are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then these stocks are separated into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, we get 125 portfolios. Compensation is the yearly total managerial compensation of firm.

In Table 23, the results of the t-statistics for the portfolios with the greatest institutional ownership and the lowest institutional ownership are shown. According to this table, there is a significant difference between the mean values of the managerial compensation amounts for the portfolios with the lowest institutional ownership and the highest institutional ownership. This suggest that there is slight evidence of IMI being proxy to agency problem risk.

Table 23. Comparison of the mean values of managerial compensation between lowest and highest institutional ownership quintile portfolios

Lowest Institutional Ownership			Highest Institutional Ownership			Difference		
n	Mean	SD	n	Mean	SD	Mean	SE	t
300	11394.23	5407.37	300	12550.81	3766.85	-1156.58**	380.48	-3.04

t-statistics results are displayed. n is the number of observations. Mean is the average bid-ask spreads of groups. SD is the standard deviation. **, represents significance at 5 percent.

In Table 24, the MIDAS regression analysis results of a model in which IMI is dependent variable, and the three possible proxies are the explanatory variables, is shown. According to these findings, the only variable that has significant impact on IMI is bid-ask spread at 10 percent level. Therefore, it can be said that IMI is possibly proxy for asymmetric information risk. As the information asymmetry increases in the market, the spread between the excess returns of portfolios with the highest institutional ownership and the excess returns of the portfolios with the lowest institutional ownership narrows, since the individual investors require greater return to recover their losses. There is no significant relationship between noise-trader risk or agency problem risk and IMI, when closed-end fund discounts and managerial compensation levels are used as proxies.

Table 24. Regressions of IMI on the Average Bid-Ask Spread of Portfolios, Yearly Closed-end Fund Discounts, and Log value of average managerial compensation: July 1980 to December 2016

IMI(t)=∝+b*Bid-Ask Spread (t) + c*Closed-end Fund(t) + l*logCompensation(t) +ε(t)

b	t(b)	c	t(c)	l	t(l)
-7.460*	-1.965	-0.003	-0.047	-0.131	-0.34

a	t (a)	R^2
1.832	0.41	0.024

Closed-end fund is the monthly selling price discount/premium of the fund from its Net Asset Value. Compensation is the yearly total managerial compensation of firm. b is the sensitivity of bid-ask spread to IMI. c represents sensitivity of closed-end fund discount to IMI. l shows the sensitivity of log total managerial compensation variable to IMI. a is the coefficient value. t's represent t-values of variables. *, represents significance at 10 percent.

CHAPTER 7

ROBUSTNESS TESTS

7.1 Dependent Variable: 25 portfolios sorted by size and BE/ME

Tables 25 to 28 present the results of three-factor and four-factor models if we calculate dependent variables by just considering size and BE/ME quintiles as in Fama and French (1993) paper. 25 portfolios used in time series regressions as dependent variables are formed as follows. 4320 stocks are sorted by size and book-to-market independently in June of every year t from 1980 to December 2016. Then we separate these stocks into 5-size quintiles and 5-book to market quintiles. By intersecting them, we obtain 25 portfolios. After that, equally-weighted monthly returns of these 25 portfolios are found from July t to June t+1. We repeat this procedure for every year.

When we compare results in Table 25 and Table 26, we see that R^2 values are higher in four-factor model. While the average of R^2 values is 0.7143 in Fama-French 3-factor model, the average becomes 0.7214 when we include IMI factor to the model. Results show that, with these dependent variables, as well, R^2 and adjusted R^2 values are higher in four-factor model. Moreover, almost 70 percent of the coefficients of IMI are significantly different from zero.

When we compare models in terms of market βs, the coefficient of RMRF, , we observe that while market βs for the portfolios of stocks in the smallest size and the lowest BE/ME quintile is 0.9047 and the average of significant market βs for the portfolios of biggest ME and highest BE/ME quintile is 1.0149 in 3-factor model, market β for 4-factor model is 1.03 and 0.98, respectively. So, including IMI to the one- factor model makes low βs increase toward 1 and high βs decrease toward 1, and it converges the βs toward the 1.0.

As in our previous findings, t-statistics indicate that, while the greatest part in explaining the common variation in returns belongs to market factor, it follows by size, book-to-market, and institutional ownership, respectively. However, t-values decrease slightly for both the coefficients of SMB and HML, and this reduction in explaining the cross-sectional variation in returns is burdened by IMI in Table 26. Yet, inclusion of IMI to the model increases the significance of the coefficients of SMB for high size and high BE/ME portfolios.

Both Table 25 and Table 26 display that, the coefficients of SMB turn from strongly positive values in bottom size quintiles to strongly negative values in the biggest size quintiles. Additionally, consistent with our and Fama-French's previous findings, the coefficients of HML turn from strongly negative values in the lowest BE/ME quintiles to strongly positive values in the highest BE/ME quintiles.

Another interesting finding is about the sensitivity of portfolios to the IMI factor shown in Table 26. While the coefficients of IMI are strongly negative in the lowest size quintiles, it becomes strongly positive in the highest size quintiles. It indicates, the portfolios in the small size quintiles are held more by individuals rather than institutions. This result support the literature that states large stocks are desired by institutional investors (see Del Guercio, 1996; Gompers and Metric, 2001; Chung and Wang, 2014). Gompers and Metric (2001) state that institutions differ from individuals in terms of demand for stock characteristics, like they prefer to invest in larger stocks.

Table 25. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB) and BE/ME (HML) factors for 25 portfolios: July 1980 to December 2016

R(t)-RF(t)=∝+b*(RM(t)-RF(t))+ s*SMB(t) + h*HML(t) +ε(t)

	BE/ME Quintile					BE/ME Quintile				
Size Quintile	1	2	3	4	5	1	2	3	4	5
	b					t(b)				
1	0.905**	0.871**	0.897**	0.877**	0.812**	14.45	17.11	20	26.85	30.1
2	1.044**	1.140**	1.093**	1.031**	1.048**	24.04	27.61	31.16	30.81	29.89
3	1.162**	1.087**	1.084**	0.938**	1.097**	30.69	30.78	32.49	30.16	29.75
4	1.134**	1.100**	1.108**	1.031**	1.161**	31.97	37.9	36.88	33.55	30.24
5	1.018**	1.055**	1.011**	0.981**	1.015**	43.44	45.41	36.09	31.72	31.15
	s					t(s)				
1	1.050**	1.276**	1.105**	0.823**	0.895**	8.81	13.18	12.96	13.26	17.43
2	1.147**	0.935**	0.903**	0.802**	0.892**	13.9	11.92	13.54	12.61	13.37
3	0.639**	0.716**	0.578**	0.619**	0.434**	8.88	10.66	9.1	10.46	6.17
4	0.266**	0.187**	0.238**	0.255**	0.197**	3.95	3.38	4.17	4.37	2.69
5	-0.175**	-0.152**	-0.106**	-0.083	-0.078	-3.92	-3.44	-2	-1.4	-1.26
	h					t(h)				
1	-0.207**	0.000	0.179**	0.250**	0.335**	-2.54	-0.01	3.16	6.07	9.57
2	-0.143**	-0.137**	0.213**	0.438**	0.536**	-2.62	-2.63	4.82	10.36	12.11
3	-0.308**	-0.018	0.358**	0.384**	0.580**	-6.45	-0.4	8.26	9.79	12.11
4	-0.205**	0.151**	0.267**	0.479**	0.521**	-4.58	4.13	7.03	12.35	10.45
5	-0.274**	0.124**	0.210**	0.432**	0.429**	-9.26	4.21	5.95	10.76	10.13
	R^2									
1	0.479	0.568	0.591	0.686	0.741					
2	0.702	0.731	0.743	0.721	0.712					
3	0.772	0.748	0.729	0.703	0.681					
4	0.759	0.782	0.767	0.725	0.680					
5	0.854	0.836	0.756	0.700	0.692					

25 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size and book-to-market independently in June of every year t from 1980 to December 2016. Then separate this stocks into 5-size quintiles and 5-book to market quintiles. By intersecting them, get 25 portfolios. After that, equally-weighted monthly returns of these 25 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 26. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML) and institutional ownership (IMI) factors for 25 portfolios: July 1980 to December 2016

$$R(t)-RF(t)=\propto + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI) + \varepsilon(t)$$

	BE/ME Quintile					BE/ME Quintile				
Size Quintile	1	2	3	4	5	1	2	3	4	5
	b					t(b)				
1	1.034**	0.989**	0.963**	0.961**	0.873**	15.2	17.98	19.56	27.45	29.89
2	1.179**	1.176**	1.101**	1.021**	1.016**	25.71	25.76	28.29	27.48	26.2
3	1.153**	1.061**	1.054**	0.909**	1.071**	27.44	27.12	28.55	26.43	26.2
4	1.119**	1.043**	1.059**	0.970**	1.138**	28.43	33	32.17	29	26.73
5	1.002**	1.011**	0.965**	0.946**	0.980**	38.56	39.9	31.43	27.71	27.23
	s					t(s)				
1	1.224**	1.435**	1.195**	0.938**	0.977**	9.92	14.4	13.39	14.78	18.46
2	1.330**	0.985**	0.915**	0.789**	0.848**	16.02	11.91	12.97	11.72	12.07
3	0.628**	0.681**	0.539**	0.579**	0.398**	8.25	9.6	8.05	9.3	5.37
4	0.246**	0.110*	0.173**	0.173**	0.166**	3.45	1.93	2.9	2.86	2.15
5	-0.197**	-0.212**	-0.169**	-0.130**	-0.124*	-4.19	-4.63	-3.05	-2.09	-1.91
	h					t(h)				
1	-0.102	0.095	0.234**	0.320**	0.384**	-1.23	1.45	3.98	7.67	10.78
2	-0.032	-0.107*	0.220**	0.429**	0.509**	-0.58	-1.96	4.75	9.69	11.01
3	-0.315**	-0.039	0.334**	0.360**	0.559**	-6.29	-0.84	7.4	8.78	11.19
4	-0.217**	0.104**	0.227**	0.429**	0.503**	-4.63	2.77	5.77	10.74	9.66
5	-0.288**	0.087**	0.172**	0.404**	0.401**	-9.29	2.87	4.69	9.68	9.12
	i					t(i)				
1	-0.525**	-0.479**	-0.270**	-0.344**	-0.246**	-4.39	-4.95	-3.11	-5.58	-4.8
2	-0.548**	-0.149*	-0.035	0.041	0.130*	-6.8	-1.86	-0.52	0.62	1.91
3	0.034	0.106	0.120*	0.118*	0.107	0.46	1.53	1.85	1.95	1.49
4	0.061	0.229**	0.196**	0.247**	0.092	0.88	4.11	3.39	4.19	1.23
5	0.068	0.181**	0.189**	0.142**	0.140**	1.49	4.06	3.5	2.36	2.21
	R^2									
1	0.501	0.591	0.600	0.707	0.754					
2	0.731	0.734	0.744	0.721	0.714					
3	0.772	0.749	0.731	0.706	0.683					
4	0.760	0.791	0.773	0.736	0.682					
5	0.855	0.842	0.763	0.704	0.695					

25 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size and book-to-market independently in June of every year t from 1980 to December 2016. Then separate this stocks into 5-size quintiles and 5-book to market quintiles. By intersecting them, get 25 portfolios. After that, equally-weighted monthly returns of these 25 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 27 and Table 28 show the intercept values of Fama-French 3-factor model and our 4-factor model, respectively. According to these results, the 17 out of 25 constant terms are significantly different from zero for 4-factor model, which states model is not capable of explaining the behaviour of excess returns completely.

Table 27. Intercepts from excess stock return regressions for 25 portfolios constructed on size, and BE/ME: July 1980 to December 2016

R(t)-RF(t)=∝ + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) +ε(t)					
	BE/ME Quintile				
Size Quintile	1	2	3	4	5
1	0.434	0.799**	0.709**	0.718**	1.003**
2	0.035	-0.076	0.101	0.289**	0.338**
3	0.086	0.165	0.202	0.058	0.341**
4	0.053	0.180	0.175	0.214	0.603**
5	0.192*	0.209**	0.266**	0.096	0.542**

25 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size and book-to-market independently in June of every year t from 1980 to December 2016. Then separate this stocks into 5-size quintiles and 5-book to market quintiles, by intersecting them, get 25 portfolios. After that, equally-weighted monthly returns of these 25 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 28. Intercepts from excess stock return regressions for 25 portfolios constructed on size, and BE/ME: July 1980 to December 2016

$$R(t)-RF(t)=\propto + b^*(RM(t)-RF(t)) + s^*SMB(t) + h^*HML(t) + i^*IMI(t) + \varepsilon(t)$$

	BE/ME Quintile				
Size Quintile	1	2	3	4	5
1	0.036	0.437*	0.505**	0.458**	0.816**
2	-0.379**	-0.189	0.074	0.320**	0.437**
3	0.112	0.245	0.293*	0.147	0.422**
4	0.099	0.353**	0.323**	0.400**	0.673**
5	0.243**	0.346**	0.409**	0.203	0.648**

25 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size and book-to-market independently in June of every year t from 1980 to December 2016. Then separate this stocks into 5-size quintiles and 5-book to market quintiles. By intersecting them, get 25 portfolios. After that, equally-weighted monthly returns of these 25 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value-weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). . i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Overall, it can be said that if we use 25 portfolios that constructed in same way with Fama and French, but with our risk factors, we reach similar results with Fama and French (1993) in terms of the significance of coefficients and their behaviour. Moreover, these results are also parallel with our results found in previous sections.

7.2 Dependent Variable: 10 Portfolios Sorted by Momentum

In this section, we will examine the impact of including IMI to the Carhart's 4-factor model when the momentum sorted portfolios are employed as dependent variables. In addition to making inferences about which asset pricing model do better job than others in explaining returns, we are also able to make comment on behavioural perspective. Kahneman and Tversly (1979) develop "prospect theory", which claims individuals tend to sell winner portfolios too soon and hold losers too long. This behaviour is named as "disposition effect" and in their paper, Shefrin and Statman (1985) show the validity of the theory on real market bases. In this study, we try to find indirect evidence to the disposition effect.

Returns to be explained are obtained from the Fama and French web-site. Our data is between July 1980 and December 2016. They construct the portfolios monthly using NYSE prior (2-12) return decile breakpoints. The portfolios created each month contain NYSE, AMEX, and NASDAQ stocks with previous return data. Following Carhart (1997), they construct ten equally-weighted portfolios on January of each year, hold the portfolios for one year, and then re-construct them. By this way, they obtain a time-series monthly returns for each decile.

As explanatory variables, we employ the same risk factors described in previous sections, which are RMRF, SMB, HML, IMI, and MOM.

Time-series regression results are displayed from Table 29 through Table 32. In Table 29, the regression results of Fama-French 3-factor model is shown with momentum sorted portfolios as dependent variables. When we examine the coefficient of SMB, we see that unlike findings in Carhart (1997), low decile portfolios seem to hold more small stocks than the top deciles. However, there is no monotonic increase or decrease in coefficients, instead it seems to have u-shape. While it decreases as portfolios move toward top portfolios, it changes direction and starts to increase after certain point. Portfolios at 6^{th} decile appear to hold the biggest stocks. When we examine the coefficient of HML, we see that bottom decile portfolios hold higher BE/ME stocks than the top decile portfolios. It is interesting to note that, last year looser portfolios contain small and high BE/ME stocks, so they are riskier. Except for the relative underperformance of previous year's poorest performing portfolios, Fama-French 3-factor model yields quite high R^2 values. However, intercept values are mostly significantly different from 0, which suggests there is room for other explanatory variables.

Table 29. Regression results of 3-factor model for portfolios formed on lagged 1-year return

3- Factor Model (RMRF-SMB-HML)									
	Coefficients				t-values				
Portfolio	Alpha	RMRF	SMB	HML	Alpha	RMRF	SMB	HML	R^2
1 (Low)	-0.780**	1.360**	1.300**	0.202**	-2.53	18.94	9.63	2.26	0.537
2	-0.188	1.132**	0.893**	0.286**	-1.16	30.15	12.65	6.03	0.723
3	0.056	1.026**	0.760**	0.300**	0.48	37.47	14.76	8,78	0.796
4	0.221**	0.971**	0.659**	0.279**	2.32	43.69	15.76	10.08	0.838
5	0.354**	0.927**	0.603**	0.256**	4.19	47.08	16.29	10.41	0.856
6	0.425**	0.907**	0.592**	0.227**	5.54	50.72	17.6	10.18	0.875
7	0.467**	0.896**	0.592**	0.192**	5.85	48.19	16.94	8.29	0.865
8	0.544**	0.895**	0.623**	0.103**	6.57	46.36	17.17	4.26	0.863
9	0.580**	0.928**	0.714**	0.050*	5.74	39.42	16.14	1.69	0.829
10 (High)	0.406**	1.093**	0.957**	-0.200**	2.79	32.22	15.01	-4.73	0.798

10 portfolios are constructed monthly using NYSE prior (2-12) return decile breakpoints. The portfolios constructed each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of month t-1), a stock must have a price for the end of month t-13 and a good return for t-2. Then average returns for each decile at time t are calculated. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). $\propto_{it}$ shows the intercept term. *, ** represents significance at 10 percent and 5 percent.

Table 30 displays the regression results of Carhart's 4-factor model with momentum sorted portfolios are used as dependent variables. As in 3-factor model, coefficients of SMB indicate that low decile portfolios hold smaller stocks than the top deciles. However, again, there is no monotonic increase or decrease in coefficients, instead it decreases as portfolios move toward top portfolios, and then it changes direction and starts to increase after certain point. The coefficients of HML also present the same behaviour observed in Fama-French 3-factor model's results. It increases first, and then starts to decrease. The coefficients of momentum factor display a monotonic increase from the bottom decile to top decile. While it is strongly negative in bottom decile, it becomes strongly positive in the highest decile. Although most of the intercept values are still significantly different from 0, the averages of significant intercepts of Carhart's 4-factor model are smaller than the Fama and French model (0.58 and 0.41 respectively).

Table 31 displays the regression results of our 4-factor model, which is Fama-French 3-factor plus IMI, with momentum sorted portfolios are used as dependent variables. SMB shows the same pattern with the previous models. There is no monotonic increase or decrease in coefficients, instead it decreases as portfolios move from bottom portfolios toward top portfolios, and then it changes direction and starts to increase after certain point. As in previous models, the lowest decile has the highest sensitivity to the SMB, which indicates portfolios in this decile hold the smallest stocks. HML displays different pattern than the previous 2 models. It monotonically decreases from bottom decile to the top decile. While it is strongly positive in the bottom decile, it is strongly negative in the top decile. The lowest decile seems to hold the stocks with the highest BE/ME. When we examine the coefficients of IMI, we observe that they have u-shaped pattern. First it increases from the bottom decile to the higher deciles, then it starts to decrease. The lowest momentum decile seems to hold stocks with more individual ownership shares than the highest momentum decile. Intercepts are mostly significantly different from 0, however; when we compare them with Carhart 4-

factor model, we observe that except the lowest deciles, 4-factor model yields alphas closer to 0 than Carhart's model.

