A CLOSER LOOK AT MUTUAL FUND PERFORMANCE IN TURKEY BASED ON ACTIVE PEER BENCHMARKS

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ABSTRACT

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This master's thesis aims to evaluate mutual fund performance in Turkey on a risk-adjusted basis with various approaches. First, commonly used Capital Asset Pricing Model (CAPM) and Carhart Four-Factor Model are employed for performance analysis. Then, active peer benchmarks (APB) are utilized to account for market-capitalization characteristics of portfolio stockholdings and to control commonalities in unsystematic risk-taking of different mutual funds.

The empirical results are mixed for the sampled fifty-two equity mutual funds over the period between July 2012 and June 2016. CAPM provides that only two funds have abnormal performance while none of the funds generate a significant positive alpha with Carhart Four-Factor Model. APBs which are the average excess returns of funds following the same market cap-strategy are further used to isolate fund-wise unsystematic risk-taking and selectivity skill.

The first stage of the model with only APB residuals incorporated as a fifth factor reveals that the sampled funds cannot generate excess return even after controlling the common unsystematic risk-taking. However, when the alpha associated with the common unsystematic risk taking of funds in the same APB group is also controlled, it is observed that two funds generate significant positive alphas.

On the other hand, APB-Augmented Model performs better than generic models in terms of capturing common unsystematic risk-taking. This study documents that four-factor models decreases the percentage of significant positive pairwise residual correlations only by one-tenth of its previous level in CAPM. Nevertheless, APB-Augmented Model provides a reduction of approximately 50% compared to four-factor model.

Keywords: Equity Mutual Funds, Performance Evaluation, Active Peer Benchmarks, Market Capitalization, Stock Characteristics

öz

TÜRKİYE'DEKİ YATIRIM FONU PERFORMANSINA AKTİF BENZER KARŞILAŞTIRMA ÖLÇÜTLERİNE DAYALI OLARAK YAKINDAN BİR BAKIŞ

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Bu yüksek lisans tezi Türkiye'deki yatırım fonu performansını çeşitli yaklaşımlarla riske göre düzeltilmiş bir temelde değerlendirmeyi amaçlamaktadır. İlk olarak, performans anlizi için yaygın olarak kullanılan sermaye varlıklarını fiyatlandırma modeli (SVFM) ve Carhart dört-etkenli model kullanılmıştır. Daha sonra, portföy hisse senetlerinin piyasa değeri özelliklerini dikkate almak ve farklı yatırım fonlarının sistematik olmayan risk alışlarındaki ortaklıkları kontrol etmek için aktif benzer karşılaştırma ölçütlerinden (ABKÖ) faydalanılmıştır.

Temmuz 2012 ve Haziran 2016 arasındaki dönemde örneklemde yer alan elli iki hisse senedi yatırım fonuna ait ampirik sonuçlaer çeşitlidir. SVFM sadece iki fonun anormal performansa sahip olduğu sonucunu verirken Carhart dört-etkenli modele göre hiçbir fon anlamlı bir pozitif alfa üretemiştir. Aynı piyasa

değeri stratejisini takip eden fonların ortalama fazla getirisi olan ABKÖler fona özgü sistematik olmayan risk alışı ve seçicilik yeteneğini ayırmak için ilaveten kullanılmıştır.

Yalnızca ABKÖ hata paylarının beşinci bir etken olarak modele dahil edildiği ilk aşamada, örneklemdeki fonlar ortak sistematik olmayan risk-alışları kontrol edildikten sonra bile fazla getiri yaratamışlardır. Bununla birlikte, aynı ABKÖ grubundaki fonların ortak sistematik olmayan risk-alışlarıyla ilişkili olan alfa da ayrıca kontrol edildiğinde iki fonun anlamlı pozitif alfa üretebildiği gözlemlenmiştir.

Öte yandan, ABKÖ-artırılmış model ortak sistematik olmayan risk alışı kontrol etme açısından jenerik modellerden daha iyi performans göstermektedir. Bu çalışma, dört-etkenli modelin anlamlı ve pozitif ikili hata payı korelasyonlarının yüzdesini SVFM'deki seviyesine göre ancak onda bir oranda düşürdüğünü belgelemektedir. Bununla birlikte ABKÖ-artırılmış model, dört-etkenli modele nazaran yaklaşık 50%'lik bir düşüş sağlamıştır.

Anahtar Kelimeler: Hisse Senedi Yatırım Fonları, Performans Değerlendirme, Aktif Benzer Karşılaştırma Ölçütleri, Piyasa Değeri, Hisse Özellikleri.

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LIST OF ABBREVIATIONS

AM	Asset Management
EF	Equity Fund

CHAPTER 1

INTRODUCTION

Mutual funds are described as the financial institutions which accepts money from savers to buy stocks, long-term bonds, or short-term debt instruments issued by either corporations or governments.[1] The main advantages of these institutions are to achieve economies of scale through pooling funds of savers and risk reduction via diversification in securities invested. Mutual funds structurally compose into two within a broad framework. Some of the funds have taken the form of index fund by mirroring a broad-based market index while some have been actively managed to generate excess return over a benchmark. Offering this service, actively-managed fund managers have started to advertise themselves with the claim that they provide a higher return in exchange for a management fee.

Practitioners have directed their attention to the portfolio performance as a consequence of proliferation of mutual funds. Most widely used Capital Asset Pricing Model was developed by Sharpe (1964), Lintner (1965) and Mossin (1966) to explain the stock returns based on their sensitivity to market portfolio. Fama & French (1992, 1993) and Carhart (1997) augmented the model with three additional factors to capture further systematic risk of stocks and explain the variation in stock returns more effectively. Jensen (1968), with his pioneer study, became the first researcher to apply a financial model

[1] Brigham, Eugene F., and Joel F. Houston. (2004). *Fundamentals of Financial Management*. 10th ed. Mason, OH: Thomson/South-Western.

so as to explain the fund performance. Since then, the alpha term has been commonly used to refer to the selectivity skill, in other words, significant fund performance in excess of a benchmark. Even though many studies have identified some manager skill at least before expenses, predominantly it was asserted that active management cannot provide excess return, net of fees as shown in Jensen (1968), Grinblatt & Titman (1989), Wermers (2000).

The researches related to the evaluation of fund performance have various drawbacks due to nuances in the applied methods. First of all, several studies on mutual fund performance disregard the differences in fund strategies with regard to market capitalization and/or value/growth measure. However, for a fair comparison, a mutual fund should be evaluated against its peers in the same characteristics group in terms of excess performance over its benchmark. Therefore it is crucial to identify market-cap and/or value growth strategy of a fund. Some of the mutual funds are passive funds which cite a generic market index in their names. This way, they declare their market-cap strategy to an extent. For instance, a passive fund whose benchmark index is BIST-30 obviously positions itself as a large-cap fund. However, it is hard to make such an inference from an actively-managed fund simply named as ABC Asset Management Equity Fund. Brown and Goetzmann (1997), Chan, Chen and Lakonishok (2002) question why equity fund classifications like income or growth are ubiquitous and far from disclosing the investment strategies and appropriate benchmarks although they are essential to evaluate fund performance. Revelation of such an implicit market-cap strategy can be handled by the information on the stockholdings of the portfolio. The advantages involved in using stockholdings data to derive fund performance are two-sided as asserted by Daniel et al. (1997). First of all, better-fitting benchmarks with the investment style of funds can be constructed. Besides, hypothetical returns of stockholdings are gross of fees and expenses hence truly exposes stock selectivity and timing skills of managers.

On the other hand, even if a fund explicitly declares its market-cap strategy in its prospectus or name, it is still doubtful to what extent the fund manager

will abide with it. Sensoy (2009) reveals that 31.2% of actively managed U.S. equity mutual funds declare a mismatched benchmark in their prospectus contrary to size and value-growth characteristics of their portfolio as well as the correlation of returns. Self-misclassification seems to be a significant determinant of future cash inflows; which incentivizes fund managers to specify mismatched, in other words easy-to-beat, benchmarks for fund's stated investment objective. Also managers may want to magnify fund performance in expectation of career concerns and individual bonuses according to Chan, Chen and Lakonishok (2002). In that sense, stockholdings data serves better to capture implicit strategies that funds signal.

Mutual funds, on the other hand, have commonalities in the strategies they pursue, especially for those competing in the same league with regard to market-capitalization or value/growth measure. Once fund managers decide on which strategy to follow, they have to narrow down the list of equities available for purchase in order to stick with the chosen strategy. Hence, managers can demonstrate their selectivity skills to generate significant and positive alphas through giving more or less weight to the equities with which fund strategies match. Even if this fine-tuning by managers may add value for investors, there is still resemblance in fund strategies, which comes in the form of correlated residuals of funds. It is acknowledged that generic four-factor model largely explains the variation in fund returns yet it partially explains the correlation between fund residuals. As documented in this study, four-factor model, as an extension of classical CAPM, decreases the percentage of significant positive pairwise correlations by only one-tenth of its previous level and fails to find a cure for the heavy amount of unexplained commonality among sampled mutual funds.

Since commonalities in fund strategies are more robust within the same market-cap or value/growth group, it is more difficult to identify the skill among the fund managers. To handle the problem, Hunter et al. (2014) develops an extended version of commonly used Carhart Four-Factor Model. An additional benchmark based on the size or value/growth measure in which

the fund positions itself can offer solution to capture commonalities in strategies. Calling it active peer benchmark (APB) augmented model, it isolates the fund-wise idiosyncratic risk-taking and exposes the alpha specific to the fund.

Mutual funds were presented to the attention of Turkish capital markets in 1987, following the founding of Istanbul Stock Exchange. Ever since, mutual fund sector has been growing steadily, reaching TL 41.3 billion gross asset value and 3.2 million investors in 417 funds by the end of June 2016. Most of the literature to date concentrates on the performance evaluation of Type A funds that are obliged to invest minimum 25% of its holdings into Turkish equities. Because this classification is no longer in effect since 2013, the sample that is used in this study is confined to the equity funds. As one of the prominent researches on the performance of Turkish mutual funds, Karacabey (1999)'s study found no timing skill of Type A fund managers yet some selectivity skill. Karatepe & Karacabey's (2000) analysis through Graham & Harvey models showed only two out of nine sampled equity funds beats the market on a risk adjusted basis. Yıldız (2005) and Karatepe & Gokgoz (2007) drew attention to that excess performance of funds depends on the benchmark selected. Goren & Umutlu (2015) reached the conclusion that excess return exists for only one type of mutual funds even after deducting expenses in their research employing both CAPM and Fama & French Three-Factor Model. Different from former studies, this research aims to evaluate the performance of equity mutual funds not just through single-factor Capital Asset Pricing Model but also Carhart Four-Factor Model over the period between July 2012 and June 2016. Furthermore, APB-Augmented Model is utilized to capture the common idiosyncratic risk-taking of funds in the same market-cap group and to identify the manager selectivity skill, if any.

The rest of the thesis is organized as follows. Literature review on mutual fund performance is presented in various respects in Chapter 2. Chapter 3 explains the data and methodologies used to explain fund performance.

Empirical results for applied three models are discussed in Chapter 4. Finally Chapter 5 outlines the overall findings from the study.

CHAPTER 2

LITERATURE REVIEW

This chapter covers the contribution of miscellaneous researches made on the performance of mutual funds starting from the sixties, especially of those that avail of the stockholdings data to analyze. The studies referred are generally selected to document the variety in the applied methodologies for explaining fund returns.

Several academic studies have attempted to analyze the performance of a portfolio in the finance literature. Researchers have adopted a risk-adjusted approach to portfolio performance evaluation for the sake of a fair comparison. Capital Asset Pricing Model, introduced by Sharpe (1964), Lintner (1965) and Mossin (1966) in separate papers, has been the first and the most used model to explain stock returns due to its simplicity in application. Based on it, early studies by Sharpe (1966) and Treynor (1965) produce ratios measuring whether the return is commensurate with the risk undertaken. Yet ratio comparisons only work well for portfolio rankings, not for indicating the value of active management or forecasting the future returns. Later on, alpha term came into prominence with the seminal work of Jensen (1968). Predominant approach has been to compare the returns of portfolios to those of benchmark indices such as S&P 500, Russel 1000 in the U.S. or BIST 100 in Turkey to see if the portfolios are able to generate a significantly positive alpha over the stated benchmark. Managers of those with a significant positive alpha have been evaluated to own selectivity skill. Even though the alpha has always been the focus of interest, scholars have also concentrated on the explanatory power of models to estimate coefficients. Several models in which

endogenous and exogenous factors are inserted into regression as an independent variable are developed to boost the power. Fama & French Three-Factor Model (1992, 1993) and Carhart Four-Factor Model (1997) aroused more attraction than others among the practitioners. The former points out that two anomalies regarded with size and book-to-market ratios should be taken into consideration while the latter augments CAPM with momentum factor along with two factors that Fama & French posit.

The relative performance of funds measured by Jensen's alpha significantly depends on the market index selected as benchmark, revealed by Roll (1978, 1979), and Dybvig and Ross (1985). Starting from the late 1980s, scholars have focused on matching mutual funds with their better-matching benchmarks. Some have relied on the correlation between the returns of funds and major benchmarks to detect the fit while some has availed fund characteristics like size and book-to-market ratio to match. While there are mixed results, the literature review is handled on two aspects. First, researches that use stockholdings data to derive fund return are investigated. Second, the studies in which funds are grouped by their portfolio style characteristics and assigned various benchmarks are reviewed.

The pioneers of using portfolio holdings to assess the performance of mutual funds are Grinblatt and Titman (1989). Distinctly from previous studies, the research drives fund returns from the returns of stocks held in the fund portfolio. Based on the quarterly holdings data from 1975 to 1984, monthly excess returns on hypothetical portfolios which is obtained by aggregating the products of excess returns of listed stocks in the portfolio and their weights in funds' equity composition are calculated for each fund and compared against several benchmarks. It is put forward that stock selection skill exists for some fund managers, especially aggressive-growth funds, growth funds and funds with smallest net asset value, at hypothetical portfolio return level. Nonetheless this superior performance is neutralized by high management fees, concluding that no investor can provide benefit from the managers with skill.

Furthermore, Grinblatt and Titman (1993) develop a benchmark-free measure of portfolio evaluation based on the portfolio holdings. The study introduces portfolio change measure leaning on the assumption that an informed investor can profit through putting more weight on assets with increasing expected returns and less weight on assets with decreasing expected returns. Portfolio change measure is constructed as the change of current portfolio weights both from previous quarter and previous year for each fund, multiplied by monthly stock returns in subsequent quarter and then summed. Over the period between 1975 and 1984, one or four-quarter measures are used depending on if the fund's superior information is exposed in a quarter or in a year following the purchase of stocks. The study reveals that quarterly holdings of mutual fund portfolios, standing alone, provide abnormal positive return on average which cannot be attributed to an inefficient passive benchmark.

Wermers (2000) decomposes the returns and costs of each mutual funds into five components, one of which is related to the characteristics of stockholdings to exhaustively explain the value of active management between 1975 and 1994. It is confirmed that stockholdings of mutual funds, on average, beat a broad-market index by 130 bps per year yet outperformance is only large enough to cover the transaction and the management expenses, consistent with Grinblatt and Titman (1989).

Wermers, Yao and Zhao (2012) proposes a systematic method to detect stock selection information of funds from efficient aggregation of fund portfolios and other proxies for selectivity skills between 1980 and 2006. Generalized inverse alphas (GIA) approach is constructed with weights and past alphas of stocks in fund portfolio along with the correlation of stock holdings across funds. Carhart (1997) four-factor model is employed to measure fund stock selection ability while sorted-portfolio approach and Fama-Macbeth regressions were utilized in order to assess the performance of GIA estimators. In brief, GIA approach evidenced that fund managers have stock selection information, taking root from fundamental analysis. Also, the return-predictive power of GIAs is dispersed among various characteristics from size

to past returns, from book-to-market ratio to breadth of mutual fund ownership. GIAs' distinctive advantage to comprehensively examine stock selection information of managers was captured as well.

The studies that utilize the stockholdings data started to evolve from analysis of stockholdings return into stockholdings characteristics to determine better-matching benchmark for each fund and evaluate the performance accordingly in the late 1990s. Daniel, Grinblatt, Titman and Wermers (1997, DGTW) propose to form more customized benchmarks on the basis of characteristics of stockholdings of mutual funds such as market-cap, book-to-market ratio and prior-year return. The advantage of the approach is stated as capturing investment styles of funds more accurately. DGTW study covering the period between 1975 and 1994, uses quarterly stockholdings data and decomposes the overall excess return of a fund into characteristics selectivity, characteristics timing, and average style measures. In order to create benchmark portfolios, stocks on NYSE, AMEX and NASDAQ are divided into 125 portfolios based on three quintiles for each stock characteristics stated earlier. Fund performance is evaluated by subtracting the monthly returns of respective benchmark from monthly returns of each stock held in fund portfolio and summing on a weighted average basis. The results show that average mutual fund has stock selectivity ability to beat mechanical strategies yet this high performance is fairly small and offset by the management fees, similar to Grinblatt and Titman (1989). It is also valid for the top performers such as aggressive-growth and growth funds as high performance was reflected in larger fees. On the other hand, no evidence of timing skill was discovered.

Chan, Chen and Lakonishok (2002) draw attention to the low level of information of funds' stated objective in their prospectus. Another caveat stated is moral hazard risk involved in the strategies applied by fund managers for the purpose of career concerns rather than fund performance. Their study employs two approaches for style identification which are stockholdings characteristics of funds with regard to size and B/M ratio as well

as the estimated loadings from factor models. Portfolio characteristics of stockholdings are assigned based on the weighted average of percentile rankings produced by ten decile breakpoints in S&P Composite Index with regard to size, B/M ratio, prior one-year and prior three-year return at every calendar year end. Analysis made for equity funds universe in U.S. with both three and four factor models for the period between 1976 and 1997 indicates that growth funds and small cap funds perform better than their counterparts. Moreover no style timing ability is detected as style shifts are observed to be a reaction against pressure felt by the managers due to the low performance. Overall, style identification approach based on stockholdings characteristics was found a better predictor of future fund performance.

Cohen, Coval and Pastor (2005) develop another performance assessment approach based on the similarity of fund managers' investment decisions to those of managers who have performed well for the period between 1982 and 2002. Measure built on historical fund returns and most recent holdings proves itself more precise than conventional measures, especially when ranking managers and predicting future mutual fund returns. The underlying reason of superiority sources from that historical returns of all managers whose holdings or changes in holdings coincide with the subject manager are incorporated into the model along with own historical returns of him/her.

Fong, Gallagher, and Lee (2008) apply Daniel et all. (1997) approach to actively-managed Australian equity funds with several modifications through the years between 1995 and 2002. Characteristics benchmarks are weighted according to composition of a generic index. Also, monthly stockholdings are utilized in order to boost the timeliness of style. Last but not the least, overlapping benchmarks were implemented to capture stock characteristics more precisely. The paper finds that improved model is better able to measure stock selection ability of managers than Carhart Four-Factor Model.

Cremers and Petajisto (2009) introduce active share measure which can be defined as the portion of holdings of a fund that deviates from the holdings of

the benchmark index. Putting differently, depending on whether a fund gives more or less weight into a stock relative to its benchmark index weight, it means that it holds an active long or short position in that stock respectively. In this context, long position held is determined as a measure of active management for funds. Respective benchmark of each is quarterly decided according to the index yielding lowest active share among nineteen generic indices. Combining active share measure with tracking error, the research analyzes the efforts of equity fund universe from 1980 to 2003 to engage in stock selection and factor timing. Active share measure is observed to be a more successful predictor of funds' future performance compared to tracking error as it can be inferred from that funds with the highest active share were able to beat their benchmarks both before and after expenses. Furthermore these funds maintained their high performance even after controlling momentum factor.

Gupta-Mukherjee's (2013) research resembles Cremer & Petajisto's (2009, CP) paper with regard to empirical design. However, peer deviation measure introduced in the article differs from active share measure of CP by deriving the divergence of fund's portfolio composition from those of unobservable representative beliefs of its peers. A fictional representative fund manager (RM) was pictured so as to measure the deviation of a fund manager's beliefs from his/her peers. The representative manager is assumed to be holding weight of stock i in his portfolio as equal to the mean weight of stock i across all funds in the peer group. Hence, efforts of fund managers to put more or less weight to a particular stock than representative manager can be informative about the manager's beliefs. Even though the peer groups and a similar setting of CP were utilized in the article, peer deviation measure is different from active share as it increases via both active and passive positions that RM takes in any stock. Based on quarterly data from 1990 to 2010 for approximately 3000 actively managed U.S. equity funds, the analysis reports that representative manager's portfolio exposes informed belief as inferred from positive risk-adjusted return. Thus the managers with the lowest peer deviation outperforms the others both in short and long term.

Hunter, Kandel, Kandel and Wermers (2014, HKKW) propose an augmented model which relies on information on the fund returns and the investment objectives to take the similarities among fund strategies into account. Putting differently, the model incorporates both implicit benchmarks mimicked by a fund and the benchmark constructed from the equal weighted portfolio of other funds pursuing the same strategy. HKKW uses the passive benchmarks assigned by Cremers and Petajisto (2009) by using active share measure where the final set is equal to nine benchmarks. Implemented over the period between 1980 and 2010 for equity universe, augmented model decreases within-group residuals by one-third to one-half compared to Carhart model while APB coefficients are found both positive and successful for more than half of the funds in each group. The study also reveals the existence of skill and competence of APB-Augmented Model to identify outperforming funds.

The studies on Turkish mutual funds generally have concentrated on Type A and Type B mutual funds, utilizing common ratios to rank portfolios and single and multiple-factor models to evaluate selectivity and timing skills.

Karacabey (1999) conducts an analysis for the impact of timing efforts of mutual fund managers on their selectivity skills for 33 Type A mutual funds for the years of 1996 and 1997. Quadratic regression model results show that only four funds have a selectivity skill but none has timing skill, benchmarking an index composed of BIST 100 and government debt securities index based on portfolio holdings. The study also reveals that selectivity and timing skills are negatively correlated.

Karatepe and Karacabey (2000) point out the difference between the risk levels of mutual funds and benchmarks when evaluating excess performance. They avail Graham-Harvey 1 & 2 models to equate the risk levels of mutual funds to the benchmarks by forming new portfolios with treasury bonds. The study made with the monthly returns of nine Type A equity funds for the period between January 1997 and July 1999 produce the result that only two funds are able to beat the market on a risk adjusted basis.

Gursoy and Erzurumlu (2001) attempt to assess performance of 55 Type A and 77 Type B mutual funds against treasury bill and BIST 100 over the period between January 1998 and June 2000, applying Sharpe, Treynor, Jensen and Graham & Harvey performance measures. Scholars point at that there is no significant difference in the ranking of funds produced by four measures applied. As a reflection of the macro economic conditions then, treasury bills stand out as the best investment, followed by BIST 100, Type B funds and Type A funds respectively.

Yildiz (2005) draws attention to the misjudgment risk associated with using BIST-100 Index as a benchmark for all types of funds. In this context, she calculates Sharpe, Treynor, Sortino performance measures for 53 Type A mutual funds including variable, mixed and stock funds between 2001 and 2003 where BIST-100 and KYD (Turkish Institutional Investment Managers' Association) Fund Index are taken as separate benchmarks. Number of mutual funds that are able to show better performance than BIST 100 is quite low on all of three measures. Nevertheless, it shows a remarkable increase when the benchmark was switched to KYD Fund Index. It is also documented that a high majority of high and low performers maintains their performance in the following year.

Karatepe and Gokgoz (2007)'s analysis scans the performance and persistence of 15 Type A mixed mutual funds during 2001 and 2002, utilizing Treynor-Mazuy quadratic regression model and Goetzmann and Ibbotson's "Repeat winners/losers" approach. Comparing against BIST-100, funds are found successful in performance and lacking selectivity and timing skill. However when BIST-100 is replaced with BIST-100 & government debt securities & U.S. Dollar blended index as benchmark, selectivity and timing skills turn positive.

Akel (2007) posits a research question whether mutual funds in Turkey have short and long term persistence and fund managers have selectivity and timing skill for the period between 2000 and 2004 years. The performance of

51 Type A and 51 Type B mutual funds is assessed with Sharpe, Treynor and Jensen measures while Treynor-Mazuy and Henriksson-Merton methods are applied to detect timing ability. On average, Type B funds show superior performance than their respective benchmarks unlike Type A funds on a risk-return basis. Also none of Type A funds are found to have timing skill however a small ratio of Type B funds demonstrates this ability. On the other hand, persistence analysis shows Type A funds are persistent only in short term but Type B funds are persistent both in short and long term by also having greater significance.

Imisiker and Ozlale (2008) assess the selectivity and market timing performance of Turkish mutual funds for pre- and post-financial crisis period, employing high-frequency data. Regression analyses performed with weekly data of 49 Type A mutual funds over the period between January 2000 and October 2003 indicate weak evidence of selectivity and some evidence of market timing ability, benchmarking against BIST 100 index. Scholars also note a fund manager can have both selectivity and timing skills thanks to the low correlation between them.

Ozek (2014) aims to determine if the industry or security concentration would end up with better fund performance. Industry concentration index of Sapp & Yan (2008) and security concentration index of Kacperczyk, Sialm & Zhengare (2005) are monthly calculated for 22 stock mutual funds for a period covering 19 months between June 2012 and December 2013. Nevertheless the analyses do not reveal any statistically significant relations between the mutual fund performance and concentration in a few industries or securities.

Goren and Umutlu (2015) evaluate the performance of 10 groups of Type A and B mutual funds and total pension funds on daily and monthly basis between 2001 and 2010 years. Differently from previous studies, they take expense ratios into consideration and use net returns. The analysis made with CAPM on daily data reveals that only two out of twenty mutual fund groups have significant and positive alpha. Yet when the data frequency is switched

from daily to monthly, it drops to one. On the other hand, consistency analysis made with Fama-French Three-Factor Model finds only one positive significant alpha in mutual fund groups, either employing daily or monthly data.

CHAPTER 3

DATA AND METHODOLOGY

The purpose of this thesis is to assess the performance of equity mutual funds in Turkey. In doing so, we employ Capital Asset Pricing Model (CAPM), Carhart Four-Factor Model and active peer benchmark-augmented model over the period between July 2012 and June 2016.

3.1 Data

Data used in the analyses is retrieved from mixed sources due to the variety in models used. First, daily portfolio values per share of equity funds are extracted from Capital Markets Board of Turkey (CMB) so as to calculate the monthly returns. Monthly returns are calculated from the gross asset values per share on the last trading days of the consecutive months. If any fund reports zero asset value on any of those days according to CMB data, then the value on the monthly portfolio allocation report published on Public Disclosure Platform is used.

$$\boldsymbol{r_{i,t} = \left[\frac{GAV_{i,t}}{GAV_{i,t-1}} - 1\right] * 100} \qquad \textbf{(1)}$$

where;

$GAV_{i,t}$: Gross asset value per share of Fund i on the last day of month t

$GAV_{i,t-1}$: Gross asset value per share of Fund i on the last day of month t-1

$r_{i,t}$: Monthly return of Fund i

Second, BIST-All Index is used as the market proxy since it is the broadest market index available. Index data series are taken from Finnet Analiz Expert and monthly returns were calculated the same way as the fund returns. Third of all, Turkish Interbank O/N Offering Rate (TRIBOR) is used as the risk-free rate where the related data is retrieved from Thomson-Reuters Eikon and uncompounded to acquire monthly series.

Equity funds were grouped on size characteristics to assign each to an active peer benchmark group. Revelation of size groups require information about the portfolio holdings of mutual funds. A high majority of Turkish mutual funds disclose their holdings on Public Disclosure Platform of Turkey (KAP) on a monthly basis. The portfolio holdings data has been available for the months starting from May 2012, which is the main challenge why this study only dates back to July 2012. As of June 30, 2016, there are 65 mutual equity funds investing in Turkish equities. Nonetheless Strateji Portfolio Management Company and Ata Portfolio Management Company that do not disclose stockholdings of their four equity funds in total are excluded from the analyses. Moreover, eight more funds were omitted from analyses because of the short horizon of returns data. Lastly, TEI (TEB Asset Management Equity Private Fund) is removed from the research since its monthly returns violate the normality assumption. In a nutshell, the funds whose performance is evaluated are diminished to 52 equity mutual funds that existed for part or all of four-year analysis period. Number of funds in each market-cap group might occasionally look limited but it should be noted that it is the entire universe of equity funds in Turkey.

Thomson Reuters' Lipper provides objective codes for funds on size and value/growth characteristics, which makes it one of the most prevalent classification methodologies among practitioners. However Lipper objective codes are not available for Turkish mutual funds, and that's why they are created from scratch for the funds that are subject of this study. Thomson Reuters' Lipper Holdings-Based Fund Classification Methodology dictates two steps to be followed in order to define investment objectives for equity funds.

The model takes root from portfolio holdings and fundamental financial characteristics. As the first step of method, each fund's market capitalization is classified into large, mid or small-cap. Next, funds are assigned with a core, growth or value style based on the six style characteristics.

Lipper methodology provides a useful insight to classify funds' investment objectives. Nevertheless limited history of portfolio holdings data, combined with limited number of listed companies and mutual funds necessitates a few modifications in the application of methodology. First, style classification is disregarded in this study in order to keep the number of funds in each group as many as possible. As there is already limited number of equity funds in Turkey, using value-growth characteristics and dividing the fund universe into even further subgroups would diminish robustness of model. Second, only one breakpoint which is large cap-small cap is used in this study unlike Lipper recommendation to apply 75% and 95% rule to each European index to determine large cap-mid cap and mid cap-small cap breakpoints. Third, funds' investment objectives are inferred from a single portfolio (the most recent semiannual or fiscal year ending portfolio) whereas Lipper methodology uses a weighted average of six historical portfolios including the most recent month and five recent semiannual or fiscal year end portfolios at each point in time.

Equity holdings of each equity mutual fund were retrieved from KAP and listed to assign an appropriate investment objective. These objectives are semiannually reviewed and adjusted if necessary for the analysis period between the dates of July 1, 2012 and June 30, 2016. Hence, equity holdings as of semiannual and fiscal year ends through years were set as the eight determinant portfolios of the subsequent six months' investment objective and APB group. For instance, investment objective of funds through July 2012 and December 2012 is determined based on the weights of large and small cap equities in June 30, 2012 equity portfolio. If the fund does not report its holdings or wholly invests its holdings into money market instruments, that makes it impossible to assign an investment objective, for any of eight portfolios, the equity holdings in the prior month –such as November for

December- were set as determinant portfolio. If it is not available either in the prior month to semiannual or fiscal year end, then subsequent month – such as July for June- is set as the determinant portfolio for the period. On the other hand, some of the funds have changed their type during the four-year analysis period either from government bond or variable fund to equity fund that is obliged to invest at least 80% of its total holdings into Turkish equities. Previous studies on Turkish mutual funds such as Gursoy & Erzurumlu (2001), Teker & Karakurum & Tav (2008) analyze the comparative performance of Type A and B funds, which is a classification no longer in use since the beginning of 2013. However, 25% threshold of Type A funds can still be used in order to keep the number of funds to be analyzed as many as possible. Hence, if any fund invested less than 25% of its holdings in equities for any of eight determinant portfolios, it was stated as missing for that six-month period. Similarly, former Type B funds were excluded from the analysis for respective six-month period(s). Lastly, if a fund emerged or changed its type to equity fund between any consecutive semiannual and fiscal year ending, the month that fund emerged/changed is set at determinant portfolio for the months until next semiannual and fiscal year ending. For instance, if the fund started activity in April, it is set as the determinant portfolio for April, May and June.

Constituents of BIST-All Index were retrospectively retrieved from Thomson Reuters Eikon and month-end market values of related equities are obtained from Finnet Analiz Expert to determine the investment objective for eight determinant portfolios. All the equities in the index are sorted by descending order of their proportion of market value in the total index at each date. Then the ratios are summed from top to bottom until 75% percentile that marks the large cap-small cap breakpoint. Accordingly, the equities that are present in top 75% percentile are large-cap equities while the equities in the bottom 25% percentile are small-cap equities. Once the breakpoints for equities are set for each of eight semiannual or fiscal year endings, the mutual fund classification in Table 1 emerged based on the concentration of fund's equity holdings in each category.

Table 1: Categorization of Mutual Funds by Market Capitalization

Large-cap Funds	Concentration of large cap equities in equity holdings of the fund ≥ 80%
Mid-cap Funds	80% > Concentration of large cap equities in equity holdings of the fund ≥ 50%
Small-cap Funds	50% > Concentration of large cap equities in equity holdings of the fund

If the equity holdings of a fund comprise of 75% large-cap and 25% small-cap equities, the fund is said to be mimicking the market portfolio. Therefore 5% margin was added on the upper bound of 75%, which means funds investing at least 80% of their equity holdings in large-cap equities are classified as large-cap funds. On the other hand, it was assumed that a fund has to invest more than half of its equity holdings into small-cap equities in order to be classified as a small-cap fund. The remaining funds whose large-cap equity holdings are between 50-80% of total equity holdings are classified as mid-cap funds.

A few funds have reported previously unlisted equities, exchange traded funds, the shares of other mutual funds and/or Group C equities which are not a part of BIST-All Index, stated under their equity holdings in one or more of their determinant portfolios. Since it will be impossible to classify these securities as large or small cap and they will have a negligible impact on total, they were removed from funds' equity holdings only for the purpose of market-cap classification.

3.2. Methodology

Equity mutual fund performance was evaluated on a-risk adjusted basis where three different models were employed to get the comparative results. First, Capital Asset Pricing Model, the most widely used in the literature, is applied to equity funds. Second, Carhart Four-Factor Model incorporating additional three factors is implemented. Last but not the least, APB-Augmented Model is performed to account for commonalities among fund strategies. The details

on the background and the implementation of each model are presented in following parts.

3.2.1. The Single-Factor Capital Asset Pricing Model

The Capital Asset Pricing Model, CAPM for short, has been the most commonly used model to explain stock returns ever since it was developed in the articles by Sharpe (1964), Lintner (1965) and Mossin (1966) as a single factor model. Based on the assumption of homogenous expectations and inputs of all investors, the model posits that the risk premium on a single asset depends on what extent it contributes to the total risk of the market portfolio including all stocks traded. Accordingly the contribution of a single asset to the total variance of market portfolio is defined as beta or systematic risk and it is utilized to predict the expected return. Beta is used as an explanatory variable to measure sensitivity of a single asset to the changes in the value of market. On the other hand, intercept in the model captures the unexplainable part in the stock return. CAPM is a linear regression model and formulated as follows:

$$\boldsymbol{r_{i,t} = r_{f,t} + \beta_i * \left(r_{m,t} - r_{f,t}\right) + \varepsilon_{i,t}} \qquad \textbf{(2)}$$

where;

$r_{i,t}$: Return of Stock i at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

$r_{m,t}$: Return of the market portfolio at time t

β_i : Sensitivity of Stock i to the market portfolio

$\varepsilon_{i,t}$: Random error term with zero mean

Jensen (1968), based on the findings of former scholars, argues that stock selection ability of a manager manifests itself in the error term and thus he incorporates a non-zero constant that is known as alpha into the model. Besides, he is the one who first uses CAPM to assess the mutual fund performance.

$$\boldsymbol{r_{i,t} - r_{f,t} = \alpha_i + \beta_i * \left(r_{m,t} - r_{f,t}\right) + \varepsilon_{i,t}} \qquad \textbf{(3)}$$

where;

α_i : Jensen's alpha (the intercept) for Stock i

$r_{i,t}$: Return of Stock i at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

$r_{m,t}$: Return of the market portfolio at time t

β_i : Sensitivity of Stock i to the market portfolio

$\varepsilon_{i,t}$: Random error term with zero mean

In CAPM with Jensen's alpha, monthly excess returns of equity mutual funds are regressed against market premium that is the difference between market portfolio return and risk-free rate. The obtained alpha from the model is interpreted depending on the sign of it. A positive and significant alpha is taken as an indicator of manager skill, in other words, active management that adds value to investors. Similarly a negative alpha is evaluated as that the fund is outperformed by the market. On the other hand, whether the beta produced by the model is greater or lower than 1 shows if the fund's returns are more or less volatile than those of the market respectively.

3.2.2. The Fama-French (FF) Three-Factor Model

Fama and French (1992, 1993) improves Capital Asset Pricing Model by introducing firm characteristics that capture further systematic risk of the stocks and predict the cross-section of average stock returns. Classical CAPM is aggregated with two factors that relies on the historical data of stocks in terms of market capitalization and book-to-market ratio. The first factor is the difference of average returns of small and big-cap companies which is denoted as SMB while the latter is HML, the differential average return of high against low B/M ratio companies. In previous works, researchers have detected two anomalies, and the proposed model introduces two factors that are based on the anomalies. The first anomaly indicates that small stocks, on average, earn a higher return than big stocks. Second anomaly that is related to book-to-market ratio exposes that average return of value stocks (high B/M ratio) is

higher than growth stocks (low B/M ratio). The formula of FF model is as follows:

$$\boldsymbol{r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,m} * (r_{m,t} - r_{f,t}) + \beta_{i,SMB} * SMB_t + \beta_{i,HML} * HML_t + \varepsilon_{i,t}} \quad \textbf{(4)}$$

where;

α_i : Alpha (the intercept) for Stock i

$r_{i,t}$: Return of Stock i at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

$r_{m,t}$: Return of the market portfolio at time t

$\beta_{i,M}$: Factor loading for sensitivity of Stock i to the market portfolio

$\beta_{i,SMB}$: Factor loading for sensitivity of Stock i to the size

$\beta_{i,HML}$: Factor loading for sensitivity of Stock i to the book-to-market

SMB_t : The risk premium on size factor at time t

HML_t : The risk premium on book-to-market factor at time t

$\varepsilon_{i,t}$: Random error term with zero mean

In our model, construction of SMB and HML factors starts with forming portfolios from constituent stocks in BIST-All Index. A stock must be present in the index both on June 30th of year t and December 31st of year t-1 so that it could be a part of portfolios to be constructed. Financial institutions comprising banks and special financial corporations, factoring, financial leasing and insurance companies, holding and investment companies, real estate investment trusts, brokerage houses, investment trusts and other financial institutions are excluded from portfolios since they might be highly leveraged as a requirement of their nature of the business unlike nonfinancial companies. Also, the companies whose fiscal year is different than the calendar year, which refers to four sports clubs listed, and negative equity firms are left out.

On June 30th of each year from 2012 to 2015, stocks were sorted on size (market value) in a descending order. Market values which are calculated as the stock price multiplied by contemporaneous number of outstanding shares are retrieved from Finnet Analiz Expert. Once sorted, stocks were grouped as big (B) or small (S) whether they are above or below median market value. Next, stocks were sorted on book-to-market equity ratio (also retrieved from Finnet Analiz Expert) as of December 31st of year *t-1* where top 30%, middle 40% and bottom 30% are named as high (H), medium (M) and low (L) groups respectively.

Table 2: Cross-Section of Size and B/M Ratio Groups

This table presents the cross section of two size and three book-to-market ratio groups, constructed as per Fama & French Three-Factor Model (1992, 1993).

			Size	
			Small *(Below Median)*	Big *(Above Median)*
B/M Ratio	High	*(Top 30%)*	S/H	B/H
	Medium	*(Middle 40%)*	S/M	B/M
	Low	*(Bottom 30%)*	S/L	B/L

Once six portfolios are formed from the cross section of two size and three B/M portfolios, monthly market value-weighted returns are computed for each portfolio starting from July 1st of year *t* to June 30th of year *t+1*. Temporarily or permanently disappearing stocks were excluded from the analysis for that time. Each year on June 30th, portfolios are rebalanced for upcoming year. At the end, SMB factor is constructed as the difference between monthly average returns of three small portfolios and three big portfolios for the tested period. Same rule applies for HML factor by subtracting the monthly average returns of two low B/M ratio portfolios from the monthly average returns of two high B/M ratio portfolios.

3.2.3. The Carhart Four-Factor Model

Carhart (1997) four-factor model is an extension of FF three-factor model with a fourth factor that is momentum. First documented in the form of 'hot hands phenomenon' by Hendricks, Patel and Zeckhauser (1993), it was found that stocks that perform superior or poorer than their respective benchmarks during the last year maintain their relative performance over short horizon. Later Jegadeesh and Titman (1993) reports that trading strategies in which past winners are bought and past losers are sold yield significantly abnormal return over the subsequent three to twelve months. Grinblatt, Titman and Wermers (1995) examines whether mutual fund managers follow momentum strategies and discovers that momentum investors form 77% of funds and they are statistically successful than others. Elton, Gruber and Blake (1996) reach the conclusion that the past data provides information about future in terms of fund performance even for longer horizon up to three years. Built on the empirical findings of previous scholars, Carhart (1997) augments FF three-factor model to capture the momentum anomaly.

$$\boldsymbol{r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,m} * (r_{m,t} - r_{f,t}) + \beta_{i,SMB} * SMB_t + \beta_{i,HML} * HML_t + \beta_{i,WML} * WML_t + \varepsilon_{i,t}} \quad \textbf{(5)}$$

where;

α_i : Alpha (the intercept) for Stock i

$r_{i,t}$: Return of Stock i at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

$r_{m,t}$: Return of the market portfolio at time t

$\beta_{i,M}$: Factor loading for sensitivity of Stock i to the market portfolio

$\beta_{i,SMB}$: Factor loading for sensitivity of Stock i to the size

$\beta_{i,HML}$: Factor loading for sensitivity of Stock i to the book-to-market

$\beta_{i,WML}$: Factor loading for sensitivity of Stock i to the momentum

SMB_t : The risk premium on size factor at time t

HML_t : The risk premium on book-to-market factor at time t

WML_t : The risk premium on momentum factor at time t

$\varepsilon_{i,t}$: Random error term with zero mean

As Carhart Four-Factor Model is an extension of three-factor model, SMB and HML factors are derived the same way. For momentum factor to be constructed, stocks are monthly ranked on their trailing 11-month returns lagged one-month. In plain English, stocks' percentage return from *t-12* month to *t-2* month is taken as the sorting measure. Financial institutions described in the previous section in detail, the companies whose fiscal years do not coincide with calendar year and stocks that were not present in BIST-All Index in either *t-2* or *t-12* month are removed. Afterwards, top 30% and bottom 30% of ranked stocks are defined as winner and loser portfolios, rebalancing monthly (unlike SMB and HML portfolios that are rebalanced annually). Finally, momentum factor is obtained as subtracting the simple average return of stocks in loser portfolio from the simple average return of stocks in winner portfolio for each month over the period between July 2012 and June 2016.

Once the monthly risk premiums on all of three factors are obtained, they are incorporated into CAPM as independent variables along with market risk premium where the excess return of funds is the dependent variable.

3.2.4. APB-Augmented Model

Hunter et al. (2014) augments Carhart (1997)'s model with a fifth factor that is asset peer benchmark (APB) to better capture the impact of commonalities among the strategies of funds chasing the same investment style. The premise of paper is that correlated residuals weaken the standard pricing models with regard to distinguishing skilled manager from unskilled among the funds following the same strategy. To overcome this shortcoming, an additional benchmark constructed from the average returns of funds in the same style peer group is incorporated into four-factor model.

Active peer benchmark model is motivated by the notion that even the least informed investor has wisdom to invest in an equally-weighted portfolio of funds of the same group once he decides which style to invest in. Mutual funds styles with regard to market-cap measure are not disclosed in Turkey unlike in the U.S. Nonetheless the average Turkish investor might be presumed to be deducing whether the fund tilts its portfolio to large or small-cap equities from the concentration of BIST-30 equities in the fund portfolio as BIST-30 is widely recognized as the top equity index in Turkey. Accordingly APB return is simply the average of excess returns of funds in the same group, calculated from gross asset values:

$$\boldsymbol{r_{APB_i,t} = \frac{1}{N_{APB_i}} \sum_{i=1}^{N_{APB_i}} (r_{i,t} - r_{f,t})} \qquad \textbf{(6)}$$

where;

$r_{APB,t}$: Excess return of APB to which Fund i belongs to at time t

$r_{i,t}$: Return of Fund i at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

N_{APB_i} : Number of funds in APB group to which Fund i belongs at time t

Following that the excess returns of funds in the same style group are averaged to obtain active peer benchmark returns, each APB is regressed on Carhart's four factor. The purpose of the regressions is to derive APB residual series and alpha. The former is utilized to capture the commonalities in unsystematic risk-taking of funds in the same APB group while the latter is used to drive the fund alpha which is independent of the alpha associated with the common unsystematic risk-taking in the same group.

$$\boldsymbol{r_{APB_k,t} = \alpha_{APB_k} + \beta_{APB_k,m} * (r_{m,t} - r_{f,t}) + \beta_{APB_k,SMB} * SMB_t + \beta_{APB_k,HML} * HML_t + \beta_{APB_k,WML} * WML_t + \varepsilon_{APB_k,t}} \qquad \textbf{(7)}$$

where;

α_{APB_k} : Alpha (the intercept) for APB k

$r_{APB_k,t}$: Return of APB k at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

$r_{m,t}$: Return of the market portfolio at time t

$\beta_{APB_k,M}$: Factor loading for sensitivity of APB k to the market portfolio

$\beta_{APB_k,SMB}$: Factor loading for sensitivity of APB k to the size

$\beta_{APB_k,HML}$: Factor loading for sensitivity of APB k to the book-to-market

$\beta_{APB_k,WML}$: Factor loading for sensitivity of APB k to the momentum

SMB_t : The risk premium on size factor at time t

HML_t : The risk premium on book-to-market factor at time t

WML_t : The risk premium on momentum factor at time t

$\varepsilon_{APB_k,t}$: Random error term with zero mean

In augmented model, residuals for the APB from the first stage model are inserted as a fifth factor to the baseline Carhart model for funds. That way, commonalities among unsystematic risk taking of funds in the same APB group can be disciplined and fund-wise unsystematic risk-taking can be isolated.

$$\boldsymbol{r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,m} * (r_{m,t} - r_{f,t}) + \beta_{i,SMB} * SMB_t + \beta_{i,HML} * HML_t + \beta_{i,WML} * WML_t + \lambda_i * \varepsilon_{APB_k,t} + \varepsilon_{i,t}} \quad \textbf{(8)}$$

where;

α_i : Alpha (the intercept) for Fund i

$r_{i,t}$: Return of Fund i at time t

$r_{f,t}$: Return of a risk-free asset such as T-bill at time t

$r_{m,t}$: Return of the market portfolio at time t

$\beta_{i,M}$: Factor loading for sensitivity of Fund i to the market portfolio

$\beta_{i,SMB}$: Factor loading for sensitivity of Fund i to the size

$\beta_{i,HML}$: Factor loading for sensitivity of Fund i to the book-to-market

$\beta_{i,WML}$: Factor loading for sensitivity of Fund i to the momentum

SMB_t : The risk premium on size factor at time t

HML_t : The risk premium on book-to-market factor at time t

WML_t : The risk premium on momentum factor at time t

λ_i : Factor loading for sensitivity of Fund i to the APB residual

$\varepsilon_{APB_k,t}$: Residual of APB k to which Fund i belongs

$\varepsilon_{i,t}$: Random error term with zero mean

The final model is the alpha-adjusted version of the augmented model, constructed to detect the source of the skill unique to specific manager rather than the entire APB group.

$$\boldsymbol{r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,m} * (r_{m,t} - r_{f,t}) + \beta_{i,SMB} * SMB_t + \beta_{i,HML} * HML_t + \beta_{i,WML} * WML_t + \lambda_i * (\alpha_{APB_k} + \varepsilon_{APB_{k,t}}) + \varepsilon_{i,t}} \quad \textbf{(9)}$$

where;

α_{APB_k} : Alpha (the intercept) for APB k

Fund alphas generated from both augmented baseline model and alpha-adjusted model should be equal if the skill unique to a specific manager is the single determinant of the fund performance. Hence λ_i must be zero. However, when the fund performance is an outcome of only the co-movement related effects in the same APB group, α_i is expected to be equal to zero, meaning that efforts to identify the fund with excess performance is of no avail while there is active peer benchmark.

In Capital Asset Pricing Model, Carhart Four-Factor Model and APB-Augmented Model that will be performed in this analysis, the fund performance that is reflected in alpha is the primary concern. When the alpha produced is statistically significant and positive, the related fund will be interpreted as showing the superior performance. In like manner, a statistically significant

but negative alpha will be taken as an indicator of poorer fund performance. The null and alternative hypotheses for alpha interpretation on a two-tailed test are depicted below:

$$H_0: \alpha = 0$$

$$H_1: \alpha \neq 0$$

Moreover, it is already acknowledged that R^2 artificially increases as more independent variable are added to the model while adjusted R^2 penalizes it unless the additional variables add extra prediction power. Therefore adjusted R^2 of the compared models will be availed to see the change in the explanatory power.

CHAPTER 4

EMPIRICAL RESULTS

Empirical results for the performance evaluation of fifty-two mutual equity funds for the period over July 2012 and June 2016 are presented in this chapter. Performance of funds is analyzed on a risk adjusted basis with Capital Asset Pricing Model, Carhart Four-Factor Model and APB-Augmented Model, using EViews 8. First, descriptive statistics for analyzed funds are demonstrated, followed by the empirical results produced through each three models. Statistically significant alpha is taken as the indicator of fund performance for all methods while the level of adjusted R^2 is interpreted as the power of fitted model to explain the fund performance. Specifically for APB-Augmented Model, significance of the additional factor is evaluated as well.

4.1 Descriptive Statistics

Extant fifty-two mutual equity funds that existed for part or all of 48-month analysis period are analyzed. The sample includes funds with unequal length in order to keep the number of funds in each active peer benchmark group as many as possible and obtain APB residuals and alphas more accurately. Accordingly, forty-six funds have been present for the entire analysis period while the remaining six funds are selected on the condition of having minimum of 24-month historical return data.

Descriptive statistics for the sampled funds over the period between July 2012 and June 2016 are depicted in Table 3. Statistics for fifty-two funds are presented following the statistics of monthly return on BIST-All Index and

Turkish Interbank O/N Offered Rates (TRIBOR) in the first and second columns respectively. It is observed that mean monthly gross returns of funds vary between 2.09% (MAC – Marmara Capital Equity Fund) and 0.27% (YDN – Yapi Kredi Asset Management DPM Equity Private Fund) however it could be attributed to the fact that both funds have return data of less than 48-month unlike the most of the sampled funds. Among the funds whose return data is available since July 2012, TTE (Is Asset Management BIST Technology Index Equity Fund) and ECH (Global MD Asset Management Second Equity Fund) rank first and last with average gross returns of 1.72% and 0.45% respectively. Moreover forty-three funds have provided a higher average monthly gross return than BIST-All Index for the respective period they are compared. One can claim that the funds, by a majority, outperformed the market in the given period. Yet, such comments would be ignoring the impact of the risk assumed for the return. In order to solve it, risk-adjusted models are applied to equity funds, as presented in the following sections. On the other hand, coefficient of variation (CV), which is a unit-free measure unlike standard deviation, is utilized to see the degree of dispersion for funds and market. It is found that forty-two of funds have lower volatility than BIST-ALL Index for their respective period of analysis. It can be explained by the lower variance of non-equity holdings of the fund portfolios. Among funds, MAC and YDN again stand out as the least and the most volatile funds respectively, possibly due to the aforementioned reason.

The risk-free rate, by nature, shows the smallest coefficient of variation among all sampled assets. Nonetheless an interesting finding from the statistics is that average monthly risk-free rate, implied by Turkish Interbank Overnight Rate (TRIBOR) was higher than the average monthly return on BIST-ALL Index by approximately 10 basis points. Termination of quantitative easing and zero interest rate policy by FED, domestic political tensions including Gezi Park protests and corruption probes in 2013, and long lasting uncertainties regarding the results of four elections held caused sharp drops in market, which fruited relatively low performance and high volatility.

Table 3: Descriptive Statistics for Mutual Funds, BIST-ALL and TRIBOR

This table presents the descriptive statistics for Turkish Interbank O/N Overnight Rate (TRIBOR) as well as monthly return on BIST-ALL Index and sampled equity funds over the period between July 2012 and June 2016. In the first and the second column, statistics are available for BIST-ALL and TRIBOR respectively. In the following columns, statistics belonging to each of sampled fifty-three funds are exhibited in an alphabetical order.

	RM	RF	ACK	ACT	ADP	AK3	AKU
Mean	0.62	0.72	0.63	0.86	0.51	0.62	0.81
Median	0.47	0.81	0.65	0.71	-0.07	-0.08	0.17
Maximum	11.96	0.97	6.81	13.20	11.61	11.74	12.34
Minimum	-10.91	0.40	-5.21	-9.85	-12.25	-12.39	-12.68
Range	22.87	0.58	12.02	23.05	23.87	24.13	25.02
Std. Dev.	5.64	0.18	2.58	4.44	5.79	5.47	5.98
CV	910	25	410	518	1,134	884	742
Skewness	-0.13	-0.49	0.07	0.17	-0.19	-0.19	-0.05
Kurtosis	2.39	1.75	3.15	3.27	2.35	2.46	2.37
Jarque-Bera	0.88	5.08	0.08	0.38	1.13	0.87	0.81
Probability	0.64	0.08	0.96	0.83	0.57	0.65	0.67
Observation	48	48	48	48	48	48	48

	ALC	ARC	ASA	BAA	BMH	BZI	DAH
Mean	1.07	0.95	0.77	0.49	0.86	1.02	0.76
Median	-0.40	-0.90	1.26	0.87	0.14	1.03	0.58
Maximum	13.60	11.07	9.44	10.66	10.15	19.22	14.32
Minimum	-11.61	-6.44	-10.26	-8.37	-8.33	-17.94	-12.09
Range	25.22	17.51	19.70	19.02	18.48	37.15	26.42
Std. Dev.	6.10	5.24	4.61	3.75	4.99	6.36	5.84
CV	572	549	598	771	578	625	773
Skewness	0.10	0.42	-0.42	-0.01	0.14	0.02	-0.08
Kurtosis	2.29	1.87	2.91	3.24	2.03	4.22	2.59
Jarque-Bera	0.80	2.37	1.45	0.11	2.02	2.97	0.38
Probability	0.67	0.31	0.48	0.95	0.36	0.23	0.83
Observation	35	29	48	48	48	48	48

Table 3 (cntd.)