Table 30. Regression results of Carhart model for portfolios formed on lagged 1-year return

Carhart Model (RMRF- SMB- HML- MOM)											
	Coefficients					t-values					
Portfolio	Alpha	RMRF	SMB	HML	MOM	Alpha	RMRF	SMB	HML	MOM	R^2
1 (Low)	-0.124	1.103**	1.332**	-1.889**	-0.937**	-0.52	19.29	12.83	-2.61	-17.34	0.726
2	0.166	0.994**	0.911**	0.072*	-0.505**	1.35	33.94	17.12	1.94	-18.24	0.843
3	0.297**	0.932**	0.772**	0.157**	-0.343**	3.15	41.63	18.98	5.52	-16.23	0.873
4	0.373**	0.911**	0.666**	0.189**	-0.217**	4.39	45.07	18.14	7.37	-11.37	0.875
5	0.436**	0.895**	0.607**	0.207**	-0.118**	5.33	45.85	17.13	8.35	-6.39	0.869
6	0.451**	0.897**	0.593**	0.212**	-0.037**	5.83	48.64	17.7	9.05	-2.15	0.876
7	0.449**	0.903**	0.592**	0.203**	0.025	5.56	46.95	16.93	8.32	1.39	0.866
8	0.476**	0.921**	0.620**	00.143**	0.097**	5.85	47.53	17.6	5.82	5.3	0.872
9	0.444**	0.981**	0.708**	0.131**	0.195**	4.74	44.01	17.47	4.63	9.25	0.857
10 (High)	0.179	1.181**	0.946**	-0.065	0.324**	1.38	38.05	16.77	-1.64	11.06	0.842

10 portfolios are constructed monthly using NYSE prior (2-12) return decile breakpoints. The portfolios constructed each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of month t-1), a stock must have a price for the end of month t-13 and a good return for t-2. Then average returns for each decile at time t are calculated. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). m_{it} is the sensitivity of excess return on portfolio i to the difference in returns on a portfolio contains past years' winners and portfolio contains past years' losers. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

Table 31. Regression results of 4-factor model for portfolios formed on lagged 1-year return

	4-Factor Model (RMRF- SMB- HML- IMI)										
	Coefficients					t-values					
Portfolio	Alpha	RMRF	SMB	HML	IMI	Alpha	RMRF	SMB	HML	IMI	R^2
1 (Low)	-1.365**	1.546**	1.564**	0.365**	-0.753**	-4.33	20.09	11.27	4	-5.6	0.568
2	-0.426**	1.208**	1.001**	0.349**	-0.307**	-2.54	29.59	13.6	7.2	-4.3	0.734
3	-0.047	1.059**	0.807**	0.329**	-0.133**	-0.38	35.09	14.82	9.18	-2.52	0.798
4	0.127	1.001**	0.701**	0.306**	-0.122**	1.26	40.95	15.91	10.54	-2.85	0.841
5	0.255**	0.959**	0.648**	0.283**	-0.127**	2.88	44.42	16.65	11.06	-3.38	0.860
6	0.318**	0.941**	0.640**	0.257**	-0.137**	3.98	48.27	18.21	11.1	-4.03	0.879
7	0.349**	0.934**	0.646**	0.225**	-0.152**	4.2	46.17	17.71	9.38	-4.29	0.871
8	0.402**	0.940**	0.687**	0.142**	-0.182**	4.71	45.11	18.29	5.74	-5	0.871
9	0.356**	0.999**	0.815**	0.112**	-0.288**	3.49	40.12	18.16	3.78	-6.62	0.845
10 (High)	0.023	1.215**	1.130**	-0.094**	-0.493**	0.16	34.57	17.84	-2.25	-8.03	0.824

10 portfolios are constructed monthly using NYSE prior (2-12) return decile breakpoints. The portfolios constructed each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of month t-1), a stock must have a price for the end of month t-13 and a good return for t-2. Then average returns for each decile at time t are calculated. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

In Table 32, the regression results of our 5-factor model, which is Carhart's 4-factor plus IMI, with momentum sorted portfolios are used as dependent variables are presented. SMB has similar pattern with previous models. In here, as well, bottom momentum decile holds smaller size stocks than the biggest momentum decile. The coefficients of momentum factor are as expected. They display a monotonic increase from the bottom decile to top decile. While it is strongly negative in bottom decile, it becomes strongly positive in the highest decile. So, momentum followers hold stocks that have higher returns in previous years. After market factor, momentum has the second greatest role in explaining the cross-sectional variation in returns. All of the coefficients of IMI factor are significantly negative. The lowest momentum decile seems to hold stocks with more individual ownership shares than the highest momentum decile. It has u-shaped pattern. First it increases from the bottom decile to higher deciles, then it starts to decrease. This finding is consistent with the “disposition effect” proposed by Shefrin and Statman (1985), which states individual investors tend to hold loser portfolios too long and sell the winner portfolios too soon. Moreover, it is in line with the study of Barinov (2017), who states that institutions tend to stay away from the stocks with extremely low and extremely high levels of firm-specific uncertainty, as they want to hedge against aggregate volatility risk or exploit their competitive advantage in gaining and processing information. Overall, when we look at the findings, the 6^{th} momentum decile has the smallest stocks with the highest BE/ME, and the highest institutional ownership. Intercepts are very close to 0, and the mean of absolute values of alphas that are significantly different from 0 is lower than all previous three models, which are Fama-French 3 factor, Carhart’s 4-factor, and our 4-Factor (Fama-French 3-factor plus IMI).

Table 32. Regression results of 5-factor model for portfolios formed on lagged 1-year return

5-Factor Model (RMRF- SMB- HML- IMI- MOM)													
	Coefficients						t-values						
Portfolio	Alpha	RMRF	SMB	HML	IMI	MOM	Alpha	RMRF	SMB	HML	IMI	MOM	R^2
1 (Low)	-0.838**	1.327**	1.673**	-0.003	-0.965**	-0.990**	-3.67	23.63	16.74	-0.04	-9.92	-20.15	0.777
2	-0.145	1.091**	1.059**	0.153**	-0.420**	-0.527**	-1.2	36.64	20.06	4.25	-8.17	-20.34	0.864
3	0.142	0.981**	0.846**	0.197**	-0.209**	-0.355**	1.48	41.26	20.08	6.86	-5.1	-17.14	0.880
4	0.247**	0.951**	0.726**	0.222**	-0.170**	-0.226**	2.83	44.06	18.99	8.5	-4.57	-12.05	0.881
5	0.322**	0.931**	0.662**	0.237**	-0.155**	-0.126**	3.81	44.56	17.88	9.37	-4.29	-6.94	0.874
6	0.342**	0.931**	0.645**	0.240**	-0.147**	-0.045**	4.28	47.19	18.45	10.07	-4.32	-2.64	0.881
7	0.340**	0.938**	0.644**	0.231**	-0.148**	0.017	4.07	45.49	17.63	9.29	-4.16	0.96	0.871
8	0.355**	0.959**	0.677**	0.175**	-0.163**	0.088**	4.24	46.36	18.47	6.98	-4.57	4.89	0.877
9	0.259**	1.039**	0.795**	0.179**	-0.249**	0.181**	2.74	44.49	19.22	6.34	-6.18	8.91	0.869
10 (High)	-0.137	1.281**	1.097**	0.018	-0.429**	0.301**	-1.07	40.34	19.49	0.47	-7.83	10.89	0.862

10 portfolios are constructed monthly using NYSE prior (2-12) return decile breakpoints. The portfolios constructed each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of month t-1), a stock must have a price for the end of month t-13 and a good return for t-2. Then average returns for each decile at time t are calculated. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). i_{it} shows the sensitivity of excess return on stock i to the mimicking portfolio returns of institutional ownership percentages (IMI). m_{it} is the sensitivity of excess return on portfolio i to the difference in returns on a portfolio contains past years' winners and portfolio contains past years' loosers. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

In Table 33, the differences of R^2 values for various models are shown. Findings display that the highest R^2 values belong to 5-factor model in all momentum deciles. As shown in Panel D and Panel F in Table 23, 5-factor model outperforms both 4-factor model that has Fama-French 3-factor plus IMI as risk factors, and Carhart's 4-factor model, especially for low momentum portfolios.

Table 33. Differences in R^2 values for the regression models

Panel A: Increase/ Decrease from 3-factor (RMRF-SMB-HML) model to Carhart Model (RMRF-SMB-HML-MOM)										
Portfolio	1 (Low)	2	3	4	5	6	7	8	9	10 (High)
	35.359	16.644	9.705	4.440	1.436	0.149	0.069	0.962	3.388	5.564
Panel B: Increase/ Decrease from 3-factor (RMRF-SMB-HML) to 4-factor model (RMRF-SMB-HML-IMI)										
Portfolio	1 (Low)	2	3	4	5	6	7	8	9	10 (High)
	5.815	1.563	0.365	0.346	0.420	0.514	0.636	0.857	1.881	3.271
Panel C: Increase/ Decrease from 4-Factor Model (RMRF-SMB-HML-IMI) to Carhart Model (RMRF-SMB-HML-MOM)										
Portfolio	1 (Low)	2	3	4	5	6	7	8	9	10 (High)
	27.920	14.848	9.306	4.079	1.012	-0.364	-0.563	0.103	1.479	2.221
Panel D: Increase/ Decrease from 4-Factor Model (RMRF-SMB-HML-IMI) to 5-Factor Model (RMRF-SMB-HML-IMI-MOM)										
Portfolio	1 (Low)	2	3	4	5	6	7	8	9	10 (High)
	36.850	17.695	10.208	4.757	1.640	0.216	0.023	0.781	2.852	4.587
Panel E: Increase/ Decrease from 3-Factor Model (RMRF-SMB-HML) to 5-Factor model (RMRF-SMB-HML-IMI-MOM)										
Portfolio	1 (Low)	2	3	4	5	6	7	8	9	10 (High)
	44.809	19.535	10.610	5.120	2.067	0.732	0.659	1.645	4.787	8.008
Panel F: Increase/ Decrease from Carhart Model (RMRF-SMB-HML-MOM) to 5-Factor model (RMRF-SMB-HML-IMI-MOM)										
Portfolio	1 (Low)	2	3	4	5	6	7	8	9	10 (High)
	6.982	2.479	0.825	0.651	0.622	0.582	0.589	0.677	1.353	2.315

10 portfolios are constructed monthly using NYSE prior (2-12) return decile breakpoints. The portfolios constructed each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of month t-1), a stock must have a price for the end of month t-13 and a good return for t-2. Then average returns for each decile at time t are calculated. Low is the portfolio that contains stocks with the lowest previous year returns, and high is the portfolio that contains stocks with the highest previous year returns.

Overall, findings in this section support our previous findings that in explaining the returns, 5-factor model performs better than any other models examined in this paper. Moreover, including IMI factor to the Carhart's 4-factor model helps us to indirectly observe "disposition effect" in the stock market.

7.3 Fama-French Five-Factor

In 2016, Fama and French include two additional factors to their 3-factor model in order to figure out whether this new model has better performance than their three-factor model in explaining average returns. These new factors represent profitability and investment. The motivation behind this model root to studies of Novy-Marx (2012) and Titman et al. (2004) that argues Fama-French 3-factor model is not capable of explaining the variation in average returns associated with the profitability and investment. Equation 7 shows the final model of Fama-French.

$$R(t)-RF(t)=\propto + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + c*(CMA) + r*(RMW) +\varepsilon(t) \quad \text{(eq. 7)}$$

In this equation, RMW is the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios, and CMA is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios. They state that this new model is better in explaining stock returns than their three-factor model. However, the HML factor becomes insignificant after including these two factors (Fama and French, 2015).

Table 34. Correlations between Fama-French 5-factor and IMI: July 1980-December 2016

Table 34						
Correlation between Fama-French 5-factor and IMI: July 1980- December 2016						
	RMRF	*SMB*	*HML*	*IMI*	*RMW*	*CMA*
RMRF	1					
SMB	0.0948	1				
HML	-0.3508	-0.2765	1			
IMI	0.365	0.2651	0.0607	1		
RMW	-0.3166	-0.3228	0.316	0.0238	1	
CMA	-0.4039	-0.0939	0.6349	0.0087	0.142	1

RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. SMB is the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks HML is the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks. IMI is the mimicking portfolio returns of institutional ownership percentages. RMW is the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios. CMA is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios.

In Table 34, the correlations between Fama-French 5 factor, and IMI are displayed. As can be seen from the table, correlation between CMA and HML is very high, which suggests these factors are not orthogonal. Moreover, correlations between RMW and CMA are very high with market factor. Therefore, this model violates one of the key assumptions of APT, the independence of factors (Ross, 1976). Additionally, IMI is not correlated with none of the two new variables of Fama and French. So, we can state that IMI is not represented by neither profitability nor investment variables.

In order to test whether the inclusion of CMA and RMW affects the explanatory power of IMI on asset returns, we apply time series regression. The model we test is shown in equation 8.

$$R(t)-RF(t)=\propto + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI)+ c*(CMA) + r*(RMW) +\varepsilon(t) \quad \text{(eq. 8)}$$

As dependent variables, we employ excess returns of 125 portfolios sorted by size, BE/ME and institutional ownership. Regression results can be seen in Table 35. Table shows that in 74 out of 125 portfolios, IMI has significant impact on excess returns. Especially for portfolios contain stocks with the lowest institutional ownership and portfolios that contain the highest institutional ownership, the coefficients of IMI are almost always significant. Moreover, its coefficients increase from strong negative values to strong positive values from the lowest institutional ownership quintiles to the highest ones. So, it can be inferred that the explanatory power of IMI is robust even two new suggested factors of Fama and French are included to the model.

Furthermore, when the slopes of profitability and the investment factors are examined, it can be seen that both of them have lower explanatory power on asset returns than IMI. The number of the significant coefficients is higher for IMI than other two factors. As a matter of fact, both profitability and investment factors are very weak in explaining the common variation in returns of portfolios sorted by size, BE/ME, and institutional ownership.

When the institutional ownership factor is included to Fama-French 5-factor model, most of the intercepts become insignificant. Therefore, including IMI to Fama-French 5-factor model gives promising results.

Table 35. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional investor (IMI), profitability, and investment factors : July 1980 to December 2016

$$R(t)-RF(t)=\alpha + b^*(RM(t)-RF(t)) + s^*SMB(t) + h^*HML(t) + i^*(IMI)+c^*(CMA) + r^*(RMW) +\varepsilon(t)$$

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					s				
	1	0.971**	1.393**	0.802**	0.911**	0.608	1.061**	0.732**	1.250**	2.509**	1.617
	2	0.929**	1.060**	1.243**	1.219**	1.156**	1.396**	1.337**	1.486**	0.775*	0.667
	3	0.905**	1.087**	1.002**	1.131**	1.090**	1.063**	1.572**	1.161**	1.046**	0.879**
	4	0.826**	1.036**	1.087**	1.098**	1.763**	0.807**	1.153**	1.159**	1.071**	1.061**
	5	0.793**	0.948**	1.016**	0.917**	0.906**	0.720**	1.028**	1.145**	1.381**	1.856**
		h					i				
	1	-0.154	-0.576**	0.270	-1.475**	-3.560**	-0.618**	-0.087	-0.310	-0.148	1.933
	2	0.041	-0.101	0.347	-0.139	-1.058**	-0.675**	-0.395**	-0.060	-0.094	0.739
	3	0.203**	0.654**	-0.159	-0.055	-0.175	-0.375**	-0.456**	0.173	-0.036	0.784**
	4	0.221**	0.314**	0.588**	0.020	0.552*	-0.403**	-0.465**	-0.409**	0.132	0.075
	5	0.269**	0.389**	0.451**	0.229*	0.709**	-0.459**	-0.327**	0.046	0.101	0.119
1											
		c					r				
	1	0.150	0.323	-0.401	1.147	0.126	-0.109	0.159	0.055	-0.005	-1.652
	2	0.099	0.299	0.246	1.016	1.389*	0.010	0.323*	-0.842**	-0.834	-0.346
	3	-0.086	-0.552**	0.510	0.114	0.955**	0.055	0.003	0.564**	0.339	-0.421
	4	0.058	0.062	-0.385**	0.167	0.573	0.161*	0.167	0.151	-0.092	-0.401
	5	0.037	0.059	-0.036	0.141	-0.014	0.225**	0.044	0.054	-0.153	0.093
		a					Adj R^2				
	1	-0.083	0.565	0.237	-0.846	1.491	0.369	0.369	0.179	0.430	0.280
	2	0.437	0.552	0.152	-0.677	-0.518	0.404	0.313	0.306	0.215	0.271
	3	0.629**	0.422	0.399	-0.525	-0.448	0.388	0.406	0.176	0.232	0.299
	4	0.576**	0.014	0.255	0.31	-0.754	0.442	0.471	0.409	0.234	0.331
	5	0.908**	0.467**	0.972**	0.678	0.015	0.479	0.611	0.444	0.380	0.361

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
		b					s				
	1	1.195**	1.155**	1.269**	1.088**	0.910**	1.253**	1.158**	1.383**	1.512**	0.870**
	2	1.162**	1.144**	1.182**	1.029**	0.858**	1.067**	1.046**	0.874**	1.105**	0.687**
	3	0.952**	1.185**	1.136**	1.125**	0.928**	0.902**	0.933**	0.910**	1.077**	1.002**
	4	0.970**	1.029**	1.097**	1.253**	1.132**	0.731**	1.023**	0.938**	1.062**	1.030**
	5	0.753**	1.059**	1.032**	1.097**	1.083**	0.500**	1.069**	0.879**	1.212**	1.006**
		h					i				
	1	0.019	-0.044	-0.446**	0.000	-1.122**	-0.973**	-0.317**	-0.541**	0.047	1.106**
	2	-0.457**	0.026	-0.126	0.460**	-0.375**	-0.649**	-0.254*	-0.016	0.419**	0.176
	3	0.034	0.190**	0.474**	0.173	0.333**	-0.417**	-0.242**	0.162	0.293*	0.600**
	4	0.228**	0.262**	0.380**	0.488**	0.431**	-0.374**	-0.265**	0.036	0.429**	0.434**
	5	0.549**	0.484**	0.414**	0.593**	0.578**	0.071	-0.303**	0.157	0.394**	0.755**
2											
		c					r				
	1	0.102	0.259	-0.373	0.256	0.830**	-0.033	0.082	-0.785**	0.460**	0.070
	2	0.186	-0.503**	-0.113	-0.304	0.265	-0.386**	-0.236**	0.193	0.317*	-0.209
	3	0.445*	0.060	-0.427**	-0.243	0.057	-0.122	0.208*	0.110	0.124	0.013
	4	0.227	0.284**	0.201	0.340*	0.038	0.355**	0.440**	0.167	0.264*	-0.049
	5	-0.287	0.119	0.135	0.119	0.051	-0.165	0.309**	0.144	0.031	-0.128
		a					Adj R^2				
	1	-0.631*	-0.115	-0.201	-0.676	-0.391	0.472	0.404	0.438	0.359	0.388
	2	0.364	0.298	-0.456	-0.328	-0.897**	0.443	0.548	0.462	0.329	0.324
	3	0.669	-0.271	-0.138	-0.002	0.184	0.204	0.500	0.494	0.478	0.440
	4	0.216	-0.259	0.059	-0.123	-0.283	0.323	0.468	0.518	0.485	0.476
	5	0.748**	0.094	0.300	0.257	0.520	0.272	0.461	0.524	0.451	0.503