	DZE	EC2	ECH	EID	FAF	FYD	GAE
Mean	0.78	0.48	0.45	0.84	0.92	1.01	0.74
Median	0.09	0.17	0.21	1.14	0.32	0.21	-0.29
Maximum	13.90	12.41	11.10	10.57	14.25	15.10	13.48
Minimum	-12.82	-9.31	-10.32	-9.25	-12.32	-12.48	-13.73
Range	26.73	21.72	21.43	19.83	26.57	27.58	27.21
Std. Dev.	6.09	5.10	4.61	4.08	5.92	5.86	6.21
CV	780	1,057	1,026	483	642	581	838
Skewness	-0.05	0.25	0.01	-0.12	0.03	0.11	-0.02
Kurtosis	2.59	2.58	2.67	2.94	2.46	2.65	2.49
Jarque-Bera	0.36	0.84	0.21	0.12	0.60	0.35	0.53
Probability	0.84	0.66	0.90	0.94	0.74	0.84	0.77
Observation	48	48	48	48	48	48	48

	GAF	GHS	GL1	GMR	GSP	HAF	HBU
Mean	0.87	0.92	0.97	1.40	0.99	0.79	0.71
Median	0.16	0.29	-0.21	1.35	0.86	0.36	-0.33
Maximum	10.97	12.54	11.52	11.73	8.13	12.25	13.11
Minimum	-9.94	-13.98	-9.93	-12.73	-4.82	-13.52	-14.05
Range	20.91	26.52	21.45	24.46	12.95	25.77	27.16
Std. Dev.	5.02	5.89	4.65	5.51	3.04	5.99	6.06
CV	576	643	478	393	307	758	854
Skewness	-0.09	-0.20	-0.11	-0.27	0.17	-0.14	-0.05
Kurtosis	2.45	2.56	2.60	2.90	2.41	2.40	2.56
Jarque-Bera	0.67	0.71	0.42	0.53	0.93	0.88	0.42
Probability	0.71	0.70	0.81	0.77	0.63	0.64	0.81
Observation	48	48	48	43	48	48	48

Table 3 (cntd.)

	HVS	IGH	IYD	KYA	MAC	SKH	TAP
Mean	0.88	0.62	0.62	1.42	2.09	0.65	0.75
Median	0.71	-0.09	-0.54	1.07	1.98	0.18	0.16
Maximum	16.06	13.18	10.40	14.13	15.48	10.12	11.08
Minimum	-16.22	-10.98	-12.30	-12.88	-6.55	-9.14	-10.86
Range	32.28	24.16	22.70	27.01	22.03	19.26	21.94
Std. Dev.	6.77	5.53	5.22	6.34	5.85	4.64	5.19
CV	770	895	848	447	280	709	691
Skewness	-0.19	-0.08	-0.13	-0.19	0.50	0.08	-0.03
Kurtosis	2.87	2.55	2.43	2.55	2.44	2.30	2.37
Jarque-Bera	0.32	0.46	0.79	0.68	1.60	1.02	0.80
Probability	0.85	0.80	0.67	0.71	0.45	0.60	0.67
Observation	48	48	48	48	29	48	48

	TAU	TI2	TI3	TIE	TKF	TPR	TTE
Mean	0.59	0.70	0.77	0.75	0.55	0.81	1.72
Median	-0.29	0.28	0.66	-0.05	0.61	-0.76	0.96
Maximum	13.99	11.77	9.54	12.82	8.16	13.98	18.42
Minimum	-14.45	-10.69	-9.11	-12.52	-8.70	-8.54	-17.00
Range	28.43	22.45	18.65	25.34	16.86	22.52	35.42
Std. Dev.	6.57	5.20	4.47	6.00	3.12	5.85	7.04
CV	1,115	746	579	804	562	725	409
Skewness	0.06	-0.01	-0.15	0.03	-0.29	0.35	-0.10
Kurtosis	2.43	2.42	2.40	2.37	3.70	2.17	3.23
Jarque-Bera	0.69	0.68	0.91	0.79	1.67	1.67	0.19
Probability	0.71	0.71	0.64	0.67	0.43	0.43	0.91
Observation	48	48	48	48	48	34	48

Table 3 (cntd.)

	TYH	TZD	TZE	TZK	VEF	YAS	YAU
Mean	0.81	0.67	0.78	0.74	0.74	1.52	0.77
Median	0.40	0.00	-0.33	0.70	-0.34	1.98	0.40
Maximum	14.33	10.75	12.69	10.77	12.84	13.76	12.63
Minimum	-13.19	-7.22	-13.43	-6.89	-12.74	-10.91	-11.92
Range	27.52	17.97	26.13	17.67	25.58	24.67	24.55
Std. Dev.	6.00	4.55	6.02	3.39	5.96	5.12	5.82
CV	737	678	775	458	803	337	754
Skewness	-0.06	0.23	-0.02	0.21	0.00	-0.21	-0.04
Kurtosis	2.57	2.30	2.50	3.56	2.41	2.95	2.44
Jarque-Bera	0.39	1.42	0.50	0.98	0.70	0.34	0.63
Probability	0.82	0.49	0.78	0.61	0.70	0.84	0.73
Observation	48	48	48	48	48	48	48

	YDE	YDI	YDN	YEF	YHS
Mean	0.81	0.75	0.27	0.78	0.76
Median	0.13	0.63	-0.40	-0.08	-0.11
Maximum	12.41	13.73	9.70	12.88	12.86
Minimum	-11.74	-12.53	-7.61	-12.86	-11.42
Range	24.15	26.26	17.31	25.74	24.29
Std. Dev.	5.89	5.96	4.62	6.00	5.61
CV	725	799	1,715	773	738
Skewness	0.07	-0.06	0.23	-0.02	-0.03
Kurtosis	2.36	2.52	2.10	2.47	2.55
Jarque-Bera	0.87	0.48	1.01	0.58	0.42
Probability	0.65	0.79	0.60	0.75	0.81
Observation	48	48	24	48	48

Table 4 presents the descriptive statistics for market-risk premium, size, book-to-market and momentum factors which are constructed for Carhart Four-Factor Model along with their correlation matrix. As shown in Panel A, the average value of size factor is found as -0.08% while the average value of book-to-market factor loading is observed as 0.17% on a monthly basis. In the same period, the average value of momentum factor is equal to 79.9%. On the other hand, none of the variable pairs show statistically significant correlation except that SMB and HML factors are negatively correlated as depicted in Panel B. Underlying reason might be the possible negative correlation of market values of stocks in June 30 of year t and December 31 of year $t\text{-}1$. As market capitalization values in both dates are used to construct SMB and HML factors, correlation of market-caps over 6-month seems a reasonable determinant. However, as there is still no consensus for the threshold of variable correlation that can be interpreted as multicollinearity and full model of four-factor is required to be implemented, the relatively high correlation of SMB and HML factors is ignored.

Table 4: Descriptive Statistics and Correlation Matrix for Four-Factors

Panel A of this table shows the descriptive statistics of market risk premium calculated as the monthly excess return of BIST-All Index over TRIBOR as well as SMB, HML and WML factors over the period between July 2012 and June 2016. Coefficients of variation are not calculated for MRP and SMB due to negative means. Panel B exhibits the correlation matrix of the four factors. Correlation coefficient of each variable pair is given in the first row while the associated p-value is presented in the parentheses in the second row. Correlation coefficients with an asterisk (*) are statistically significant at 95% confidence level.

Panel A: Descriptive Statistics for Four Factors

	MRP	SMB	HML	WML
Mean	-0.10	-0.08	0.17	79.92
Median	0.07	-0.30	1.04	78.07
Maximum	11.34	16.55	9.96	114.95
Minimum	-11.43	-5.17	-30.68	51.84
Range	22.77	21.73	40.65	63.11
Std. Dev.	5.66	3.89	6.28	15.08
CV	N/A	N/A	3,593.37	18.87
Skewness	-0.13	1.98	-2.68	0.38
Kurtosis	2.35	8.89	13.63	2.56
Jarque-Bera	0.96	100.62	283.37	1.56
Probability	0.62	0.00	0.00	0.46
Observation	48	48	48	48

Panel B: Correlation Matrix of Four-Factors

	MRP	SMB	HML	WML
MRP	1 -			
SMB	-0.19 (0.19)	1 -		
HML	0.04 (0.80)	-0.77 (0.00)*	1 -	
WML	-0.28 (0.06)	0.17 (0.25)	-0.28 (0.05)	1 -

Capital Markets Board of Turkey describes the mutual equity funds as the funds that are obliged to invest at least 80% of its portfolio holdings into the company shares listed in Borsa Istanbul (BIST) except for the shares of investment trusts as per Communique on Principles of Investment Funds dated July 9th 2013. As of June 2016, Table 5 summarizes the portfolio holdings for each sampled fund separately as well as the weighted average of entire sample. Accordingly, total gross asset value of sampled funds is equal to approximately 1.1 billion Turkish lira while the funds have invested 90.52% of its holdings into Turkish stocks on a weighted average basis. Though the asset allocation is various for sampled funds, reverse repo agreements are the second most common security in the aggregate portfolio. Equity funds have also investments in treasury bills and bonds, money market instruments, bonds issued by corporations and other securities.

Table 5: Asset Allocations of Equity Funds as of June 2016

This table presents the asset allocation of sampled funds for June 2016. The first six columns show the percentage values of each security held in the fund portfolio. The last column is for the gross asset values of funds in million Turkish Liras. The bottom row in the table includes the weighted average asset allocations in the first six columns and total gross asset value in the last column.

Code	Equity Fund Name	Stocks	T-Bills & Bonds	Reverse Repo	Money Market	C-Bonds	Other	GAV (mTL)
AKU	Ak AM BIST 30 Index Fund	88.95	1.34	0	7.46	0	2.25	41.8
ADP	Ak AM BIST Bank Index EF	90.33	0	0	9.67	0	0	7.4
ALC	Ak AM BIST Dividend 25 Index Fund	89.6	0	0	10.4	0	0	8.3
AK3	Ak AM EF	86.04	2.66	0	9.34	0	1.96	13.3
ACT	Alkhair AM Participation EF	90.02	0	0	0	9.98	0	3.0
ARC	Ashmore AM EF	95.63	0	0	2.34	0	2.03	7.8
GL1	Azimut AM First EF	87.54	0	0	0.4	0	12.06	7.1
GSP	Azimut AM Dividend Paying EF	90.91	0	0	1.99	0	7.1	12.5
BAA	Bizim AM Energy Industry Participation EF	100	0	0	0	0	0	0.6
BZI	Bizim AM Construction Industry Participation EF	100	0	0	0	0	0	0.4
BMH	Burgan AM EF	86.56	0	0	0	0	13.44	0.0
DZE	Deniz AM BIST 100 Index EF	92.27	0	0	7.73	0	0	7.8
DAH	Deniz AM EF	86.46	8.89	4.65	0	0	0	2.3
FYD	Finans AM First EF	84.94	0	14.12	0	0	0.94	8.5
FAF	Finans AM Second EF	95.88	0	2.86	0	0	1.26	5.0
ASA	Fokus AM EF	96.86	0	0	1.05	0	2.09	1.4
GAE	Garanti AM BIST 30 Index EF	93.62	0	6.38	0	0	0	32.4
GHS	Garanti AM EF	88.11	0	11.06	0	0	0.83	14.4
GAF	Gedik AM First EF	80.99	0	0	17.45	0	1.56	1.0
GMR	Gedik AM Second EF	95.52	0	0	2.84	0	1.64	5.0
EC2	Global MD AM First EF	93.64	0	2.67	0	0	3.69	1.1
ECH	Global MD AM Second EF	85.27	0	8.81	0	0	5.92	1.2
HAF	Halk AM EF	95.21	0	4.77	0	0	0.02	6.4

Table 5 (cntd.)

Code	Equity Fund Name	Stocks	T-Bills & Bonds	Reverse Repo	Money Market	C-Bonds	Other	GAV (mTL)
HBU	HSBC AM BIST 30 Index EF	98.43	0	1.07	0	0	0.5	16.7
HVS	HSBC AM EF	96.71	0	1.66	0	0	1.63	11.4
IGH	ING AM First EF	89.48	1.43	0	9.09	0	0	6.7
IYD	Is AM Second EF	88.21	0	10.07	0	0	1.72	50.3
ACK	Istanbul AM EF	81.71	10.95	0	2.3	0	5.04	9.0
TIE	Is AM BIST 30 Index EF	94.47	0	5.53	0	0	0	36.3
TAU	Is AM BIST Financial Index EF	94.94	0	5.06	0	0	0	22.2
TTE	Is AM BIST Technology Index EF	94.69	0	5.31	0	0	0	33.1
TI2	Is AM EF	89.03	0	8.77	0	0	2.2	19.5
TI3	Is AM Isbank Subsidiaries EF	94.77	0	5.23	0	0	0	60.6
TAP	Is AM Privia Banking Private EF	94.37	0	2.57	0	0	3.06	8.4
TPR	Is AM Private EF	87.79	0	7.54	0	0	4.67	40.6
KYA	Kare AM EF	84.22	0	0	3.88	4.02	7.88	12.8
MAC	Marmara Capital AM EF	98.93	0	0	1.07	0	0	28.3
EID	Qinvest AM EF	91.76	0	8.24	0	0	0	2.3
SKH	Seker AM EF	92.12	0	7.88	0	0	0	1.8
TKF	Tacirler AM EF	77.95	0	0	12.03	0	10.02	2.5
TYH	TEB AM EF	87.54	0	7.87	1.89	0	2.7	6.3
VEF	Vakif AM BIST 30 Index EF	87.25	0	10.72	0	2.03	0	4.8
YAU	Yapı Kredi AM ISE 100 Index EF	94	0	6	0	0	0	14.9
YEF	Yapı Kredi AM ISE 30 Index EF	91.26	0	8.74	0	0	0	18.5
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	94.56	0	5.44	0	0	0	7.8
YHS	Yapı Kredi AM First EF	91.63	0	4.33	0	0	4.04	21.5
YDI	Yapı Kredi AM Second EF	94.38	0	3.09	0	0	2.53	13.6

Table 5 (cntd.)

Code	Equity Fund Name	Stocks	T-Bills & Bonds	Reverse Repo	Money Market	C-Bonds	Other	GAV (mTL)
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	88.74	0	8.04	0	2.69	0.53	447.2
YDN	Yapı Kredi AM DPM Private EF	92.41	0	0	5.54	0	2.05	1.6
TZE	Ziraat AM BIST 30 Index EF	89.23	0	0.33	9.88	0	0.56	7.8
TZD	Ziraat AM EF	88.51	0	0.84	9.18	0	1.47	1.1
TZK	Ziraat AM Dividend Paying Companies EF	90.82	0	8.23	0	0	0.95	1.6
	Aggregated	90.52	0.20	5.99	0.94	1.18	1.17	1,098.2

4.2 Empirical Results for Single-Factor Capital Asset Pricing Model

The results for the performance of fifty-two mutual equity funds analyzed by employing the single-factor Capital Asset Pricing Model are presented in this section. As per the methodology described in Chapter 3, excess returns of individual funds, calculated as the gross return minus risk-free rate, are regressed on the market risk premium for the period they are analyzed. Table 6 provides regression results for single-factor CAPM.

Jensen's alpha, as the primary interest of the model and the study, varies between 1.20% (MAC - Marmara Capital Equity Fund) and -0.20% (BAA – Bizim Asset Management Energy Industry Participation Equity Fund). The former is likely to be located on the marginal edge due to having less than 48-month historical data. Noting that, TTE (Is Asset Management BIST Technology Index Equity Fund) is the top performer among funds with 48-month history with alpha of 1.08%. In general, forty-two funds are able to generate a positive alpha yet only two of them is statistically significant at 95% confidence level. Putting differently, KYA (Kare Asset Management Equity Fund) and YAS (Yapı Kredi Asset Management Koc Holding Affiliate and Equity Fund) are the only funds that were able to provide a statistically greater return than BIST-All Index on a risk-adjusted basis. Furthermore ALC (Ak Asset Management BIST Dividend 25 Index Fund) and GMR (Gedik Asset Management Second Equity Fund) have a statistically significant positive alpha at 90% confidence level but it could be explained by the smaller number of return observations for both funds. CAPM results show that equity funds, on average, outperform the market by 21 basis points on a monthly basis. In this context, equity fund managers can be evaluated as successful in general however only two fund managers have stock selectivity skill as implied by the statistically significant Jensen's alpha at 5% significance level.

Market betas of all sampled funds are found statistically significant at 95% confidence level. The top and the bottom betas in the sample are 1.15 (HVS – HSBC Asset Management Equity Fund) and 0.22 (BAA – Bizim Asset

Management Energy Industry Participation Equity Fund) respectively. Presuming that the beta of the market equals one, coefficient tests conducted for the fund betas find that twenty-four betas are different than the market beta as shown in Appendix A. Only two of these funds have a statistically greater beta than the market where the remaining twenty-two funds have a beta less than one. Accordingly, the sampled equity mutual funds can be evaluated as defensive compared to the market.

Explanatory power of the CAPM is another concern for the performance evaluation of equity funds. On average, adjusted R^2 is equal to 80.8%, meaning that 80.8% of the variation in excess fund returns can be explained by the variation in the excess returns of BIST-All Index. Expectedly, market risk premium is said to be a highly strong variable to explain fund returns since sampled funds are equity funds that are obliged to invest minimum 80% of their holding into Turkish equities. The highest adjusted R^2 observed in the sample is equal to 93.1% and belongs to YDN (Yapi Kredi Asset Management DPM Equity Private Fund) where BAA (Bizim Asset Management Energy Industry Participation Equity Fund) has the lowest as 25.1%. Reminding YDN has a shorter history than the others, HBU (HSBC Asset Management BIST-30 Index Equity Fund) attracts attention with adjusted R^2 value of 92.4%, among the funds which has 48-month observation. On the other hand, F-tests in all regressions have a p-value of less than 0.01, implying that all constructed models are statistically significant at 99% confidence level.

Overall, regression results based on single-factor CAPM show that only two equity funds outperform the market yet none of the funds perform significantly poorer than it. Accordingly, managers of KYA (Kare Asset Management Equity Fund) and YAS (Yapı Kredi Asset Management Koc Holding Affiliate and Equity Fund) can be assumed to be having skill at 95% confidence level.

Table 6: Regression Results of Single-Factor CAPM

This table presents the regression results of single-factor CAPM for fifty-two equity funds over the period between July 2012 and June 2016. In the first two columns, R^2 and adjusted R^2 values are shown. F-stat is the overall F-statistic for the regression. α is Jensen's alpha while β is the market beta of the related fund. The values in parenthesis are p-values of F-stat, α, and β. The last column shows the number of observations. Alphas that are significant at 90% level are presented in bold and those significant at 95% level are presented in bold with an asterisk (*).

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	#
ACK	Istanbul AM EF	66.2%	65.5%	90.3 (0.00)	-0.05 (0.82)	0.37 (0.00)	48
ACT	Alkhair AM Participation EF	74.6%	74.0%	135.0 (0.00)	0.20 (0.53)	0.68 (0.00)	48
ADP	Ak AM BIST Bank Index EF	88.3%	88.0%	346.9 (0.00)	-0.11 (0.70)	0.96 (0.00)	48
AK3	Ak AM EF	90.3%	90.1%	428.3 (0.00)	-0.01 (0.97)	0.92 (0.00)	48
AKU	Ak AM BIST 30 Index Fund	92.4%	92.2%	558.8 (0.00)	0.19 (0.44)	1.02 (0.00)	48
ALC	Ak AM BIST Dividend 25 Index Fund	86.4%	85.9%	208.8 (0.00)	**0.71** (0.08)	0.97 (0.00)	35
ARC	Ashmore AM EF	85.1%	84.5%	154.2 (0.00)	0.05 (0.89)	0.96 (0.00)	29
ASA	Fokus AM EF	68.7%	68.0%	100.9 (0.00)	0.12 (0.75)	0.68 (0.00)	48
BAA	Bizim AM Energy Industry Participation EF	26.7%	25.1%	16.8 (0.00)	-0.20 (0.68)	0.34 (0.00)	48
BMH	Burgan AM EF	81.7%	81.3%	205.0 (0.00)	0.22 (0.48)	0.80 (0.00)	48
BZI	Bizim AM Construction Industry Participation EF	70.9%	70.3%	112.0 (0.00)	0.39 (0.44)	0.95 (0.00)	48
DAH	Deniz AM EF	87.9%	87.6%	333.2 (0.00)	0.13 (0.66)	0.97 (0.00)	48
DZE	Deniz AM BIST 100 Index EF	91.6%	91.5%	504.7 (0.00)	0.16 (0.53)	1.03 (0.00)	48
EC2	Global MD AM First EF	88.5%	88.3%	354.3 (0.00)	-0.15 (0.55)	0.85 (0.00)	48
ECH	Global MD AM Second EF	85.9%	85.6%	279.7 (0.00)	-0.19 (0.45)	0.76 (0.00)	48
EID	Qinvest AM EF	70.9%	70.2%	112.0 (0.00)	0.19 (0.57)	0.61 (0.00)	48

Table 6 (cntd.)

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	#
FAF	Finans AM Second EF	87.9%	87.6%	333.3 (0.00)	0.30 (0.33)	0.98 (0.00)	48
FYD	Finans AM First EF	78.8%	78.3%	170.8 (0.00)	0.38 (0.34)	0.92 (0.00)	48
GAE	Garanti AM BIST 30 Index EF	92.3%	92.2%	555.0 (0.00)	0.13 (0.62)	1.06 (0.00)	48
GAF	Gedik AM First EF	74.3%	73.7%	132.9 (0.00)	0.23 (0.54)	0.77 (0.00)	48
GHS	Garanti AM EF	88.7%	88.4%	360.4 (0.00)	0.29 (0.31)	0.98 (0.00)	48
GL1	Azimut AM First EF	58.7%	57.8%	65.5 (0.00)	0.32 (0.47)	0.63 (0.00)	48
GMR	Gedik AM Second EF	62.5%	61.5%	68.2 (0.00)	**0.96** (0.07)	0.75 (0.00)	43
GSP	Azimut AM Dividend Paying EF	53.7%	52.7%	53.4 (0.00)	0.31 (0.32)	0.40 (0.00)	48
HAF	Halk AM EF	89.1%	88.8%	375.3 (0.00)	0.17 (0.56)	1.00 (0.00)	48
HBU	HSBC AM BIST 30 Index EF	92.5%	92.4%	570.5 (0.00)	0.09 (0.70)	1.03 (0.00)	48
HVS	HSBC AM EF	91.2%	91.1%	479.6 (0.00)	0.27 (0.36)	1.15 (0.00)	48
IGH	ING AM First EF	86.8%	86.5%	301.9 (0.00)	-0.01 (0.97)	0.91 (0.00)	48
IYD	Is AM Second EF	88.9%	88.7%	368.6 (0.00)	-0.02 (0.95)	0.87 (0.00)	48
KYA	Kare AM EF	87.6%	87.4%	326.5 (0.00)	**0.80*** (0.02)	1.05 (0.00)	48
MAC	Marmara Capital AM EF	46.2%	44.2%	23.2 (0.00)	1.20 (0.15)	0.79 (0.00)	29
SKH	Seker AM EF	89.8%	89.5%	403.0 (0.00)	0.01 (0.95)	0.78 (0.00)	48
TAP	Is AM Privia Banking Private EF	91.1%	90.9%	470.7 (0.00)	0.12 (0.60)	0.88 (0.00)	48
TAU	Is AM BIST Financial Index EF	89.8%	89.6%	406.0 (0.00)	-0.02 (0.94)	1.10 (0.00)	48
TI2	Is AM EF	90.2%	90.0%	423.4 (0.00)	0.06 (0.79)	0.88 (0.00)	48

Table 6 (cntd.)

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	#
TI3	Is AM Isbank Subsidiaries EF	72.3%	71.7%	119.8 (0.00)	0.12 (0.73)	0.68 (0.00)	48
TIE	Is AM BIST 30 Index EF	92.0%	91.8%	529.0 (0.00)	0.13 (0.61)	1.02 (0.00)	48
TKF	Tacirler AM EF	66.3%	65.6%	90.6 (0.00)	-0.12 (0.65)	0.45 (0.00)	48
TPR	Is AM Private EF	93.2%	93.0%	437.4 (0.00)	0.17 (0.52)	0.99 (0.00)	34
TTE	Is AM BIST Technology Index EF	38.9%	37.6%	29.3 (0.00)	1.08 (0.18)	0.77 (0.00)	48
TYH	TEB AM EF	89.8%	89.6%	405.1 (0.00)	0.19 (0.49)	1.01 (0.00)	48
TZD	Ziraat AM EF	81.4%	81.0%	201.6 (0.00)	0.02 (0.94)	0.73 (0.00)	48
TZE	Ziraat AM BIST 30 Index EF	92.2%	92.0%	544.7 (0.00)	0.16 (0.52)	1.02 (0.00)	48
TZK	Ziraat AM Dividend Paying Companies EF	81.3%	80.9%	200.2 (0.00)	0.08 (0.72)	0.54 (0.00)	48
VEF	Vakif AM BIST 30 Index EF	92.1%	91.9%	533.4 (0.00)	0.12 (0.62)	1.01 (0.00)	48
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	80.7%	80.3%	192.2 (0.00)	**0.88*** (0.01)	0.81 (0.00)	48
YAU	Yapı Kredi AM ISE 100 Index EF	91.3%	91.1%	481.7 (0.00)	0.15 (0.55)	0.99 (0.00)	48
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	89.8%	89.5%	403.3 (0.00)	0.19 (0.49)	0.99 (0.00)	48
YDI	Yapı Kredi AM Second EF	89.4%	89.2%	389.6 (0.00)	0.12 (0.66)	1.00 (0.00)	48
YDN	Yapı Kredi AM DPM Private EF	93.4%	93.1%	309.5 (0.00)	0.12 (0.63)	0.93 (0.00)	24
YEF	Yapı Kredi AM ISE 30 Index EF	92.0%	91.8%	530.6 (0.00)	0.16 (0.53)	1.02 (0.00)	48
YHS	Yapı Kredi AM First EF	90.2%	90.0%	424.4 (0.00)	0.13 (0.60)	0.94 (0.00)	48
FUND	Average	81.2%	80.8%		0.21	0.86	

4.3 Empirical Results for Carhart Four-Factor Model

This section contains the regression results for Carhart Four-Factor Model for each equity fund. Excess monthly gross returns of funds are regressed on market risk premium as well as three factor loadings of SMB, HML and WML in a multiple-factor model. The construction of factors are explained in Chapter 3 per the methodologies developed in the papers of Fama and French (1992, 1993) and Carhart (1997). Table 7 illustrates the regression results in detail.

When CAPM is aggregated with additional three factors which are designed to capture further systematic risk of stocks, the most obvious finding is the dramatic decline in the fund alphas. Regression results for four-factor model show that only three funds that are EID (Qinvest Asset Management Equity Fund), TAU (Is Asset Management BIST Financial Index Equity Fund), and TZD (Ziraat Asset Management Equity Fund) have a positive alpha but none of them are significant even at 90% confidence level. At the same time, the number of funds with a statistically significant negative alpha rises to two at 95% confidence level. ASA (Fokus Asset Management Equity Fund) and FYD (Finans Asset Management First Equity Fund) are able to generate an alpha of -4.53% and -6.16% respectively in the analysis period. FYD's alpha is significant even at 99% confidence level. Furthermore, GMR (Gedik Asset Management Second Equity Fund), IGH (ING Asset Management First Equity Fund) and TTE (Is Asset Management BIST Technology Index Equity Fund) generate alphas which are significantly negative at 90% confidence level. The averaged alpha for all funds is equal to -1.67%, indicating that equity funds failed to provide a greater return despite the active management during the analysis period.

Betas on market risk premium and factor loadings show various results for sampled funds. Market betas of all funds are statistically different than zero at 99% confidence level while the average beta is equal to 0.90. Number of funds with a beta significantly greater than 1 is two but twenty-two betas are

significantly lower than the market beta as depicted in Appendix A. Hence, sampled funds can be evaluated as defensive in total. The first additional factor, SMB, of the model is found statistically significant and positive for only 5 funds at 99%, eleven funds at 95% and seventeen funds at 90% confidence level. Sixteen of these funds have concentrated their holdings into small or mid-cap stocks for most of the periods; hence positive beta on SMB factor is comprehensible. Number of funds with a statistically significant beta on HML factor is observed as sixteen, twenty-four, and thirty at 99%, 95% and 90% confidence levels respectively. Lastly, only one fund has a statistically significant coefficient on momentum factor at 99% confidence level while the number rises to five and eight at 95% and 90% confidence levels respectively.

Average adjusted R^2 produced by Carhart Four-Factor Model for all funds is equal to 82.6%, which is higher by 1.8% than CAPM. The increase in the adjusted R^2 despite additional three variables reveals the higher explanatory power of four-factor model for the performance evaluation of funds. It is even more pronounced at individual fund level since forty-six regressions have a greater adjusted R^2 in four-factor model than CAPM. YDN (Yapi Kredi Asset Management DPM Equity Private Fund) and BAA (Bizim Asset Management Energy Industry Participation Equity Fund) protect their titles from CAPM with regard to adjusted R^2. Similarly, HBU (HSBC Asset Management BIST-30 Index Equity Fund) still has the highest adjusted R^2, among the funds which have 48-month observation. On the other hand, all regressions are found statistically significant at 99% confidence level.

Implementation of Carhart Four-Factor Model results in observable decline in the level of alphas. Unlike in CAPM, none of the funds manage to outperform the market while two funds, which are ASA (Fokus Asset Management Equity Fund) and FYD (Finans Asset Management First Equity Fund), stand out with their statistically lower performance at 95% confidence level. Besides explanatory power of the model is higher than CAPM even though additional three factors are augmented.

Table 7: Regression Results of Carhart Four-Factor Model

This table presents the regression results of Carhart Four-Factor Model implemented for sampled equity funds over the period between July 2012 and June 2016. In the first and second columns, R^2 and adjusted R^2 values are shown. F-stat is the overall F-statistic for the regression. α is Jensen's alpha while β is the market beta of the related fund. SMB, HML and WML are the betas on size, book-to-market and momentum factors respectively. The values in parenthesis are p-values of F-stat, α, β, SMB, HML and WML. The last column shows the number of monthly observations. Alphas that are significant at 90% level are presented in bold and those significant at 95% level are presented in bold with an asterisk (*) and those significant at 99% level are presented in bold with two asterisks (**).

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	SMB	HML	WML	#
ACK	Istanbul AM EF	69.0%	66.2%	24.0	-1.06	0.39	0.11	0.11	0.01	48
				(0.00)	(0.42)	(0.00)	(0.26)	(0.06)	(0.44)	
ACT	Alkhair AM Participation EF	76.3%	74.1%	34.7	-2.98	0.72	0.08	0.10	0.04	48
				(0.00)	(0.13)	(0.00)	(0.55)	(0.28)	(0.11)	
ADP	Ak AM BIST Bank Index EF	90.3%	89.4%	99.6	-0.13	0.98	0.14	0.18	0.00	48
				(0.00)	(0.94)	(0.00)	(0.24)	(0.02)	(1.00)	
AK3	Ak AM EF	92.1%	91.4%	126.1	-1.16	0.95	0.17	0.19	0.01	48
				(0.00)	(0.41)	(0.00)	(0.10)	(0.00)	(0.41)	
AKU	Ak AM BIST 30 Index Fund	93.0%	92.4%	143.2	-0.38	1.02	0.02	0.09	0.01	48
				(0.00)	(0.79)	(0.00)	(0.85)	(0.18)	(0.70)	
ALC	Ak AM BIST Dividend 25 Index Fund	87.4%	85.7%	52.0	-2.18	1.00	0.07	0.11	0.04	35
				(0.00)	(0.34)	(0.00)	(0.65)	(0.28)	(0.20)	
ARC	Ashmore AM EF	89.6%	87.9%	51.9	-2.17	1.09	0.38	0.30	0.03	29
				(0.00)	(0.29)	(0.00)	(0.02)	(0.00)	(0.28)	
ASA	Fokus AM EF	76.3%	74.1%	34.5	**-4.53***	0.76	0.41	0.31	0.06	48
				(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.02)	
BAA	Bizim AM Energy Industry Participation EF	29.9%	23.4%	4.6	-3.24	0.37	0.05	0.12	0.04	48
				(0.00)	(0.26)	(0.00)	(0.81)	(0.37)	(0.28)	
BMH	Burgan AM EF	82.9%	81.3%	52.2	-1.01	0.82	0.14	0.14	0.02	48
				(0.00)	(0.59)	(0.00)	(0.31)	(0.09)	(0.51)	

Table 7 (cntd.)

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	SMB	HML	WML	#
BZI	Bizim AM Construction Industry Participation EF	75.0%	72.6%	32.2 (0.00)	-3.69 (0.21)	1.02 (0.00)	0.37 (0.08)	0.33 (0.01)	0.05 (0.16)	48
DAH	Deniz AM EF	90.9%	90.0%	107.1 (0.00)	-2.38 (0.14)	1.02 (0.00)	0.24 (0.04)	0.26 (0.00)	0.03 (0.12)	48
DZE	Deniz AM BIST 100 Index EF	92.2%	91.5%	126.7 (0.00)	-0.67 (0.67)	1.05 (0.00)	0.08 (0.48)	0.11 (0.13)	0.01 (0.59)	48
EC2	Global MD AM First EF	89.3%	88.3%	90.0 (0.00)	-1.23 (0.42)	0.87 (0.00)	0.12 (0.26)	0.12 (0.08)	0.01 (0.47)	48
ECH	Global MD AM Second EF	89.2%	88.2%	88.7 (0.00)	-0.07 (0.96)	0.77 (0.00)	0.16 (0.10)	0.19 (0.00)	0.00 (0.92)	48
EID	Qinvest AM EF	75.5%	73.3%	33.2 (0.00)	1.08 (0.56)	0.63 (0.00)	0.33 (0.02)	0.20 (0.02)	-0.01 (0.62)	48
FAF	Finans AM Second EF	89.6%	88.6%	92.2 (0.00)	-1.50 (0.39)	1.02 (0.00)	0.25 (0.04)	0.20 (0.01)	0.02 (0.30)	48
FYD	Finans AM First EF	84.8%	83.4%	60.2 (0.00)	**-6.16**** (0.00)	1.02 (0.00)	0.38 (0.01)	0.32 (0.00)	0.08 (0.00)	48
GAE	Garanti AM BIST 30 Index EF	92.9%	92.2%	140.8 (0.00)	-0.55 (0.71)	1.06 (0.00)	0.02 (0.84)	0.09 (0.20)	0.01 (0.65)	48
GAF	Gedik AM First EF	80.3%	78.5%	43.9 (0.00)	-1.79 (0.38)	0.83 (0.00)	0.40 (0.01)	0.33 (0.00)	0.02 (0.32)	48
GHS	Garanti AM EF	90.9%	90.1%	107.8 (0.00)	-1.50 (0.35)	1.02 (0.00)	0.22 (0.06)	0.23 (0.00)	0.02 (0.27)	48
GL1	Azimut AM First EF	65.2%	61.9%	20.1 (0.00)	-2.41 (0.34)	0.68 (0.00)	0.28 (0.12)	0.30 (0.01)	0.03 (0.28)	48

Table 7 (cntd.)

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	SMB	HML	WML	#
GMR	Gedik AM Second EF	78.2%	76.0%	34.2	**-5.04**	0.87	0.73	0.56	0.07	43
				(0.00)	(0.05)	(0.00)	(0.00)	(0.00)	(0.02)	
GSP	Azimut AM Dividend Paying EF	59.1%	55.2%	15.5	-1.31	0.40	-0.12	0.05	0.02	48
				(0.00)	(0.47)	(0.00)	(0.35)	(0.55)	(0.37)	
HAF	Halk AM EF	91.0%	90.1%	108.3	-1.31	1.03	0.18	0.21	0.02	48
				(0.00)	(0.42)	(0.00)	(0.13)	(0.01)	(0.37)	
HBU	HSBC AM BIST 30 Index EF	93.2%	92.5%	146.9	-0.93	1.03	-0.04	0.06	0.01	48
				(0.00)	(0.52)	(0.00)	(0.71)	(0.35)	(0.48)	
HVS	HSBC AM EF	92.6%	91.9%	134.1	-1.06	1.18	0.20	0.20	0.02	48
				(0.00)	(0.53)	(0.00)	(0.09)	(0.01)	(0.43)	
IGH	ING AM First EF	88.5%	87.5%	82.9	**-3.06**	0.96	0.20	0.17	0.04	48
				(0.00)	(0.08)	(0.00)	(0.10)	(0.03)	(0.08)	
IYD	Is AM Second EF	89.8%	88.8%	94.5	-0.90	0.88	0.06	0.11	0.01	48
				(0.00)	(0.56)	(0.00)	(0.58)	(0.12)	(0.56)	
KYA	Kare AM EF	91.7%	90.9%	118.2	-2.24	1.11	0.35	0.33	0.04	48
				(0.00)	(0.18)	(0.00)	(0.00)	(0.00)	(0.07)	
MAC	Marmara Capital AM EF	58.3%	51.4%	8.4	-7.49	1.06	0.53	0.49	0.11	29
				(0.00)	(0.10)	(0.00)	(0.15)	(0.03)	(0.06)	
SKH	Seker AM EF	90.5%	89.6%	102.3	-1.22	0.80	0.13	0.10	0.02	48
				(0.00)	(0.35)	(0.00)	(0.18)	(0.09)	(0.34)	
TAP	Is AM Privia Banking Private EF	91.7%	90.9%	118.6	-0.25	0.88	0.02	0.07	0.00	48
				(0.00)	(0.86)	(0.00)	(0.86)	(0.23)	(0.79)	
TAU	Is AM BIST Financial Index EF	90.8%	89.9%	106.2	0.30	1.11	0.13	0.15	0.00	48
				(0.00)	(0.87)	(0.00)	(0.31)	(0.07)	(0.85)	

Table 7 (cntd.)

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	SMB	HML	WML	#
TI2	Is AM EF	90.9%	90.1%	107.9	-0.63	0.88	0.04	0.09	0.01	48
				(0.00)	(0.66)	(0.00)	(0.73)	(0.16)	(0.63)	
TI3	Is AM Isbank Subsidiaries EF	75.0%	72.7%	32.2	-1.85	0.71	0.19	0.19	0.02	48
				(0.00)	(0.37)	(0.00)	(0.19)	(0.04)	(0.33)	
TIE	Is AM BIST 30 Index EF	92.5%	91.8%	132.9	-0.23	1.02	-0.01	0.07	0.00	48
				(0.00)	(0.88)	(0.00)	(0.92)	(0.33)	(0.82)	
TKF	Tacirler AM EF	71.1%	68.4%	26.5	-1.66	0.48	0.23	0.18	0.02	48
				(0.00)	(0.27)	(0.00)	(0.04)	(0.01)	(0.31)	
TPR	Is AM Private EF	93.8%	93.0%	110.2	-1.33	1.02	0.08	0.10	0.02	34
				(0.00)	(0.39)	(0.00)	(0.47)	(0.14)	(0.32)	
TTE	Is AM BIST Technology Index EF	61.2%	57.6%	17.0	**-7.63**	1.00	1.33	0.71	0.11	48
				(0.00)	(0.06)	(0.00)	(0.00)	(0.00)	(0.03)	
TYH	TEB AM EF	91.6%	90.9%	117.7	-0.65	1.04	0.21	0.21	0.01	48
				(0.00)	(0.68)	(0.00)	(0.07)	(0.01)	(0.60)	
TZD	Ziraat AM EF	82.3%	80.6%	49.9	0.95	0.71	-0.04	0.04	-0.01	48
				(0.00)	(0.58)	(0.00)	(0.78)	(0.64)	(0.58)	
TZE	Ziraat AM BIST 30 Index EF	92.8%	92.1%	137.6	-0.03	1.03	0.03	0.08	0.00	48
				(0.00)	(0.99)	(0.00)	(0.80)	(0.21)	(0.90)	
TZK	Ziraat AM Dividend Paying Companies EF	82.2%	80.6%	49.8	-0.60	0.54	-0.08	0.00	0.01	48
				(0.00)	(0.64)	(0.00)	(0.36)	(0.98)	(0.60)	
VEF	Vakif AM BIST 30 Index EF	92.6%	91.9%	134.3	-0.44	1.02	0.01	0.08	0.01	48
				(0.00)	(0.77)	(0.00)	(0.94)	(0.26)	(0.71)	
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	83.1%	81.5%	52.8	-3.18	0.87	0.19	0.11	0.05	48
				(0.00)	(0.10)	(0.00)	(0.16)	(0.22)	(0.04)	

Table 7 (cntd.)

Code	Equity Fund	R^2	Adj. R^2	F-stat	α	β	SMB	HML	WML	#
YAU	Yapı Kredi AM ISE 100 Index EF	92.0%	91.3%	123.6 (0.00)	-0.65 (0.67)	1.00 (0.00)	0.07 (0.51)	0.11 (0.10)	0.01 (0.59)	48
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	90.4%	89.5%	101.6 (0.00)	-0.02 (0.99)	0.99 (0.00)	0.03 (0.82)	0.09 (0.23)	0.00 (0.90)	48
YDI	Yapı Kredi AM Second EF	91.4%	90.6%	114.0 (0.00)	-1.15 (0.47)	1.03 (0.00)	0.22 (0.06)	0.21 (0.00)	0.02 (0.42)	48
YDN	Yapı Kredi AM DPM Private EF	94.3%	93.1%	78.2 (0.00)	-0.79 (0.62)	1.00 (0.00)	0.21 (0.11)	0.12 (0.11)	0.01 (0.56)	24
YEF	Yapı Kredi AM ISE 30 Index EF	92.6%	91.9%	134.8 (0.00)	-0.84 (0.57)	1.03 (0.00)	0.01 (0.90)	0.08 (0.22)	0.01 (0.50)	48
YHS	Yapı Kredi AM First EF	91.4%	90.6%	114.1 (0.00)	-1.91 (0.21)	0.97 (0.00)	0.08 (0.45)	0.13 (0.06)	0.03 (0.17)	48
FUND	Average	84.2%	82.6%		-1.67	0.90	0.18	0.18	0.02	

4.4 Empirical Results for APB-Augmented Model

This section presents the regression results for active-peer benchmark augmented model. As described in Chapter 3, active peer benchmarks are the average returns of equity funds pursuing the same market-cap strategy. Fund market-cap groups are revised semiannually based on the extent they mimic BIST-All Index through their stockholdings. After APBs are acquired, they were regressed as a separate fund on four factors of Carhart. Residuals and alphas produced by the regressions are further utilized to augment four-factor model for equity funds so that it can capture the unique manager skill that is uncorrelated with the average skill of the managers pursuing the same market-cap strategy.

Table 8 summarizes the semiannual market-cap groups of fifty-two equity funds based on the methodology mentioned in Chapter 3. As seen in Panel A, seventeen funds have been loyal to a single market-cap group through all periods they have existed. On the other hand, BMH (Burgan Asset Management Equity Fund) and SKH (Seker Asset Management Equity Fund) have been able to be the most volatile funds in terms of loyalty to a single market-cap group. Both funds have shifted their market-cap groups five times and tilted their portfolios to each of large, mid and small cap groups. Style shifts may be attributed to either style timing attempts of fund managers or a reaction to bad past performance and following the crowd according to Chan, Chen and Lakonishok (2002).

Panel B shows the number and percentage of funds in each market group over eight semiannual periods. Large-cap group always ranks first while small-cap group always has the minimum number of funds. Besides, it can be inferred from the table that there is a tendency among fund managers to tilt their portfolios to large-cap group over time. Taking the negative average SMB factor and poor performance of the market for the analysis period into account, it is understandable why many fund managers hold blue chips as opposed to small, unknown and risky companies.

Table 8: Market-cap Groups of Funds between July 2012 and June 2016

Panel A of this table presents the semiannually reviewed market-cap groups of sampled fifty-two equity funds per the methodology described in Chapter 3. The final column documents the number of group shifts. Panel B depicts the numbers and percentages of funds for each six-month period in each market-cap group. Groups in bold indicate that fund emerged after the beginning of that period.

Panel A

Code	Equity Fund	Jul - Dec 2012	Jan - Jun 2013	Jul - Dec 2013	Jan - Jun 2014	Jul - Dec 2014	Jan - Jun 2015	Jul - Dec 2015	Jan - Jun 2016	#
ACK	Istanbul AM EF	Small	Small	Mid	Mid	Mid	Mid	Small	Small	2
ACT	Alkhair AM Participation EF	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	0
ADP	Ak AM BIST Bank Index EF	Mid	Mid	Mid	Mid	Mid	Large	Large	Large	1
AK3	Ak AM EF	Mid	Mid	Mid	Mid	Mid	Large	Large	Mid	2
AKU	Ak AM BIST 30 Index Fund	Large	Large	Large	Large	Large	Large	Large	Large	0
ALC	Ak AM BIST Dividend 25 Index Fund	-	-	**Large**	Large	Large	Large	Large	Mid	1
ARC	Ashmore AM EF	-	-	-	**Large**	Large	Mid	Mid	Mid	1
ASA	Fokus AM EF	Small	Small	Small	Mid	Small	Small	Small	Large	3
BAA	Bizim AM Energy Industry Participation EF	Small	Mid	Small	Small	Small	Small	Small	Small	2
BMH	Burgan AM EF	Mid	Mid	Small	Large	Mid	Large	Large	Mid	5
BZI	Bizim AM Construction Industry Participation EF	Small	Small	Small	Small	Small	Small	Mid	Small	2
DAH	Deniz AM EF	Mid	Mid	Mid	Mid	Mid	Mid	Mid	Mid	0
DZE	Deniz AM BIST 100 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
EC2	Global MD AM First EF	Mid	Mid	Mid	Large	Large	Large	Large	Large	1
ECH	Global MD AM Second EF	Mid	Mid	Large	Large	Large	Mid	Large	Large	3
EID	Qinvest AM EF	Mid	Mid	Small	Mid	Mid	Mid	Mid	Small	3
FAF	Finans AM Second EF	Mid	Mid	Mid	Mid	Mid	Mid	Large	Mid	2
FYD	Finans AM First EF	Mid	Mid	Mid	Mid	Small	Small	Small	Mid	2
GAE	Garanti AM BIST 30 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
GAF	Gedik AM First EF	Small	Small	Mid	Small	Small	Small	Mid	Mid	3
GHS	Garanti AM EF	Large	Large	Large	Large	Mid	Mid	Mid	Large	2

Table 8 (cntd.)

Code	Equity Fund	Jul - Dec 2012	Jan - Jun 2013	Jul - Dec 2013	Jan - Jun 2014	Jul - Dec 2014	Jan - Jun 2015	Jul - Dec 2015	Jan - Jun 2016	#
GL1	Azimut AM First EF	Small	Small	Small	Mid	Large	Mid	Mid	Mid	3
GMR	Gedik AM Second EF	Small	Small	Small	Small	Small	Small	Small	Small	0
GSP	Azimut AM Dividend Paying EF	Small	Large	Mid	Mid	Large	Mid	Mid	Mid	4
HAF	Halk AM EF	Mid	Large	Large	Large	Large	Large	Mid	Mid	2
HBU	HSBC AM BIST 30 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
HVS	HSBC AM EF	Large	Mid	Mid	Large	Large	Large	Large	Large	2
IGH	ING AM First EF	Small	Small	Mid	Mid	Mid	Large	Large	Large	2
IYD	Is AM Second EF	Mid	Large	Mid	Large	Large	Large	Large	Large	3
KYA	Kare AM EF	Small	Small	Mid	Mid	Small	Small	Small	Mid	3
MAC	Marmara Capital AM EF	-	-	-	Small	Small	Small	Small	Small	0
SKH	Seker AM EF	Mid	Large	Mid	Mid	Mid	Large	Small	Mid	5
TAP	Is AM Privia Banking Private EF	Mid	Large	Large	Large	Large	Large	Large	Large	1
TAU	Is AM BIST Financial Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
TI2	Is AM EF	Mid	Large	Large	Large	Large	Large	Large	Large	1
TI3	Is AM Isbank Subsidiaries EF	Small	Small	Small	Small	Small	Small	Small	Small	0
TIE	Is AM BIST 30 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
TKF	Tacirler AM EF	Small	Small	Mid	Mid	Small	Small	Mid	Mid	3
TPR	Is AM Private EF	-	-	Large	Large	Large	Large	Large	Large	0
TTE	Is AM BIST Technology Index EF	Small	Mid	Mid	Mid	Mid	Mid	Mid	Mid	1
TYH	TEB AM EF	Large	Large	Large	Large	Large	Mid	Mid	Mid	1
TZD	Ziraat AM EF	Large	Mid	Large	Large	Large	Large	Mid	Large	4
TZE	Ziraat AM BIST 30 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
TZK	Ziraat AM Dividend Paying Companies EF	Large	Mid	Large	Large	Large	Mid	Mid	Large	4
VEF	Vakif AM BIST 30 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	Small	Small	Mid	Mid	Mid	Mid	Mid	Mid	1

Table 8 (cntd.)

Code	Equity Fund	Jul - Dec 2012	Jan - Jun 2013	Jul - Dec 2013	Jan - Jun 2014	Jul - Dec 2014	Jan - Jun 2015	Jul - Dec 2015	Jan - Jun 2016	#
YAU	Yapı Kredi AM ISE 100 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	Large	Large	Large	Large	Large	Large	Large	Mid	1
YDI	Yapı Kredi AM Second EF	Large	Large	Large	Large	Large	Large	Mid	Mid	1
YDN	Yapı Kredi AM DPM Private EF	-	-	-	-	Mid	Mid	Large	Mid	2
YEF	Yapı Kredi AM ISE 30 Index EF	Large	Large	Large	Large	Large	Large	Large	Large	0
YHS	Yapı Kredi AM First EF	Large	Large	Large	Large	Large	Large	Large	Large	0
Panel B										
	Large-cap Funds	18	21	23	28	28	27	26	24	
	Mid-cap Funds	15	15	18	17	14	15	17	21	
	Small-cap Funds	14	11	8	6	10	10	9	7	
	Large-cap Funds	38%	45%	47%	55%	54%	52%	50%	46%	
	Mid-cap Funds	32%	32%	37%	33%	27%	29%	33%	40%	
	Small-cap Funds	30%	23%	16%	12%	19%	19%	17%	13%	

Active peer benchmarks are formed through the equal-weighted monthly returns of funds following the same market-cap strategy. The regression results of four-factor model applied for active peer benchmarks are depicted in Table 9. When active peer benchmarks of large, mid and small-cap groups are regressed on four factors, it is observed that all models are statistically significant at 99% confidence level and adjusted R^2 values range through 92.2% and 80.4%.

None of the APBs manage to yield a significant alpha except for small-cap group at 90% level. Reminding that number of significant fund alphas produced by four-factor model is limited to two at 95% confidence level and APBs are the equally weighted average of excess returns of funds in the same market-cap group, it is not a surprise that APB alphas are not different than zero at 95% confidence level. Also, Turkish mutual equity funds exhibit a diminishing performance from large to small-cap group contrary to small-minus-big anomaly asserted by Fama & French (1992, 1993). Apart from alpha, all APBs have a statistically significant beta on market risk premium like the equity funds. Betas on all three factor loadings are statistically significant for small APB but it is exactly the opposite for large APB. Moreover betas on size and book-to-market factors are found statistically significant for mid APB at 95% confidence level. Hence it can be said that when funds in the same APB group are aggregated, the significant betas on additional three factors tend to proportionally increase from individual fund level.

Table 9: Regression Results of APBs for Carhart Four-Factor Model

This table presents the regression results of three APBs for Carhart Four-Factor Model over the period between July 2012 and June 2016. In the first and second columns, R^2 and adjusted R^2 values are shown. F-stat is the overall F-statistic for the regression. α is Jensen's alpha while β is the market beta of the related APB. SMB, HML and WML are the betas on size, book-to-market and momentum factors respectively. The values in parenthesis are p-values of F-stat, and equation coefficients. The last column shows the number of monthly observations. Alphas that are significant at 90% level are presented in bold.

APB	R^2	Adj. R^2	F-stat	α	β	SMB	HML	WML	#
Large	92.8%	92.2%	139.01	-0.63	0.97	0.06	0.12	0.01	48
			(0.00)	(0.65)	(0.00)	(0.51)	(0.06)	(0.57)	
Mid	91.7%	91.0%	119.22	-1.83	0.85	0.24	0.20	0.03	48
			(0.00)	(0.15)	(0.00)	(0.01)	(0.00)	(0.10)	
Small	82.1%	80.4%	49.19	**-3.43**	0.75	0.35	0.30	0.05	48
			(0.00)	(0.05)	(0.00)	(0.01)	(0.00)	(0.03)	

Generic three anomalies discussed by Fama & French (1992, 1993) and Carhart (1997) provide a great tool to explain the variation in stock/fund returns and expose manager skill. However, there might be still room for some unmodelled commonalities, which complicate the identification of skill among fund managers. Primarily, correlation of APB residuals from four-factor model could evidence these unmodelled commonalities as shown in Panel A of Table 10. Null of uncorrelated errors is rejected at 99% confidence level, meaning that even separate APB groups have commonalities that four-factor model fails to capture. Some may oppose by saying that it is natural to observe correlated residuals since thresholds to determine market-cap groups of funds are assigned arbitrarily and funds may hold both large and small-cap stocks in their portfolios. As a second evidence, correlation among fund residuals in all three models can be compared. If APBs constructed could really capture the unmodelled commonalities among funds, it would be expected to observe a major decrease in the number of significant and positive pairwise correlations after four-factor model is augmented with APB residuals. Panel B of Table 10 documents the percentage of statistically significant pairwise correlations of fund residuals from all three models. Number of significant

positive and negative pairwise correlations at 95% confidence level is divided by the total number of correlations which is 1326 (52*51/2). When classical CAPM is augmented with three additional factors, the percentage of significant and positive pairwise correlations of fund residuals are decreased by one-tenth of its prior level. Nonetheless, when APB residuals are involved, the percentage of significant and positive correlations is almost halved compared to four-factor model. Besides, the percentages of significant positive and negative correlations converge, resulting in a more balanced distribution of significant residual correlations. Collecting together, active peer benchmarks solve the problem of correlated errors both conceptually and methodologically.