Table 35 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional investor (IMI), profitability, and investment factors : July 1980 to December 2016

$$R(t)-RF(t)=\propto + b^*(RM(t)-RF(t)) + s^*SMB(t) + h^*HML(t) + i^*(IMI)+c^*(CMA) + r^*(RMW) +\varepsilon(t)$$

Size Quintile	BE/ME Quintile	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					s				
	1	1.078**	1.141**	1.100**	1.195**	0.764**	0.573**	0.453**	0.626**	0.514**	0.628**
	2	1.135**	1.044**	1.127**	1.033**	1.043**	0.268	0.842**	0.591**	0.704**	0.527**
	3	1.131**	1.050**	1.069**	1.149**	1.080**	1.049**	0.676**	0.707**	0.589**	0.376**
	4	0.879**	0.931**	0.975**	1.008**	0.970**	0.350**	0.509**	0.724**	0.658**	0.647**
	5	1.025**	1.058**	1.079**	1.022**	1.229**	0.447**	0.351**	0.280**	0.279*	0.761**
		h					i				
	1	-0.413**	-0.324**	-0.119	-0.109	-0.093	-0.325*	-0.233*	0.132	0.557**	0.800**
	2	-0.467**	0.139	-0.052	-0.199*	0.042	-0.422*	-0.263**	0.216*	0.244*	0.387**
	3	0.663**	0.417**	0.329**	0.335**	0.149*	-0.409**	-0.039	-0.058	0.386**	0.445**
	4	0.082	0.224**	0.151*	0.366**	0.278**	-0.326**	-0.019	0.029	0.270**	0.373**
	5	0.443**	0.621**	0.361**	0.775**	0.852**	-0.387**	-0.110	0.189*	0.816**	0.311**
3		c					r				
	1	-0.370	-0.308**	-0.137	-0.151	-0.536**	-0.075	-0.117	0.116	-0.249	-0.835**
	2	0.549*	-0.416**	0.014	0.330*	-0.137	0.141	-0.133	0.208**	-0.448**	0.222
	3	-0.258	-0.011	0.029	-0.309*	0.168	0.310*	0.268**	0.299**	0.253**	0.026
	4	0.506**	0.555**	0.219	0.328**	0.150	0.332**	0.118	0.057	-0.147	0.024
	5	0.299	-0.000	0.483**	-0.350*	-0.450**	0.065	0.014	0.047	-0.240	0.247
		a					Adj R^2				
	1	0.487	0.062	-0.139	0.553	1.104**	0.398	0.578	0.495	0.507	0.494
	2	-0.423	0.164	0.098	0.559	0.284	0.239	0.457	0.540	0.481	0.391
	3	-0.464	-0.301	-0.061	0.199	0.486*	0.346	0.460	0.521	0.567	0.547
	4	-0.347	0.124	-0.133	-0.072	-0.081	0.313	0.379	0.515	0.549	0.487
	5	-0.076	0.364	0.296	1.425**	0.084	0.263	0.421	0.485	0.461	0.499

Size Quintile	BE/ME Quintile	Institutional Ownership Quintile 1	2	3	4	5	Institutional Ownership Quintile 1	2	3	4	5
		b					s				
	1	1.240**	0.902**	1.140**	1.096**	0.946**	0.022	0.159	0.262**	0.306**	-0.050
	2	1.018**	0.899**	1.073**	1.072**	1.093**	-0.097	-0.083	0.268**	0.080	0.212**
	3	0.945**	1.071**	1.163**	1.220**	1.086**	0.411**	0.313**	0.445**	0.195*	0.203*
	4	0.921**	0.865**	0.981**	1.181**	1.156**	0.050	-0.137	0.391**	0.413**	0.086
	5	1.244**	1.000**	1.108**	1.222**	1.224**	0.236	0.070	-0.006	0.132	0.243
		h					i				
	1	-0.315**	-0.272**	-0.059	-0.049	-0.071	-0.912**	-0.114	0.118	0.273**	0.492**
	2	0.068	-0.105	0.285**	-0.012	-0.029	-0.188	0.253**	0.062	0.265**	0.305**
	3	0.215*	0.250**	0.098	0.223**	0.137*	-0.342**	-0.143	0.072	0.387**	0.488**
	4	0.113	0.212**	0.195**	0.465**	0.327**	-0.701**	-0.057	0.083	0.064	0.776**
	5	0.695**	0.300**	0.277**	0.439**	0.212*	-0.310*	-0.374**	0.200	0.346**	0.125
4		c					r				
	1	-0.400	-0.296	-0.107	-0.467**	-0.387**	-0.029	-0.280*	-0.552**	0.308**	-0.287**
	2	0.089	0.079	-0.050	0.051	0.105	0.073	0.010	0.075	0.162*	-0.060
	3	0.161	0.375**	0.178	-0.010	-0.027	0.352**	0.157	0.503**	0.432**	0.200**
	4	0.386**	0.450**	0.202	0.362**	0.341**	0.205	0.264**	0.126	0.326**	0.146
	5	-0.314	0.647**	0.552**	0.413**	-0.014	0.146	0.196	-0.082	-0.005	0.025
		a					Adj R^2				
	1	-0.582	0.355	0.332	0.132	0.924**	0.386	0.353	0.562	0.473	0.594
	2	-0.052	0.081	0.252	0.488**	0.376	0.359	0.462	0.569	0.585	0.620
	3	0.028	-0.004	-0.033	0.142	0.383	0.263	0.360	0.581	0.632	0.594
	4	-0.169	0.549*	0.034	-0.075	0.363	0.292	0.371	0.451	0.520	0.614
	5	0.705*	0.166	0.831**	0.617**	0.298	0.420	0.253	0.389	0.575	0.439

Table 35 (Cont'd). Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional investor (IMI), profitability, and investment factors: July 1980 to December 2016

$$R(t)-RF(t)=\propto + b*(RM(t)-RF(t)) + s*SMB(t) + h*HML(t) + i*(IMI)+c*(CMA) + r*(RMW) +\varepsilon(t)$$

		Institutional Ownership Quintile					Institutional Ownership Quintile				
Size Quintile	BE/ME Quintile	1	2	3	4	5	1	2	3	4	5
				b					s		
	1	0.995**	1.072**	1.096**	0.894**	0.951**	-0.016	0.015	-0.137	-0.193**	-0.241**
	2	1.085**	1.072**	1.072**	0.983**	1.100**	-0.248	-0.275	-0.178*	-0.139**	-0.138*
	3	0.977**	0.941**	0.990**	1.153**	1.083**	0.092	-0.184	0.127	-0.222**	-0.110
	4	0.926**	0.962**	0.815**	1.100**	0.929**	-0.410**	-0.236	0.130	-0.134	0.042
	5	1.105**	0.848**	0.797**	1.072**	1.153**	0.119	-0.211	-0.206	0.164	-0.046
				h					i		
	1	-0.388**	-0.376**	-0.175**	-0.153**	-0.176**	-0.325*	0.028	-0.097	0.186**	0.188**
	2	0.188	-0.063	0.142*	0.048	0.019	-0.415**	-0.229	0.085	0.243**	0.368**
	3	0.040	0.132	0.321**	0.040	0.138*	-0.427**	0.134	0.036	0.224**	0.375**
	4	0.307**	0.215**	0.354**	0.315**	0.375**	-0.229	-0.044	0.026	-0.077	0.371**
	5	0.654**	0.472**	0.473**	0.264**	0.427**	-0.408**	-0.027	0.065	0.171	0.708**
5											
				c					r		
	1	-0.296	-0.493	-0.280**	-0.211**	-0.279**	-0.359**	0.290**	0.187**	0.107	0.029
	2	-0.624**	-0.704**	0.021	-0.116	0.211**	0.141	-0.139	0.367**	-0.134**	0.286**
	3	0.261	0.096	-0.005	0.118	0.066	0.063	0.081	0.612**	0.457**	0.150*
	4	-0.221	0.382**	0.541**	0.132	0.055	0.006	0.354**	0.134	0.390**	0.123
	5	-0.172	0.139	0.301	0.011	0.183	0.114	-0.375**	-0.233	0.307**	0.041
				a					Adj R^2		
	1	0.145	-0.240	0.476**	0.465**	0.336*	0.471	0.493	0.692	0.635	0.712
	2	-0.197	0.242	0.251	0.270	0.163	0.319	0.378	0.579	0.739	0.706
	3	-0.213	0.624*	-0.157	0.259	0.324	0.301	0.349	0.442	0.579	0.620
	4	0.326	-0.169	0.077	-0.159	0.185	0.326	0.439	0.434	0.467	0.472
	5	0.329	0.387	0.780**	0.484*	1.166**	0.314	0.308	0.261	0.494	0.447

125 portfolios used in time series regressions as dependent variables are formed as follows.4320 stocks are sorted by size, book-to-market and institutional ownership percentage independently in June of every year t from 1980 to December 2016. Then separate this stocks into 5-size quintiles. 5-book to market quintiles, and 5 institutional ownership quintiles independently. By intersecting them, get 125 portfolios. After that, equally-weighted monthly returns of these 125 portfolios are found from July t to June t+1. Repeat this procedure for every year. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). c_{it} is the sensitivity of excess return on portfolio i to the difference in returns on two conservative investment portfolios minus the average return on the two aggressive investment portfolios. r_{it} is the sensitivity of excess returns on portfolio i to the difference in returns average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

7.4 Dependent Variable: 25 Portfolios Sorted by Profitability and Investment

In this section, in order to test the robustness of IMI, time-series regression analyses, in which the profitability and investment sorted portfolios are used as dependent variables, are applied. 25 portfolios used in time series regressions as dependent variables are obtained from Fama-French website and formed as follows. At the end of each June, stocks are sorted into 5 quintiles according to profitability (OP), which is the division of difference between annual revenues and cost of goods sold, interest expense and administrative expense to BE/ME. Additionaly, these stocks are sorted into 5 quantiles according to investment, which is the division of the change in total assets from t-2 to t-1 to total assets. Then, by intersecting these portfolios, 25 portfolios are obtained. As explanatory variables, market factor (RMRF), size factor (SMB), BE/ME factor (HML), institutional ownership factor (IMI), and two recently suggested factors by Fama and French (2016) that are profitability (RMW) and investment (CMA) are employed.

Empirical results of these regressions are presented in Table 36. Findings suggest that all of the risk factors, including RMW and CMA, have significant impact on explaining the common variation in stock returns. Moreover, while there is monotonic increase in the coefficients of RMW from the lowest to the highest profitability portfolio quintiles, there is monotonic increase in the coefficients of CMA from the lowest to the highest investment portfolio quintiles. Additionally, the coefficients of IMI show that, IMI still has significant explanatory power in common variations in returns. 13 out of 25 coefficients of IMI are significantly different from 0.

These results, together, indicate that the effect if IMI is robust even the profitability and investment sorted portfolios are used as dependent variables.

Table 36. Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutional investor (IMI), profitability, and investment factors for 25 portfolios: July 1980 to December 2016

Regressions of excess stock returns (in %) on the excess stock market return (RMRF), mimicking returns for size (SMB), BE/ME (HML), institutonal investor (IMI), profitability, and investment factors : July 1980 to December 2016

$R(t)\text{-}RF(t)=\propto + b^*(RM(t)\text{-}RF(t)) + s^*SMB(t) + h^*HML(t) + i^*(IMI)+c^*(CMA) + r^*(RMW) +\varepsilon(t)$

	Investment Quintile					Investment Quintile				
OP Quintile	1	2	3	4	5	1	2	3	4	5
			b					s		
1	1.028**	0.915**	0.913**	0.908**	1.003**	1.257**	0.922**	0.909**	0.941**	1.114**
2	0.972**	0.877**	0.826**	0.889**	0.979**	0.886**	0.678**	0.672**	0.745**	0.943**
3	0.982**	0.847**	0.841**	0.906**	1.042**	0.780**	0.541**	0.600**	0.693**	0.932**
4	1.014**	0.907**	0.900**	0.946**	1.070**	0.792**	0.594**	0.549**	0.683**	0.840**
5	1.096**	1.015**	0.974**	1.022**	1.123**	0.827**	0.679**	0.622**	0.727**	0.983**
			h					i		
1	0.280**	0.278**	0.186**	0.257**	0.357**	-0.47**	-0.24**	-0.19**	-0.22**	-0.43**
2	0.321**	0.294**	0.286**	0.202**	0.256**	-0.12**	0.003	-0.01	-0.03	-0.12**
3	0.352**	0.252**	0.233**	0.251**	0.294**	0.006	-0.01	0.031	0.005	-0.04
4	0.361**	0.276**	0.235**	0.260**	0.269**	-0.09**	-0.00	-0.04*	-0.02	-0.08**
5	0.393**	0.225**	0.257**	0.223**	0.303**	-0.2**	-0.01	-0.01	-0.10**	-0.11**
			c					r		
1	0.229**	0.102	0.095	-0.01	-0.70**	-0.62**	-0.18**	-0.27**	-0.33**	-0.76**
2	0.390**	0.322**	0.146**	0.098**	-0.22**	0.082*	0.168**	0.216**	0.135**	0.024
3	0.326**	0.345**	0.214**	0.041	-0.25**	0.262**	0.286**	0.274**	0.305**	0.304**
4	0.372**	0.301**	0.182**	-0.03	-0.32**	0.264**	0.391**	0.430**	0.370**	0.321**
5	0.309**	0.261**	0.139**	-0.01	-0.36**	0.303**	0.426**	0.446**	0.413**	0.373**
			a					Adj R^2		
1	0.512**	0.468**	0.363**	0.184	-0.38**	0.810	0.858	0.871	0.843	0.852
2	0.464**	0.601**	0.681**	0.498**	-0.00	0.880	0.922	0.841	0.907	0.916
3	0.607**	0.480**	0.534**	0.428**	-0.00	0.868	0.898	0.923	0.929	0.930
4	0.665**	0.518**	0.441**	0.414**	-0.00	0.847	0.909	0.909	0.933	0.934
5	0.480**	0.395**	0.374**	0.339**	-0.01	0.850	0.887	0.915	0.919	0.927

25 portfolios used in time series regressions as dependent variables are obtained from Fama-French website and formed as follows. At the end of each June, stocks are sorted into 5 quintiles according to profitability (OP), which is the division of difference between annual revenues and cost of goods sold, interest expense and administrative expense to BE/ME. Additionaly, these stocks are sorted into 5 quantiles according to investment, which is the division of the change in total assets from t-2 to t-1 to total assets. Then, by intersecting these portfolios, 25 portfolios are obtained. RMRF is the excess market return, obtained by market portfolio rate of return(R_M), which is the value- weighted percent monthly return on all stocks in Fama and French database minus risk free rate(R_f), which is one-month Treasury bill rate. b_{it} is the sensitivity of return of security i to market portfolio. s_{it}, is the sensitivity of excess return on stock i to the difference in returns on a portfolio contains small stocks and on portfolios containing big stocks (SMB). h_{it} represents the sensitivity of stock i to the difference in returns on portfolio contains high book-to-market (BE/ME) stocks and on portfolio contains low book-to-market stocks (HML). c_{it} is the sensitivity of excess return on portfolio i to the difference in returns on two conservative investment portfolios minus the average return on the two aggressive investment portfolios. r_{it} is the sensitivity of excess returns on portfolio i to the difference in returns average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios. $\propto_{it}$ shows the intercept term that shows the part of excess returns that cannot be explained by the model. *, represents significance at 10 percent. **, represents significance at 5 percent.

CHAPTER 8

CONCLUSION

As the institutional owners are huge players in financial markets and the importance of them in stock market has increased in recent years, it is crucial to understand the impact of institutional investors on stock price and on the efficiency of the market (Chen et al., 2015). In this paper, we basically hypothesize that, institutional investor variable might be a proxy for some systematic risk factors, such as asymmetric information risk, noise trader risk, or agency problem risk, that should be incorporated to the asset-pricing model. The theoretical motivation for this study is rooted in the study of Allen (2001). He states that with the raise in the institutional investors in the market, the last decision makers are not the owners anymore. However, extant asset pricing models do not consider this transformation in the market participants and potential agency problem. Additionally, as Fama (2008) claims, anomalies observed in the empirical studies might not be because of the inefficiency of the market, but because of the inappropriate asset pricing models that are unable to include all systematic risks. Therefore, inclusion of a factor that represents institutional ownership might capture this risk, and the anomalies observed in empirical studies might disappear. Theoretical and empirical studies that present why this risk is systematic and cannot be diversified away are summarized in this thesis. Moreover, which systematic risk this new factor is proxied to is also explained.

In the first part, we compare the success of one-factor model, Fama-French 3-factor model and our 4-factor model that employs Fama-French 3-factor plus IMI, which is "Institutional minus Individual", as explanatory variables. As in Fama and French (1993) paper, we employ Black et al. (1972)'s time series regression approach. We regress monthly stock returns on the market portfolio returns, and mimicking portfolios for size and book-to-market equity. In addition to this, we also include mimicking portfolios for institutional investments (as % of shares outstanding) to the regression model. Slopes in this time series regression give us the factor loadings. Our final data set includes 4320 firms traded in NYSE, NASDAQ, or AMEX, and the data period is between January 1980 and Deecember 2016. Our sample begins from 1980 since we do not have institutional ownership database before this year.

Our analyses mainly show that, most of the time, portfolios that are created in order to mimic risk factors linked to size, book-to-market and institutional ownership capture strong common variation in returns. Therefore, we not only support the findings of Fama-French (1993) that state size and book-to-market proxy for some common risk factors in stock returns, we also conclude that institutional ownership is another proxy for a common risk factor. In addition to this, in line with the results of Fama- French (1993), the number of the intercepts that are significantly different from zero in the three-factor model are less than the one-factor model. However, when we also include mimicking portfolios for institutional ownership to the regression, the number of the intercepts that are significantly different from zero in the 4-factor model are less than the number of the intercepts that are significantly different from zero in both the one-factor and in the 3-factor models. Therefore, we can conclude that the 4-factor model is doing better job than the 3-factor model and the 1-factor CAPM in explaining the cross section of average returns.

Another important finding is that, the explanation power of models to common variation in stock returns, and the significance of the explanatory variables in models show that including IMI to the asset pricing model is necessary. Findings suggest that IMI helps us to improve the asset pricing models especially for portfolios including the lowest institutional ownership and for the portfolios including the highest institutional ownership. This result resonates well with the related literatures suggesting that noise-trader risk is more probably observed in stocks with highest individual ownership (Lee et al., 1991).

In addition to this, our findings support Easley and O'Hara (2004) who propose that cost of capital can be reduced by decreasing the private information.

In the second part, we put momentum into the picture. In their 1996 paper, Fama and French confess the inability of their 3-factor model in explaining the cross-sectional variation in momentum arranged portfolio returns. In 2008, Fama and French present that momentum sorted stocks generates strong positive average returns for all size groups. Average returns tend to increase from low to high momentum arranged portfolios. Microcaps have the strongest abnormal momentum returns. Additionally, cross-sectional regression analysis presents that momentum has strong explanatory power on returns for all size groups. Carhart (1997) examine this phenomena and states that the persistence in mutual fund performance does not reflect better stock picking talent, instead it is mostly because of the sensitivity to common factors. He suggests the four-factor model in line with a model of market equilibrium with four risk factors by including momentum factor that seize Jegadeesh and Titman's (1993) one-year momentum anomaly to the Fama and French 3-factor model. In the literature, there are papers that state detected anomalies should appeal arbitrage activity since there is room for large and robust abnormal returns. Major candidates for such an arbitrageur role are institutional investors since they are considered as well-informed, sophisticated investors and construct great part of the market (Calluzzo et al., 2015). As mentioned by Sias (2007), there are plenty of reasons like overreaction/ underreaction to information and agency problems that institutional investors follow momentum trade. Additionally, institutional investors have a great role in setting equilibrium price since they compose most of the trading volume. Sias (2007) states that such behaviours of institutional investors might support momentum or reversal patterns in stock returns. Therefore, we examine if the Carhart 4-factor model outperforms our suggested 4-factor model, as momentum factor might capture the impact of IMI factor.