Table 10: Correlations between APB and Fund Residuals

Panel A of this table shows correlation matrix of APB residuals from four factor model. Correlation coefficient of each variable pair is given in the first row while the associated p-value is presented in the parentheses in the second row. Coefficients with an asterisk (*) are statistically significant at 99% confidence level. Panel B exhibits the percentage of significant positive and negative residual correlations of funds produced through CAPM, Carhart Four-Factor Model and APB-Augmented Model at 95% confidence level.

Panel A: Correlation Matrix for APB Residuals from Four-Factor Model

	Large	Mid	Small
Large	1 -		
Mid	0.90* (0.00)	1 -	
Small	0.70* (0.00)	0.86* (0.00)	1 -

Panel B: Percentage of Significant Correlations among Fund Residuals

	CAPM	Four-Factor Model	ABP-Aug. Model
Positive	16.0%	14.4%	7.8%
Negative	1.1%	1.4%	6.6%

Providing solid evidence that active peer benchmark residuals substantially decrease the across-fund residual correlations and capture the commonalities unmodelled by four factors, APBs can be availed to evaluate fund performance. First stage of the analysis, the residuals obtained from the regressions of APBs are included as an orthogonal factor to Carhart Four-Factor Model. A radical change in the explanatory power of the regression is not anticipated because error terms are added not to capture an undiscovered anomaly but to capture the unexplained commonalities in the unsystematic-risk taking of funds sailing at the same APB group. Putting differently, adding APB residuals as a fifth factor aims to isolate the fund-specific unsystematic risk-taking. If APB residuals are successful at isolation, then alpha t-statistics of the funds are expected to approach the tails on either positive or negative side. Consequently, a greater concentration in significantly positive and negative alphas are assumed to be observed.

Table 11 presents the regression results for equity funds when APB-Augmented Model is implemented. Number of funds with a statistically significant positive alpha stays at zero even at 90% confidence level. It shows that equity fund managers fail to demonstrate any skill not just in Turkish equity fund universe, but also within the market-cap group they adhere. Despite being not significant, four equity funds including ADP (Ak Asset Management BIST Bank Index Equity Fund), EID (Qinvest Asset Management Equity Fund), TAU (Is Asset Management BIST Financial Index Equity Fund) and TZD (Ziraat Asset Management Equity Fund) have yielded a positive alpha. Unlike significant positive alphas, number of significant negative alphas largely grow at 95% confidence level upon the augmentation of fifth factor. Fifteen equity funds show a poorer performance compared to market, after controlling the commonalities in unsystematic-risk taking in respective market-cap group.

The number of significant betas on market risk premium does not change since it is already at highest level but significant betas on all of size, book-to-market and momentum factors soar with APB-Augmented Model. The increase

possibly relies on the addition of APB residuals as a separate factor. Once the common error terms of ABPs to which the funds belong are captured as a separate factor, the error terms in fund regressions diminish and the explanatory power and the number of significant size, book-to-market and momentum factors increase. More importantly, the coefficient of APB residual factor, λ is proven statistically significant for all sampled funds at 95% confidence level, meaning that the skills of all fund managers are correlated with their respective APB skill at varying degrees. Herding behavior might a possible explanation for that as the managers follow the crowd or past high performers. Also, limited number of investable equities in the large-cap group is likely to cause the correlation, noting that large-cap funds make up half of the sample. Furthermore it is found that the additional factor performs well in terms of capturing the commonalities in unsystematic risk-taking of sampled funds.

Adjusted R^2, on average, rises from 82.64% to 91.90% while all sampled funds have a greater adjusted R^2 than they have in Carhart Four-Factor Model. Even though a substantial increase is not expected, average adjusted R^2 grows substantially with augmented model that shows the effectiveness of both market-cap categorization of funds and the model. Rather than the variation in adjusted R^2, whether t-statistics of alpha coefficients approach the tails is the primary interest. It is found that forty-seven out of fifty-two equity funds have a greater t-stat in absolute value, showing the adequacy of APB factor. Furthermore, fourteen funds that have stuck with a single market-cap group and have 48-month historical data generates zero alpha as expected since their returns were regressed on the residual series of a single APB. Overall, APB-Augmented Model can be evaluated as successful at controlling the average idiosyncratic risk taking of funds competing in the same market-cap group.

Table 11: Regression Results of APB-Augmented Model

This table presents the regression results of APB-Augmented Model implemented for sampled equity funds over the period between July 2012 and June 2016. In the first and second columns, R^2 and adjusted R^2 values are shown. F-stat is the overall F-statistic for the regression. α is Jensen's alpha while β is the market beta of the related fund. SMB, HML and WML are the betas on size, book-to-market and momentum factors respectively. λ shows the coefficient of APB residuals. The values in parenthesis are p-values of F-stat, α, β, SMB, HML, WML and λ. The last column shows the number of monthly observations. Alphas that are significant at 90% level are presented in bold and those significant at 95% level are presented in bold with an asterisk (*) and those significant at 99% level are presented in bold with two asterisks (**).

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
ACK	Istanbul AM EF	79.0%	76.4%	31.5	-1.11	0.39	0.15	0.13	0.01	0.51	48
				(0.00)	(0.31)	(0.00)	(0.06)	(0.01)	(0.32)	(0.00)	
ACT	Alkhair AM Participation EF	91.8%	90.8%	93.6	**-2.98***	0.72	0.08	0.10	0.04	1.26	48
				(0.00)	(0.01)	(0.00)	(0.32)	(0.07)	(0.01)	(0.00)	
ADP	Ak AM BIST Bank Index EF	95.8%	95.3%	192.5	0.58	0.98	0.12	0.18	-0.01	1.03	48
				(0.00)	(0.60)	(0.00)	(0.12)	(0.00)	(0.52)	(0.00)	
AK3	Ak AM EF	97.7%	97.5%	364.7	-0.64	0.94	0.17	0.19	0.01	0.94	48
				(0.00)	(0.40)	(0.00)	(0.00)	(0.00)	(0.44)	(0.00)	
AKU	Ak AM BIST 30 Index Fund	99.6%	99.5%	2,023.8	-0.38	1.02	0.02	0.09	0.01	1.02	48
				(0.00)	(0.29)	(0.00)	(0.45)	(0.00)	(0.12)	(0.00)	
ALC	Ak AM BIST Dividend 25 Index Fund	95.4%	94.6%	119.3	**-2.39**	0.98	0.11	0.14	0.04	1.18	35
				(0.00)	(0.09)	(0.00)	(0.25)	(0.02)	(0.03)	(0.00)	
ARC	Ashmore AM EF	96.1%	95.2%	113.1	-1.94	1.00	0.28	0.25	0.02	0.98	29
				(0.00)	(0.13)	(0.00)	(0.01)	(0.00)	(0.11)	(0.00)	
ASA	Fokus AM EF	87.6%	86.1%	59.2	**-4.12****	0.76	0.40	0.30	0.05	0.97	48
				(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
BAA	Bizim AM Energy Industry Participation EF	62.4%	57.9%	13.9	-3.05	0.37	0.04	0.11	0.04	1.14	48
				(0.00)	(0.15)	(0.00)	(0.80)	(0.26)	(0.16)	(0.00)	

Table 11 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
BMH	Burgan AM EF	89.5%	88.2%	71.4	-0.90	0.80	0.13	0.15	0.01	0.84	48
				(0.00)	(0.55)	(0.00)	(0.21)	(0.03)	(0.48)	(0.00)	
BZI	Bizim AM Construction Industry Participation EF	90.2%	89.0%	77.3	**-3.27**	1.03	0.28	0.29	0.04	1.35	48
				(0.00)	(0.08)	(0.00)	(0.04)	(0.00)	(0.06)	(0.00)	
DAH	Deniz AM EF	96.7%	96.3%	244.3	**-2.38***	1.02	0.24	0.26	0.03	1.02	48
				(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	
DZE	Deniz AM BIST 100 Index EF	99.4%	99.3%	1,389.0	-0.67	1.05	0.08	0.11	0.01	1.09	48
				(0.00)	(0.13)	(0.00)	(0.01)	(0.00)	(0.06)	(0.00)	
EC2	Global MD AM First EF	95.9%	95.4%	197.1	-1.10	0.87	0.11	0.12	0.01	0.91	48
				(0.00)	(0.25)	(0.00)	(0.09)	(0.01)	(0.31)	(0.00)	
ECH	Global MD AM Second EF	95.4%	94.9%	175.8	-0.30	0.79	0.19	0.20	0.00	0.81	48
				(0.00)	(0.74)	(0.00)	(0.00)	(0.00)	(0.88)	(0.00)	
EID	Qinvest AM EF	85.8%	84.1%	50.7	1.06	0.63	0.34	0.20	-0.01	0.83	48
				(0.00)	(0.45)	(0.00)	(0.00)	(0.00)	(0.53)	(0.00)	
FAF	Finans AM Second EF	95.6%	95.1%	182.8	-1.19	1.03	0.28	0.21	0.02	1.07	48
				(0.00)	(0.30)	(0.00)	(0.00)	(0.00)	(0.20)	(0.00)	
FYD	Finans AM First EF	93.0%	92.2%	112.2	**-5.99****	1.00	0.42	0.32	0.08	1.15	48
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
GAE	Garanti AM BIST 30 Index EF	99.7%	99.6%	2,525.1	**-0.55**	1.06	0.02	0.09	0.01	1.07	48
				(0.00)	(0.10)	(0.00)	(0.37)	(0.00)	(0.04)	(0.00)	
GAF	Gedik AM First EF	92.4%	91.4%	101.4	-1.45	0.84	0.31	0.29	0.02	1.04	48
				(0.00)	(0.26)	(0.00)	(0.00)	(0.00)	(0.23)	(0.00)	
GHS	Garanti AM EF	97.7%	97.5%	363.8	**-1.89***	1.02	0.22	0.23	0.03	1.04	48
				(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	

Table 11 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
GL1	Azimut AM First EF	79.0%	76.5%	31.5	-2.45	0.70	0.26	0.29	0.03	1.09	48
				(0.00)	(0.22)	(0.00)	(0.07)	(0.00)	(0.16)	(0.00)	
GMR	Gedik AM Second EF	95.6%	95.0%	160.6	**-4.95****	0.83	0.79	0.57	0.07	1.30	43
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
GSP	Azimut AM Dividend Paying EF	70.8%	67.4%	20.4	-1.01	0.40	-0.14	0.03	0.02	0.70	48
				(0.00)	(0.51)	(0.00)	(0.19)	(0.63)	(0.37)	(0.00)	
HAF	Halk AM EF	97.7%	97.5%	363.2	**-1.49**	1.02	0.18	0.21	0.02	1.02	48
				(0.00)	(0.08)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)	
HBU	HSBC AM BIST 30 Index EF	99.5%	99.5%	1,722.1	**-0.93***	1.03	-0.04	0.06	0.01	1.01	48
				(0.00)	(0.02)	(0.00)	(0.18)	(0.00)	(0.01)	(0.00)	
HVS	HSBC AM EF	97.9%	97.7%	400.7	-1.17	1.17	0.19	0.20	0.02	1.06	48
				(0.00)	(0.20)	(0.00)	(0.00)	(0.00)	(0.11)	(0.00)	
IGH	ING AM First EF	97.3%	97.0%	303.4	**-2.05***	0.98	0.17	0.17	0.02	1.16	48
				(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	
IYD	Is AM Second EF	97.8%	97.5%	365.3	-0.48	0.86	0.04	0.09	0.01	1.01	48
				(0.00)	(0.51)	(0.00)	(0.49)	(0.01)	(0.53)	(0.00)	
KYA	Kare AM EF	97.3%	96.9%	298.0	**-1.92**	1.11	0.37	0.34	0.03	0.96	48
				(0.00)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	
MAC	Marmara Capital AM EF	71.3%	65.1%	11.4	-6.31	0.93	0.42	0.44	0.09	1.20	29
				(0.00)	(0.11)	(0.00)	(0.17)	(0.03)	(0.05)	(0.00)	
SKH	Seker AM EF	95.2%	94.7%	167.8	-1.07	0.78	0.15	0.12	0.01	0.70	48
				(0.00)	(0.25)	(0.00)	(0.03)	(0.01)	(0.23)	(0.00)	
TAP	Is AM Privia Banking Private EF	99.4%	99.3%	1,308.2	-0.01	0.88	0.02	0.08	0.00	0.98	48
				(0.00)	(0.98)	(0.00)	(0.50)	(0.00)	(0.74)	(0.00)	

Table 11 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
TAU	Is AM BIST Financial Index EF	97.6%	97.3%	335.5	0.30	1.11	0.13	0.15	0.00	1.13	48
				(0.00)	(0.75)	(0.00)	(0.05)	(0.00)	(0.72)	(0.00)	
TI2	Is AM EF	99.3%	99.2%	1,132.0	-0.38	0.88	0.04	0.09	0.01	1.02	48
				(0.00)	(0.36)	(0.00)	(0.22)	(0.00)	(0.28)	(0.00)	
TI3	Is AM Isbank Subsidiaries EF	89.0%	87.7%	68.1	-1.85	0.71	0.19	0.19	0.02	0.89	48
				(0.00)	(0.18)	(0.00)	(0.06)	(0.00)	(0.15)	(0.00)	
TIE	Is AM BIST 30 Index EF	99.6%	99.6%	2,366.9	-0.23	1.02	-0.01	0.07	0.00	1.06	48
				(0.00)	(0.49)	(0.00)	(0.64)	(0.00)	(0.29)	(0.00)	
TKF	Tacirler AM EF	75.2%	72.2%	25.5	-1.40	0.48	0.21	0.17	0.02	0.41	48
				(0.00)	(0.33)	(0.00)	(0.04)	(0.01)	(0.37)	(0.01)	
TPR	Is AM Private EF	99.3%	99.1%	757.1	**-1.36***	1.02	0.10	0.12	0.02	0.97	34
				(0.00)	(0.02)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	
TTE	Is AM BIST Technology Index EF	67.9%	64.1%	17.8	**-7.20**	1.01	1.30	0.70	0.10	1.24	48
				(0.00)	(0.05)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	
TYH	TEB AM EF	98.6%	98.5%	608.3	**-1.35***	1.03	0.23	0.21	0.02	1.03	48
				(0.00)	(0.04)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	
TZD	Ziraat AM EF	91.8%	90.8%	93.7	0.44	0.72	-0.04	0.04	-0.01	0.94	48
				(0.00)	(0.72)	(0.00)	(0.60)	(0.45)	(0.73)	(0.00)	
TZE	Ziraat AM BIST 30 Index EF	99.5%	99.5%	1,824.7	-0.03	1.03	0.03	0.08	0.00	1.04	48
				(0.00)	(0.94)	(0.00)	(0.32)	(0.00)	(0.64)	(0.00)	
TZK	Ziraat AM Dividend Paying Companies EF	88.7%	87.4%	65.9	-1.07	0.55	-0.08	0.00	0.01	0.58	48
				(0.00)	(0.31)	(0.00)	(0.31)	(0.98)	(0.26)	(0.00)	
VEF	Vakif AM BIST 30 Index EF	99.7%	99.6%	2,450.5	-0.44	1.02	0.01	0.08	0.01	1.05	48
				(0.00)	(0.18)	(0.00)	(0.73)	(0.00)	(0.09)	(0.00)	

Table 11 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	91.5%	90.5%	90.4	**-3.00***	0.88	0.18	0.11	0.05	1.01	48
				(0.00)	(0.03)	(0.00)	(0.07)	(0.08)	(0.01)	(0.00)	
YAU	Yapı Kredi AM ISE 100 Index EF	99.8%	99.7%	3,431.5	**-0.65***	1.00	0.07	0.11	0.01	1.08	48
				(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	97.8%	97.5%	371.7	-0.16	0.98	0.04	0.10	0.00	1.04	48
				(0.00)	(0.84)	(0.00)	(0.45)	(0.01)	(0.72)	(0.00)	
YDI	Yapı Kredi AM Second EF	98.3%	98.1%	495.0	**-1.58***	1.02	0.21	0.22	0.02	1.01	48
				(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	
YDN	Yapı Kredi AM DPM Private EF	99.0%	98.7%	355.3	-0.69	0.94	0.17	0.11	0.01	0.87	24
				(0.00)	(0.32)	(0.00)	(0.00)	(0.00)	(0.30)	(0.00)	
YEF	Yapı Kredi AM ISE 30 Index EF	99.7%	99.6%	2,643.8	**-0.84****	1.03	0.01	0.08	0.01	1.06	48
				(0.00)	(0.01)	(0.00)	(0.55)	(0.00)	(0.00)	(0.00)	
YHS	Yapı Kredi AM First EF	99.2%	99.0%	979.9	**-1.91****	0.97	0.08	0.13	0.03	1.04	48
				(0.00)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	
FUND	Average	92.8%	91.9%		-1.57	0.89	0.18	0.18	0.02	1.00	

In the second stage of analysis, APB alphas are incorporated into four-factor model along with APB residuals so that it can better assess the differential performance of a fund apart from the alpha generated from the co-movement of funds in the same APB group. In that sense, the fund alphas are expected to approach zero in the alpha-adjusted model compared to Carhart Four-Factor Model if APB factor is successful at isolation of fund-specific unsystematic risk taking. For example, a fund manager that simply leverages the APB strategy rather than pursuing a unique strategy should generate zero alpha with this model. However, if the fund performance is independent of its APB performance, such drift is not expected to be observed. Besides, average alphas produced through alpha-adjusted model is expected to be less negative than augmented model because all APBs have negative alphas.

Regression results for alpha-adjusted model are summarized in Table 12. After ABP alphas are involved into the model, number of funds with a statistically significant and positive alpha rises to two at 95% confidence level. AK3 (Ak Asset Management Equity Fund) and TAP (Is Asset Management Privia Banking Private Equity Fund) generate alphas of 1.93% and 1.20% respectively. ADP (Ak Asset Management BIST Bank Index Equity Fund), EID (Qinvest Asset Management Equity Fund), TZE (Ziraat Asset Management BIST 30 Index Equity Fund) have also significant positive alphas at 90% confidence level. On the significantly negative alpha side, there is a small change, from three to four, in the number of funds from four-factor model at 95% confidence level. Alphas of ASA (Fokus Asset Management Equity Fund), GHS (Garanti Asset Management Equity Fund), FYD (Finans Asset Management Equity Fund), and YHS (Yapı Kredi Asset Management First Equity Fund) are significantly negative at 95% confidence level while the latter two are also negative at 99% confidence level. These funds can be declared as the worst performers in the sample even after controlling the common unsystematic risk-taking and the alpha produced by it.

In alpha-adjusted model, number of significant betas on SMB, HML and WML factors slightly decline compared to APB-Augmented Model. Probably, when

alpha related to co-movement of funds in the same group is inserted to model, it dissipates the exposure of a few funds to the factors. Meanwhile, all of coefficients on factor of APB ($\lambda+\alpha$) are still statistically significant at 95% confidence level, showing the achievement of factor to capture commonalities in unsystematic risk-taking of funds in their peer groups.

Level of adjusted R^2, on average, equals to 91% for sampled funds. In line with expectations, it is not far from the value created by APB-Augmented Model. On the other hand, the impact of both APB-augmented and alpha-adjusted models to alphas are outlined in the Table 13. When four-factor model is augmented with APB residuals, the expectation was the concentration of alphas on the tails. Since there is not a significant positive alpha in baseline four-factor model, the increase is observed for only significant negative alphas. In the second stage with APB alphas incorporated into the model, the fund alphas are anticipated to approach zero at varying degrees, depending on their correlation with the alpha produced by the co-movement of peers. Indeed, thirty-eight alphas approach zero and the percentage of non-significant positive and negative alphas increases from 71.2% to 88.5%, compared to APB-Augmented Model. Putting in a nutshell, those five fund managers that have significant positive alphas at varying confidence levels are evaluated to have skill and APB alpha-adjusted model provides a valuable tool to identify manager skill in the sampled mutual equity funds.

Table 12: Regression Results of APB Alpha-Adjusted Model

This table presents the regression results of APB alpha-adjusted model implemented for sampled equity funds over the period between July 2012 and June 2016. In the first and second columns, R^2 and adjusted R^2 values are shown. F-stat is the overall F-statistic for the regression. α is Jensen's alpha while β is the market beta of the related fund. SMB, HML and WML are the betas on size, book-to-market and momentum factors respectively. λ shows the coefficient of APB factor. The values in parenthesis are p-values of F-stat, α, β, SMB, HML, WML and λ. The last column shows the number of monthly observations. Alphas that are significant at 90% level are presented in bold and those significant at 95% level are presented in bold with an asterisk (*) and those significant at 99% level are presented in bold with two asterisks (**).

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
ACK	Istanbul AM EF	78.7%	76.2%	31.1	0.47	0.39	0.14	0.14	0.01	0.45	48
				(0.00)	(0.68)	(0.00)	(0.08)	(0.01)	(0.53)	(0.00)	
ACT	Alkhair AM Participation EF	91.8%	90.8%	93.6	-0.68	0.72	0.08	0.10	0.04	1.26	48
				(0.00)	(0.57)	(0.00)	(0.32)	(0.07)	(0.01)	(0.00)	
ADP	Ak AM BIST Bank Index EF	95.1%	94.5%	163.7	**2.41**	0.99	0.08	0.17	-0.02	0.89	48
				(0.00)	(0.06)	(0.00)	(0.34)	(0.00)	(0.27)	(0.00)	
AK3	Ak AM EF	97.5%	97.1%	321.4	**1.93***	0.94	0.12	0.18	-0.01	0.87	48
				(0.00)	(0.03)	(0.00)	(0.04)	(0.00)	(0.42)	(0.00)	
AKU	Ak AM BIST 30 Index Fund	99.6%	99.5%	2,023.8	0.26	1.02	0.02	0.09	0.01	1.02	48
				(0.00)	(0.46)	(0.00)	(0.45)	(0.00)	(0.12)	(0.00)	
ALC	Ak AM BIST Dividend 25 Index Fund	95.0%	94.1%	109.4	-0.39	0.98	0.08	0.13	0.03	1.12	35
				(0.00)	(0.79)	(0.00)	(0.43)	(0.04)	(0.16)	(0.00)	
ARC	Ashmore AM EF	96.0%	95.1%	110.6	-0.94	0.96	0.25	0.23	0.03	1.01	29
				(0.00)	(0.47)	(0.00)	(0.02)	(0.00)	(0.06)	(0.00)	
ASA	Fokus AM EF	86.5%	84.8%	53.6	**-4.10***	0.77	0.39	0.29	0.08	0.83	48
				(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
BAA	Bizim AM Energy Industry Participation EF	56.5%	51.3%	10.9	0.14	0.37	0.05	0.11	0.04	1.00	48
				(0.00)	(0.95)	(0.00)	(0.76)	(0.27)	(0.19)	(0.00)	

Table 12 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
BMH	Burgan AM EF	86.6%	85.0%	54.1	0.11	0.80	0.07	0.13	0.01	0.53	48
				(0.00)	(0.95)	(0.00)	(0.56)	(0.09)	(0.59)	(0.00)	
BZI	Bizim AM Construction Industry Participation EF	88.6%	87.2%	65.0	1.66	1.03	0.19	0.24	0.03	1.26	48
				(0.00)	(0.43)	(0.00)	(0.20)	(0.01)	(0.18)	(0.00)	
DAH	Deniz AM EF	96.7%	96.3%	244.3	-0.51	1.02	0.24	0.26	0.03	1.02	48
				(0.00)	(0.61)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	
DZE	Deniz AM BIST 100 Index EF	99.4%	99.3%	1,389.0	0.02	1.05	0.08	0.11	0.01	1.09	48
				(0.00)	(0.97)	(0.00)	(0.01)	(0.00)	(0.06)	(0.00)	
EC2	Global MD AM First EF	95.6%	95.1%	184.7	0.12	0.86	0.05	0.10	0.01	0.84	48
				(0.00)	(0.90)	(0.00)	(0.49)	(0.03)	(0.52)	(0.00)	
ECH	Global MD AM Second EF	93.9%	93.1%	128.5	0.17	0.79	0.15	0.18	0.00	0.68	48
				(0.00)	(0.87)	(0.00)	(0.05)	(0.00)	(0.71)	(0.00)	
EID	Qinvest AM EF	83.2%	81.2%	41.6	**3.04**	0.61	0.30	0.20	-0.02	0.67	48
				(0.00)	(0.06)	(0.00)	(0.01)	(0.01)	(0.37)	(0.00)	
FAF	Finans AM Second EF	94.6%	94.0%	148.2	0.86	1.03	0.22	0.18	0.01	0.94	48
				(0.00)	(0.52)	(0.00)	(0.02)	(0.00)	(0.42)	(0.00)	
FYD	Finans AM First EF	92.4%	91.4%	101.4	**-6.22****	1.02	0.50	0.34	0.11	1.02	48
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
GAE	Garanti AM BIST 30 Index EF	99.7%	99.6%	2,525.1	0.12	1.06	0.02	0.09	0.01	1.07	48
				(0.00)	(0.71)	(0.00)	(0.37)	(0.00)	(0.04)	(0.00)	
GAF	Gedik AM First EF	88.9%	87.6%	67.2	0.79	0.86	0.30	0.27	0.02	0.83	48
				(0.00)	(0.62)	(0.00)	(0.01)	(0.00)	(0.28)	(0.00)	
GHS	Garanti AM EF	97.5%	97.2%	328.8	**-2.79****	1.03	0.29	0.23	0.05	1.01	48
				(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Table 12 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
GL1	Azimut AM First EF	72.8%	69.6%	22.5	0.01	0.68	0.19	0.28	0.02	0.74	48
				(0.00)	(1.00)	(0.00)	(0.25)	(0.01)	(0.38)	(0.00)	
GMR	Gedik AM Second EF	95.6%	95.0%	160.6	-0.50	0.83	0.79	0.57	0.07	1.30	43
				(0.00)	(0.68)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
GSP	Azimut AM Dividend Paying EF	73.4%	70.2%	23.2	1.04	0.40	-0.18	0.02	0.01	0.70	48
				(0.00)	(0.50)	(0.00)	(0.08)	(0.74)	(0.72)	(0.00)	
HAF	Halk AM EF	97.1%	96.7%	280.6	0.13	1.02	0.18	0.22	0.01	0.93	48
				(0.00)	(0.90)	(0.00)	(0.01)	(0.00)	(0.28)	(0.00)	
HBU	HSBC AM BIST 30 Index EF	99.5%	99.5%	1,722.1	-0.29	1.03	-0.04	0.06	0.01	1.01	48
				(0.00)	(0.46)	(0.00)	(0.18)	(0.00)	(0.01)	(0.00)	
HVS	HSBC AM EF	97.9%	97.7%	401.2	-0.35	1.16	0.16	0.19	0.02	0.99	48
				(0.00)	(0.69)	(0.00)	(0.02)	(0.00)	(0.09)	(0.00)	
IGH	ING AM First EF	94.0%	93.3%	132.7	0.23	0.98	0.08	0.14	0.01	0.80	48
				(0.00)	(0.86)	(0.00)	(0.36)	(0.01)	(0.37)	(0.00)	
IYD	Is AM Second EF	96.5%	96.1%	234.3	0.66	0.86	-0.03	0.08	0.00	0.90	48
				(0.00)	(0.47)	(0.00)	(0.69)	(0.06)	(0.87)	(0.00)	
KYA	Kare AM EF	96.0%	95.6%	203.4	-1.31	1.12	0.37	0.33	0.05	0.78	48
				(0.00)	(0.27)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
MAC	Marmara Capital AM EF	71.3%	65.1%	11.4	-2.20	0.93	0.42	0.44	0.09	1.20	29
				(0.00)	(0.60)	(0.00)	(0.17)	(0.03)	(0.05)	(0.00)	
SKH	Seker AM EF	94.3%	93.6%	139.1	-0.11	0.79	0.19	0.14	0.01	0.51	48
				(0.00)	(0.91)	(0.00)	(0.01)	(0.00)	(0.31)	(0.00)	
TAP	Is AM Privia Banking Private EF	98.9%	98.8%	747.5	**1.20***	0.89	-0.03	0.06	0.00	0.95	48
				(0.00)	(0.02)	(0.00)	(0.48)	(0.01)	(0.50)	(0.00)	

Table 12 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
TAU	Is AM BIST Financial Index EF	97.6%	97.3%	335.5	1.01	1.11	0.13	0.15	0.00	1.13	48
				(0.00)	(0.29)	(0.00)	(0.05)	(0.00)	(0.72)	(0.00)	
TI2	Is AM EF	98.8%	98.6%	666.9	0.88	0.89	-0.01	0.08	0.00	0.99	48
				(0.00)	(0.11)	(0.00)	(0.80)	(0.00)	(0.93)	(0.00)	
TI3	Is AM Isbank Subsidiaries EF	89.0%	87.7%	68.1	1.20	0.71	0.19	0.19	0.02	0.89	48
				(0.00)	(0.40)	(0.00)	(0.06)	(0.00)	(0.15)	(0.00)	
TIE	Is AM BIST 30 Index EF	99.6%	99.6%	2,366.9	0.44	1.02	-0.01	0.07	0.00	1.06	48
				(0.00)	(0.18)	(0.00)	(0.64)	(0.00)	(0.29)	(0.00)	
TKF	Tacirler AM EF	76.1%	73.2%	26.7	-0.81	0.49	0.18	0.15	0.02	0.43	48
				(0.00)	(0.57)	(0.00)	(0.08)	(0.02)	(0.20)	(0.01)	
TPR	Is AM Private EF	99.3%	99.1%	757.1	-0.75	1.02	0.10	0.12	0.02	0.97	34
				(0.00)	(0.17)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	
TTE	Is AM BIST Technology Index EF	68.5%	64.8%	18.3	-3.89	1.02	1.22	0.67	0.09	1.23	48
				(0.00)	(0.31)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	
TYH	TEB AM EF	98.7%	98.5%	622.3	-1.05	1.02	0.28	0.22	0.03	1.01	48
				(0.00)	(0.11)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
TZD	Ziraat AM EF	90.9%	89.9%	84.3	0.83	0.72	0.00	0.06	0.00	0.84	48
				(0.00)	(0.51)	(0.00)	(0.98)	(0.29)	(0.99)	(0.00)	
TZE	Ziraat AM BIST 30 Index EF	99.5%	99.5%	1,824.7	**0.63**	1.03	0.03	0.08	0.00	1.04	48
				(0.00)	(0.10)	(0.00)	(0.32)	(0.00)	(0.64)	(0.00)	
TZK	Ziraat AM Dividend Paying Companies EF	87.9%	86.5%	61.2	-1.24	0.54	-0.05	0.00	0.02	0.53	48
				(0.00)	(0.26)	(0.00)	(0.51)	(0.93)	(0.09)	(0.00)	
VEF	Vakif AM BIST 30 Index EF	99.7%	99.6%	2,450.5	0.23	1.02	0.01	0.08	0.01	1.05	48
				(0.00)	(0.48)	(0.00)	(0.73)	(0.00)	(0.09)	(0.00)	

Table 12 (cntd.)

Code	Equity Fund	R^2	Adj.R^2	F-stat	α	β	SMB	HML	WML	λ	#
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	88.8%	87.5%	66.9	-0.74	0.88	0.13	0.09	0.04	0.79	48
				(0.00)	(0.65)	(0.00)	(0.26)	(0.22)	(0.04)	(0.00)	
YAU	Yapı Kredi AM ISE 100 Index EF	99.8%	99.7%	3,431.5	0.03	1.00	0.07	0.11	0.01	1.08	48
				(0.00)	(0.90)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	97.3%	97.0%	301.2	1.26	0.98	0.03	0.10	0.00	0.98	48
				(0.00)	(0.17)	(0.00)	(0.60)	(0.02)	(0.68)	(0.00)	
YDI	Yapı Kredi AM Second EF	98.0%	97.8%	421.7	-0.54	1.01	0.26	0.24	0.02	0.94	48
				(0.00)	(0.48)	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)	
YDN	Yapı Kredi AM DPM Private EF	98.1%	97.6%	190.4	0.78	0.95	0.11	0.07	0.00	0.73	24
				(0.00)	(0.42)	(0.00)	(0.15)	(0.12)	(0.68)	(0.00)	
YEF	Yapı Kredi AM ISE 30 Index EF	99.7%	99.6%	2,643.8	-0.17	1.03	0.01	0.08	0.01	1.06	48
				(0.00)	(0.59)	(0.00)	(0.55)	(0.00)	(0.00)	(0.00)	
YHS	Yapı Kredi AM First EF	99.2%	99.0%	979.9	**-1.25***	0.97	0.08	0.13	0.03	1.04	48
				(0.00)	(0.01)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	
FUND	Average	92.1%	91.0%		-0.16	0.89	0.16	0.17	0.02	0.92	

Table 13: Summary of Four Regressions Applied

This table summarizes the four models applied which are single-factor Capital Asset Pricing Model, Carhart Four-Factor Model, APB-Augmented Model, and APB alpha-adjusted model over the period between July 2012 and June 2016. Percentages in top eight rows show the number of significant coefficients at 95% confidence level for sampled fifty-two equity funds while the bottom row represents the averaged adjusted R^2 of sampled funds in each model.

	CAPM	Four-Factor Model	APB-Augmented Model	APB Alpha-Adjusted Model
Significant Positive α	3.8%	0.0%	0.0%	3.8%
Positive α	76.9%	5.8%	7.7%	53.8%
Negative α	19.2%	90.4%	63.5%	34.6%
Significant Negative α	0.0%	3.8%	28.8%	7.7%
Significant MRP	100.0%	100.0%	100.0%	100.0%
Significant SMB	-	21.2%	50.0%	40.4%
Significant HML	-	46.2%	88.5%	82.7%
Significant WML	-	9.6%	38.5%	32.7%
Significant λ	-	-	100.0%	100.0%
Average Adjusted R2	80.8%	82.6%	91.9%	91.0%

CHAPTER 5

CONCLUSION

Mutual funds are the main channel for individual investors to benefit from the expertise and skills of investment professionals so that they can achieve diversification and earn better returns. Mutual fund managers can follow active strategies by selecting assets that are expected to perform better than the market and by timing their transactions to realize higher returns. In academic discussions, the contribution of active management to mutual fund performance has been a pervasive issue, researched by several scholars starting from late 1960s.

In order to measure fund performance in a fair manner, most of the studies both in Turkey and the U.S. have focused on risk-adjusted single or multi-factor models. Alpha, which is the excess performance over a determined benchmark, and the power of applied models has been instrumental to explain the manager skills and variations in funds' return respectively. Majority of previous studies have agreed on the existence of some excess return which can be attributed to stock selectivity skill, at least in gross level before expenses. In terms of modelling, many researches have focused on explaining a higher portion of the variation in the returns of funds via either single or multiple-factor models. Subsequent to Fama & French (1992, 1993) and Carhart (1997)'s findings, multiple-factor models are more favored in the literature.

In evaluating manager skills, stockholdings characteristics have also been used in order to compare against better-matched benchmarks and evaluate

fund performance fairly along with the peers. In this thesis, APB-Augmented Model developed by Hunter et al. (2014) is utilized along with commonly used CAPM and Carhart Four-Factor Model to evaluate the performance of fifty-two equity mutual funds over the period between July 2012 and June 2016. In each model implemented, the presence of significant and positive alphas is attributed to the manager stock selectivity skill while the change in the level of adjusted R^2 is observed to measure the explanatory power of the fitted model.

The empirical results based on CAPM show that sampled mutual funds, on average, produce an alpha of 0.21%. Although the average alpha is positive, the number of funds with significant positive alphas is limited to two out of fifty-two equity funds at 95% confidence level. In that sense, those two managers can be considered to generate excess return at least before expenses. Moreover, market betas and constructed models are found significant for all regressions where the average adjusted R^2 is observed as 80.8%. Overall, market risk premium, standing alone, carries a great amount of power to explain variations in fund returns in Turkish capital markets.

When single-factor model is further augmented with three additional factors, empirical results drastically change. Based on the regressions made with Carhart Four-Factor Model, none of the managers produce excess return in the sample, and average alpha deteriorates to -1.67%. On top of it, two funds make an appearance with their significant and negative alphas at 95% confidence level. While all the models are statistically significant and adjusted R^2 level is slightly higher than CAPM, only CAPM beta is found to be significant for all funds considered, the size, book-to-market and momentum factors are found significant for less than half of the funds. Albeit increased explanatory power in the four-factor model, single-factor CAPM is advised to be used in performance evaluation of funds for the sake of parsimony.

Aside from the level of explanatory power, commonalities among idiosyncratic risk-taking of funds, especially in the same characteristics group, is a problem

that four-factor model fails to solve. Hunter et al. (2014) proposes to accommodate active peer benchmarks which are the average excess return of funds in the same peer group to fix the problem. In this model, APB returns are regressed on four-factors and then residuals and alphas of APBs are inserted as a fifth factor to Carhart's model. As distinct from the methodology in the original study, this thesis contains some modifications due to the limitations in the data set. First, only three APBs based on market-cap are formed due to the scarcity in the number of equity funds, unlike Hunter et al. (2014)'s 3x3 matrix based on size and value/growth measures. Second, market-cap groups are reviewed semiannually to obtain dynamic results. Third, a modified version of Lipper methodology is utilized to determine market-cap groups of funds, differently from active share measure used in Hunter et al. (2014).

In the first stage of the regression with only APB residuals, it is found that there is still no significant positive alpha in the sampled funds at 95% confidence level but approximately one-third of funds generate significant negative alphas. Moreover, APB factor is found significant for the entire sample, showing the correlation between the skill of fund and the respective APB. On the other hand, the number of significant betas on SMB, HML and WML factors either almost get doubled or tripled with augmented model. Unlike Hunter et al. (2014)'s findings, average adjusted R^2 level makes a great advance, reaching 91.9%. Overall, forty-seven out of fifty-two funds' returns approach the tails on their alpha t-statistics in line with the expectations. The major findings from the analysis are, first, the absence of managerial selectivity skill, even after controlling the average unsystematic risk-taking of funds in the same APB group, and, second, the ability of augmented model to decrease the percentage of correlated residuals among funds at a large extent.

In the second stage, APB alphas are also used in modelling the fund alpha that is free of the alpha produced by the commonalities in idiosyncratic risk-taking of funds in the same APB group. While the explanatory power of the

model slightly changes compared to the first stage, alphas are concentrated around zero as expected. Results show that two equity funds have positive significant alphas and four have significant negative alphas at 95% confidence level, after controlling both the common unsystematic risk-taking of funds in same APB group and the alpha associated. However two funds with significant positive alphas are not the same as the funds in CAPM. In a nutshell, this thesis endorses Hunter et al. (2014)'s findings to a large extent and exhibits that APB-augmented and alpha adjusted models are of great use to identify stock selectivity skill among managers and to solve correlated residuals problem in the sampled funds over the period between July 2012 and June 2016.

Availability of the data set puts limitations on this research such as the sample size, the length of analysis period and the modification of applied methods. However, this is the first study on Turkish mutual funds that uses stockholdings data to derive market-cap groups and to assess the performance accordingly. Similar to the outcome of the previous studies on mutual funds in Turkey such as Karatepe & Karacabey (2000), Imisiker and Ozlale (2008) and Goren and Umutlu (2015) an in the U.S. like Grinblatt & Titman (1989), Wermers (2000); CAPM and APB alpha-adjusted model in this study find that only a small portion of funds generates excess return. Nevertheless, when Carhart four-factor and APB-Augmented Model are employed, no excess return before expenses is observed among sampled funds like Chang & Lewellen (1984), and Malkiel (1995) asserted. Mutual fund performance net of expenses, the analysis with a more dynamic market-cap classification, and the application of APB-Augmented Model to other fund types are the probable research topics waiting to be evaluated in further studies.

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APPENDICES

APPENDIX A. COEFFICIENT TEST FOR BETAS

Table A1: Coefficient Test for Betas

This table presents the one-sided coefficient tests for betas of fifty-two mutual funds, produced through CAPM and Carhart Four-Factor Model. The first column is for betas, the second and third columns are t-statistics and related critical values for each beta coefficient. Based on whether the beta is higher or lower than one, upper or lower-tail test is implemented at 5% significance level. Betas that are significantly different than one are presented in bold.

	Single-Factor CAPM			Carhart Four-Factor Model			
Code	**β**	**t-stat**	**Crit. Value**	**β**	**t-stat**	**Crit. Value**	**#**
ACK	**0.37**	-15.90	-1.68	**0.39**	-14.33	-1.68	48
ACT	**0.68**	-5.49	-1.68	**0.72**	-4.49	-1.68	48
ADP	0.96	-0.68	-1.68	0.98	-0.46	-1.68	48
AK3	**0.92**	-1.76	-1.68	0.95	-1.19	-1.68	48
AKU	1.02	0.43	1.68	1.02	0.48	1.68	48
ALC	0.97	-0.45	-1.69	1.00	0.05	1.70	35
ARC	0.96	-0.49	-1.70	1.09	1.02	1.71	29
ASA	**0.68**	-4.82	-1.68	**0.76**	-3.66	-1.68	48
BAA	**0.34**	-7.86	-1.68	**0.37**	-6.82	-1.68	48
BMH	**0.80**	-3.56	-1.68	**0.82**	-2.90	-1.68	48
BZI	0.95	-0.57	-1.68	1.02	0.23	1.68	48
DAH	0.97	-0.53	-1.68	1.02	0.31	1.68	48
DZE	1.03	0.72	1.68	1.05	0.93	1.68	48
EC2	**0.85**	-3.35	-1.68	**0.87**	-2.66	-1.68	48
ECH	**0.76**	-5.32	-1.68	**0.77**	-5.14	-1.68	48
EID	**0.61**	-6.87	-1.68	**0.63**	-6.21	-1.68	48
FAF	0.98	-0.33	-1.68	1.02	0.43	1.68	48
FYD	0.92	-1.14	-1.68	1.02	0.25	1.68	48
GAE	1.06	1.27	1.68	1.06	1.28	1.68	48
GAF	**0.77**	-3.46	-1.68	**0.83**	-2.64	-1.68	48
GHS	0.98	-0.31	-1.68	1.02	0.39	1.68	48
GL1	**0.63**	-4.67	-1.68	**0.68**	-3.90	-1.68	48
GMR	**0.75**	-2.68	-1.68	**0.87**	-1.74	-1.69	43
GSP	**0.40**	-10.91	-1.68	**0.40**	-10.36	-1.68	48
HAF	1.00	0.04	1.68	1.03	0.59	1.68	48

Table A1 (cntd.)

Code	β	t-stat	Crit. Value	β	t-stat	Crit. Value	#
HBU	1.03	0.76	1.68	1.03	0.74	1.68	48
HVS	**1.15**	2.80	1.68	**1.18**	3.26	1.68	48
IGH	0.91	-1.64	-1.68	0.96	-0.71	-1.68	48
IYD	**0.87**	-2.80	-1.68	**0.88**	-2.36	-1.68	48
KYA	1.05	0.88	1.68	**1.11**	2.08	1.68	48
MAC	0.79	-1.28	-1.70	1.06	0.28	1.71	29
SKH	**0.78**	-5.74	-1.68	**0.80**	-4.73	-1.68	48
TAP	**0.88**	-3.00	-1.68	**0.88**	-2.70	-1.68	48
TAU	**1.10**	1.88	1.68	**1.11**	1.90	1.68	48
TI2	**0.88**	-2.93	-1.68	**0.88**	-2.56	-1.68	48
TI3	**0.68**	-5.26	-1.68	**0.71**	-4.39	-1.68	48
TIE	1.02	0.45	1.68	1.02	0.39	1.68	48
TKF	**0.45**	-11.79	-1.68	**0.48**	-10.55	-1.68	48
TPR	0.99	-0.11	-1.69	1.02	0.35	1.70	34
TTE	0.77	-1.58	-1.68	1.00	0.00	-1.68	48
TYH	1.01	0.18	1.68	1.04	0.70	1.68	48
TZD	**0.73**	-5.36	-1.68	**0.71**	-5.15	-1.68	48
TZE	1.02	0.56	1.68	1.03	0.55	1.68	48
TZK	**0.54**	-12.02	-1.68	**0.54**	-11.07	-1.68	48
VEF	1.01	0.28	1.68	1.02	0.32	1.68	48
YAS	**0.81**	-3.15	-1.68	**0.87**	-2.04	-1.68	48
YAU	0.99	-0.31	-1.68	1.00	-0.04	-1.68	48
YDE	0.99	-0.21	-1.68	0.99	-0.17	-1.68	48
YDI	1.00	-0.04	-1.68	1.03	0.57	1.68	48
YDN	0.93	-1.42	-1.72	1.00	0.05	1.73	24
YEF	1.02	0.44	1.68	1.03	0.55	1.68	48
YHS	0.94	-1.22	-1.68	0.97	-0.66	-1.68	48

APPENDIX B. EMPIRICAL RESULTS FOR APB-AUGMENTED CAPM

Table B1: Empirical Results for APB-Augmented CAPM

This table presents the regression results of APB-Augmented CAPM and alpha-adjusted model implemented for sampled equity funds over the period between July 2012 and June 2016. Similar to methodology described in Chapter 3, APB returns are regressed on single-factor that is market risk premium. The residuals and alphas from APB regressions are later used as a second factor in CAPM for individual funds. In the first and second columns, R^2 and adjusted R^2 values are shown. F-stat is the overall F-statistic for the regression. α is Jensen's alpha while β is the market beta of the related fund. λ shows the coefficient of APB residuals. The values in parenthesis are p-values of F-stat, α, β and λ. The last column shows the number of monthly observations. Alphas that are significant at 90% level are presented in bold and those significant at 95% level are presented in bold with an asterisk (*) and those significant at 99% level are presented in bold with two asterisks (**).

	APB-Augmented CAPM						**APB Alpha-Adjusted CAPM**						
	R^2	**Ad. R^2**	**F-stat**	**α**	**β**	**λ**	**R^2**	**Ad. R^2**	**F-stat**	**α**	**β**	**λ**	**#**
ACK	78.6%	77.6%	82.5	-0.02	0.37	0.51	78.4%	77.4%	81.6	-0.18	0.37	0.51	48
			(0.00)	(0.90)	(0.00)	(0.00)			(0.00)	(0.32)	(0.00)	(0.00)	
ACT	89.9%	89.4%	199.8	0.20	0.68	1.10	89.9%	89.4%	199.8	-0.06	0.68	1.10	48
			(0.00)	(0.33)	(0.00)	(0.00)			(0.00)	(0.79)	(0.00)	(0.00)	
ADP	95.0%	94.8%	425.2	-0.04	0.97	1.02	95.0%	94.8%	427.8	-0.25	0.97	1.02	48
			(0.00)	(0.82)	(0.00)	(0.00)			(0.00)	(0.20)	(0.00)	(0.00)	
AK3	97.4%	97.3%	849.6	0.03	0.92	0.97	97.4%	97.3%	852.7	-0.18	0.92	0.97	48
			(0.00)	(0.81)	(0.00)	(0.00)			(0.00)	(0.18)	(0.00)	(0.00)	
AKU	99.5%	99.5%	4,950.4	**0.19****	1.02	1.00	99.5%	99.5%	4,950.4	0.04	1.02	1.00	48
			(0.00)	(0.00)	(0.00)	(0.00)			(0.00)	(0.46)	(0.00)	(0.00)	
ALC	95.0%	94.6%	301.3	**0.77****	0.95	1.17	94.9%	94.6%	298.5	**0.58***	0.95	1.16	35
			(0.00)	(0.00)	(0.00)	(0.00)			(0.00)	(0.02)	(0.00)	(0.00)	

Table B1 (cntd.)

	APB-Augmented CAPM						APB Alpha-Adjusted CAPM						
	R^2	Ad. R^2	F-stat	α	β	λ	R^2	Ad. R^2	F-stat	α	β	λ	#
ARC	95.7%	95.4%	289.4	0.05	0.94	1.04	95.6%	95.2%	281.2	-0.16	0.95	1.03	29
			(0.00)	(0.83)	(0.00)	(0.00)			(0.00)	(0.46)	(0.00)	(0.00)	
ASA	88.3%	87.8%	169.7	0.19	0.67	1.05	88.2%	87.7%	168.5	-0.17	0.67	1.04	48
			(0.00)	(0.43)	(0.00)	(0.00)			(0.00)	(0.48)	(0.00)	(0.00)	
BAA	57.7%	55.9%	30.7	-0.10	0.35	0.95	58.0%	56.1%	31.1	-0.45	0.35	0.95	48
			(0.00)	(0.79)	(0.00)	(0.00)			(0.00)	(0.22)	(0.00)	(0.00)	
BMH	88.5%	88.0%	173.5	0.23	0.77	0.80	88.7%	88.2%	176.1	0.05	0.77	0.81	48
			(0.00)	(0.37)	(0.00)	(0.00)			(0.00)	(0.84)	(0.00)	(0.00)	
BZI	89.9%	89.4%	200.1	0.31	0.96	1.24	90.0%	89.5%	201.4	-0.15	0.96	1.25	48
			(0.00)	(0.30)	(0.00)	(0.00)			(0.00)	(0.63)	(0.00)	(0.00)	
DAH	96.4%	96.2%	602.3	0.13	0.97	1.08	96.4%	96.2%	602.3	-0.12	0.97	1.08	48
			(0.00)	(0.42)	(0.00)	(0.00)			(0.00)	(0.46)	(0.00)	(0.00)	
DZE	99.3%	99.3%	3,398.4	**0.16***	1.03	1.06	99.3%	99.3%	3,398.4	0.01	1.03	1.06	48
			(0.00)	(0.03)	(0.00)	(0.00)			(0.00)	(0.87)	(0.00)	(0.00)	
EC2	96.3%	96.1%	583.5	-0.08	0.83	0.91	96.2%	96.1%	575.7	-0.24	0.83	0.91	48
			(0.00)	(0.60)	(0.00)	(0.00)			(0.00)	(0.11)	(0.00)	(0.00)	
ECH	94.8%	94.5%	408.3	-0.12	0.77	0.89	94.8%	94.6%	409.7	**-0.27**	0.77	0.89	48
			(0.00)	(0.46)	(0.00)	(0.00)			(0.00)	(0.09)	(0.00)	(0.00)	
EID	83.2%	82.4%	111.1	0.20	0.59	0.81	83.3%	82.5%	112.0	-0.02	0.59	0.81	48
			(0.00)	(0.42)	(0.00)	(0.00)			(0.00)	(0.93)	(0.00)	(0.00)	
FAF	95.5%	95.3%	478.2	**0.35**	0.97	1.08	95.5%	95.3%	480.2	0.11	0.97	1.08	48
			(0.00)	(0.07)	(0.00)	(0.00)			(0.00)	(0.58)	(0.00)	(0.00)	

Table B1 (cntd.)

	APB-Augmented CAPM						APB Alpha-Adjusted CAPM						
	R^2	Ad. R^2	F-stat	α	β	λ	R^2	Ad. R^2	F-stat	α	β	λ	#
FYD	92.5%	92.2%	276.9	**0.43**	0.91	1.24	92.6%	92.3%	282.6	0.07	0.91	1.24	48
			(0.00)	(0.08)	(0.00)	(0.00)			(0.00)	(0.78)	(0.00)	(0.00)	
GAE	99.6%	99.6%	5,897.4	**0.13***	1.06	1.05	99.6%	99.6%	5,897.4	-0.02	1.06	1.05	48
			(0.00)	(0.03)	(0.00)	(0.00)			(0.00)	(0.69)	(0.00)	(0.00)	
GAF	91.6%	91.3%	246.3	0.14	0.80	1.01	91.7%	91.4%	249.4	-0.19	0.80	1.01	48
			(0.00)	(0.51)	(0.00)	(0.00)			(0.00)	(0.38)	(0.00)	(0.00)	
GHS	97.3%	97.1%	799.8	0.18	0.99	1.07	97.2%	97.1%	792.4	-0.01	0.99	1.06	48
			(0.00)	(0.21)	(0.00)	(0.00)			(0.00)	(0.96)	(0.00)	(0.00)	
GL1	79.1%	78.1%	85.0	0.39	0.63	1.13	79.4%	78.5%	86.9	0.07	0.63	1.14	48
			(0.00)	(0.23)	(0.00)	(0.00)			(0.00)	(0.83)	(0.00)	(0.00)	
GMR	93.7%	93.4%	297.8	**0.77****	0.70	1.45	93.7%	93.4%	297.8	0.20	0.70	1.45	43
			(0.00)	(0.00)	(0.00)	(0.00)			(0.00)	(0.37)	(0.00)	(0.00)	
GSP	65.1%	63.6%	42.0	0.39	0.41	0.60	64.9%	63.3%	41.6	0.25	0.41	0.60	48
			(0.00)	(0.15)	(0.00)	(0.00)			(0.00)	(0.36)	(0.00)	(0.00)	
HAF	97.5%	97.4%	869.0	0.16	1.01	1.05	97.5%	97.3%	863.3	-0.03	1.01	1.05	48
			(0.00)	(0.26)	(0.00)	(0.00)			(0.00)	(0.86)	(0.00)	(0.00)	
HBU	99.3%	99.3%	3,317.7	0.09	1.03	0.99	99.3%	99.3%	3,317.7	-0.05	1.03	0.99	48
			(0.00)	(0.21)	(0.00)	(0.00)			(0.00)	(0.52)	(0.00)	(0.00)	
HVS	98.1%	98.0%	1,150.6	**0.29***	1.12	1.11	98.0%	97.9%	1,117.9	0.11	1.12	1.11	48
			(0.00)	(0.04)	(0.00)	(0.00)			(0.00)	(0.44)	(0.00)	(0.00)	
IGH	97.3%	97.2%	804.3	0.05	0.93	1.11	97.3%	97.2%	808.1	-0.22	0.93	1.11	48
			(0.00)	(0.74)	(0.00)	(0.00)			(0.00)	(0.11)	(0.00)	(0.00)	

Table B1 (cntd.)