When 125 portfolios that are sorted by size, BE/ME, and institutional ownership are employed as dependent variables, we find that our 4-factor model explains the cross-sectional variations in returns better than Carhart's 4-factor model. On average, they have higher adjusted R^2 values. However; when IMI is included to Carhart's 4-factor model and obtain a 5-factor model, according to adjusted R^2 values and significance of coefficients of variables, findings show that this 5-factor model performs better than any other asset pricing models examined in this paper. More importantly, when portfolios sorted on momentum are employed as dependent variables, IMI has always significant effect on returns, and consistent with previous findings, the 5-factor model performs better than any other asset pricing models examined in this paper, in terms of adjusted R^2 values, significance of slopes of coefficients, and intercept values. Another interesting finding is that, our results are consistent with the "disposition effect" that individuals tend to hold losers longer and sell winners sooner.

In the third part, in order to make more inference about which risk it is proxy for, we investigate the relationship between these risks and IMI, empirically. Results show that, although we cannot find significant relationship between managerial compensation and close-end fund discounts, there is significant relationship between IMI and bid-ask spread. Therefore, it can be proposed that IMI proxies to information asymmetry risk.

As a concluding remark, we aim to fill the gap that Allen (2001) stresses out by incorporating institutional holdings into the asset-pricing model. First, institutional investors might be related to information asymmetry risk. Moreover, studies have shown that institutions and individuals differ in terms of being influenced by investor sentiment. Furthermore, there is a potential agency problem when financial institutions control huge amount of stocks, as the last decision makers are not the owners. In asset pricing models, on the other hand, these possible undiversifiable risks are not considered. In the literature, researchers try to explain anomalies by assuming market incompleteness, transaction costs and other kind of frictions. Though these explanations help us to account for some of the anomalies, some of them remain as unexplained. Studies have shown that the assumption of rationality in traditional asset pricing models makes these models to fail empirically, because individual investors are not fully rational. This brings behavioural models of asset pricing into the scene. Unlike neo-classical approach, this approach does not assume all investors are rational. Instead it allows some of them be not fully rational. Therefore, stocks with high institutional investors should be less affected by the irrational investments. Then, we hypothesize that, putting additional factor proxies to such risks should correct these mispricing and cross-sectional anomalies.

Consistent with the theoretical studies, overall, it can be said that, including IMI to the Carhart's 4-factor model performs better than all other models that are tested. With higher R^2 values, this model captures the common variations in returns better than Fama- French three-factor, Carhart's 4-factor model and other models that are examined. Moreover, as most of the slopes of IMI are significantly different from zero, it is crucial to include this factor to the model. New model improves mispricing mostly in portfolios including stocks with low institutional ownership, which is consistent with the literature. Moreover, when we empirically test which risk IMI is proxy for, we find a significant relationship between IMI and bid-ask spread. Therefore, it can be proposed that IMI most likely proxies to information asymmetry risk.

The findings in this thesis might also have macroeconomic implications. As the results show that there is a significant effect of institutional investment on stock returns, firms might try to attract more institutional investors. Findings indicate that the higher the amount of institutional ownership is, the more informative the market will be. This causes the financial market to lead economic growth by information production and efficient capital allocation (see Bai et al, 2016, Levine, 2005, King and Levine, 1993b). Moreover, by motivating firms to attract more institutional investors, our results might cause the increase of innovation in the market, as Aghion et al. (2009) present that research and development (R&D) and productivity of R&D increase with institutional ownership.

REFERNCES

Aboody, D., Hughes, J., and Liu, J., (2005), "Earnings Quality, Insider Trading, And Cost of Capital", *Journal of Accounting Research*, vol.43(5), pp.651–73

Agarwal, P., (2007), "Institutional Ownership and Stock Liquidity", *SSRN working paper*

Aghion, P., Van-Reenen, J., and Zingales, L., (2013), "Innovation and Institutional Ownership", *American Economic Review*, vol.103(1), pp.277-304

Akins, B.K., Ng, J., Verdi, R.S., (2012), "Investor Competition over Information and The Pricing of Information Asymmetry", *Accounting Review*, vol.87(1), pp.33-58

Aktas, N., De Bodt, E., Declerck, F., and Van Oppens, H., (2007), "The PIN Anomaly Around M&A Announcements", *Journal of Financial Markets*, vol.10 (2), pp.169–91

Allen. F., (2001), "Do Financial Institutions Matter?", *The Journal of Finance*, Vol. 56 (4), pp.1165-1175

Aslan, H. and Easley, D. and Hvidkjaer, S. and O'Hara, M., (2011), "Firm Characteristics and Informed Trading: Implications for Asset Pricing", *Journal of Empirical Finance*, vol. 18 (5)

Badrinath, S.G., and Wahal, S., (2002), "Momentum Trading by Institutions", *The Journal of Finance*, vol.57, pp.2449–78

Bagehot, W., (1971), "The Only Game in Town", *Financial Analysts Journal*, vol.27, pp.12–14

Bai, J., Phillippon, T., and Savov, A., (2016), "Have Financial Markets Become More Informative?", *Journal of Financial Economics*, Vol.122(3), pp.625-654

Banerjee, A., (1992), "A Simple Model of Herd Behavior", *Quarterly Journal of Economics*, vol.107, pp.797–817

Banz., R. W., (1981), "The Relationship Between Return and Market Value of Common Stocks*", Journal of Financial Economics,* vol.9, pp.3-15

Barber, B.M., and T. Odean, (2000), “Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors”, *The Journal of Finance,* vol. 55, no. 2, pp. 773–806

Barber, B., Odean, T., (2008), “All That Glitters: The Effects of Attention and News on the Buying Behavior of Individual and Institutional Investors”, *Review of Financial Studies*, vol.21, pp.785–818

Barber, B., Lee, Y., Liu, Y., Odean, T., (2009), “Just How Much Do Individual Investors Lose by Trading?”, *Review of Financial Studies*, vol.22, pp.609–632

Barinov, A., (2017), “Institutional Ownership and Aggregate Volatility Risk”, *Journal of Empirical Finance,* vol.40, pp.20-38

Basak. S., and Pavlova, A., (2013), “Asset Prices and Institutional Investors”, *American Economic Review*, vol.103(5), pp.1728-1758

Basak. S., and Pavlova, A., (2016), “A Model of Financialization of Commodities”, *The Journal of Finance,* vol.71 (4), pp.1511-1556

Beneish, M. D., and Whaley, R., (1996), "An Anatomy of the 'S&P Game': The Effect of Changing Rules", *The Journal of Finance*, vol.51, pp.1909-1930

Bennett, J. A., Sias, R. W., and Starks, L. T., (2003), “Greener Pastures and the Impact of Dynamic Institutional Preferences”, *Review of Financial Studies*, vol.16, pp.1203–1238

Bhattacharya, U., Daouk, H., and Welker., M., (2003), “The World Price of Earnings Opacity”, *The Accounting Review*, vol.78(3), pp.641–78

Bikhchandani, S., Hirshleifer, D., Welch, I., (1992), “A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades”, *Journal of Political Economy*, vol.100, pp.992–1026

Black, F., Jensen, M. C., and Scholes, M., (1971), “The Capital Asset Pricing Model: Some Empirical Tests”, in: M. Jensen. ed. Studies In the theory of capital markets (Praeger, New York, NY)

Boehmer B., and Boehmer E., and R. P. H. Fishe, (2006), “Do Institutions Receive Favorable Allocations in IPOs with Better Long-Run Returns?”, *Journal of Financial and Quantitative Analysis*, vol.41(4), pp.809-828

Bogle, J. C., (2010), “Restoring Faith in Financial Markets”, *The Wall Street Journal,* pp.17

Botosan, C. A., and Plumlee, M. A., (2002), “A Re-Examination of Disclosure Level and the Expected Cost of Equity Capital”, *Journal of Accounting Research,* vol.40(1), pp.21–40

Boone, Audra L. and White, Joshua T., (2015), “The Effect of Institutional Ownership on Firm Transparency and Information Production”, *Journal of Financial Economics*, vol.117(3), pp.508-533

Brockman, P., and Chung, D.Y., (2000), “Informed and Uniformed Trading in an Electronic, Order-Driven Environment”, *Financial Review*, vol.35, pp. 125–146

Calluzzo, P., Moneta, F. and Topaloglu, S., (2017), “When Anomalies Are Publicized Broadly, Do Institutions Trade Accordingly?”. Available at SSRN: https://ssrn.com/abstract=2660413

Carhart, M.M., (1997), “On Persistence in Mutual Fund Performance”, *The Journal of Finance*, vol.52, pp. 57-82

Carleton, W., Nelson, J., and Weisbach, M., (1998), “The Influence of Institutions on Corporate Governance through Private Negotiations: Evidence from TIAACREF”, *The Journal of Finance*, vol.53, pp.1335–1362

Chan, L., and Lakonishok, J., (1995), “The Behavior of Stock Prices Around Institutional Trades”, *The Journal of Finance*, vol.50, pp.1147–1174

Chan, L., Jegadeesh, N., Lakonishok, J., (1996), “Momentum Strategies”, *The Journal of Finance*, vol. 51(5), pp. 1681-1713

Chemmanur, T., S. He, and G. Hu, (2009), “The Role of Institutional Investors in Seasoned Equity Offerings.”, *Journal of Financial Economics*, vol.94(3), pp.384-411

Chen, X., Harford, J., Li, K., (2007), “Monitoring: Which Institutions Matter?”, *Journal of Financial Economics*, vol.86, pp.279–305

Chen, J., Lee, S., Lin, C., and Sun, P., (2015), “'Heterogeneity of Institutional Ownership and Stock Price Delay”, *Auckand Finance Meeting*

Chen, Y., Zhao, H., (2012), “Informed trading, information uncertainty and price momentum”, *Journal of Banking and Finance*, vol.36, pp.2095-2109

Choi, J. J., Lam, K. C. K., Sami, H. and Zhou, H., (2013), “Foreign Ownership and Information Asymmetry”, *Asia Pacific Journal of Financial Studies*, vol.42, pp.141–166

Chung, Y. C., and Wang, K., (2014), “Do Institutional Investors Monitor Management? Evidence from the Relationship between Institutional Ownership and Capital Structure”, *North American Journal of Economics and Finance*, vol.34, pp.203-233

Coffee, J., (1991), “Liquidity Versus Control: The Institutional Investor as Corporate Monitor”, *Columbia Law Review*, vol.91, pp.1277-1368

Cohen R. B., Gompers, P. A., and Vuolteenaho T., (2002), "Who Underreacts to Cash-Flow News? Evidence from Trading between Individuals and Institutions", *Journal of Financial Economics*, vol.66, pp.409-462

Cook, D., Jarrell, S., and Kieschnick, R., (2003), “Investor Sentiment and IPO Cycles”, *Working Paper, University of Texas at Dallas*

Core, J. E., Holthausen, R. W., and Larcker, D. F., (1998), “Corporate Governance, Chief Executive Officer Compensation, and Firm Performance”, *Journal of Financial Economics,* vol.51, pp.371-406

Core, J. E., W. R. Guay, and R. Verdi, (2008), “Is accruals quality a priced risk factor?”, *Journal of Accounting and Economics*, vol.46 (1), pp.2–22

Cornell, B., and Roll, R., (2005), “A Delegated-Agent Asset-Pricing Model”, *Financial Analysts Journal*, vol.61, pp.57-69

Dasgupta, A, Prat, A. and Verardo, M., (2011), “Institutional Trade Persistence and Long-term Equity Returns”, *The Journal of Finance*, vol:66, pp.635-65

Del Guercio, D., (1996), "The Distorting Effect of the Prudent-Man Laws on Institutional Equity Investments", *Journal of Financial Economics*, vol.40, pp.31-62

DeLong, J.B., Shleifer, A., Summers, L., Waldmann, R., (1990), “Positive Feedback Investment Strategies and Destabilizing Rational Speculation.”, *The Journal of Finance,* vol.45, pp.379–395

Demsetz, H, (1968), “The Cost of Transaction”, *Quarterly Journal of Economics*, vol.82, pp.33–53

Demsetz, H., (1983), “The Structure of Ownership and the Theory of The Firm”, *Journal of Law and Economics*, vol.26, pp.375-390

Duarte, J., and Young, L., (2009), “Why is PIN Priced?”, *Journal of Financial Economics*, vol.91(2), pp.119–38

Easley, D., and O’Hara, M., (1987), “Price, Trading Size and Information in Securities Markets”, *Journal of Financial Economics*, vol.19, pp.69-90

Easely, D., O’Hara, M., and Paperman, J. B., (1998), “Financial Analysts and Information-Based Trade”, *Journal of Financial Markets*, vol.1, pp.175–210

Easley, D., and S. Hvidkjaer, and M. O'Hara, 2002, “Is Information Risk a Determinant of Asset Returns?”, *The Journal of Finance,* vol.57, no.5, pp.2185–2221

Easley, D., and M. O'Hara, (2004), "Information and the Cost of Capital", *The Journal of Finance*, vol.59, pp.1553-1583

Easley, D., N. M. Kiefer, M. O’Hara, and J. B. Paperman, (1996), “Liquidity, Information, and Infrequently Traded Stocks”, *The Journal of Finance*, vol.51(4), pp.1405–36

Easley, D., S. Hvidkjaer, and M. O’Hara, (2010), “Factoring Information into Returns”, *Journal of Financial and Quantitative Analysis*, vol.45(2), pp.293–309

El Ghoul, S., Guedhami, O., Ni, Y., Pittman, J., and Saadi, S., (2013), “Does Information Asymmetry Matter to Equity Pricing? Evidence from Firms’ Geographic Location”, *Contemporary Accounting Research*, vol:30, pp.140-181

Fabozzi, F., (1979), “Bid-Ask Spreads for Over-the-Counter Stocks”, *Journal of Economics and Business,* vol.32, pp.56-65

Falkenstein, E. G., (1996), “Preferences for Stock Characteristics as Revealed by Mutual Fund Portfolio Holdings”, *The Journal of Finance*, vol. 51 (1), pp. 111-35

Fama, E.F., and K.R. French, (1992), “The Cross-Section of Expected Stock Returns”, *The Journal of Finance*, vol.47 (2), pp. 427-465

Fama, E.F., and K.R. French, (1993), “Common Risk Factors in the Returns on Stock and Bonds.”, *Journal of Financial Economics*, vol.33 (1), pp.3–56

Fama, E.F., French, K.R., (1996), “Multifactor Explanations of Asset Pricing Anomalies”, *The Journal of Finance*, vol.51, pp. 55-84

Fama, E.F., French, K.R., (2008), “Dissecting Anomalies”, *The Journal of Finance*, vol. 63 (4), pp. 1653-1678

Fama, E.F., French, K.R., (2016), “Dissecting Anomalies with Five-Factor Model”, *Review of Financial Studies,* vol.29 (1), pp.69-103

Fehle, F., (2004), “Bid-Ask Spreads and Institutional Ownership”, *Review of Quantitative Finance and Accounting*, vol.22, pp.275–292

Francis, J., LaFond, R., Olsson, P. M., and Schipper, K., (2004), “Costs of Equity and Earnings Attributes”, *The Accounting Review*, vol.79(4), pp.967–1010

Field, L. C.., and Lowry, M., (2009), “Institutional versus Individual Investment in IPOs: The Importance of Firm Fundamentals”, *Journal of Financial and Quantitative Analysis*, vol.44, pp 489-516

Galsband, V., (2012), “Downside Risk of International Stock Returns”, *Journal of Banking and Finance*, vol.36(8), pp.2379–238

Glosten, L. R., and Milgrom, P., (1985), “Bid, Ask, and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders”, *Journal of Financial Economics*, vol.14 (1), pp.71-100

Gomez, J.P., and Zapatero, F., (2003), "Asset Pricing Implications of Benchmarking: A TwoFactor CAPM", *European Journal of Finance*, vol.9, pp.343-57

Gompers, P., and Metrick, A., (2001), "Institutional Investors and Equity Prices", *Quarterly Journal of Economics,* vol.116 (1), pp.229-259

Graham, J. R., Harvey, C. R., and Rajgopal, S., (2005), "The Economic Implications of Corporate Financial Reporting", *Journal of Accounting and Economics,* vol.40 (1), pp.3–73

Grinblatt, M., Titman, S., and Wermers, R., (1995), "Momentum Investment Strategies, Portfolio Performance and Herding: A Study of Mutual Fund Behavior", *American Economic Review*, vol. 85, pp.1088–105

Grossman, S., and Stiglitz, J., (1980), "On the Impossibility of Informationally Efficient Markets", *American Economic Review*, vol.70, pp.393-408

Hand, J., (1990), "A Test of the Extended Functional Fixation Hypothesis", *The Accounting Review,* vol.65, pp.740–763

Hamilton, J. L., (1978), "Marketplace Organization And Marketability: Nasdaq, the Stock Exchange and the National Market System", *The Journal of Finance*, vol.33, pp.487-503

Healy, P. M., Hutton, A. P., Palepu, K. G., (1999), "Stock Performance and Intermediation Changes Surrounding Sustained Increases in Disclosure", *Contemporary Accounting Research*, vol.16, pp.485–520

Healy, P. M., and Palepu, K. G., (2001), "Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review Of The Empirical Disclosure Literature", *Journal of Accounting and Economics*, vol.3, pp.405–440

Heflin, F., and Shaw, K. W., (2000), "Block-Holder Ownership and Market Liquidity", *Journal of Financial and Quantitative Analysis*, vol.35, pp.621–633

Hendershott, T., Livdan, D., and Schurhoff, N., (2015), "Are Institutions Informed about News?", *Journal of Financial Economics*, vol.117, pp.249-287

Hope, O., Thomas, W. B., and Vyas, D., (2009), “Transparency, Ownership, and Financial Constraints: An International Study Using Private Firms”, *Working paper,* Toronto University

Huddart, S., Ke, B., (2007), “Information Asymmetry and Cross-Sectional Variation in Insider Trading”, *Contemporary Accounting Research*, vol.24, pp.195-232

Hughes, J. S., L. Jing, and J. Liu., (2007), “Information Asymmetry, Diversification, and Cost of Capital”, *The Accounting Review*, vol.82(3), pp.705–29

Irvine, P., and Lipson, M., and Puckett, A., (2007), “Tipping”, *Review of Financial Studies,* vol.20, pp.741–768.

Jegadeesh, N., Titman, S., (1993), “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency”, *The Journal of Finance*, vol.48, pp. 65-91

Jones C. M., and Slezak, S. L., (1999), “The Theoretical Implications of Asymmetric Information on the Dynamic and Cross-Sectional Characteristics of Asset Returns”, *working Paper*, University of North Carolina

Jennings, W. W., Schnatterly, K., and Seguin, P. J., (2002), " Institutional Ownership Information and Liquidity ", *Innovations in Investments and Corporate Finance*, vol. (7), pp. 41-71

Jones, S.L., D. Lee, and Weis, E., (1999), “Herding and Feedback Trading by Different Type of Institutions and the Effects on Stock Prices”, *Working Paper* (Kelley School of Business, Indiana University)

Kahneman, D., and Tversky, A., (1979), "Prospect Theory: An Analysis of Decision Under Risk", *Econometrica*, vol. 47, pp. 263-91

Kelley, E. K., and Boehmer, E., “Institutional Investors and the Informational Efficiency of Prices”, (2007), *AFA 2007 Chicago Meetings Paper*; Sixteenth Annual Utah Winter Finance Conference

King, R. G., and Levine, R., (1993b), “Finance, Entrepreneurship and Growth”, *Journal of Monetary Economics*, vol.32, pp.513-542

Kini, O., and Mian, S., (1995), “Bid-Ask Spread and Ownership Structure”, *Journal of Financial Research*, vol.18, pp.410–414

Lakonishok, J., Shleifer, A., and Vishny, R., (1992), "The Structure and Performance of the Money Management Industry", *Brookings Papers: Microeconomics*, pp.339-391

Lang, M. and McNichols, M., (1997), “Institutional Trading and Corporate Performance”, *Working paper*, Stanford University

Lee, C.M. C., Shleifer, A., and Thaler, R. H., (1991), “Investor Sentiment and the Closed-End Fund Puzzle”, *The Journal of Finance*, vol.66(1), pp.75-109

Lev, B., (1988), “Toward a Theory of Equitable and Efficient Accounting Policy”, *The Accounting Review*, vol.63, pp.1-22

Levine, R., (2005), “Finance and Growth: Theory and Evidence”, *Handbook of Economic Growth*, vol.1, pp.865-934

Lynch, A., and Mendenhall, R., (1997), "New Evidence on Stock Price Effects Associated with Changes in the S&P 500", *Journal of Business*, vol.70, pp.351—384

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., and Vishny, R., (2000), “Agency Problems and Dividend Policies Around the World”, *The Journal of Finance*, vol.55, pp.1–33

Mele, A., (2007), “Asymmetric Stock Market Volatility and the Cyclical Behavior of Expected Returns”, *Journal of Financial Economics*, vol.86, pp.446-478

Michaely, R., and Vincent, C., (2013), “Do institutional investors influence capital structure decisions?”, *Cornell University* (Unpublished manuscript)

Nagel, S., (2005), “Short Sales, Institutional Investors and The Cross-Section of Stock Returns”, *Journal of Financial Economics*, vol.78 (2), pp.277-309

Nofsinger, J. R., and Sias, R. W., (1999), "Herding and Feedback Trading by Institutional and Individual Investors", *The Journal of Finance*, vol.54, pp.2263-2296

Novy-Marx, R., (2013), “The Other Side of Value: The Gross Profitability Premium”, *Journal of Financial Economics*, vol.108, pp.1-28

O’Brien, P., and Bhushan, R., (1990), “Analyst Following and Institutional Ownership”, *Journal of Accounting Research*, vol.28, pp.55–77

Odean, T., (1999), “Do Investors Trade Too Much?”, *American Economic Review*, vol.89, pp.1279–1298

O’Neil, M., and Swisher, J., (2003), “Institutional Investor and Information Asymmetry: An Event Study of Self-Tender Offers”, *The Financial Review*, vol.38, pp.197-211

Opler, T.C., and Sokobin, J., (1997), “Does Coordinated Institutional Shareholders Activism Work? An Analysis of The Activities of The Council of Institutional Investors”, *Working paper*, Ohio State University

Parrino, R., Sias, R. W., and Starks, L. T., (2003), “Voting with Their Feet: Institutional Ownership Changes Around Forced CEO Turnover”, *Journal of Financial Economics,* vol.68, pp.3-46

Petajisto, A., (2009), “Why Do Demand Curves for Stocks Slope Down?”, *Journal of Financial and Quantitative Analysis*, vol.44, pp.1013-1044

Potter, G., (1992), “Accounting Earnings Announcements, Institutional Investor Concentration, And Common Stock Returns”, *Journal of Accounting Research*, vol.30, pp.146-155

Puckett, A. and X. Yan, (2013), “The Interim Trading Skills of Institutional Investors”, *The Journal of Finance*, vol. 66(2), pp.601-633

Ramalingegowda, S., and Yu, Y., (2012), “Institutional Ownership and Conservatism”, *Journal of accounting and Economics*, vol.53, pp.98-114

Roberts, M. R., and Whited, T. M., (2012), “Endogeneity in Empirical Corporate Finance”, in: Constantinides, M., Stuz, R. (Eds.), Elsevier, vol. 2. Handbook of the Economics of Finance, North Holland, Amsterdam.

Ross, S. A., (1976), “The Arbitrage Theory of Capital Asset Pricing”, *Journal of Economic Theory*, vol.13(3), pp. 341-360

Sarin, A., Shastri, K.A., Shastri, K., (2000), “Ownership Structure and Stock Market Liquidity”, *Working paper*, University of Pittsburgh.

Scharfstein, D.S., and Stein, J.C., (1990), “Herd Behavior and Investment”, *American Economic Review*, vol.80, pp.465–79

Shefrin, H., and Statman, M., (1985), “The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence”, *The Journal of Finance*, vol. 40(3), pp.777-790

Shleifer, A., and Vishny, R., (1986), “Large Shareholders and Corporate Control”, *Journal of Political Economy*, vol.94, pp.461-488

Schwert, W., (1989), “Why Does Stock Market Volatility Change Over Time?”, *The Journal of Finance*, vol.44, pp.1115-1153

Shleifer, A., and R. Vishny, (1997), "The Limits of Arbitrage", *The Journal of Finance*, vol.52, pp.35-55

Shiller, R., Pound, J., (1989), “Survey Evidence on Diffusion of Interest and Information Among Investors”, *Journal of Economic Behavior and Organization*, vol.12, pp.47–66

Sias, R., (1996), “Volatility and the Institutional Investor”, *Financial Analysts Journal*, vol.52, pp.13-20

Sias, R., (2004), “Institutional Herding”, *Review of Financial Studies*, vol.17, pp.165–206

Sias, R., (2007), “Reconcilable Differences: Momentum Trading By Institutions”, *The Financial Review*, vol. 42 (1), pp. 1-22

Sias, R., Starks, L., Titman, S., (2006), “Changes in Institutional Ownership and Stock Returns: Assessment and Methodology”, *Journal of Business*, vol.79, pp.2869–2910

Smith, M. P., (1996), “Shareholder Activism by Institutional Investors: Evidence fromCalPERS”, *The Journal of Finance*, vol.51, pp.227-252

Taylor, W., (1990), “Can Big Owners Make a Big Difference?”, *Howard Business Review*, pp.70-82

Tinic, S.M., (1972), “The Economics of Liquidity Services”, *Quarterly Journal of Economics*, vol.86, pp.79-93

Titman, S., Wei, K., and Xie, F., (2004), “Capital Investments and Stock Returns”, *Journal of Financial and Quantitative Analysis,* vol.39, pp.677-700

Utama, S. and Cready, W., (1997), “Institutional Ownership, Differential Predisclosure Precision and Trading Volume at Announcement Dates”, *Journal of Accounting and Economics*, vol.24, pp.124-50

Verardo, M., (2009), “Heterogeneous Beliefs and Momentum Profits”, *Journal of Financial and Quantitative Analysis*, vol44, pp.795-822

Voronkova, S., and Bohl, M. T., (2005), “Institutional Traders’ Behaviour in an Emerging Stock Market: Empirical Evidence on Polish Pension Fund Investor”, *Journal of Business Finance and Accounting*, vol.32(7), pp.1537-1560

Wang J., (1993), “A Model of Intertemporal asset prices under asymmetric information”, *Review of Economic Studies*, vol.60, pp.249-282

Wermers, R., (1999), "Mutual Fund Herding and the Impact on Stock Prices", *The Journal of Finance*, vol.54, pp.581-622

Xavier G., Gopikrishnan, P., Plero, V., and Stanley, H. E., (2006), "Institutional Investors and Stock Market Volatility," *The Quarterly Journal of Economics*, vol.121(2), pp.461-504

Xu, Y., (2001), “Extracting Factors with Maximum Explanatory Power”, Working Paper, The University of Texas at Dallas

Zhang, X. F., (2006), “Information Uncertainty and Stock Returns”, *The Journal of Finance*, vol.61, pp.105-137

Zheng, D., Li, H., and Zhu, X., (2015), “Herding Behavior in Institutional Investors: Evidence from China’s Stock Markey”, *Journal of Multinational Financial Management,* vol.32, pp.59-76

Appendix A

Yearly summary statistics of data

	Observation	Mean	Standard Deviation	Minimum	Maximum
Panel A: 1980					
Market Value	2426	1060000000	3120000000	3230000	39600000000
BE/ME	2426	0.9456296	0.5500342	0.00505	3.872855
Ins. Own. (% of outstanding share	2426	27.22323	19.55396	0.09	86.37043
Firms' Excess Returns	2426	0.0214375	0.1144817	-0.464641	0.686217
Panel A: 1981					
Market Value	3054	986000000	2750000000	2750000	36500000000
BE/ME	3054	0.8853108	0.510933	0.0073006	4.278266
Ins. Own. (% of outstanding share	2521	26.26065	19.48842	0.0079928	83.41772
Firms' Excess Returns	3054	-0.0007141	0.1019492	-0.550773	0.796133
Panel A: 1982					
Market Value	2426	1060000000	3120000000	3230000	39600000000
BE/ME	2426	0.9456296	0.5500342	0.00505	3.872855
Ins. Own. (% of outstanding share	2426	27.22323	19.55396	0.09	86.37043
Firms' Excess Returns	2426	0.0214375	0.1144817	-0.464641	0.686217
Panel A: 1983					
Market Value	3832	1180000000	4550000000	4823000	77300000000
BE/ME	3832	0.6526107	0.3900731	0.0053644	2.827021
Ins. Own. (% of outstanding share	3832	27.88585	19.76133	0.0226045	94.7759
Firms' Excess Returns	3832	0.0193065	0.1061513	-0.528778	0.992416
Panel A: 1984					
Market Value	4077	1090000000	4370000000	4663750	76000000000
BE/ME	4077	0.7166873	0.397746	0.0051059	3.791402
Ins. Own. (% of outstanding share	4077	28.95022	19.87499	0.001024	95.88765
Firms' Excess Returns	4077	-0.0061929	0.093287	-0.415443	0.575371
Panel A: 1985					
Market Value	4186	1230000000	4950000000	4655000	95700000000
BE/ME	4186	0.6635884	0.3634025	0.0055534	3.235612
Ins. Own. (% of outstanding share	4186	31.19568	20.31275	0.0207226	98.28233
Firms' Excess Returns	4186	0.0203647	0.0933626	-0.521658	0.966067
Panel A: 1986					
Market Value	4407	1490000000	5410000000	5922000	93400000000
BE/ME	4407	0.587306	0.3466333	0.0036662	2.549009
Ins. Own. (% of outstanding share	4407	33.17921	20.74939	0.0092338	97.83652
Firms' Excess Returns	4407	0.0091817	0.1051049	-0.398148	0.734778

Appendix A (Cont'd)

Yearly summary statistics of data

	Observation	Mean	Standard Deviation	Minimum	Maximum
Panel A: 1987					
Market Value	4668	1740000000	5950000000	4378500	98100000000
BE/ME	4668	0.5570568	0.3248738	0.0036485	2.509636
Ins. Own. (% of outstanding share	4668	34.78868	21.15076	0.0069434	97.7704
Firms' Excess Returns	4668	0.0061795	0.1443462	-0.562562	1.914058
Panel A: 1988					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	5242	1500000000	4820000000	4189500	75400000000
BE/ME	5242	0.6070114	0.3242366	0.0036485	2.463492
Ins. Own. (% of outstanding share	5242	35.63472	21.12839	0.0009854	99.98556
Firms' Excess Returns	5242	0.0183135	0.0924305	-0.299074	0.912579
Panel A: 1989					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	5311	1790000000	5300000000	5036250	64800000000
BE/ME	5311	0.5933196	0.3411202	0.004202	2.636653
Ins. Own. (% of outstanding share	5311	37.78261	21.10167	0.007095	99.50779
Firms' Excess Returns	5311	0.0070008	0.0920912	-0.475047	1.113107
Panel A: 1990					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	5110	1940000000	5960000000	4998000	67300000000
BE/ME	5110	0.6864025	0.4733776	0.0032425	8.116889
Ins. Own. (% of outstanding share	5110	41.08914	21.64297	0.0133881	99.95689
Firms' Excess Returns	5110	-0.0012266	0.1172095	-0.497959	0.745364
Panel A: 1991					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	5111	2200000000	6810000000	5081250	66100000000
BE/ME	5111	0.6154737	0.5234465	0.0020699	8.100498
Ins. Own. (% of outstanding share	5111	44.76493	22.9609	0.0033293	99.67097
Firms' Excess Returns	5111	0.0361667	0.1209004	-0.486145	1.330274
Panel A: 1992					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	5446	2200000000	6900000000	5265000	74900000000
BE/ME	5446	0.5713832	0.4739552	0.0001012	7.177741
Ins. Own. (% of outstanding share	5446	44.03197	23.8248	0.0930483	99.96935
Firms' Excess Returns	5446	0.0161135	0.1115918	-0.538915	1.330274
Panel A: 1993					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	6322	2210000000	6770000000	5265000	89500000000
BE/ME	6322	0.5042523	0.3684924	0.0003119	4.223788
Ins. Own. (% of outstanding share	6322	41.66132	23.48116	0.015663	99.56184
Firms' Excess Returns	6322	0.0190805	0.1058784	-0.47061	1.012325

Appendix A (Cont'd)

Yearly summary statistics of data

	Observation	Mean	Standard Deviation	Minimum	Maximum
Panel A: 1994					
Market Value	7245	2120000000	6700000000	6432000	87000000000
BE/ME	7245	0.5327739	0.3414621	0.0001537	3.389381
Ins. Own. (% of outstanding share	7245	42.5576	24.11873	0.0012199	99.67358
Firms' Excess Returns	7245	0.0024016	0.0978268	-0.665345	0.929315
Panel A: 1995					
Market Value	7202	2300000000	7340000000	5365000	120000000000
BE/ME	7202	0.5236672	0.332987	0.0001589	2.766145
Ins. Own. (% of outstanding share	7202	43.28091	25.14892	0.0012103	99.73479
Firms' Excess Returns	7202	0.0217128	0.108444	-0.590847	1.288046
Panel A: 1996					
Market Value	7805	2870000000	10300000000	4988500	163000000000
BE/ME	7805	0.4942243	0.3108309	0.0003439	2.766145
Ins. Own. (% of outstanding share	7805	43.61333	26.13169	0.002783	99.90958
Firms' Excess Returns	7805	0.0196623	0.1751246	-0.527861	11.06882
Panel A: 1997					
Market Value	8272	3620000000	14700000000	5711438	240000000000
BE/ME	8272	0.4580974	0.2770456	0.0000234	2.528435
Ins. Own. (% of outstanding share	8272	44.01238	27.02536	0.0079762	99.96819
Firms' Excess Returns	8272	0.0215634	0.1231301	-0.660069	1.220196
Panel A: 1998					
Market Value	9459	4520000000	19300000000	5711438	348000000000
BE/ME	9459	0.5072816	0.3377948	0.0003505	2.576562
Ins. Own. (% of outstanding share	9459	44.86971	26.47179	0.0002185	99.28185
Firms' Excess Returns	9459	0.0060045	0.1459949	-0.636059	1.609098
Panel A: 1999					
Market Value	9120	6290000000	29900000000	5895730	604000000000
BE/ME	9120	0.5866714	0.4381026	0.00023	5.521146
Ins. Own. (% of outstanding share	9120	45.55086	26.54287	0.0005399	99.57755
Firms' Excess Returns	9120	0.0177025	0.1707584	-0.660841	4.222903
Panel A: 2000					
Market Value	9455	7130000000	33100000000	5549500	572000000000
BE/ME	9455	0.6010161	0.4852486	0.0000607	4.766585
Ins. Own. (% of outstanding share	9455	45.40047	26.50691	0.0023237	125.8122
Firms' Excess Returns	9455	0.0222364	0.1974814	-0.77788	3.65716

Appendix A (Cont'd)

Yearly summary statistics of data

	Observation	Mean	Standard Deviation	Minimum	Maximum
Panel A: 2001					
Market Value	11386	6440000000	26600000000	5635000	484000000000
BE/ME	11386	0.5752956	0.4124409	5.50E-06	3.800527
Ins. Own. (% of outstanding share	11386	48.79312	26.65754	0.0005025	99.93131
Firms' Excess Returns	11386	0.0242116	0.1576438	-0.615653	1.565512
Panel A: 2002					
Market Value	12307	6120000000	23300000000	6751800	372000000000
BE/ME	12307	0.5726613	0.4051758	0.0001448	8.104335
Ins. Own. (% of outstanding share	12307	51.6169	26.51937	0.00019	99.98207
Firms' Excess Returns	12307	0.0017601	0.1337093	-0.641189	1.865225
Panel A: 2003					
Market Value	13060	6620000000	24100000000	6502080	312000000000
BE/ME	13060	0.5456397	0.3746848	0.0001448	4.67623
Ins. Own. (% of outstanding share	13060	52.47501	27.4221	0.000037	99.98756
Firms' Excess Returns	13060	0.0432903	0.123704	-0.612097	2.129158
Panel A: 2004					
Market Value	14335	7140000000	25200000000	6600880	386000000000
BE/ME	14335	0.468621	0.2933355	0.0002336	3.510108
Ins. Own. (% of outstanding share	14335	55.04912	28.53422	0.0001894	99.98318
Firms' Excess Returns	14335	0.0236919	0.1273991	-0.682097	6.907449
Panel A: 2005					
Market Value	15435	7400000000	25200000000	8721850	395000000000
BE/ME	15435	0.4610524	0.2864035	0.0001263	3.177575
Ins. Own. (% of outstanding share	15435	55.332	28.82556	3.27E-06	99.97857
Firms' Excess Returns	15435	0.0115549	0.1082896	-0.713693	3.301156
Panel A: 2006					
Market Value	16347	7940000000	25600000000	6192250	439000000000
BE/ME	16347	0.4535249	0.2890532	0.0000943	2.568612
Ins. Own. (% of outstanding share	16347	57.89044	28.77647	0.0001379	99.9848
Firms' Excess Returns	16347	0.0171129	0.1024122	-0.660576	1.781431
Panel A: 2007					
Market Value	16385	9280000000	31000000000	9124028	526000000000
BE/ME	16385	0.4641779	0.3132467	0.0000806	2.734771
Ins. Own. (% of outstanding share	16385	59.12273	28.81548	0.0005271	99.96841
Firms' Excess Returns	16385	0.0046427	0.1055502	-0.773771	1.518379

Appendix A (Cont'd)

Yearly summary statistics of data

	Observation	Mean	Standard Deviation	Minimum	Maximum
Panel A: 2008					
Market Value	14451	8980000000	28500000000	7372800	458000000000
BE/ME	14451	0.6258463	0.4749615	0.0000806	6.128418
Ins. Own. (% of outstanding share	14451	60.09202	28.77587	0.0148102	99.98415
Firms' Excess Returns	14451	-0.0200718	0.1457623	-0.638078	2.365192
Panel A: 2009					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	15726	7830000000	23700000000	8646400	370000000000
BE/ME	15726	0.6939774	0.5034928	0.0003065	4.921561
Ins. Own. (% of outstanding share	15726	61.6705	28.45898	0.0003543	99.99456
Firms' Excess Returns	15726	0.0470542	0.1954821	-0.631726	13.49503
Panel A: 2010					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	19047	8240000000	25800000000	6049900	413000000000
BE/ME	19047	0.5981095	0.3949899	0.0001692	4.731001
Ins. Own. (% of outstanding share	19047	59.61599	28.10707	0.0001078	99.99808
Firms' Excess Returns	19047	0.0274994	0.1128492	-0.482345	1.417971
Panel A: 2011					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	20138	8720000000	27200000000	5050000	457000000000
BE/ME	20138	0.5999128	0.4227624	0.0001829	6.192877
Ins. Own. (% of outstanding share	20138	61.21692	28.26347	0.0002518	99.99088
Firms' Excess Returns	20138	0.0031611	0.1113376	-0.593155	1.071284
Panel A: 2012					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	21241	9110000000	30000000000	10600000	627000000000
BE/ME	21241	0.5925871	0.4259842	0.0000202	7.056905
Ins. Own. (% of outstanding share	21241	61.47006	27.93313	0.000206	99.94326
Firms' Excess Returns	21241	0.0181182	0.1026902	-0.582601	3.199915
Panel A: 2013					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	21505	9890000000	30100000000	11900000	439000000000
BE/ME	21505	0.5237039	0.3879256	0.0002181	7.056905
Ins. Own. (% of outstanding share	21505	59.5773	28.53888	0.0003589	99.97702
Firms' Excess Returns	21505	0.0339923	0.106782	-0.572164	2.465627
Panel A: 2014					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	27031	9720000000	31200000000	7806601	643000000000
BE/ME	27031	0.4883037	0.3666413	0.0001629	5.901993
Ins. Own. (% of outstanding share	27031	55.91395	26.42139	9.52E-06	99.98926
Firms' Excess Returns	27031	0.010454	0.1600228	-0.650477	18.79999

Appendix A (Cont'd)

Yearly summary statistics of data

	Observation	Mean	Standard Deviation	Minimum	Maximum
Panel A: 2015					
Market Value	28890	9410000000	31600000000	10000000	740000000000
BE/ME	28890	0.5267498	0.4416451	0.0002283	5.513416
Ins. Own. (% of outstanding share	28890	56.70804	26.04142	0.0017928	99.98579
Firms' Excess Returns	28890	0.00048	0.1275645	-0.828144	8.298886
Panel A: 2016					
	Observation	Mean	Standard Deviation	Minimum	Maximum
Market Value	19865	9900000000	32300000000	7267000	609000000000
BE/ME	19865	0.5461746	0.4930847	0.0001837	8.979865
Ins. Own. (% of outstanding share	19865	55.03111	25.04526	0.0008641	99.89403
Firms' Excess Returns					

Appendix B

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	
Sosyal Bilimler Enstitüsü	X
Uygulamalı Matematik Enstitüsü	
Enformatik Enstitüsü	
Deniz Bilimleri Enstitüsü	

YAZARIN

Soyadı : Uğurlu Yıldırım
Adı : Ecenur
Bölümü : İşletme

TEZİN ADI (İngilizce): Institutional Ownership as an Additional Factor To Describe Stock Return

TEZİN TÜRÜ : Yüksek Lisans [ ] Doktora [X]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. [X]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ:

Appendix C

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Ugurlu Yildirim, Ecenur
Nationality: Turkish (TC)
Date and Place of Birth: 10 Nisan 1988, Ankara
Marital Status: Married
Phone: +90 5058327647
email: ecenur.ugurlu@gmail.com

EDUCATION

2018 (exp) **Middle East Technical University**
Ph.D. Finance
2010 **University of Essex, United Kingdom**
MSc. Economics (with Distinction)
Awards: *"Economics Department Prize for the Best MSc Dissertation"*
2009 **Hacettepe University**
BSc. Business Administration
2005 **Ankara Atatürk Anadolu High School**

WORK EXPERIENCE

YILDIRIM BEYAZIT UNIVERSITY
03.2015 –
International Trade and Business Research Assistant

MIDDLE EAST TECHNICAL UNIVERSITY
10.2011 – 03.2015
Business Administration Research Assistant

DELOITTE TOUCHE TOHMATSU
07.2008 – 08.2008
Consulting Intern

GÜNSA INCORPORATED COMPANY
06.2008 - 07.2008
Accounting Intern

ARTICLES

Ordu-Akkaya, B. M., Ugurlu-Yildirim, E., Soytas, U., "Volatility Spillovers between Spot and Futures Markets of Oil and Gold: The Role of Trading Volume, Open Interest and Trader Types", *Resources Policy,* Accepted Manuscript (SSCI)

Soytas, U., Sari, R., Kocaaslan, B., and Ugurlu-Yildirim, E., "The Changing Role of Financial Stress, Oil Price, and Gold Price on Financial Contagion among US and BRIC Stock Markets after Global Economic Crisis", *International Review of Finance,* Accepted Manuscript (SSCI)

CONFERENCES

"Kuresellesme ve Rasyonel Piyasa Balonlari", presented at "Gazi Akademi Genc Sosyal Bilimciler Senpozyumu", Ankara, 2016

"An Empirical Analysis of the Impact of Financial Development on Unemployment Rate", presented at "First World Congress in Comparative Economics", Rome, June 2015

"The Effect of Bank Diversification on Stock Market Value: Empirical Evidence of Turkey", presented at "15th Eurasia Business and Economics Society (EBES) Conference", Lisbon, January 2015

"Fiscal Deficit and Stock Market: Empirical Evidence for Turkey", presented at "15th Annual International Conference of the Global Business and Technology Association (GBATA) Conference, Helsinki, July 2013

RESEARCH AWARDS

"Global Entrepreneurship Summit, 2011", The Winner Project

"Economics Department Prize for the Best MSc Dissertation", 2010, University of Essex

LANGUAGE

English	*Advanced*
German	*Intermediate*
Spanish	*Beginner*

Appendix D

TURKISH SUMMARY/ TÜRKÇE ÖZET

Varlık fiyatlama teorisi ve önerilen modellerin ampirik doğrulaması, uzun süredir finans literatüründe sıcak bir tartışmanın odağı olmuştur. Varlık fiyatlama modellerinin geliştirilmesinden sonra uygulanan ampirik çalışmalar, bu teorik modeller ile ampirik bulgular arasında tutarsızlıklar olduğunu göstermiştir. Bu tutarsızlıklar nedeniyle, varlık fiyatlama modelleri üzerinde çalışan araştırmacılar, varlık piyasasının davranışını etkileyebilecek daha geniş bir dizi faktörü incelemeye başlamışlardır (Aslan ve ark., 2011). Etkin piyasa hipotezinde, yatırımcıların rasyonel olduğu ve hisse senedi fiyatlarının yalnızca hisse senedi hakkındaki yeni temel bilgilere tepki verdiği varsayılmaktadır. Buna karşın, ampirik çalışmalar, piyasa katılımcılarının tam anlamıyla rasyonel olmayabileceğini ve küçük bireysel yatırımcıların psikolojik önyargılardan etkilenebileceğini ortaya koymuştur.

Çalışmamızın ilk bölümünde, Fama-French'in (1993) çalışmalarında kullandıkları, pazar faktörü, büyüklük ve değer faktörleri gibi açıklayıcı değişkenlerin yanı sıra, kurumsal yatırımcı oranını taklit eden yeni bir değişken, modelimize dahil edilmiştir. Analizlerimiz, çoğu zaman, pazar, büyüklük, değer ve kurumsal sahiplik oranı ile ilişkili risk faktörlerini taklit etmek için yaratılan portföylerin, getirilerdeki güçlü ortak değişimi yakaladığını göstermektedir. Bu nedenle, çalışmamız, Fama-French (1993) bulgularını desteklemekle beraber; kurumsal sahipliğin ortak bir risk faktörü için bir vekil olduğunu da göstermektedir.

İkinci bölümde, momentum faktörü ve kurumsal yatırımcı oranı arasındaki ilişki incelenmiştir. Fama ve French (1996) çalışmalarında, momentumla düzenlenmiş portföy getirilerindeki bölümler arası değişimi açıklarken, 3 faktörlü modellerinin yetersiz olduğunu itiraf etmişlerdir. 2008 yılında, Fama ve French, momentuma göre sıralanmış portfoylerin bütün büyüklükler için güçlü pozitif ortalama getiriler verdiğini göstermişlerdir. Ortalama getiriler, momentuma göre düzenlenmiş portföyler icin düşükten yükseğe doğru artma eğilimindedir. Carhart (1997) bu olguyu incelemiş ve momentuma göre oluşturulmuş portföylerin başarısının nedenini genel olarak ortak faktörlere karşı duyarlılığın bir sonucu olduğunu belirtmiştir. Carhart, Jegadeesh ve Titman'ın (1993) bir yıllık momentum anomalisini Fama ve French'in 3 faktör modeline dahil ederek, dört risk faktörlü bir varlık fiyatlama modeli ortaya koymuştur. Bu nedenle, momentum faktörü, IMI faktörünün etkisini yansıtıyor olabileceğinden, Carhart 4 faktörlü modelin, önerilen 4 faktörlü modelimize göre başarısı incelenmiştir. Sonuçlarımıza göre, hisse senedi getirilerinin açıklanmasında, piyasa, büyüklük, BE / ME, momentum ve kurumsal sahiplik oranı olmak üzere en az beş faktörün var olduğu ortaya konmaktadır.

Çalışmamızın üçüncü bölümünde, IMI değişkeninin, önerilen sistematik risklerden hangisine vekil olduğu hakkında daha fazla çıkarımda bulunabilmek amacıyla, bu riskler ile IMI arasındaki ampirik ilişki incelenmiştir. Sonuçlar, IMI ve teklif-talep farkı arasında anlamlı bir ilişki olduğunu göstermektedir. Bu nedenle IMI'nin bilgi asimetrisi riskine vekil olabileceği belirtilmiştir.

Literatürü oluşturan varlık fiyatlama modellerinin geliştirilmesinden bu yana, pazar yapısı, katılımcılar ve yönetmelikler değişiklik göstermiştir. Son 30 yılda, kurumsal yatırımcıların toplam hisse senetleri icindeki yüzdesi büyük ölçüde artmıştır. Günümüzde, borsadaki oyuncuların çoğunu kurumsal yatırımcılar oluşmaktadır (% 55'in üzerinde). Kurumsal yatırımcıların finansal piyasalarin büyük oyuncuları haline gelmesiyle ve son yıllarda hisse senedi piyasasındaki önemlerinin artmasıyla, kurumsal yatırımcıların hisse senedi fiyatı ve piyasa etkinliği üzerindeki etkilerini anlamak oldukça önemli bir konu haline gelmiştir (Chen ve ark. 2015). Bu calışmada, oluşturulan kurumsal yatırımcı değişkenine, literatürde var olan varlık fiyatlama modellerinin dahil edilmesi gerektigi, ve bu degişkenin asimetrik bilgi riski, gürültücü yatırımcı riski veya temsilci problemi gibi bazı sistematik risk faktörlerinin bir vekili olabileceği hipotezi sunulmuştur.

CAPM'nin temel varsayımlarından biri, bireylerin ortak inanışlara sahip olmaları ve varlıkların bu inançlarla uyumlu bir şekilde fiyatlandırılmış olmasıdır. Denge durumunda, yatırımcıların, piyasa riski tutmaları için daha fazla beklenen getiri ile ödüllendirilmesi gerekmektedir. Öte yandan, sistematik olmayan riskler icin bir ödül yoktur, çünkü bu riskler çeşitlenebilir. Yatırımcılar, CAPM gibi geleneksel varlık fiyatlandırma modellerinde, yalnızca sistematik riskler karşılığında ödüllendirilir. Bu geleneksel modellere göre, hisse senedi fiyatları her zaman ilgili bilgileri yansıtmaktadır ve bilgi asimetrisi fiyatlandırılmamalıdır (Ghoul ve ark., 2013). Bununla birlikte, Easley ve ark. (2002), yeni bilgilerin dinamik bir şekilde ulaşması sonucu, pazar etkinliğinin halihazirda kabul edilen statik algılanmasının güç olduğunu belirtmektedir. Ayrıca, bilinçli yatırımcılarla işlem yapmak, hisse senetleri ile ilgili kamusal veya özel bilgilere sahip olmayan yatırımcılar açısından bilgi riski yaratmaktadır. Sonuç olarak, özel bilgilerin varlığı, bazı varlıklar icin beklenenden fazla getiriye sebep olmaktadır. Özel bilgilerin, beklenen getirilerde bir artışa neden olabileceği iddia edilmektedir (Easley ve ark., 2002). Özetle, yukarıda belirtilen çalışmalar, varlık gelirlerinin asimetrik bilgilerden etkileneceğini iddia etmektedir. Olumsuz seçim riski nedeniyle pazarda bilgi birikimi olan yatırımcılar olursa, riskten etkilenmeyen piyasa yapıcısı tarafından daha yüksek teklif istenir (Easley ve O'Hara, 1987). Literatürde, kurumsal yatırımcıların bilgi duzeyinin bireysel yatırımcılardan çok daha fazla olduğunu gösteren birçok çalışma bulunmaktadır. Kurumsal yatırımcıların, başlıca bilgi toplama ve bu bilgileri işleme acisindan daha becerikli oldugu ongorulmektedır. Bilgiye daha fazla erişimi olan ve bu bilgileri işlemek için daha fazla bilgiye sahip olan kurumsal yatırımcıların, bireysel yatırımcılardan daha bilgili oldukları düşünülmektedir. Kurumsal yatırımcılar, halka açık şirketlerle ve aracı kurumlarla doğrudan iletişim kurabildikleri ve profesyonel kişileri ve teknolojileri kullandıkları için, bireysel yatırımcılara göre üstün bilgi işleme ve toplama becerilerine sahip olurlar (Hendershott ve diğerleri, 2015). Lang ve McNichols (1997), kurumsal sahiplik veya bu sahiplik oranındaki değişiklikler ile getiri arasında doğrudan bir ilişki olduğunu göstermektedir.

Hendershott ve ark. (2015), kurumsal yatırımcıların genel olarak bilgileri, kamuya açık hale gelmeden önce öngörduklerini belirtmiştir. Bu nedenle, kurumsal yatırımcıların, hisse senetleri için değerli bilgiler üretmekte olduğunu ve kurumsal sahiplik oranı ve kurumsal ticaretin fiyat verimliliğini artırdığı görüşünü desteklemişlerdir. Bunlara ek olarak, bazı çalışmalar, kurumsal sahiplik oranının yükselmesi nedeniyle hisse senedi getirisinin oynaklığının artmasının, öz sermaye maliyetini arttırabileceğini göstermiştir (bkz. Potter, 1992; Sias, 1996). Teorik ve ampirik çalışmaların geniş bir bölümü, kurumsal yatırımcıların bireysel yatırımcılara oranla daha yüksek bir bilgi duzeyine sahip olduklarını belirttiği için, bu çalışmada önerilen yeni sistematik faktörün, bilgi asimetrisi için bir vekil olabileceği düşünülmektedir. Bu nedenle, bu çalışmada, kurumsal yatırımcıların, mevcut hisse sayısının yüzdesi olarak hisse senedi getirileri üzerinde önemli bir etkisi olup olmadığı incelenmekte ve daha yuksek oranda kurumsal yatırımcıya sahip olan varlıkların, teorinin belirttiği gibi fazla getiri getirip getirmediği incelenmektedir.

Yukarıda bahsedildiği üzere etkin piyasa hipotezinde var olan bir diğer varsayım, yatırımcıların rasyonel olduğu ve hisse senedi fiyatlarının yalnızca hisse senedi hakkındaki yeni temel bilgilere tepki verdiğidir. Bununla birlikte ampirik çalışmalar, piyasa katılımcılarının tam anlamıyla rasyonel olmayabileceğini ve küçük bireysel yatırımcıların psikolojik önyargıları olabileceğini göstermiştir. Literatürde, bireysel yatırımcılar çoğunlukla bilgi ile ilişkili olmayan nedenlerle ticaret yapan basit yatırımcılar iken (bkz. Odean, 1999; Barber ve Odean, 2008; Barber ve diğerleri, 2009, Ramalingegowda ve Yu, 2012), kurumsal yatırımcılar, sermaye piyasalarında fiyat belirleme konusunda bireysel yatırımcılardan daha önemli olan sofistike yatırımcılardır (bkz. Hand, 1990; Chan ve Lakonishok, 1995; Sias ve ark., 2006). Bazı mevcut araştırmalar, profesyonellerden daha az karmaşık ve daha az deneyimli olan bireysel yatırımcıların, varlıkları temel değerlerinden uzaklaştırabileceğini belirtmektedir. Delong ve ark. (1990), bireysel yatırımcıların gürültüye ya da hissiyata dayalı ticaret yaptıklarını göstermiştir. Delong ve ark. (1990), tamamen rasyonel olmayan yatırımcıların, bir diğer adıyla gürültü tüccarlarının, ticaret yaptıkları varlık üzerinde satış fiyat riskini öngörülemezliğinin düşünülmesi üzerine bir varlık fiyatlandırma modeli sunarlar. Bu gürültü tüccarlarının varlık getirileri hakkındaki beklentileri stokastik ve öngörülemeyen duyumlardan etkilenir. Gürültü yatırımcılarının yarattığı bu ilave risk "gürültücü yatırımcı riski" olarak adlandırılır. Birçok varlık, aynı gürültü yatırımcısının hissiyat dalgalanmalarına maruz kalırsa, bu risk denge durumunda fiyatlandırılmaktadır. Başka bir deyişle, tamamen rasyonel olmayan yatırımcılar, geleneksel varlık fiyatlandırma modellerinde dikkate alınmayan benzersiz bir sistematik risk faktörü olan ilave bir bağımsız sistematik risk ekleyebilirler. Dolayısıyla, gürültü riski taşıyan varlıkların, bu riske maruz kalmayan menkul kıymetlerden daha yüksek beklenen getiri elde etmesi beklenmektedir. Temel değerlerine göre, bu varlıkların maliyeti düşük olacaktır. Bir çok teorik ve ampirik calışma, kurumsal yatırımcıların bireysel yatırımcılara oranla daha fazla rasyonel olduğunu belirtmektedir. Bireysel yatırımcılar bu gibi duygulara daha yatkındır ve psikolojik önyargılardan daha cok etkilenirler. Dolayısıyla, varlık fiyatlama modellerinde, kurumsal yatırımcının yüzdesini temsil eden ek bir değişkene yer verilmesinin, gürültücü yatırımcıların neden olduğu sistematik risk için bir vekil olduğu düşünülmüştür.

Son olarak, geleneksel varlık fiyatlandırma modellerinde, yatırımcıların servetlerini piyasalara doğrudan yatırdıkları varsayılmaktadır. Bununla birlikte, yukarıda da belirtildiği gibi, son yıllarda bireysel yatırımlardan ziyade kurumsal yatırımlar, hızlı bir yükseliş sergilemektedir. Finansal kurumlar oldukça yüksek miktarlarda hisse senedi kontrol ederken, nihai yatırım kararını veren makamların, paranın asıl sahipleri olmamasından kaynaklanan, potansiyel bir vekil problemi vardır. Öte yandan, varlık fiyatlandırma modellerinde, vekil problemleri dikkate alınmaz. Allen (2001), piyasa balonlarının ortaya çıkmasının, finansal kurumlarda vekil problemlerinin varlığı ile açıklanabileceğini iddia etmektedir. Sınırlı sorumluluk nedeniyle, kurumlar riskli yatırım kararları alırlar ve bir varlık için iskonto edilmiş nakit akışından daha fazlasını ödemeye rıza gösterirler. Bu nedenle, riskli varlıklar çekici hale gelir ve piyasa balonları oluşabilir. Bu nedenle Allen (2001), finansal yatırımcılarla varlık fiyatlanması arasındaki ilişkinin henüz tam olarak anlaşılamadığını belirtmektedir. Ayrıca, finansal kurumların varlık fiyatlandırma modellerine dahil edilmesi gerektiğini savunmaktadır. Birçok ampirik çalışmanın yanı sıra, 2007-2008 finansal krizi, kurumların varlık fiyatlarında çok önemli etkileri olduğunu göstermiştir. Bununla birlikte, profesyonel para yöneticilerinin varlığı durumunda pazar dengesinin gereklilikleri hakkında çok fazla teorik çalışma bulunmamaktadır (Basak ve Pavlova, 2013). Önerdiğimiz faktörün, kurumsal yatırımcıları varlık-fiyatlandırma modeline dahil etmesiyle, Allen'ın (2001) vurguladığı boşluğu doldurabileceğini düşünmekteyiz.

Bu çalışmada, döneme ilişkin ortak risk faktörleri için primler ile ortalama getirilerin kesitini açıklamak için zaman serileri regresyon analizleri kullanılmıştır. Kurumsal yatırımcı değişkenlerini hesaplamak için kullanılan veriler, Thomson Financial 13F veritabanının üç aylık kurumsal yatırımcı verilerinden elde edilmiştir. Hisse senedi getirileri, hisse senedi fiyatları, işlem gören hisse senetleri, işlem hacmi, defter değeri ve risksiz faiz oranı verileri DATASTREAM veri setinden elde edilmiştir. Ocak 1980 ile Aralık 2016 arasında işlem gören hisse senedi miktarı, fiyat, defter değeri, aylık değer ve kurumsal yatırımcı oranı ile ilgili eksiksiz veri sahibi olan, NYSE, NASDAQ ve AMEX'de listelenen finansal olmayan firmalar, mevcut analiz için örneklem olarak kullanılmaktadır. Her üç aylık dönem sonunda finansal firmalar ve hisse senedi fiyatlarının 2 $ 'dan düşük firmaları veri setinden çıkardıktan sonra, NYSE, NASDAQ ve AMEX'te listelenen 4320 firma veri setine dahil edilmiştir. Bu çalışmada kullanılan örneklem dönemi, Ocak 1980 - Aralık 2016 arası olarak belirlenmiştir.

Bu çalışmada amacımız, varlık fiyatlama modellerine, kurumsal yatırımcı için portföy taklit eden bir değişkenin de dahil edilmesinin, getirileri daha iyi açıklayabilmemizi sağlamamıza yardımcı olup olmadığını test etmektir. Bunu yapmak için, kurumsal yatırımcı oranı ile ilgili bazı sistematik risk faktörleri için vekil olabilecek ek bir değişkenin Fama-French 3 faktörüne eklenmesi ve bu

değişkenin hisse senedi getirileri üzerinde açıklayıcı bir gücü olup olmadığını incelemekteyiz. Fama ve French (1993) makalesinde uygulanan metodolojiye uygun olarak, zaman serisi regresyon analizi uygulanmaktadır. Açıklayıcı değişkenler olarak, çalışmanın ilk kısmında, pazar faktörü, Küçük-Eksi-Büyük (SMB) ve Yüksek-Eksi-Düşük (HML) değişkenleri kullanmaktadırlar. Piyasa faktörü, Sermaye Varlıkları Fiyatlama Modeli'nde (CAPM) kullanılan tek faktördür ve bu, piyasadaki portföy getirisi ile risksiz faiz oranı arasındaki farktır. İkinci risk faktörü, hisse senedi getirilerinde ortak boyut faktörü için taklit portföy getirisi olan boyut faktörüdür (SMB). SMB, küçük hisse senedi portföyleri üzerindeki getiriler ile büyük hisse senedi portföyleri üzerindeki getiriler arasındaki fark alınarak hesaplanmaktadır. Fama-French 3 faktör modelindeki son risk faktörü, hisse senedi getirilerinde defter-pazar özkaynak faktörünü taklit eden portföy getirisi olan HML'dir. HML, portföy üzerindeki getiriler arasındaki farkın yüksek defter/pazar değeri (BE / ME) ve düşük defter/pazar değeri arasındaki farktan oluştuğunu belirtmektedir.
Fama-French’in ortaya attığı üç faktör şu şekildedir:

$$R_{it} - R_{ft} = \propto_{it} + b_{it}\left(R_{Mt} - R_{ft}\right) + s_{it}(SMB) + h_{it}(HML) + \varepsilon_{it} \qquad (1)$$

Bu çalışmada, SMB ve HML'yi hesaplamak için Fama-French’in (1993) çalışmalarında kullanılan benzer bir prosedür uygulanmıştır. 1980'den 2016'ya kadar her yılın haziran ayında, örneklemimizdeki tüm NYSE, AMEX ve NASDAQ hisse senetleri, pazar değerine gore büyükten küçüğe sıralanmaktadır. Bu örneklemin ortanca değeri daha sonra tüm stokları küçük (S) ve büyük (B) olmak üzere iki gruba ayırmak için kullanılmıştır.

Benzer şekilde, örneklemimizdeki tüm hisse senetleri, kitap değerinin sıralanan değerlerinin altındaki % 30, orta % 40 ve en üst % 30 (düşük, orta, yüksek) bölümlerine göre üç piyasa payı grubuna ayrılmıştır.

Bununla birlikte, Fama ve French’de yapılmayan bir kalsifikasyon olarak, örneklemimizi kurumsal yatırımcılar açısından (toplam payların % 'si olarak) da sıralamaktayız. Örneklemimiz hisse senetlerinin kurumsal yatırımcı yüzdelerine göre sıralanmış ve BE / ME'de yaptığımız gibi, yüzdelerin en üst yüzde 30, orta yüzde 40 ve alt yüzde 30'u (kurumsal (I), yüzde ortalama (A), perakende (R)) olarak gruplara ayrılmıştır. Ardından, bu üç klasifikasyona göre oluşturulan gruplar kesiştirilerek her çeyrek için 18 farklı portföy oluşturulmuştur.

Bu durumda, her sene Temmuz ayından Haziran ayına kadar SMB, örneklemimiz icin, 9 küçük-hisse senedi portföyündeki ortalama getiriden 9 büyük hisse senedi portföyünün eşit ağırlıklı ortalama getirisinin farkı hesaplanmıştır. Benzer şekilde, HML, 6 yüksek BE / ME portföyündeki ortalama getirilerin ve 6 düşük BE / ME portföyünün ortalama getirilerden farkı kullanılarak hesaplanmıştır. Son olarak, önerdiğimiz açıklayıcı değişken olan IMI (kurumsal eksi bireysel), yüksek kurumsal hisse senetlerinden olusan 6 portföyun eşit ağırlıklı ortalama getirileri ve düşük kurumsal hisse senetlerinden oluşan 6 portföyun eşit ağırlıklı ortalama getirileri arasindaki fark alınarak hesaplanmıştır. Bu faktör, kurumsal yatırımcının artmasıyla birlikte ortalama ekstra getiri oranının artıp artmadığını gösterecektir. Yüksek kurumsal yatırımcı sahibi hisse senetlerinden oluşan portföyler ile düşük kurumsal yatırımcı (diğer bir deyişle yüksek bireysel mülkiyet) hisse senetlerinden oluşan portföyler arasındaki aylık getiri farkı, kurumsal eksi bireysel olan yeni faktörü verecektir. Böylelikle, boyut ve BE/ME ile kurumsal yatırımcı oranı etkisi birbirinden ayrılmıştır.

Regresyon sonuçlarını belirtmeden önce, bağımsız değişkenler arasındaki ve bu çalışmada bulunan bağımsız değişkenler ile Fama-French tarafindan bulunan bağımsız değişkenler arasındaki korelasyonlar incelenmiştir. Bu sonuçlara göre, bu çalışmada elde edilen SMB faktörü ile Fama ve French'in kendi internet sitelerinde sundukları ve kendi metodolojileriyle elde ettikleri SMB faktörü arasındaki korelasyonun yaklaşık %70 olduğunu ve bu çalışmada elde edilen HML ile Fama-French tarafından elde edilen HML faktörleri arasındaki korelasyonun yaklaşık %66 olduğunu gösterdik. Fama ve French'e yakın sonuçlar elde etmemiz, hesaplamalarımızda doğru yolda olduğumuzu göstermek açısından ümit verici olmuştur.

Çalışmamızda bağımlı değişken olarak kullanılacak değişkenleri elde etmek için kullanılan yöntem şu şekilde özetlenmiştir. SMB, HML ve IMI portföylerinin hisse senedi getirilerinde ortak faktörleri ele alıp almayacağına karar vermek için, zaman serisi regresyonlarında bağımlı değişken olarak kullanılan 125 portföy, büyüklük, BE / ME ve kurumsal yatırımcı oranı bakımından yapılandırılmıştır. Bu 125 portföyün oluşturulması, yukarıda anlatılan, büyüklük-BE / ME ve kurumsal yatırımcı oranına göre oluşturulan 18 portföyün oluşturulmasına benzemektedir. 4320 hisse senedi, her yıl haziran ayında bağımsız olarak büyüklük, BE/ME oranı ve kurumsal yatırımcı yüzdesi olarak sıralanmıştır. Ardından bu hisse sentleri, büyüklüklerine göre, BE/ME oranlarına göre ve kurumsal yatırımcı oranlarına göre, bağımsız olarak beşer gruba ayrılmıştır. Ardından, bu beşerli gruplar kesiştirilerek, 125 portföy elde edilmiştir. Bundan sonra, bu 125 portföyün eşit ağırlıklı aylık getirileri Temmuz t ile Haziran t + 1 arası için bulunmuştur. Bu işlem her yıl tekrarlanarak 125 portföyün Temmuz 1980'den Aralık 2016'ya kadar olan ekstra getirileri bölünmüş ve bu getiriler zaman serisi regresyonlarındaki bağımlı değişkenler olarak kullanılmıştır.

Çalışmamızda önerilen ilk modelimiz (4-faktorlu model) aşağıdaki gibidir:

$$R_{it} - R_{ft} = \propto_{it} + b_{it}\left(R_{Mt} - R_{ft}\right) + s_{it}(SMB) + h_{it}(HML) + i_{it}(IMI) + \varepsilon_{it} \qquad (2)$$

Bağımlı değişken ve açıklayıcı değişken olarak, zaman serileri regresyonunda portföylerin ekstra getirileri kullanılmıştır. Bu testlerde, eğer varlık fiyatlandırma modeli iyi oluşturulmuşsa, regresyon modeli, 0'dan önemli ölçüde farklı olmayan sabit değer vermelidir. Buna ek olarak, varlık fiyatlandırma modellerinin başarısını değerlendirirken, zaman serisi regresyonlarında kullanılan risk faktörlerinin hisse senedi getirilerinde genel bir değişimi yakalaması durumunda, eğim ve R^2 değerleri doğrudan göstergedir. Bu nedenle, analizlerimizde, sabit değerleri, R^2 değerlerini ve bağımsız değişkenlerin katsayılarını yorumlayıp, birbirleri ile ve Fama ve French (1993) bulguları ile karşılaştırmaktayız.

Yukarda da belirtildiği üzere, varlık fiyatlandırma modellerinin başarısını değerlendirirken, zaman serisi regresyonlarında kullanılan risk faktörlerinin hisse senedi getirilerinde genel bir değişimi yakalaması durumunda, eğim ve düzeltilmiş R^2 değerleri doğrudan göstergelerdir. Bu nedenle ilk olarak, zaman serileri regresyon analizleri uygulanmış ve faktörlerin eğimleri ve düzeltilmiş R^2 değerleri ile ilgili bulgularımız yorumlanmıştır. Hisse senedi getirilerinde faktörlerin rolünü araştırırken, 5 adım izlenmiştir. Her şeyden önce, tek faktör modeli olan ve bağımsız değisken olarak sadece pazar faktörünü kullanan CAPM için analiz yapılmıştır. Ardından, Fama- French (1993) makalesinde önerilen ve bağımsız değişken olarak üç adet faktör kullanan, 3-faktör modeli incelenmiştir. Bu modele pazar faktörüne ek olarak, büyüklük faktörü (SMB) ve değer faktörü (HML) regresyon modeline konulmuştur. Üçüncü analizimizde, CAPM'de pazar faktörüne ek olarak, kendi oluşturduğumuz kurumsal yatırımcı oranını taklit eden IMI faktörü bağımsız değişkenler olarak kullanılmıştır. Ardından, SMB, HML ve IMI'den oluşan 3 faktörün hisse senedi getirilerini açıklamada başarısı test edilmiştir. Son olarak, pazar faktörü, büyüklük, değer ve kurumsal yatırımcı oranı faktörlerini açıklayıcı değişkenler olarak kullanan dört faktörlü modelimiz test edilmiştir.

Tek faktörlü modelin düzeltilmiş R^2 değerlerini araştırdığımızda, hisse senedi getirilerinde piyasa faktörünün, bu faktör dışındaki faktörler tarafından tanımlanabilecek çok fazla değişime izin verdiği tespit edilmiştir. Fama ve French (1993) sonuçlarına paralel olarak, yalnızca büyük boyutlu ve düşük BE / ME'ye sahip portföyler için yüzde 70'lik düzeyde düzeltilmiş R^2 değerleri elde edilmiştir. Tek faktörlü model regresyonlarında, 125 $R^{2'}$den sadece 19'u yüzde 50'den büyükken, Fama-French üç faktörlü modelde 125'ten 33'ü yüzde 50'den büyüktür. Dört faktörlü modelin düzeltilmiş R^2 değerleri, CAPM ve 3 faktörlü modelden daha yüksektir. 125 R^2 değerinden 38'i, % 50'den daha fazla R^2 değerine sahip olduğu görülmüştür. Bu da hem tek faktörlü hem de üç faktörlü modellerden daha yüksek bir değerdir.

Önceden de bahsedildiği gibi, düzeltilmiş R^2'lerin yanı sıra, faktörlerin eğimleri de modelin başarısı açısından önemli bir göstergedir. Piyasa faktörünün eğimlerinin hemen hemen hepsi, istatistiksel olarak önemli derecede pozitiftir. Sonuçlar, Fama ve French (1993) makalesinde olduğu gibi, HML, RM-RF ve IMI tarafından açıklanamayan hisse senedi getirilerinin ortak varyasyonunun, SMB faktörü tarafından açıklandığı göz önüne sermektedir. Bununla birlikte, SMB tarafından yakalanan ortak varyasyon miktarı, 4-faktörlü modelimizde, IMI nedeniyle üç faktörlü modele göre daha düşüktür. SMB ve HML faktörlerinin bağımsız, IMI faktörünün bağımlı değişken olarak kullanıldığı regresyon sonuçları gösterilmiştir ki bu regresyonun R^2 değeri yüzde 10'dur ve ortak varyasyonların çoğu SMB (6.81 t-istatistikleri ile) tarafından açıklanmaktadır. Dört faktörlü modelde, SMB'nin katsayılarından neredeyse yüzde 74'ü (125'den 92'sinde) sıfırdan istatistiksel olarak önemli derecede farklıdır ve üç faktörde olduğu gibi, 0'dan istatistiksel olarak önemli derecede farklı olmayan katsayılar çoğunlukla büyük boyutlu beşte birlik gruptadır. Genel olarak, HML fakörünün eğimleri, her BE / ME ve kurumsal yatırımcı oranı gruplarında, küçük gruplardan büyük gruplara doğru monoton olarak azalmaktadır.

Aynı şekilde, Fama ve French (1993) makalesinde olduğu gibi, SMB, RM-RF ve IMI tarafından açıklanamayan hisse senedi getirilerinin ortak varyasyonu, HML, piyasa payı değerinin taklit portföy getirisi tarafından açıklanmaktadır. HML faktörünün eğimlerinin neredeyse yüzde 77'si (125'ten 96'sı) sıfırdan istatistiksel açıdan önemli derecede farklıdır. Ayrıca 0'dan istatistiksel olarak önemli derecede farklı olmayan katsayılar çoğunlukla küçük hisse senetlerinin oluşturduğu portföylerin bulunduğu beşli grupta bulunmaktadır. HML faktörünün eğimleri, küçük BE/ME'ye sahip portföylerden yüksek BE/ME'ye sahip portföylere gittikçe monoton olarak yükselmektedir.

Sonuçlar, 4 faktörlü modelde, SMB, HML ve RM-RF tarafından kaçırılan hisse senedi getirilerinin ortak varyasyonunun, kurumsal yatırımcı oranı değişkeni olan IMI tarafından yakalandığını göstermektedir. IMI’nin katsayılarının neredeyse yüzde 60'ı (74'ü) istatistiksel olarak 0'dan anlamlı derecede farklıdır. Anlamlı olmayan katsayıların çoğu küçük büyüklükteki beşlik bölgededir (özellikle kurumsal yatırımcı oranı açısından küçük boyutlu beşli). Bir faktörlü model yorumunda belirttiğimiz gibi, CAPM yüksek kurumsal yatırımcı oranına sahip hisse sentleri ile büyük hisse senetlerinin oluşturduğu portföyler için en iyi sonucu verir. Yüksek kurumsal sahiplik oranına sahip küçük boyutlu hisse senetlerine sahip portföylerdeki anlamlı olmayan IMI katsayılarının nedeni, piyasa faktörünün getirilerdeki ortak değişimi ve IMI ile RMRF arasındaki yüksek korelasyonu yakalaması olabilir. Dahası, Lee ve ark. (1991) ile uyumlu olarak, 4 faktörlü modelin, bireysel yatırımcı oranının en yüksek olduğu (en düşük kurumsal yatırımcı oranı) hisse senetleri için anlamlı olması, bu portföylerin daha fazla yatırımcı duyarlılığına maruz kaldıklarından, IMI'nin bu tür riskleri temsil edecek şekilde yapılandırılmış olabileceği çıkarımında bulunabiliriz. IMI faktörünün katsayıları monoton olarak her büyüklükte düşük kurumsal yatırımcı gruplarından yüksek kurumsal yatırımcı gruplarına doğru yükselmektedir. En düşük kurumsal yatırımcı grubu için güçlü negatif değerler elde edilmişken, en yüksek kurumsal yatırımcı grubu için güçlü pozitif değerler elde edilmiştir.

Fama-French (1993) makalesinde elde edilen sonuçlarla pararlel olarak, üç faktörlü modele tek faktörlü modele kıyasla daha az sayıda istatistiksel olarak anlamlı sabit katsayı elde edilmiştir. Bununla birlikte, kurumsal yatırımcı oranı değişkeni regresyon modeline dahil edildiğinde, 4 faktörlü modelin daha az sayıda istatistiksel olarak anlamlı sabit katsayı verdiği bulunmuştur. Bu nedenle sabit katsayılar incelendiğinde, 4 faktör modelinin 3 faktörlü model veya 1 faktörlü CAPM'den daha iyi sonuç verdiği sonucuna ulaşılmıştır.

Modellerin açıklama gücünü hisse senedi getirilerindeki ortak değişime ve modellerdeki açıklayıcı değişkenlerin önemine vurgu yaparak, varlık fiyatlama modeline IMI'nin dahil edilmesi gerektiğini iddia edebiliriz. Bulgular, IMI'nin, özellikle kurumsal yatırımcı oranının en düşük olduğu; gürültü ticareti riskinin en yüksek olduğu portföyler ve en yüksek kurumsal yatırımcı oranı olan portföyler için, asimetrik bilgi ve / veya temsilci sorununun riskinin bulunduğu portföylerde değerleme modellerini iyileştirmemize yardımcı olduğunu göstermektedir.

İkinci bölümde, momentum faktörü analizlerimize dahil edilmiştir. 1996 tarihli makalesinde, Fama ve French, momentumla düzenlenmiş portföy getirilerindeki kesitsel değişimi açıklarken 3 faktörlü modellerinin yetersiz olduğunu belirtmişlerdir. 2008 yılında, Fama ve French, momentuma göre oluşturulmuş hisse senetleri çeşitlerinin, tüm büyüklük grupları için güçlü pozitif ortalama getiri sağladığını ortaya koymuşlardır. Hisse senetlerinden momentuma göre düzenlenmiş portföylerin ortalama getirileri, düşükten yükseğe doğru artma eğilimi göstermiştir. Carhart, 1997 makalesinde, bu olguyu incelemiş ve momentuma göre oluşturulmuş portföylerin üstün performans göstermesinin, bu portföylerin daha iyi hisse toplama yeteneğinden kaynaklanmadığını, bunun yerine genellikle ortak faktörlere karşı duyarlılığın bir sonucu olduğunu iddia etmiştir. Carhart, Jegadeesh ve Titman'ın (1993) bir yıllık momentum faktörünü, Fama ve French'in üç faktör modeline dahil ederek elde ettikleri dört faktörlü modelin, piyasa dengesinin ve hisse senedi getirilerini daha iyi yansıttığını göstermiştir. Literatürde, kurumsal yatırımcıların, momentum takip eden ve sürü psikolojisinin yaygın olduğu yatırımcılar olduğu vurgulanmıştır. Bu nedenle, oluşturduğumuz IMI faktörünün, momentum faktörüyle ilintili olabileceği, momentum faktörünün, IMI faktörünün etkilerini veya IMI faktörünün momentum faktörünün etkilerini yansıtabileceği düşünülmüştür. Bu konuya açıklık getirebilmek icin, çalışmamızın ikinci kısmında, Carhart 4-faktör modelinin, bir önceki bölümde oluşturduğumuz 4-faktor modelinin, ve bu kısımda oluşturacağımız 5-faktor modelinin (Carhart dort faktorune ek olarak IMI faktörünün modele dahil edilemsi) performanslarını karşılaştırdık.

Bu çalışmada, Temmuz 1980 ile Aralık 2016 arasındaki momentum faktörü (MOM), Gene Fama ve Ken French'in web sitelerinden elde edilmiştir. Bir önceki yıl getirilerinden elde edilen ve momentumunu taklit eden portföy olan MOM faktörü, NYSE, AMEX ve NASDAQ'daki tüm firmaların önceki on bir aylık en yüksek getiri getiren yüzde 30'luk kısım ile NYSE, AMEX ve NASDAQ'daki tüm firmaların önceki 11 ayda en düşük getiri getiren yüzde 30'luk kısmının portföyleri oluşturulduğunda, bu portöylerin aylık ekstra getirileri arasındaki fark hesaplanarak bulunmaktadır. Portföyler, her ay yeniden düzenlenerek, aylık bir zaman serisi elde edilmiştir.

Bu bölümde, iki yeni modelin zaman serileri regresyon analizi sonuçları sunulmuştur. Önce RMRF, SMB, HML ve MOM'ın açıklayıcı değişkenler olduğu, Carhart 4 faktörlü model uygulanmıştır. Daha sonra açıklayıcı değişkenler olarak RMRF, SMB, HML, MOM ve IMI kullanan 5 faktörlü model test edilmiştir. Her iki regresyonda da, 1980'den Aralık 2016'ya kadar her yılın haziran ayında bağımsız olarak hisse senetlerini büyüklük, piyasa değeri ve kurumsal yatırımcı yüzdesi olarak ayırarak oluşturulan 125 portföy bağımlı değişken olarak kullanılmıştır.

Son modelimiz şu şekilde olacaktır;

$$R_{it} - R_{ft} = \propto_{it} + b_{it}\left(R_{Mt} - R_{ft}\right) + s_{it}(SMB) + h_{it}(HML) + i_{it}(IMI) + m_{it}(MOM) + \varepsilon_{it} \tag{3}$$

R^2 değerlerine baktığımızda, Carhart'in yüzde 50'den büyük R^2 değerlerinin sayısının, önerdiğimiz 4 faktörden (açıklayıcı değişken olarak RMRF, SMB, HML ve IMI kullanılan model) az olduğu sonucuna ulaştık. Carhart modeli göstermiştir ki, en küçük büyüklüğe sahip hisse senetlerinden oluşan gruplardaki portföyler haricinde genel olarak ayarlanmış R^2 değerleri, kurumsal yatırımcı oranının yüksek olduğu beşli gruplara geçtikçe artmaktadır. Bu, momentum faktörünün dahil edilmesinin özellikle kurumsal yatırım oranı yüksek hisse senedi portföylerinde getirileri açıklama yeteneğini geliştirdiğini ortaya koymaktadır. Bununla birlikte, Fama-French 3 faktör modeline kurumsal yatırımcı faktörünü eklediğimizde, ulaştığımız 4-faktor modeli, düşük kurumsal yatırımcı oranlı portföyler için getiri değişiminde açıklama yapmakta yetersiz kalmaktadır. 5 faktörlü model sonuçları (4 faktör modele momentum faktörünün eklenmesinin), IMI faktörünün etkisini önemli ölçüde etkilemediğini göstermektedir. IMI katsayılarının neredeyse yüzde 58'i halen 0'dan önemli derecede farklıdır ve en düşük kurumsal yatırımcı oranından en yüksek kurumsal yatırımcı oranına doğru katsayılar güçlü pozitif değerlerden, güçlü negatif değerlere dönmeketedir. Bu nedenle, bazı araştırmaların kurumsal yatırımcıların momentum stratejisi takip etmesini savunmasının aksine, IMI faktörünün, momentum faktörü tarafından yakalanmadığını söyleyebiliriz. Benzer şekilde, IMI'yi Carhart'ın 4 faktörlü modele ekleme, getirilerdeki kesitsel değişkenliklerin açıklanmasında momentum faktörünün etksini ele geçirmemektedir. Aksine momentum faktörü katsayıları sıfırdan önemli ölçüde farklı olan momentum faktörü katsayılarının sayısı 5-faktor modelde Carhart'a göre daha fazladır. Buna karşılık, 0'dan önemli ölçüde farklı olan sabit terim, 5-faktörlü modelde, Carhart 4 faktörlü model ve 4 faktörlü modelimizden daha yüksektir. Bununla birlikte, bu fark çok yüksek değildir. Özellikle düşük kurumsal yatırımcı gruplarındaki ortalama getirileri açıklamak açısından, 5-faktör model umut vericidir.

Sonuçlara göre, hemen hemen tüm beşli gruplar için 5 faktörlü model, Carhart'ın 4 faktörlü modelinden daha yüksek R^2 değerleri sunmaktadır. R^2 değerleri, oluşturduğumuz iki modelin, 4 faktörlü model (Fama-Fransız 3 faktörlü model + IMI) ve 5 faktörlü model (Carhart'ın 4 faktörlü model + IMI), 125 faktörün tamamında, 5 faktörlü modelde 4 faktörlü modele göre daha iyi performans ortaya koyduğunu göstermektedir. Özellikle düşük kurumsal yatırımcı oranına sahip portföyler için, 4 faktör modelimize momentum faktörü dahil etmenin, modelin performansini arttırdığı sonucuna ulaşılmıştır.

Sonuç olarak bulgularımız, hisse senedi getirilerini açıklarken piyasa, büyüklük, BE / ME, momentum ve kurumsal yatırımcı oranı olmak üzere en az beş faktörün gerekli olduğunu önermektedir.

Çalışmamızda inceledigimiz teorik çalışmalar ve deneysel bulgular, IMI değişkeninin asimetrik bilgi riski, gürültücü yatırımcı riski ve temsilci problemi riskine vekil olabileceğini göstermiştir. Bu nedenle, tezimizin üçüncü bölümünde, IMI'nin hangi risk icin vekil oluşturduğu hakkında daha fazla çıkarımda bulunmak icin, potansiyel sistematik riskler ve IMI arasındaki ampirik ilişkiler incelenmiştir.

Talep edilen fiyat ve teklif edilen fiyat arasındaki farktan oluşan teklif-talep farkı (bid-ask spread), literatürde bilgi asimetrisi riski açısından yaygın olarak kullanılan bir vekildir (Boone and White, 2015). Bu nedenle, IMI'nin asimetrik bilgi riskine vekil olup olmadığı hakkında çıkarım yapmak için, üçüncü bölümde ampirik olarak teklif-talep farkı ile IMI arasındaki ilişki incelenmektedir. Bu çalışmada, firmaların teklif-talep farkı Datastream veritabanından elde edilmiştir. Veriler, Temmuz 1980 ile Aralık 2016 aralığını kapsamaktadır. En düşük kurumsal yatırımcı oranına sahip olan portföyler için teklif-talep farkı, en yüksek olanlardan daha yüksektir. Bu bulgu, bilgilendirilmiş yatırımcıların ticareti sonucunda fiyatların daha bilgilendirici hale geldiğini iddia eden Grossman ve Stiglitz (1980) ile uyumludur. En az kurumsal yatırımcı oranına sahip portföyler icin teklif-talep farkı ortalaması ile en yüksek kurumsal yatırımcı oranına sahip portfoylerin teklif-talep farki ortalama değerleri arasındaki farkın anlamli olup olmadığını incelemek icin, t-testi kullanılmış ve iki grup arasındaki teklif-talep farkı oranlarına istatistiki olarak anlamlı derecede farklı olduğu sonucuna ulaşılmıştır.

IMI'nin temsilci problemi riski için bir vekil olup olmadığını test etmek için toplam yönetimsel tazminat miktarı ile IMI arasındaki ilişki incelenmiştir. Core ve ark. (1998) daha zayıf yönetim yapılarına sahip şirketlerde temsilci sorunlarının daha yüksek olduğunu ve bu tür firmalar için yöneticilerin daha fazla tazminat aldığını belirtmektedir. Dolayısıyla, tazminat seviyesinin temsilci problemi riski ile ilişkili olması beklenmektedir. Yıllık idari tazminat seviyeleri için veriler Thomson veri tabanından elde edilmiştir. Veriler 1992 yılından başlamaktadır ve yıllıktır. Dolayısıyla, örneklem 1992-2016 aralığını kapsamaktadır. Yapılan t-testi sonucu, en düşük kurumsal yatırımcı oranına sahip ve en yüksek kurumsal yatırımcı oranına sahip olan portföyler için idari tazminat tutarlarının ortalama değerleri arasında belirgin bir fark olduğunu göstermektedir.

Yukarıda belirtildiği gibi teorik çalışmalar ve deneysel bulgularımız, IMI'nin düşük kurumsal yatırımcı oranına sahip portföylerin getirileri üzerinde önemli etkiye sahip olduğunu ve bu nedenle, IMI'nin gürültücü yatırımcı riski için vekil olabileceğini sezgisel olarak düşünmemizi sağlamıştır. Literatürde, gürültücü yatırımcı riski için en çok kabul gören faktörlerden biri, kapalı uçlu fonlardaki indirim oranıdır (Lee ve ark., 1991). Bu analizde, kapalı uçlu fonlardaki indirim oranı için veriler Bloomberg LP'den elde edilmiştir. Temmuz 1980 ile Aralık 2016 arasındaki dönemin Net Varlık Değerinden aylık satış fiyatı indirimi / primi kullanılmıştır. Kapalı uçlu fonlardaki indirim oranı ve IMI arasında çok düşük ancak negatif korelasyon bulunmuştur. Bireylerin bir varlık hakkında kötümser olması ve bu varlığın aynı yatırımcı düşüncelerinden etkilenmesi durumunda, en fazla kurumsal yatırımcı oranına sahip olan portfoyler bu kapalı uçlu fonlardaki indirim oranı ile ters ilişkili olması literatürü desteklemektedir.

IMI'nin bağımlı değişken, ve uc muhtemel sistematik risk faktörünün bağımsız değişken olarak kullanıldığı bir modelin zaman serisi regresyon analizi yapılmıştır. Bu bulgulara göre, IMI üzerinde önemli bir etkisi olan tek değişken, teklif-talep farkı oranıdır. Bu nedenle, IMI'nin muhtemelen asimetrik bilgi riski için bir vekil olduğunu söyleyebiliriz. Kapalı uçlu fon indirim oranları ve yönetimsel tazminat düzeylerinin vekil olarak kullanıldığı, gürültücü yatırımcı riski veya vekil problemi riski ile IMI arasında anlamlı bir ilişki bulunmamaktadır.

Sonuçlarımızın geçerliliğini test etmek için çeşitli sağlamlık kontrolleri yapıldı. 5 faktörlü modelin diğerlerinden daha iyi performans sergilediği ve IMI'nin, büyüklük ve BE / ME'ye göre sıralanmış Fama-French 25 portföyünün bağımlı değişken olarak kullanıldığı, momentuma göre sıralanmış portföylerin bağımlı değişkenler olarak kullanıldığı durumlarda da getiriler üzerinde anlamlı etkisi olduğu gösterilmiştir. Bunlara ilave olarak, 5 faktörlü modelimiz, boyut, BE / ME ve kurumsal sahiplik üzerine sıralanmış 125 portföyün bağımlı değişken olarak kullanılan regresyonlarda, Fama-French’in (2016) 5 faktör modelinden daha yüksek R^2 değerleri sunduğu ve IMI’nin ilave edilmesi durumunda yine anlamlı etkisi olduğu gösterilmiştir. Bütün bu testler, IMI'nin hisse senedi getirileri üzerinde belirgin bir açıklayıcı güce sahip olduğunu göstermiş ve hemen

hemen her zaman 5 faktörlü modelin, incelenen diğer modellerden daha iyi performans sergilediğini ortaya koymuştur.

Analizlerimiz, çoğu zaman, büyüklük, değer ve kurumsal yatırımcı oranı ile bağlantılı risk faktörlerini taklit etmek için yaratılan portföylerin, getirilerin ortak değişimini güçlü bir şekilde yakaladığını göstermektedir. Dolayısıyla, yalnızca hisse senedi getirilerinde sık görülen bazı risk faktörleri için hisse senedi büyüklüğünü ve değerini vekil olarak kullanan Fama-French (1993) bulgularını desteklemekle kalmamakta, aynı zamanda kurumsal yatırımcı oranının ortak bir risk faktörü için başka bir vekil olduğunu göstermektedir.

Bir diğer önemli bulgu ise, modellerin açıklama gücünü, hisse senedi getirilerindeki ortak değişim ve modellerdeki açıklayıcı değişkenlerin önemiyle ilişkili olarak yorumladığımızda, IMI'yi varlık fiyatlandırma modeline dahil etmenin gerekli olduğu sonucudur. Bulgular, özellikle kurumsal yatırımcı oranının en düşük olduğu gürültücü yatırımcı riskinin en üst düzeyde olduğu portföyler için ve asimetrik bilginin en fazla olduğu en yüksek kurumsal yatırımcı oranına sahip portföyler için, IMI'nin modele dahil edilmesinin portföy fiyatlandırma modellerinin geliştirilmesinde yardımcı olduğuna işaret etmektedir. Bu sonuç, ilgili literatürleri güçlü bir şekilde desteklemektedir. Literatür, gürültücü yatırımcı riskinin muhtemelen bireysel mülkiyeti en fazla olan hisse senetlerinde gözlemlendiğini göstermektedir (Lee ve ark., 1991). Buna ek olarak, bulgularımız, özel bilgilerin azaltılması veya firmanin birçok yatırımcı arasında dağılımının arttırılması yoluyla, sermayenin maliyetinin düşürülebileceğini öne süren Easley ve O'Hara (2004)'ı desteklemektedir.

Sonuç olarak, bu çalışmada, çalışmamızın amacı olan Allen'ın (2001) vurguladığı, kurumsal yatırımcıların varlık fiyatlandırma modellerine dahil edilmesi gerekliliği konusunu gerçekleştirmeye yönelik bir adım atılmıştır. Kurumsal yatırımcı oranı, pek çok sistematik riske vekil olabilir. Bunlardan ilki, kurumsal yatırımcılar ve bilgi asimetrisi riski arasındaki ilişki olabilir. Dahası, çalışmalar, kurumların ve kişilerin yatırımcıların düşüncelerinden etkilenme açısından farklılık gösterdiğini ortaya koymuştur. Son olarak, nihai karar vericilerin yatırımların asıl sahipleri olmadığı finansal kurumlar, çok miktarda hisse senedi kontrol ederken potansiyel bir temsilci problemine neden olabilirler. Öte yandan varlık fiyatlandırma modellerinde, bu muhtemel sistematik riskler dikkate alınmaz.

Çalışmamızı özetlemek gerekirse, teorik çalışmalarla tutarlı olarak, genel olarak, IMI'nin Carhart'ın 4 faktörlü modeline dahil edilmesinin, bir diğer deyişle beş faktör varlık fiyatlama modelinin, test edilen diğer tüm modellerden daha iyi performans gösterdiği söylenebilir. Daha yüksek R^2 değerleri ile bu modelin, Fama-French'in üç faktörlü modeli, Carhart'ın 4 faktörlü modeli, kendi oluşturduğumuz 4 faktörlü model ve incelenen diğer modellerle kıyaslandığında, getirilerin ortak varyasyonlarını daha iyi yakaladığını ortaya koymuştur. Dahası, IMI'nin eğimlerinin çoğu istatistiksel açıdan sıfırdan önemli derecede farklı olduğu için, bu faktörü varlık fiyatlama modellerine dahil etmek büyük önem taşımaktadır. Yeni model, literatürü destekler bir şekilde, özellikle düşük kurumsal yatırımcı oranına sahip hisse senetlerinin oluşturduğu portföylerde yanlış fiyatlamayı düzeltmiş bulunmaktadır. Dahası, IMI'nin hangi sistematik risk faktörü icin vekil olduğu ampirik olarak test edildiğinde, IMI ve teklif-talep farkı arasında anlamlı bir ilişki bulunmuştur. Bu nedenle, IMI'nin bilgi asimetrisi riskine vekil olabileceği sonucuna ulaşılmıştır.