	APB-Augmented CAPM						APB Alpha-Adjusted CAPM						
	R^2	Ad. R^2	F-stat	α	β	λ	R^2	Ad. R^2	F-stat	α	β	λ	#
IYD	97.2%	97.1%	784.6	0.04	0.85	0.96	97.3%	97.2%	805.2	-0.12	0.85	0.96	48
			(0.00)	(0.74)	(0.00)	(0.00)			(0.00)	(0.36)	(0.00)	(0.00)	
KYA	97.0%	96.9%	726.1	**0.83****	1.05	1.03	97.0%	96.8%	723.4	**0.48****	1.05	1.03	48
			(0.00)	(0.00)	(0.00)	(0.00)			(0.00)	(0.01)	(0.00)	(0.00)	
MAC	70.1%	67.8%	30.4	**1.22**	0.80	1.31	70.1%	67.8%	30.4	0.71	0.80	1.31	29
			(0.00)	(0.06)	(0.00)	(0.00)			(0.00)	(0.27)	(0.00)	(0.00)	
SKH	95.1%	94.9%	434.7	0.04	0.77	0.68	95.0%	94.8%	430.0	-0.12	0.77	0.68	48
			(0.00)	(0.79)	(0.00)	(0.00)			(0.00)	(0.45)	(0.00)	(0.00)	
TAP	99.2%	99.1%	2,654.6	**0.18***	0.89	0.95	99.2%	99.2%	2,763.2	0.03	0.88	0.95	48
			(0.00)	(0.02)	(0.00)	(0.00)			(0.00)	(0.65)	(0.00)	(0.00)	
TAU	97.4%	97.3%	839.7	-0.02	1.10	1.13	97.4%	97.3%	839.7	-0.18	1.10	1.13	48
			(0.00)	(0.89)	(0.00)	(0.00)			(0.00)	(0.25)	(0.00)	(0.00)	
TI2	99.1%	99.1%	2,493.5	**0.13**	0.88	1.00	99.1%	99.1%	2,585.2	-0.03	0.88	1.00	48
			(0.00)	(0.09)	(0.00)	(0.00)			(0.00)	(0.71)	(0.00)	(0.00)	
TI3	88.5%	88.0%	173.5	0.12	0.68	0.81	88.5%	88.0%	173.5	-0.20	0.68	0.81	48
			(0.00)	(0.59)	(0.00)	(0.00)			(0.00)	(0.40)	(0.00)	(0.00)	
TIE	99.5%	99.5%	4,648.2	**0.13***	1.02	1.03	99.5%	99.5%	4,648.2	-0.02	1.02	1.03	48
			(0.00)	(0.04)	(0.00)	(0.00)			(0.00)	(0.76)	(0.00)	(0.00)	
TKF	75.1%	74.0%	68.0	-0.14	0.45	0.49	74.9%	73.7%	67.0	-0.29	0.45	0.48	48
			(0.00)	(0.54)	(0.00)	(0.00)			(0.00)	(0.22)	(0.00)	(0.00)	
TPR	99.2%	99.1%	1,830.5	**0.23***	1.00	0.96	99.2%	99.1%	1,830.5	0.10	1.00	0.96	34
			(0.00)	(0.02)	(0.00)	(0.00)			(0.00)	(0.32)	(0.00)	(0.00)	

Table B1 (cntd.)

	APB-Augmented CAPM						APB Alpha-Adjusted CAPM						
	R^2	Ad. R^2	F-stat	α	β	λ	R^2	Ad. R^2	F-stat	α	β	λ	#
TTE	57.5%	55.6%	30.4	**1.24**	0.80	1.79	57.1%	55.2%	29.9	0.78	0.80	1.78	48
			(0.00)	(0.07)	(0.00)	(0.00)			(0.00)	(0.26)	(0.00)	(0.00)	
TYH	98.3%	98.3%	1,335.4	0.13	1.01	1.04	98.3%	98.2%	1,276.8	-0.06	1.01	1.03	48
			(0.00)	(0.28)	(0.00)	(0.00)			(0.00)	(0.63)	(0.00)	(0.00)	
TZD	90.8%	90.4%	221.4	0.00	0.74	0.85	90.7%	90.3%	219.8	-0.14	0.74	0.84	48
			(0.00)	(0.99)	(0.00)	(0.00)			(0.00)	(0.51)	(0.00)	(0.00)	
TZE	99.5%	99.5%	4,306.5	**0.16***	1.02	1.02	99.5%	99.5%	4,306.5	0.01	1.02	1.02	48
			(0.00)	(0.02)	(0.00)	(0.00)			(0.00)	(0.82)	(0.00)	(0.00)	
TZK	87.4%	86.9%	156.7	0.07	0.55	0.51	87.4%	86.9%	156.7	-0.02	0.55	0.51	48
			(0.00)	(0.71)	(0.00)	(0.00)			(0.00)	(0.89)	(0.00)	(0.00)	
VEF	99.6%	99.6%	5,306.4	**0.12***	1.01	1.02	99.6%	99.6%	5,306.4	-0.02	1.01	1.02	48
			(0.00)	(0.04)	(0.00)	(0.00)			(0.00)	(0.69)	(0.00)	(0.00)	
YAS	90.0%	89.6%	202.4	**0.86****	0.83	0.91	90.1%	89.7%	204.7	**0.61***	0.82	0.91	48
			(0.00)	(0.00)	(0.00)	(0.00)			(0.00)	(0.01)	(0.00)	(0.00)	
YAU	99.7%	99.7%	8,546.8	**0.15****	0.99	1.06	99.7%	99.7%	8,546.8	0.00	0.99	1.06	48
			(0.00)	(0.00)	(0.00)	(0.00)			(0.00)	(0.99)	(0.00)	(0.00)	
YDE	97.8%	97.7%	987.2	0.17	0.98	1.02	97.8%	97.7%	996.3	0.01	0.98	1.03	48
			(0.00)	(0.21)	(0.00)	(0.00)			(0.00)	(0.95)	(0.00)	(0.00)	
YDI	98.2%	98.1%	1,201.9	0.05	1.00	1.04	98.1%	98.0%	1,180.8	-0.12	1.00	1.04	48
			(0.00)	(0.68)	(0.00)	(0.00)			(0.00)	(0.32)	(0.00)	(0.00)	
YDN	98.3%	98.2%	614.4	0.06	0.91	0.78	98.3%	98.1%	606.2	-0.11	0.91	0.78	24
			(0.00)	(0.67)	(0.00)	(0.00)			(0.00)	(0.42)	(0.00)	(0.00)	

Table B1 (cntd.)

	APB-Augmented CAPM						APB Alpha-Adjusted CAPM						
	R^2	Ad. R^2	F-stat	α	β	λ	R^2	Ad. R^2	F-stat	α	β	λ	#
YEF	99.6%	99.6%	5,687.5	**0.16****	1.02	1.03	99.6%	99.6%	5,687.5	0.01	1.02	1.03	48
			(0.00)	(0.01)	(0.00)	(0.00)			(0.00)	(0.86)	(0.00)	(0.00)	
YHS	99.0%	99.0%	2,234.3	0.13	0.94	1.04	99.0%	99.0%	2,234.3	-0.01	0.94	1.04	48
			(0.00)	(0.11)	(0.00)	(0.00)			(0.00)	(0.87)	(0.00)	(0.00)	
FUND	92.0%	91.6%		0.22	0.86	1.00	92.0%	91.6%		0.00	0.86	1.00	

APPENDIX C. COMPARISON OF ALPHA ESTIMATES

Table C1: Comparison of Alpha Estimates

This table presents the alpha estimates produced through each model applied for sampled equity funds over the period between July 2012 and June 2016. The first column is the average raw returns of the funds. Alpha estimates from CAPM, APB-Augmented CAPM and APB Alpha-Adjusted CAPM are presented in the second, third and fourth columns respectively. Similarly, alpha estimates from Carhart Four-Factor Model, APB-Augmented Model and APB Alpha-Adjusted model are provided in the fifth, sixth and seventh columns respectively. The values in parenthesis are p-values alpha estimates. The last column shows the number of monthly observations. Alphas that are significant at 90% level are presented in bold and those significant at 95% level are presented in bold with an asterisk (*) and those significant at 99% level are presented in bold with two asterisks (**).

Code	Equity Fund	Avg. Raw Return	CAPM	CAPM APB-Aug.	CAPM Alpha-Adj.	4F	4F APB-Aug.	4F Alpha-Adj.	#
ACK	Istanbul AM EF	0.63	-0.05	-0.02	-0.18	-1.06	-1.11	0.47	48
			(0.82)	(0.90)	(0.32)	(0.42)	(0.31)	(0.68)	
ACT	Alkhair AM Participation EF	0.86	0.20	0.20	-0.06	-2.98	**-2.98***	-0.68	48
			(0.53)	(0.33)	(0.79)	(0.13)	(0.01)	(0.57)	
ADP	Ak AM BIST Bank Index EF	0.51	-0.11	-0.04	-0.25	-0.13	0.58	**2.41**	48
			(0.70)	(0.82)	(0.20)	(0.94)	(0.60)	(0.06)	
AK3	Ak AM EF	0.62	-0.01	0.03	-0.18	-1.16	-0.64	**1.93***	48
			(0.97)	(0.81)	(0.18)	(0.41)	(0.40)	(0.03)	
AKU	Ak AM BIST 30 Index Fund	0.81	0.19	**0.19****	0.04	-0.38	-0.38	0.26	48
			(0.44)	(0.00)	(0.46)	(0.79)	(0.29)	(0.46)	
ALC	Ak AM BIST Dividend 25 Index Fund	1.07	**0.71**	**0.77****	**0.58***	-2.18	**-2.39**	-0.39	35
			(0.08)	(0.00)	(0.02)	(0.34)	(0.09)	(0.79)	
ARC	Ashmore AM EF	0.95	0.05	0.05	-0.16	-2.17	-1.94	-0.94	29
			(0.89)	(0.83)	(0.46)	(0.29)	(0.13)	(0.47)	

Table C1 (cntd.)

Code	Equity Fund	Avg. Raw Return	CAPM	CAPM APB-Aug.	CAPM Alpha-Adj.	4F	4F APB-Aug.	4F Alpha-Adj.	#
ASA	Fokus AM EF	0.77	0.12	0.19	-0.17	**-4.53***	**-4.12****	**-4.10***	48
			(0.75)	(0.43)	(0.48)	(0.03)	(0.01)	(0.01)	
BAA	Bizim AM Energy Industry Participation EF	0.49	-0.20	-0.10	-0.45	-3.24	-3.05	0.14	48
			(0.68)	(0.79)	(0.22)	(0.26)	(0.15)	(0.95)	
BMH	Burgan AM EF	0.86	0.22	0.23	0.05	-1.01	-0.90	0.11	48
			(0.48)	(0.37)	(0.84)	(0.59)	(0.55)	(0.95)	
BZI	Bizim AM Construction Industry Participation EF	1.02	0.39	0.31	-0.15	-3.69	**-3.27**	1.66	48
			(0.44)	(0.30)	(0.63)	(0.21)	(0.08)	(0.43)	
DAH	Deniz AM EF	0.76	0.13	0.13	-0.12	-2.38	**-2.38***	-0.51	48
			(0.66)	(0.42)	(0.46)	(0.14)	(0.02)	(0.61)	
DZE	Deniz AM BIST 100 Index EF	0.78	0.16	**0.16***	0.01	-0.67	-0.67	0.02	48
			(0.53)	(0.03)	(0.87)	(0.67)	(0.13)	(0.97)	
EC2	Global MD AM First EF	0.48	-0.15	-0.08	-0.24	-1.23	-1.10	0.12	48
			(0.55)	(0.60)	(0.11)	(0.42)	(0.25)	(0.90)	
ECH	Global MD AM Second EF	0.45	-0.19	-0.12	**-0.27**	-0.07	-0.30	0.17	48
			(0.45)	(0.46)	(0.09)	(0.96)	(0.74)	(0.87)	
EID	Qinvest AM EF	0.84	0.19	0.20	-0.02	1.08	1.06	**3.04**	48
			(0.57)	(0.42)	(0.93)	(0.56)	(0.45)	(0.06)	
FAF	Finans AM Second EF	0.92	0.30	**0.35**	0.11	-1.50	-1.19	0.86	48
			(0.33)	(0.07)	(0.58)	(0.39)	(0.30)	(0.52)	
FYD	Finans AM First EF	1.01	0.38	**0.43**	0.07	**-6.16****	**-5.99****	**-6.22****	48
			(0.34)	(0.08)	(0.78)	(0.00)	(0.00)	(0.00)	

Table C1 (cntd.)

Code	Equity Fund	Avg. Raw Return	CAPM	CAPM APB-Aug.	CAPM Alpha-Adj.	4F	4F APB-Aug.	4F Alpha-Adj.	#
GAE	Garanti AM BIST 30 Index EF	0.74	0.13	**0.13***	-0.02	-0.55	**-0.55**	0.12	48
			(0.62)	(0.03)	(0.69)	(0.71)	(0.10)	(0.71)	
GAF	Gedik AM First EF	0.87	0.23	0.14	-0.19	-1.79	-1.45	0.79	48
			(0.54)	(0.51)	(0.38)	(0.38)	(0.26)	(0.62)	
GHS	Garanti AM EF	0.92	0.29	0.18	-0.01	-1.50	**-1.89***	**-2.79****	48
			(0.31)	(0.21)	(0.96)	(0.35)	(0.02)	(0.00)	
GL1	Azimut AM First EF	0.97	0.32	0.39	0.07	-2.41	-2.45	0.01	48
			(0.47)	(0.23)	(0.83)	(0.34)	(0.22)	(1.00)	
GMR	Gedik AM Second EF	1.40	**0.96**	**0.77****	0.20	**-5.04**	**-4.95****	-0.50	43
			(0.07)	(0.00)	(0.37)	(0.05)	(0.00)	(0.68)	
GSP	Azimut AM Dividend Paying EF	0.99	0.31	0.39	0.25	-1.31	-1.01	1.04	48
			(0.32)	(0.15)	(0.36)	(0.47)	(0.51)	(0.50)	
HAF	Halk AM EF	0.79	0.17	0.16	-0.03	-1.31	**-1.49**	0.13	48
			(0.56)	(0.26)	(0.86)	(0.42)	(0.08)	(0.90)	
HBU	HSBC AM BIST 30 Index EF	0.71	0.09	0.09	-0.05	-0.93	**-0.93***	-0.29	48
			(0.70)	(0.21)	(0.52)	(0.52)	(0.02)	(0.46)	
HVS	HSBC AM EF	0.88	0.27	**0.29***	0.11	-1.06	-1.17	-0.35	48
			(0.36)	(0.04)	(0.44)	(0.53)	(0.20)	(0.69)	
IGH	ING AM First EF	0.62	-0.01	0.05	-0.22	**-3.06**	**-2.05***	0.23	48
			(0.97)	(0.74)	(0.11)	(0.08)	(0.02)	(0.86)	
IYD	Is AM Second EF	0.62	-0.02	0.04	-0.12	-0.90	-0.48	0.66	48
			(0.95)	(0.74)	(0.36)	(0.56)	(0.51)	(0.47)	

Table C1 (cntd.)

Code	Equity Fund	Avg. Raw Return	CAPM	CAPM APB-Aug.	CAPM Alpha-Adj.	4F	4F APB-Aug.	4F Alpha-Adj.	#
KYA	Kare AM EF	1.42	**0.80***	**0.83****	**0.48****	-2.24	**-1.92**	-1.31	48
			(0.02)	(0.00)	(0.01)	(0.18)	(0.05)	(0.27)	
MAC	Marmara Capital AM EF	2.09	1.20	**1.22**	0.71	-7.49	-6.31	-2.20	29
			(0.15)	(0.06)	(0.27)	(0.10)	(0.11)	(0.60)	
SKH	Seker AM EF	0.65	0.01	0.04	-0.12	-1.22	-1.07	-0.11	48
			(0.95)	(0.79)	(0.45)	(0.35)	(0.25)	(0.91)	
TAP	Is AM Privia Banking Private EF	0.75	0.12	**0.18***	0.03	-0.25	-0.01	**1.20***	48
			(0.60)	(0.02)	(0.65)	(0.86)	(0.98)	(0.02)	
TAU	Is AM BIST Financial Index EF	0.59	-0.02	-0.02	-0.18	0.30	0.30	1.01	48
			(0.94)	(0.89)	(0.25)	(0.87)	(0.75)	(0.29)	
TI2	Is AM EF	0.70	0.06	**0.13**	-0.03	-0.63	-0.38	0.88	48
			(0.79)	(0.09)	(0.71)	(0.66)	(0.36)	(0.11)	
TI3	Is AM Isbank Subsidiaries EF	0.77	0.12	0.12	-0.20	-1.85	-1.85	1.20	48
			(0.73)	(0.59)	(0.40)	(0.37)	(0.18)	(0.40)	
TIE	Is AM BIST 30 Index EF	0.75	0.13	**0.13***	-0.02	-0.23	-0.23	0.44	48
			(0.61)	(0.04)	(0.76)	(0.88)	(0.49)	(0.18)	
TKF	Tacirler AM EF	0.55	-0.12	-0.14	-0.29	-1.66	-1.40	-0.81	48
			(0.65)	(0.54)	(0.22)	(0.27)	(0.33)	(0.57)	
TPR	Is AM Private EF	0.81	0.17	**0.23***	0.10	-1.33	**-1.36***	-0.75	34
			(0.52)	(0.02)	(0.32)	(0.39)	(0.02)	(0.17)	
TTE	Is AM BIST Technology Index EF	1.72	1.08	**1.24**	0.78	**-7.63**	**-7.20**	-3.89	48
			(0.18)	(0.07)	(0.26)	(0.06)	(0.05)	(0.31)	

Table C1 (cntd.)

Code	Equity Fund	Avg. Raw Return	CAPM	CAPM APB-Aug.	CAPM Alpha-Adj.	4F	4F APB-Aug.	4F Alpha-Adj.	#
TYH	TEB AM EF	0.81	0.19	0.13	-0.06	-0.65	**-1.35***	-1.05	48
			(0.49)	(0.28)	(0.63)	(0.68)	(0.04)	(0.11)	
TZD	Ziraat AM EF	0.67	0.02	0.00	-0.14	0.95	0.44	0.83	48
			(0.94)	(0.99)	(0.51)	(0.58)	(0.72)	(0.51)	
TZE	Ziraat AM BIST 30 Index EF	0.78	0.16	**0.16***	0.01	-0.03	-0.03	**0.63**	48
			(0.52)	(0.02)	(0.82)	(0.99)	(0.94)	(0.10)	
TZK	Ziraat AM Dividend Paying Companies EF	0.74	0.08	0.07	-0.02	-0.60	-1.07	-1.24	48
			(0.72)	(0.71)	(0.89)	(0.64)	(0.31)	(0.26)	
VEF	Vakif AM BIST 30 Index EF	0.74	0.12	**0.12***	-0.02	-0.44	-0.44	0.23	48
			(0.62)	(0.04)	(0.69)	(0.77)	(0.18)	(0.48)	
YAS	Yapı Kredi AM Koc Holding Affiliate and EF	1.52	**0.88***	**0.86****	**0.61***	-3.18	**-3.00***	-0.74	48
			(0.01)	(0.00)	(0.01)	(0.10)	(0.03)	(0.65)	
YAU	Yapı Kredi AM ISE 100 Index EF	0.77	0.15	**0.15****	0.00	-0.65	**-0.65***	0.03	48
			(0.55)	(0.00)	(0.99)	(0.67)	(0.02)	(0.90)	
YDE	Yapı Kredi AM ISE Dividend 25 Index EF	0.81	0.19	0.17	0.01	-0.02	-0.16	1.26	48
			(0.49)	(0.21)	(0.95)	(0.99)	(0.84)	(0.17)	
YDI	Yapı Kredi AM Second EF	0.75	0.12	0.05	-0.12	-1.15	**-1.58***	-0.54	48
			(0.66)	(0.68)	(0.32)	(0.47)	(0.03)	(0.48)	
YDN	Yapı Kredi AM DPM Private EF	0.27	0.12	0.06	-0.11	-0.79	-0.69	0.78	24
			(0.63)	(0.67)	(0.42)	(0.62)	(0.32)	(0.42)	
YEF	Yapı Kredi AM ISE 30 Index EF	0.78	0.16	**0.16****	0.01	-0.84	**-0.84****	-0.17	48
			(0.53)	(0.01)	(0.86)	(0.57)	(0.01)	(0.59)	

Table C1 (cntd.)

Code	Equity Fund	Avg. Raw Return	CAPM	CAPM APB-Aug.	CAPM Alpha-Adj.	4F	4F APB-Aug.	4F Alpha-Adj.	#
YHS	Yapı Kredi AM First EF	0.76	0.13	0.13	-0.01	-1.91	**-1.91****	**-1.25***	48
			(0.60)	(0.11)	(0.87)	(0.21)	(0.00)	(0.01)	
FUND	Average	0.84	0.21	0.24	0.00	-1.67	-1.57	-0.16	

APPENDIX D. TURKISH SUMMARY / TÜRKÇE ÖZET

TÜRKİYE'DEKİ YATIRIM FONU PERFORMANSINA AKTİF BENZER KARŞILAŞTIRMA ÖLÇÜTLERİNE DAYALI OLARAK YAKINDAN BİR BAKIŞ

Yatırım fonları, tasarruf sahiplerinden topladığı paralar karşılığında, hisse senetleri, kısa ve uzun vadeli borçlanma araçları gibi sermaye piyasası araçları ile kıymetli madenlerden oluşan portföyleri yönetmek amacıyla kurulan finansal kuruluşlar olarak tanımlanmıştır. Bu kuruluşların temel faydaları, tasarruf sahiplerinin fonlarını havuzda toplayarak ölçek ekonomisi sağlamaları ve yatırım yapılan varlıklarda çeşitlendirme yoluyla risk azaltımı sağlamalarıdır. Yatırım fonları yapısal olarak iki genel grupta incelenebilir. Bazı fonlar, geniş çaplı bir piyasa endeksini taklit ederek endeks fon formunu almışken bazıları ise belli bir karşılaştırma ölçütünün üzerinde getiri elde edebilmek adına aktif olarak yönetilmektedir. Bu hizmeti sunan aktif-yönetilen fon yöneticileri, belli bir yönetim ücreti karşılığında yüksek getiri vaadi ile fonlarını pazarlamaktadır. Yatırım fonlarının yaygınlaşması ile birlikte araştırmacıların ilgisi portföy performansına yönlenmiştir. Bu konuda en sık kullanılan Sermaye Varlıkları Fiyatlama Modeli, hisse senedi getirilerini piyasa portföyüne duyarlılıklarına dayanarak açıklamak üzere Sharpe (1964), Lintner (1965) ve Mossin (1966) tarafından geliştirilmiştir. Fama & French (1992, 1993) ve Carhart (1997) ise hisse senetlerinin sistematik risklerini daha iyi yakalamak ve getirilerdeki değişikliği daha etkin bir biçimde açıklamak için modele üç yeni etken eklemiştir. Jensen (1968), öncü çalışmasında fon performansını açıklamak için finansal model uygulayan ilk araştırmacı olmuştur. Jensen in çalışmasından beri, kendisinin geliştirdiği bir terim olan alfa seçicilik yeteneğine, bir diğer deyişle karşılaştırma ölçütünün üstünde anlamlı fon performansına atıfta bulunmak için yaygın olarak kullanılmaktadır. Bazı çalışmalar, en azından giderlerden önce, yönetici yeteneği tespit etmişse de genellikle giderler düşüldükten sonra aktif yönetimin aşırı getiri

sağlayamayacağı iddiası Jensen (1968), Grinblatt & Titman (1989) ve Wermers (2000) gibi çalışmalarda öne sürülmüştür.

Fon performansını değerlendirmek için yapılan araştırmalarda, uygulanan metotlardaki ince farklardan dolayı çeşitli handikaplar mevcuttur. İlk olarak, bir çok çalışma piyasa değeri veya değer/büyüme ölçütleri açısından fon stratejileri arasındaki farkları gözardı etmiştir. Ancak, adil bir kıyaslama için yatırım fonları aynı karakteristik özelliklere sahip olduğu benzerlerine göre değerlendirilmelidir. Bu yüzden fonların piyasa değeri ve/veya değer/büyüme stratejilerini tespit etmek önemlidir. Bazı fonlar, isimlerinde genel bir piyasa endeksine atıf veren pasif fonlar olduğu için bu şekilde piyasa değeri stratejilerini ilan etmiş olurlar. Örneğin, karşılaştırma ölçütü BIST-30 olan pasif bir fon açıkça kendini büyük-değerli bir fon olarak konumlandırmaktadır. Ancak, yalnızca ABC Portföy Yönetimi Yatırım Fonu isimli bir fondan bu tarz bir çıkarım yapmak zordur. Brown and Goetzmann (1997) ve Chan, Chen and Lakonishok (2002), fon performansını değerlendirmede esas olmalarına rağmen gelir veya büyüme gibi hisse senedi fonu sınıflandırmalarının neden yatırım stratejilerini ve uygun karşılaştırma ölçütünü göstermekten uzak olduğunu sorgular. Bu tarz üstü kapalı piyasa değeri stratejileri, portföyde yer alan hisse senetlerine dair bilgi kullanılarak bulunabilir. Daniel vd.'ne (1997) göre fon performansını ölçmek için portföydeki hisse senedi verisini kullanmanın iki yönlü faydası vardır. Birincisi, yatırım tarzıyla daha uyumlu karşılaştırma ölçütleri kurulabilir. Ayrıca, portföydeki hisse senetlerinin varsayımsal brüt getirileri yöneticilerin hisse senedi seçiciliği ve zamanlama yeteneklerini daha doğru bir biçimde açığa çıkarır.

Öte yandan, bir fon piyasa değeri stratejisini adında veya izahnamesinde açıkça beyan etse bile buna ne derece sadık kalacağı şüphelidir. Sensoy (2009), ABD'deki aktif yönetilen hisse senedi yatırım fonlarının %31,2'sinin izahnamelerinde; portföylerinin büyüklük veya değer/büyüme özellikleriyle veya getiriler arası korelasyonla uyumsuz bir karşılaştırma ölçütü belirttiğini bulmuştur. Öz-yanlış sınıflandırma gelecekteki nakit akışlarının önemli bir belirleyicisi olarak görünmektedir ki bu durum fon yöneticilerini uyumsuz, bir

diğer deyişle yenmesi kolay, karşılaştırma ölçütü beyan etmeye teşvik etmektedir. Ayrıca Chan, Chen ve Lakonishok'a (2002) göre yöneticiler kariyer kaygısı ve prim beklentisi ile fon performansını olduğundan yüksek göstermek isteyebilirler. Bu bağlamda, portföy hisse senedi verisi fonların üstü kapalı stratejilerini tespit etmek açısından daha iyi fayda sağlamaktadır.

Fon performansı değerlendirmelerinde göz ardı edilen bir başka durum ise yatırım fonları stratejilerindeki, özellikle piyasa değeri veya değer/büyüme ölçütü açısından aynı ligde yarışanlar için, benzerliklerdir. Fon yöneticileri hangi stratejiyi takip edeceğine karar verdiğinde, bu stratejiye sadık kalabilmek için satın alabilecekleri hisse senetleri listesini daraltmak zorunda kalırlar. Bu yüzden, yöneticiler anlamlı ve pozitif bir alfa yaratabilmek için stratejileriyle uyumlu hisselere daha fazla veya az ağırlık vererek seçicilik yeteneklerini sergilerler. Yöneticilerin yaptığı bu ince ayar, yatırımcılar için katma değer sağlayabilse de, fon stratejileri arasında benzerlikler mevcuttur ki bunu fon hata payları arasındaki korelasyondan çıkarmak mümkündür. Genel dört faktörlü modelin, fon getirileri arasındaki değişimi büyük ölçüde açıkladığı, ancak fon hata payları arasındaki korelasyonu kısmen açıkladığı kabul edilmektedir. Bu çalışmada belgelendiği üzere, dört faktörlü model, klasik SVFM'nin bir uzantısı olarak, anlamlı ve pozitif çift yönlü korelasyonların yüzdesini bir önceki seviyesinin yalnızca onda biri kadar düşürmekte ve örneklemde yer alan yatırım fonları arasında bulunan yüksek miktardaki ağırlığı açıklanamayan ortaklık için bir çözüm bulamamaktadır.

Fon stratejilerindeki ortaklıklar aynı piyasa değeri veya değer/büyüme grubu içerisinde daha güçlü olduğu için, fon yöneticileri arasındaki yeteneği tespit etmek daha zordur. Sorunu çözmek için Hunter vd. (2014), yaygın olarak kullanılan Carhart Dört Faktörlü Model'in genişletilmiş bir sürümünü geliştirmiştir. Fonun kendisini konumlandırdığı büyüklük veya değer/büyüme ölçütüne dayalı ek bir kriter, stratejilerdeki ortaklıkları yakalamak için çözüm sunabilir. Aktif Benzer Karşılaştırma Ölçütü (ABKÖ) Artırılmış Model olarak adlandırılan bu model, fona özgü sistematik olmayan risk alımını izole ederek fona özgü alfayı ortaya koymaktadır. Bu tez, tek faktörlü Sermaye Varlıkları

Fiyatlama Modeli ve Carhart Dört Faktörlü Model aracılığıyla Temmuz 2012 ve Haziran 2016 arasındaki dönemde elli iki hisse senedi yatırım fonunun performansını değerlendirmeyi amaçlamaktadır. Ayrıca, ABKÖ-Artırılmış Model, aynı piyasa değeri grubundaki fonların ortak sistematik olmayan risk alımını yakalamak ve varsa yönetici seçicilik becerisini tespit etmek için kullanılmıştır.

Jensen alfası ile ölçülen fonların göreceli performansı, Roll (1978, 1979) ve Dybvig ve Ross (1985) tarafından ortaya konulduğu üzere karşılaştırma ölçütü olarak seçilen piyasa endeksine önemli ölçüde bağlıdır. Bu sebeple, 1980'lerin sonundan itibaren, akademisyenler fonları daha uyumlu karşılaştırma endeksleriyle eşleştirmeye odaklanmıştır. Bazıları, uyumu tespit etmek için fonlar ve ana endeksler arasındaki korelasyona güvenirken, bazıları ise eşleştirme için büyüklük ve DD/PD oranı gibi fon özelliklerinden faydalanmıştır. Grinblatt & Titman (1989) fon performansını portföy hisse senetleri üzerinden ölçtükleri çalışmalarında yalnızca büyüme fonlarının fazla getiri sağladığını ancak bu performansın da yüksek yönetim giderleri tarafından nötrlendiğini ortaya koymuştur. Wermers (2000), çalışmasında fonların fazla getirisinin ancak fon yönetim giderlerini karşılayacak kadar yüksek olduğunu iddia etmiştir. Daniel vd. (1997), ABD'deki hisseleri piyasa değeri, DD/PD oranı ve geçmiş yıl getirisi üzerinden sınıflandırarak karşılaştırma ölçütleri oluşturmuş ve fon portföyünde yer alan hisse senetlerinin oluşturulan bu ölçütlere karşı gösterdiği performanstan fon performansına ulaşmaya çalışmıştır. Çalışma, giderler düşüldükten sonra fonlarda ne seçicilik ne de zamanlama becerisi olduğunu vurgulamıştır. Chan, Chen ve Lakonishok (2002), fonları portföy hisse senetlerinin piyasa değeri, DD/PD oranı, geçmiş yıl ve geçmiş üç yıl getirisi üzerinden sınıflandırmış ve bu yöntemin gelecekteki performansı tahmin etmede daha başarılı olduğunu iddia etmiştir. Cohen, Coval ve Pastor (2005), fon yöneticilerinin becerisini geçmişte başarılı olmuş yöneticilerin portföy hisse senetleriyle benzerlikleri üzerinden değerlendirmiştir. Cremers ve Petajisto (2009) ise portföyde yer alan her bir hisse senedinin, fonun karşılaştırma ölçütünden sapmasını bir aktif yönetim çabası olarak görmüş ve beceriyi bu açıdan değerlendirmiştir. Gupta-

Mukherjee'nin (2013) çalışması amprik tasarım açısından Cremers & Petajisto'ya (2013) benzerdir ancak karşılaştırma ölçütü yerine aynı grupta yer alan fonların varsayımsal portföyünden faydalanmıştır.

Türk sermaye piyasaları ise 1987 yılında İstanbul Menkul Kıymetler Borsası'nın kuruluşundan sonra yatırım fonlarıyla tanışmıştır. O günden beri yatırım fonu sektörü, Haziran 2016 sonu itibariyle 41,3 milyar TL brüt aktif değer ve 417 fonda 3,2 milyon yatırımcısı sayısına ulaşarak istikrarlı bir şekilde büyümektedir. Bugüne dek Türk yatırım fonları ile ilgili literatürün çoğunun, sahip olduğu varlıkların en az %25'ini Türk hisse senetlerine yatırmak zorunda olan A tipi fonların performans değerlendirmesi üzerine yoğunlaştığı bilinmektedir. Ancak, bu sınıflandırma 2013'ten bu yana geçerli olmadığından, bu çalışmada kullanılan örneklem, hisse senedi yatırım fonlarıyla sınırlıdır. Türk yatırım fonlarının performans değerlendirmesi üzerine öncü çalışmalardan bir olarak, Karacabey (1999) A tipi fon yöneticilerinde zamanlama yeteneği bulamamış ancak bazı seçicilik yetenekleri bulmuştur. Karatepe & Karacabey'in (2000) Graham & Harvey modelleri ile yaptığı analiz, örneklenen dokuz hisse senedi fonundan sadece ikisinin risk düzeltildikten sonra piyasadan daha iyi performans gösterdiğini bulmuştur. Yıldız (2005) ve Karatepe & Gokgoz (2007) fonların aşırı performansının seçilen karşılaştırma ölçütüne bağlı olduğuna dikkat çekmiştir. Goren ve Umutlu (2015), hem SVFM hem de Fama & French Üç Faktörlü Modeli kullanan araştırmalarında giderler düşüldükten sonra bile, yalnızca bir tür yatırım fonunda fazladan getirinin var olduğu sonucuna varmıştır.

Analizlerde kullanılan veriler, kullanılan modellerin çeşitliliği nedeniyle değişik kaynaklardan alınmıştır. İlk olarak, aylık getirileri hesaplanmak amacıyla hisse senedi fonlarının hisse başına günlük portföy değerleri, Sermaye Piyasası Kurulu'ndan (SPK) alınmıştır. Aylık getiriler, ardışık ayların son işlem günlerindeki hisse başına brüt portföy değerlerinden hesaplanmaktadır. İkincisi, mevcut en geniş piyasa endeksi olduğundan, BIST-Tüm Endeksi piyasa temsilcisi olarak kullanılmıştır. Endeks veri serileri Finnet Analiz Expert'ten alınmış ve aylık getiriler, fon getirileri ile aynı şekilde

hesaplanmıştır. Üçüncüsü, Türkiye Bankalararası Gecelik Borçlanma Faizi (TRIBOR) risksiz faiz oranı olarak kullanılmış ve ilgili veri serisi Thomson-Reuters Eikon'dan alınmıştır.

Hisse senedi fonları, her birine bir aktif benzer karşılaştırma ölçütü atanabilmesi için büyüklük özelliklerine göre gruplandırılmıştır. Büyüklük gruplarının ortaya çıkarılması, yatırım fonlarının portföy hisse senetleri hakkında bilgi gerektirmektedir. Türk yatırım fonlarının çoğunluğu aylık olarak Kamuyu Aydınlatma Platformu'nda (KAP) varlıklarını açıklamaktadır. Portföy hisse senetleri verisi Mayıs 2012'den bu yana mevcut olduğundan dolayı bu çalışma ancak Temmuz 2012 – Haziran 2016 arasındaki dönemi kapsamaktadır. Performansı değerlendirilen fonlar, dört yıllık analiz döneminin bir kısmı veya tamamında var olan 52 adet hisse senedi yatırım fonundan ibarettir. Her bir piyasa değeri grubundaki fonların sayısı zaman zaman sınırlı görülebilir ancak bunun Türkiye'de hisse senedi fonlarının tüm evreni olduğuna dikkat edilmelidir.

Fonları piyasa değerlerine göre sınıflandırmada kullanılan Thomson Reuters Lipper Porftöy Hisse Senedine Dayalı Fon Sınıflandırma Metodolojisi'nde hisse senedi fonları için yatırım hedeflerini tanımlamak amacıyla izlenecek iki adım belirtilir. Model, portföy hisse senetlerinden ve temel finansal özelliklerden beslenmektedir. Metodun ilk adımı olarak, her bir fonun piyasa piyasa değeri; büyük, orta veya küçük değer olarak sınıflandırılır. Ardından, çekirdek, büyüme veya değer stilleri, altı stil özelliğine göre fonlara atanır. Lipper metodolojisi, fonların yatırım hedeflerini sınıflandırmak açısından oldukça faydalı olsa da Türkiye'deki sınırlı sayıdaki borsaya kote şirket ve yatırım fonu sayısı ile portföy hisse senedi verilerinin kısa geçmişi, metodolojinin uygulanmasında birkaç değişiklik yapılmasını gerekli kılmaktadır. İlk olarak, bu çalışmada her gruptaki fon sayısının olabildiğince çok olabilmesi için stil sınıflandırması gözardı edilmiştir. Halihazırda Türkiye'de sınırlı sayıda hisse senedi fonunun olması nedeniyle, değer/büyüme özelliklerini kullanmak ve fon evrenini daha alt gruplara bölmek, modelin sağlamlığını azaltacaktır. İkinci olarak, bu çalışmada Lipper'ın her bir Avrupa endeksi için önerdiği büyük-orta

değer ve orta-küçük değer sınırlarını belirlemek için kullandığı %75 ve %95 kırılma noktalarından farklı olarak, büyük-küçük piyasa değeri olmak üzere sadece bir kırılma noktası kullanılmıştır. Üçüncüsü, fonların yatırım hedefleri tek bir portföyden (en son yarı yıl veya mali yıl sonu) elde edilirken, Lipper metodu, en son ay ve son beş yarı yıl veya mali yıl sonu portföyünü içeren geçmiş altı portföyün ağırlıklı ortalamasını kullanmaktadır.

Her yatırım fonunun portföy hisse senedi verisi KAP'tan alınmış ve uygun bir yatırım hedefi atamak üzere listelenmiştir. Bu hedefler, 1 Temmuz 2012 ile 30 Haziran 2016 tarihleri arasındaki analiz dönemi için altı ayda bir gözden geçirilmiş ve gerektiğinde düzeltilmiştir. Bu sebeple, yıllar itibariyle her bir yarı yıl veya mali yıl sonu portföy hisse senetleri, takip eden altı ayın yatırım hedefi ve ABKÖ grubunun belirleyici sekiz portföyü olarak belirlenmiştir. Örneğin, Temmuz 2012 ve Aralık 2012 tarihleri arasında fonların yatırım hedefi, 30 Haziran 2012 hisse senedi portföyündeki büyük ve küçük değerli hisse senetlerinin ağırlıklarına dayanılarak belirlenir. Fon, varlıklarını bildirmemişse veya tamamen para piyasası araçlarına yatırmışsa, ki bu sekiz portföyün herhangi biri için bir yatırım hedefi atamayı imkansız hale getirir, bir önceki aya ait portföy hisse senetleri, örneğin Aralık yerine Kasım, belirleyici portföy olarak belirlenmiştir. Eğer bir önceki ayda da mevcut değilse, sonraki ay - yani Haziran yerine Temmuz - bu dönem için belirleyici portföy olarak ayarlanır. Öte yandan, fonların bir kısmı, dört yıllık analiz döneminde türlerini devlet tahvili veya değişken fondan, toplam varlıklarının en az %80'ini Türk hisse senetlerine yatırmak zorunda olan hisse senedi fonuna değiştirmiştir. Gursoy & Erzurumlu (2001), Teker & Karakurum & Tav (2008) gibi Türk yatırım fonları ile ilgili daha önce yapılmış çalışmalar, 2013 yılının başından beri kullanılmayan bir sınıflandırma olan A ve B tipi fonların karşılaştırmalı performansını analiz etmektedir. Bu yüzden, analiz edilecek fon sayısını olabildiğince yüksek tutmak için A Tipi fonların %25'lik eşiği kullanılabilir. Bu nedenle, herhangi bir fon, sekiz belirleyici portföyünden herhangi birinde, hisse senetlerine varlıklarının %25'inden daha az yatırım yapmışsa, ilgili altı aylık dönemde eksik olarak belirtilmiştir. Benzer şekilde, eskiden B Tipi olan fonlar da ilgili altı aylık dönem(ler) için analiz dışı

bırakılmıştır. Son olarak, bir fon art arda gelen yarı yıl ve mali yıl arasında bir tarihte ortaya çıkmışsa veya türünü hisse senedi fonuna dönüştürmüşse, fonun ortaya çıktığı / değiştiği ay, bir sonraki yarı yıl ve mali yıl sonuna kadar olan aylar için belirleyici portföy olarak belirlenmiştir. Örneğin, fon Nisan ayında faaliyete geçmişse Nisan, Mayıs ve Haziran aylarında belirleyici portföy olarak belirlenmiştir.

Sekiz belirleyici portföyün yatırım amacını belirlemek için BIST-Tüm Endeksi'nin bileşenleri geriye dönük olarak Thomson Reuters Eikon'dan, ilgili hisselerin ay sonundaki piyasa değerleri ise Finnet Analiz Expert'ten edilmiştir. Her bir tarihte, hisse senetlerinin endeksin toplam piyasa değerine olan oranları çoktan aza doğru sıralanır. Ardından oranlar, yukardan aşağı doğru büyük–küçük değer kırılma noktasını işaretleyen % 75 persantiline kadar toplanır. Buna göre, üst %75 persantilde yer alan hisse senetleri büyük değer, alt %25 persantilde yer alanlar ise küçük değer hisse senetleridir. Eğer bir fonun hisse senetleri %75 büyük değer ve %25 küçük değerden oluşuyorsa, fonun piyasa portföyünü taklit ettiği söylenebilir. Dolayısıyla, %75'lik üst sınıra %5 marj eklenmiştir ki bu, hisse senedi varlıklarının en az %80'ini büyük değer hisse senetlerine yatıran fonların büyük değer fonlar olarak sınıflandırıldığı anlamına gelir. Öte yandan, bir fonun, küçük bir fon olarak sınıflandırılabilmesi için, hisse senedi varlıklarının yarısından çoğunu küçük değer hisselere yatırması gerektiği varsayılmıştır. Büyük değer hisse senetleri toplam hisse senedi varlıklarının %50-80'ini oluşturan kalan fonlar ise orta-değer fon olarak sınıflandırılmıştır. Birkaç fon, bir veya birden fazla belirleyici portföyünde hisse senetleri altında, daha önce kotasyondan çıkarılmış hisse senetlerini, borsa yatırım fonlarını, diğer yatırım fonlarının paylarını ve/veya artık BIST-Tüm Endeksi'nin bir parçası olmayan C grubu hisse senetlerini rapor etmiştir. Bu menkul kıymetleri büyük veya küçük değer olarak sınıflandırmak mümkün olmayacağından ve toplamda ihmal edilebilir bir etkiye sahip olacaklarından dolayı, yalnızca hisse değeri sınıflandırma sürecinde gözardı edilmişlerdir.

Çalışmada uygulanan modellerden ilki olan SVFM'de fonların risksiz faiz oranı düşülmüş aylık getirileri piyasa risk priminin bağımsız değişken olduğu tek faktörlü regresyona sokulmuştur. İkinci olarak Fama & French (1992, 1993) ve Carhart (1997) makalelerinde tasarlanana metodoloji uyarınca büyüklük, DD/PD oranı ve momentum faktörleri kurulmuş ve oluşturulan seriler piyasa risk priminin yanı sıra bağımsız değişkenler olarak regresyona dahil edilmiştir. Üçüncü olarak ABKÖ-Artırılmış Model, fon stratejileri arasındaki ortaklıkları kontrol etmek amacıyla işleme konmuştur. İlk etapta aynı stratejiyi takip eden fonların ortalama getirileri olan ABKÖler oluşturulmuş ve Carhart Dört Faktörlü Model ile regresyona sokulmuştur. Büyük, orta ve küçük ABKÖlere ait regresyonlar sonucu elde edilen hata payı serileri ve alfaları ise ABKÖ-Artırılmış Modelin ilk ve ikinci aşamasında kullanılmıştır. İlk aşamada ABKÖ hata payı serileri fonlar için yapılacak regresyonlara beşinci faktör olarak eklenmiş, bu sayede aynı piyasa değeri stratejisini takip eden fonlar arasındaki sistematik olmayan risk alımlarındaki ortaklıklar kontrol edilerek fona özgü sistematik olmayan risk alımı ortaya çıkarılmıştır. İkinci aşamada ise ABKÖ hata paylarına ek olarak alfalar da modele dahil edilmiş ve bu şekilde fonların sistematik olmayan risk alımlarındaki ortaklıklar sonucu oluşan alfa kontrol altına alınarak fona özgü alfa izole edilmiştir. Uygulanan tüm modellerde anlamlı ve pozitif alfanın varlığı ve modelin açıklayıcı gücü temel ilgi konusu olmuştur.

SVFM'ye dayanan amprik sonuçlar, örneklenen yatırım fonlarının, ortalama %0,21 değerinde bir alfa ürettiğini göstermektedir. Ortalama alfa pozitif olmasına rağmen, %95'lik güven seviyesinde anlamlı ve pozitif bir alfaya sahip olan fonların sayısı, elli iki hisse senedi fonu içinde iki ile sınırlıdır. Bu anlamda, bu iki yöneticinin, en azından masraflardan önce fazladan getiri sağladığı düşünülebilir. Ayrıca, piyasa betaları ve oluşturulan modeller tüm regresyonlar için anlamlı bulunurken ortalama düzeltilmiş R^2'nin %80,8 olduğu gözlemlenmiştir. Genel olarak, piyasa riski primi, tek başına, Türk sermaye piyasalarındaki fon getirilerinin değişkenliklerini açıklamak için büyük bir güç taşımaktadır.

Tek faktörlü model, üç ek faktörle zenginleştirildiğinde ise ampirik sonuçlar büyük oranda değişmektedir. Carhart Dört Faktörlü Model ile yapılan regresyonlar sonucunda örneklenen hiçbir fon yöneticisi fazla getiri elde edememiş ve ortalama alfa %-1,67'ye gerilemiştir. Üstelik, %95 güven seviyesinde iki fon anlamlı ve negatif alfalarıyla öne çıkmıştır. Tüm modellerin istatistiksel olarak anlamlı olmasına ve düzeltilmiş R^2 seviyesinin SVFM'den biraz daha yüksek olmasına karşın, yalnızca piyasa betası, dikkate alınan tüm fonlar için anlamlı bulunmuştur; büyüklük, DD/PD oranı ve momentum faktörleri ise ancak örneklemin yarısından azı için anlamlı bulunmuştur. Dört faktörlü modelde açıklayıcı güç artmış olmasına rağmen, fonların performans değerlendirmesinde basitliği ve tutumluluğu dolayısıyla tek faktörlü SVFM'nin kullanılması önerilmektedir.

Açıklayıcı güç seviyesinin yanı sıra, fonların, özellikle de aynı özellik gruplarındaki fonların, sistematik olmayan risk alımları arasındaki ortaklıklar dört faktörlü modelin çözemediği bir sorundur. Hunter vd. (2014), sorunu düzeltmek için aynı akran grubundaki fonların ortalama fazla getirisi olan aktif benzer karşılaştırma ölçütlerini kullanmayı önermektedir. Bu modelde, ABKÖ getirileri dört faktöre karşı regresyona sokulur ve daha sonra ABKÖ'lerin hata payları ve alfaları, Carhart'ın modeline beşinci faktör olarak eklenir. Orijinal çalışmadaki metodolojiden farklı olarak, bu tez veri kümesindeki kısıtlamalardan dolayı bazı değişiklikler içermektedir. İlk olarak, Hunter vd.'nin (2014) büyüklük ve değer/büyüme ölçütlerine dayanan 3x3 matrisinin aksine, hisse senedi fonlarının sayısındaki azlığa bağlı olarak, sadece piyasa değerine dayalı üç ABKÖ oluşturulmuştur. İkincisi, piyasa değeri grupları, dinamik sonuçlar elde etmek için altı ayda bir gözden geçirilmiştir. Üçüncüsü, fonların piyasa değeri gruplarını belirlemek için Hunter vd. (2014) tarafından kullanılan aktif pay ölçütünden farklı olarak Lipper metodolojisinin modifiye edilmiş bir versiyonu kullanılmıştır.

Sadece ABKÖ hata paylarının yer aldığı ilk aşama regresyonda, örneklenen fonlarda %95 güven seviyesinde hala anlamlı bir pozitif alfa bulunamadığı, ancak fonların yaklaşık üçte birinin anlamlı negatif alfa ürettiği görülmektedir.

Dahası, APB faktörü örneklemin tamamı için önemli bulunmuştur ki bu fon ile ilgili ABKÖ becerisi arasındaki korelasyonu göstermektedir. Öte yandan, büyüklük, DD/PD ve momentum faktörlerine ilişkin önemli betaların sayısı artırılmış modelle birlikte neredeyse ikiye veya üçe katlanmıştır. Hunter vd.'nin (2014) bulgularının aksine, ortalama düzeltilmiş R^2 düzeyi %91,9'a ulaşarak büyük bir ilerleme kaydetmiştir. Genel olarak, elli iki fon getirisinden kırk yedisi, beklentiler doğrultusunda alfa t-istatistiklerinde kuyruklara doğru yaklaşmaktadır. Analizin ana bulgularından ilki, aynı ABKÖ grubundaki fonların ortalama sistematik olmayan risk alımını kontrol ettikten sonra bile, yöneticilerin seçicilik becerilerinin yetersizliğidir ve ikincisi, artırılmış modelin fonlar arasındaki korele hata payları yüzdesini büyük oranda azaltma kabiliyetidir.

İkinci aşamada; ABKÖ alfaları da aynı ABKÖ grubundaki fonların sistematik olmayan risk alımında ortaklıklar tarafından üretilen alfadan bağımsız fon alfası modellemesinde kullanılmıştır. Modelin açıklayıcı gücü ilk aşamaya kıyasla fazla değişim göstermezken, alfalar beklendiği gibi sıfırın etrafında yoğunlaşmıştır. Sonuçlar, aynı ABKÖ grubundaki fonların hem ortak sistematik olmayan risk alımını hem ilişkili alfayı kontrol ettikten sonra, % 95 güven seviyesinde iki hisse senedi fonunun anlamlı ve pozitif, dördünün ise anlamlı ve negatif alfaya sahip olduğunu ortaya koymaktadır. Bununla birlikte, anlamlı ve pozitif alfaya sahip iki fon SVFM'deki fonlarla aynı değildir. Özetle, bu tez Hunter vd.'nin (2014) bulgularını büyük ölçüde onaylamakta ve ABKÖ-Artırılmış ve Alfa-Düzeltilmiş Modellerin 2012 Temmuz ve Haziran 2016 arasındaki dönemde yöneticiler arasındaki hisse seçicilik becerisini belirlemek ve örneklenen fonlardaki korele hata payları sorununu çözmek için çok kullanışlı olduğunu sergilemektedir.

Veri kümesinin mevcudiyeti, bu araştırmaya örneklem büyüklüğü, analiz süresinin uzunluğu ve uygulanan yöntemlerin değiştirilmesi gibi çeşitli sınırlamalar getirmektedir. Bununla birlikte, bu çalışma, piyasa değeri gruplarını oluşturmak ve performansı buna göre değerlendirmek için portföydeki hisse senetleri verisini kullanan, Türk yatırım fonları üzerine

yapılan ilk çalışmadır. Türkiye'den Karatepe & Karacabey (2000), Imisiker ve Ozlale (2008) ve Goren ve Umutlu (2015); ABD'den Grinblatt & Titman (1989), Wermers (2000) gibi yatırım fonları ile ilgili daha önceki çalışmaların sonuçlarına benzer şekilde; SVFM ve ABKÖ Alfa-Düzeltilmiş Model fonların yalnızca küçük bir kısmının aşırı getiri sağladığını ortaya koymaktadır. Bununla birlikte, Carhart Dört Faktörlü Model ve APB-Artırılmış Model kullanıldığında, Chang & Lewellen (1984) ve Malkiel'in (1995) iddia ettiği gibi örneklenen fonlar arasında giderler öncesi aşırı getiri gözlenmemektedir. Giderler düşüldükten sonraki yatırım fonu performansı, daha dinamik bir piyasa değeri sınıflandırmasıyla yapılacak bir analiz ve APB-Artırılmış Model'in diğer fon türlerine uygulanması daha sonraki çalışmalarda değerlendirilmesi beklenen muhtemel araştırma konularıdır.

APPENDIX E. TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

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

YAZARIN

Soyadı: Şanap
Adı: Aybars Furkan
Bölümü: İşletme

TEZİN ADI: A Closer Look at Mutual Fund Performance in Turkey Based on Active Peer Benchmarks

TEZİN TÜRÜ: Yüksek Lisans [X] Doktora [ ]

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 bir (1) yıl süreyle fotokopi alınamaz. [X]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: