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PERFORMANCE EVALUATION ANALYSIS WITH VARIOUS TECHNIQUES FOR A-TYPE MUTUAL FUNDS

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DECLARATION

I hereby declare that this Doctoral Thesis titled as "**Performance Evaluation Analysis With Various Techniques for A-Type Mutual Funds** " has been written by myself in accordance with the academic rules and ethical conduct. I also declare that all materials benefited in this thesis consist of the mentioned resources in the reference list. I verify all these with my honour.

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ABSTRACT

Doctoral Thesis

Doctor of Philosophy (PhD)

Performance Evaluation Analysis With Various Techniques For A-Type Mutual Funds

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Under the assumption of perfect market there are no frictions in the economy and cost of capital of the firms equals to investor returns. Nonetheless in reality markets are not perfect and transaction costs which stems from frictions cause cost of capital and investor return to be different. In an attempt to minimize transaction costs financial intermediaries come into stage. Mutual funds are one of the most important financial intermediaries whose assets constitute an important part of countries' GDP. Large portfolios managed by mutual funds have lead researchers to question mutual fund performance. Especially in developed markets there are so many studies that examine that topic from different perspectives by using different methods. Nonetheless there is limited number of studies which examines fund performance from perspective of emerging markets. This study attempts to investigate mutual fund performance for Turkish mutual funds for the period between 2003Q1-2013Q4. It is noteworthy to mention that data availability is a big constraint in measurement of mutual fund performance especially for emerging markets, like it is the case in this study. In the empirical part different types of methods that exist in worldwide literature are used. In conclusion mutual fund managers are not found successful as they are expected.

ÖZET

Doktora Tezi

A Tipi Yatırım Fonlarının Çeşitli Tekniklerle Performans Analizi

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Mükemmel piyasalar varsayımı altında ekonomide sürtüşmeler yoktur ve firmaların sermaye maliyeti yatırımcıların elde ettiği getiriye eşittir. Oysa gerçekte piyasalar mükemmel değildir ve söz konusu sürtüşmelerden kaynaklanan işlem maliyetleri firmaların sermaye maliyetlerinin yatırımcıların elde ettiği getiriden farklı olmasına neden olmaktadır. Sözkonusu işlem maliyetlerini azaltmak amacıyla finansal aracılar ortaya çıkmıştır. Finansal aracıların en önemlilerinden biri olan yatırım fonlarının varlıkları ülkelerin milli gelirlerinin önemli bir kısmını oluşturmaktadır. Yatırım fonları tarafından yönetilen büyük portföyler araştırmacıların yatırım fonlarının performansını sorgulamasına sebebiyet vermiştir. Özellikle gelişmiş piyasalarda bu konuyu farklı bakış açılarından farklı yöntemler kullanarak inceleyen birçok çalışma bulunmaktadır. Ancak yatırım fonu performansını gelişmekte olan piyasalar açısından inceleyen sayılı çalışma vardır. Bu çalışma Türkiye'deki yatırım fonlarının performanslarını 2003Q1-2013Q4 dönemi için incelemeyi amaçlamaktadır. Bu noktada bu çalışmada olduğu gibi özellikle gelişmekte olan ülkelerde veriye erişimin yatırım fonu performansının ölçümünde büyük bir sorun teşkil ettiğinin belirtilmesi gerekmektedir. Çalışmanın ampirik kısmında dünya literatüründe kullanılan farklı yöntemler uygulanmıştır. Sonuçta yatırım fonu yöneticilerinin beklenildiği gibi başarılı olmadığı görülmüştür.

PERFORMANCE EVALUATION ANALYSIS WITH VARIOUS TECHNIQUES FOR A-TYPE MUTUAL FUNDS

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CHAPTER 4

EMPIRICAL STUDY

ABBREVATIONS

AMEX	American Stock Exchange
APT	Arbitrage Pricing Theory
BIST	Borsa İstanbul
CAPM	Capital Asset Pricing Model
CML	Capital Market Line
CMB	Capital Markets Board
CRSP	Center For Research in Security Prices
DEA	Data Envelopment Analysis
DEF	Default
EFAMA	European Fund and Asset Management Association
FDR	False Discovery Rate
GDP	Gross Domestic Product
ISE	Istanbul Stock Exchange
MEBAN	Menkul Değerler Bankerlik ve Finansman A.Ş.
NASDAQ	National Association of Securities Dealers Automated Quotations
NAV	Net Asset Value
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
OTC	Over the Counter
RAP	Risk Adjusted Performance
RAPA	Risk adjusted excess return
SML	Security Market Line
S&P	Standards & Poors
USA	United States of America
USD	United States Dolar
TKYD	Corporate Governance Association of Turkey

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INTRODUCTION

The major aim of the financial markets is the allocation of financial resources efficiently in the economy. In the economy there are two types of economic units namely the fund demanders and fund suppliers. While the former are the economic units with funding needs who aim to minimize cost of capital, the latter are the economic units with surplus funds who provide financial capital in an attempt to maximize their savings. Under the assumption of perfect market without frictions firm's cost of capital and returns of investors' are equal and in such a market neither banks nor mutual funds are required. However there are market frictions in the economy and difference between returns and cost of capital stems from transaction costs. Therefore banks, mutual funds and other intermediaries exist in order to offer services related to minimization of transaction costs.

Although the initial mutual funds were founded in early 1900s in developed markets, first Turkish mutual fund was founded in 1980s. The first communiqué regarding mutual funds was enacted in 1986 in Turkey. After that a number of Turkish mutual funds have established year by year. Although it's a rapid development, the mutual fund industry is still small when we compare it with those in developed countries.

While mutual fund assets constitute an important part of developed countries' GDP, assets hold by Turkish mutual funds constitute only 1.8 % of Turkey's GDP. That ratio is so high for countries like the US and Luxembourg, 85.2% and 4799.5% respectively. Since the magnitude of portfolios managed by fund managers has attracted attention of researchers examining mutual fund performance, they try to answer whether the mutual funds provide high returns. Many studies have conducted on this issue for the mutual funds in developed countries however we observe only a few studies for developing countries.

Although many studies have been proposed until now, there is no consensus about the ability of mutual fund managers to get abnormal returns. Existing studies which have used net returns of mutual funds have generally found negative performance. According to Grinblatt and Titman (1989b) this is not surprising. If fund managers have superior ability, they will capture the rents from their ability in the form of higher management fees. Because of that reason authors assert that

abnormal performance can be observed only by examining gross returns. This study has tested whether the consensus on the inability of mutual funds to beat market in developed markets also holds in Turkey. Furthermore selectivity and timing abilities of mutual managers are also questioned.

According to efficient market hypothesis active investment management is pointless. Rather it states that best thing to do is following passive market strategy. In a price efficient market, investment strategies for outperforming market-index will not get abnormal returns after adjustments are made for risk and transaction costs. Results of this study have indicated that mutual funds do not get abnormal return compared to benchmarks. However it cannot be evaluated as efficiency of the market, since result is sensitive to benchmark that is selected. Moreover this result is consistent with Grossman view of efficiency since net returns are used. Nonetheless a certain evaluation about efficiency (according to view of Grossman) cannot be made since same procedure cannot be implemented to gross returns.

This study attempts to evaluate the performance of Turkish A-type mutual funds by using various methods which are rarely applied to emerging markets including Turkey. This study is comprehensive since it applies various methods to a wide data set. With this study it is expected to guide investors who invest in mutual fund industry. In the first place we present best and worst performing funds based on various measures. We depict mutual funds with security selection and market timing abilities. Moreover fund performance is questioned by using multifactor models. Results of this study can also be essential for mutual fund managers who could compare fund performance he manages with performance of other funds. This study differentiates itself from others by the methods it applies. It is the first one that calculates characteristics selectivity, characteristic timing and average style measures for Turkish mutual funds. Nonetheless data availability is a limitation. Since the CMB of Turkey has begun to provide data on the content of the mutual funds since June 2012, multifactor models and characteristic performance measures could be applied for the period after June 2012.

This study attempts to shed light on the performance of A type mutual funds by using various methods under the limitation of data availability. In the first chapter we present a general outlook to fund industry including history of it both in Turkey

and in the world, the management principles, the legal perspective and the types of mutual funds. In the second chapter we present the essential studies regarding mutual fund performance. Moreover some important researches examining performance persistence will be also mentioned.

In the third chapter we mention about the methodology which will be applied in the following chapter. First traditional measures including Sharpe ratio, Treynor ratio, Jensen's alpha, M^2, T^2, information ratio and Fama measure are explained. In the next section quadratic regression and dummy variable regression, which will be used to examine stock selection and market timing ability of fund managers, are explained. After then multifactor models including Fama French model and Carhart four factor model are introduced. Formation of passive portfolios which is the most difficult part of this study is explained in detail in this chapter. Lastly characteristic performance measures including CS (Characteristic Selectivity), CT (Characteristic Timing) and AS (Average Style) is mentioned in detail.

In the last chapter, we present the empirical study which consists of implementation of the methods presented in the previous chapter to the data of A-type mutual funds in Turkey. According to results of traditional measures although ranking between funds changes, best and worst performing funds generally include same funds. Unfortunately multifactor models can be applied for only a limited time period, since data regarding portfolio content is available from 2012 June. Because of the same reason, characteristic measures can be calculated only for a limited time period.

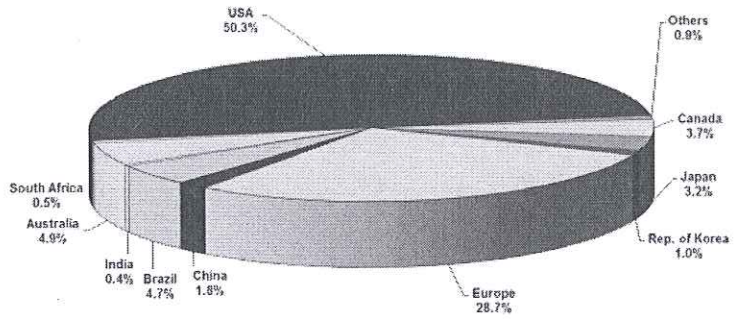
CHAPTER 1
AN OUTLOOK TO MUTUAL FUND INDUSTRY

1.1. GENERAL OUTLOOK TO MUTUAL FUNDS

Last decade has witnessed the intensive popularity experienced by investment companies including mutual funds. Although there were only 68 mutual funds with $ 0.45 billion invested in assets in 1940 in US, in 2014 there were 7846 mutual funds with $ 15664 billion. According to table 1.1, Turkish fund industry has had 405 mutual funds which have total net assets in the amount of 15255 million USD by the third quarter of 2014.

Table 1.1 enables us to make comparison between countries. As it is seen on Table 1.1, net assets invested by mutual funds are very low in developing countries compared to developed countries. According to Figure 1.1 the US and Europe have the largest market shares in terms of fund assets, 50.3 % and 28.7 % respectively. Market share of Turkish fund industry is approximately 0.05 %. This case could be attributed to deficiency of savings in Turkey. Another factor might be that Turkish mutual fund industry was established later than those of the US and Europe.

Figure 1.1: Top 10 Countries Investment Fund Assets



Source: International Statistical Release, EFAMA, Third Quarter 2014

Figure 1.1 highlights top ten domiciles worldwide of investment fund asset at September 2014.

Table 1.1: Number of Mutual Funds

Countries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014/6
America													
USA	8244	8126	8041	7975	8117	8027	8022	7663	7548	7580	7582	7707	7846
Argentina	211	186	186	200	223	241	253	252	254	281	291	297	299
Brazil	2755	2805	2859	2685	2907	3381	4169	4744	5618	6513	7468	8072	8398
Canada	1956	1887	1915	1695	1764	2038	2015	2075	2117	2655	2866	2963	2976
Costa Rica	128	129	115	110	100	93	85	64	68	63	66	66	66
Mexico	364	374	411	416	437	420	431	407	434	464	488	487	484
Chile	226	414	537	683	926	1260	1484	1691	1912	2150	2286	2385	2383
Europe													
Germany	1092	1050	1041	1076	1199	1462	1675	2067	2106	2051	2059	2012	2046
Austria	808	833	840	881	948	1070	1065	1016	1016	1003	995	981	957
Belgium	1141	1224	1281	1391	1549	1655	1828	1845	1797	1723	1529	1432	1227
Czech Republic	76	58	53	51	52	66	76	78	80	80	80	85	96
Denmark	485	400	423	471	494	500	489	483	490	500	495	510	522
Finland	312	249	280	333	376	379	389	377	366	368	375	369	368
France	7773	7902	7908	7758	8092	8243	8301	7982	7791	7744	7392	7154	7042
Holland	680	593	-	515	473	450	-	-	-	495	497	501	583
England	1787	1692	1710	1680	1903	2057	2371	2266	2204	1941	1922	1910	1905
Ireland	1905	1978	2088	2127	2531	2898	3097	2721	2899	3085	3167	3345	3416
Spain	2466	2471	2559	2672	3235	2940	2944	2588	2486	2474	2349	2267	2291
Sweden	512	485	461	464	474	477	508	506	504	508	456	484	497
Swiss	512	441	385	510	609	567	572	509	653	664	667	765	794
Italy	1073	1012	1142	1,035	989	924	742	675	650	659	600	661	672
Lihtenştayn	111	137	171	200	233	391	335	348	409	437	535	657	660
Luxembourg	6874	6578	6855	7222	7919	8782	9351	9017	9353	9462	9435	9500	9663
Hungary	90	96	97	91	161	212	270	264	276	152	167	182	187

Norway	419	375	406	419	524	511	530	487	507	507	406	573	603
Poland	107	112	130	150	157	188	210	208	214	226	259	264	272
Portugal	170	160	163	169	175	180	184	171	171	173	157	153	151
Romaine	20	20	19	23	32	41	52	51	56	105	62	64	68
Russia	57	132	210	257	358	533	528	480	462	472	-	-	-
Slovakia		37	40	43	43	54	56	54	58	63	58	54	65
Turkey	**242**	**241**	**240**	**275**	**282**	**294**	**304**	**286**	**311**	**337**	**351**	**373**	**405**
Greece	260	265	262	247	247	230	239	210	213	196	177	166	147
Asia and Pacific													
China	-	-	-	-	-	434063	276303	381207	364985	339037	437449	460332	561342
Philippines	474	792	952	1449	1544	2090	1263	1488	2184	2363	3566	4662	4917
South Korea	149544	121663	177417	198994	251930	329979	221992	264573	266495	226716	267582	285173	309128
India	20364	29800	32846	40546	58219	108582	62805	130284	111421	87519	114489	107895	127054
Japan	303191	349148	399462	470044	578883	713998	575327	660666	785504	745383	738488	774126	824672
Pakistan	-	-	-	-	2164	4956	1985	2224	2290	2984	3159	3464	3850
Taiwan	62153	76205	77328	57301	55571	58323	46116	58297	59032	53437	59192	62286	65682
New Zealand	7505	9641	11171	10332	12892	14924	10612	17657	19562	23709	31145	34185	41395
Africa													
South Africa	460	466	537	617	750	831	884	904	943	947	967	1062	1088

Source: International Economic and Financial Indicators, CMB (September, 2014)

Table 1.2 gives total net asset values of mutual funds. According to table 1.2, countries with highest net asset values are the US, Luxembourg, Australia, Ireland and France. Compared to those countries total net asset value of Turkish fund industry is very small. Turkish mutual fund industry has the 32th highest net asset value from 42 countries that take place in table 1.2.

Table 1.2: Total Net Assets Values of Mutual Funds (million USD)

ountries	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014/6
USA	6390358	7414401	8106939	8904824	10396508	12000645	9603649	11112970	11831334	11626493	13043666	15017682	15664975
Argentina	1021	1916	2355	3626	6153	6789	3867	4470	5179	6808	9185	11179	11011
Brazil	96729	171596	220586	302927	418771	615365	479321	783970	980448	1008928	1070998	1018641	1136976
Canada	248979	338369	413772	490518	566298	698397	416031	565156	636947	753606	856504	940580	1030361
Costa Rica	1738	2754	1053	804	1018	1203	1098	1309	1470	1266	1484	1933	2164
Mexico	30759	31953	35157	47253	62614	75428	60435	70659	98094	92743	112201	120518	132399
Chile	6705	8552	12588	13969	17700	24444	17587	34227	38243	33425	37900	39291	41525
Germany	209168	276319	295997	296787	340325	372072	237986	317543	333713	293011	327640	382976	397418
Austria	66877	87982	103709	109002	128236	138709	93269	99628	94670	81038	89125	90633	90770
Belgium	74983	98724	118373	115314	137291	149842	105057	106721	96288	81505	81651	91528	93770
Czeh Republic	3297	4083	4860	5331	6490	7595	5260	5436	5508	4445	5001	5131	5452
Denmark	40153	49533	64799	75199	95620	104082	65182	83024	89800	84891	103506	118702	126879
Finland	16516	25601	37658	45415	67804	81136	48750	66131	71210	62193	73985	88462	93873
France	845147	1148446	1370954	1362671	1769258	1989690	1591082	1805641	1617176	1382068	1473085	1531500	1559487
Holland	84211	93573	102134	94357	108560	113759	77379	95512	85924	69156	76145	85304	84391
England	288887	396523	492726	547103	755156	897460	504681	729141	854413	816537	985517	1166834	1252547
Ireland	250116	360425	467620	546242	855011	951371	720486	860515	1014104	1061051	1276601	1439867	1580120
Spain	179133	255344	317538	316864	367918	396534	270983	269611	216915	195220	191284	248234	264732
Sweden	57992	87746	107064	119059	176943	194955	113331	170277	205449	179707	205733	252878	289090
Swiss	82622	90772	94407	116669	159515	176282	135052	168260	261893	273061	310686	397080	421645
Italy	378259	478734	511733	450514	452798	419687	263588	279474	234313	180754	181720	215553	240851
Lihtenştayn	3847	8936	12543	13970	17315	25103	20489	30329	35387	32606	31951	36235	34060
Luxembourg	803869	1104112	1396131	1635785	2188278	2685065	1860763	2293973	2512874	2277465	2641964	3030665	3312932
Hungary	3992	3936	4966	6068	8523	12577	9188	11052	11532	7193	8570	12158	12676

Norway	15471	21994	29907	40122	54065	74709	41157	71170	84505	79999	98723	109325	132845
Poland	5468	8576	12014	17652	28957	45542	17782	23025	25595	18463	25883	27858	28243
Portugal	19969	26985	30514	28801	31214	29732	13572	15808	11004	7321	7509	9625	10625
Romania	27	29	72	109	247	390	326	1134	1713	2388	2613	4000	4795
Russia	372	851	1347	2417	5659	7175	2026	3182	3917	3072	-	-	-
Slovakia	-	1061	2168	3035	3171	4762	3841	4222	4349	3191	2951	3292	4013
Turkey	**6002**	**14157**	**18112**	**21761**	**15463**	**22609**	**15404**	**19426**	**19545**	**14048**	**16478**	**14078**	**15255**
Greece	26621	38394	43106	32011	27604	29807	12189	12434	8627	5213	6011	6742	7359
China	-	-	-	-	-	434063	276303	381207	364985	339037	437449	460332	561342
Philippines	474	792	952	1449	1544	2090	1263	1489	2164	2363	3566	4662	4917
South Korea	149544	121663	177417	198994	251930	328979	221992	264573	266495	226716	267582	285173	309128
India	20364	29800	32846	40546	58219	108582	62805	130284	111421	87519	114489	107895	127054
Japan	303191	349148	399462	470044	578883	713998	575327	660666	785504	745383	738488	774126	824672
Pakistan	-	-	-	-	2164	4956	1985	2224	2290	2984	3159	3464	3850
Taiwan	62153	76205	77328	57301	55571	58323	46116	58297	59032	53437	59192	62286	65682
New Zealand	7505	9641	11171	10332	12892	14924	10612	17657	19562	23709	31145	34185	41395

Source: EFAMA, International Statistical Release, Q3_2014_Q3

Table 1.3: Net Asset Values of Turkish Mutual Funds (million USD)

	Number of funds	Net Asset Value
2002	242	6,002
2003	241	14,157
2004	240	18,112
2005	275	21,761
2006	282	15,463
2007	294	22,609
2008	304	15,404
2009	286	19,426
2010	311	19,545
2011	337	14,048
2012	351	16,478
2013	373	14,078
2014/6	405	15,255

Source: Capital Markets Board, December 2014

The number and the net asset values of Turkish mutual funds are given in table 1.3. Although only seven funds exist in 1987, it has increased to 405 by the end of the sixth month of 2014. As it is obvious in table 1.3, net asset values have a fluctuating trend. The reason for the decrease in net asset value in 2006 might be the result of capital outflows which are accompanied by depreciation of Turkish Lira, increase in interest rates and fall of stock market. The reason for another decrease in net asset value in 2008 might be the effect of global financial crisis. Last decrease in NAV is experienced in 2011.

Table 1.4 presents the ratio of mutual fund assets to GDP that is an indicator showing development level of institutional investor base yearly for Turkey.

Table 1.4: Mutual Fund Assets as a Percentage of GDP

Years	Mutual Fund Assets as a percentage of GDP
2000	1.162
2001	1.980
2002	2.667
2003	4.366
2004	4.373
2005	4.527
2006	2.902
2007	3.129
2008	2.498
2009	3.108
2010	2.811
2011	2.334

Source: World Bank, Economics Research Division Federal Reserve Bank of St. Louis, January 2015

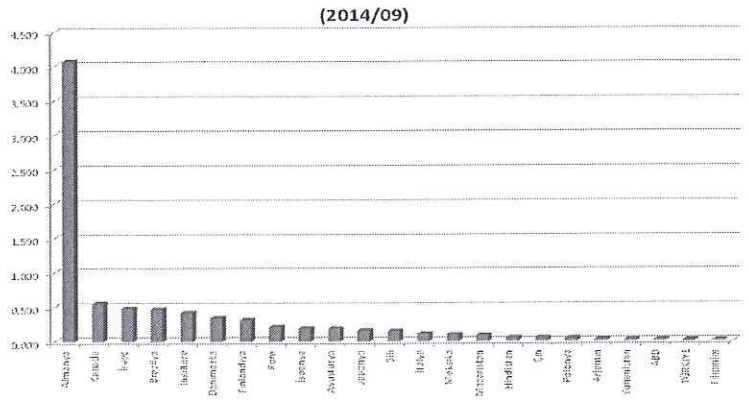
Table 1.5 gives comparison of mutual fund industry among some selected countries. As it can be seen from the table, top 10 countries possess 90 % of total mutual fund assets of the world. Ratio of total asset value of mutual funds to GDP is 48 % on average. This ratio is higher than 48 % for the US. Ratio of mutual fund assets to GDP is 1.80 % for Turkey which is extremely low.

Table 1.5: Comparison of Mutual Fund Assets to GDP between Countries

2014/9	NAV (Billion $)	Percentage	Portfolio/GDP
USA	15558	49.7 %	89.3 %
Luxemborg	3225	10.3 %	5044.4 %
Australia	1682	5.4 %	113.4 %
Ireland	1552	5.0 %	631.4%
France	1456	4.7 %	50.2 %
UK	1203	3.8 %	42.2 %
Brazil	1064	3.4 %	47.4 %
Canada	997	3.2 %	55.6 %
Japan	794	2.5 %	16.7 %
China	612	2.0 %	5.9 %
Turkey	15	0.0 %	1.8 %
Total	31315	100.0 %	47.8%

Source: Turkish Capital Markets Association, Report April 2015

Figure 1.2: Ratio of Net Asset Value of Mutual Funds to GDP



Source: International, Economic and Financial Indicators Report of CMB, January 2015.

Low income level that is accompanied by low savings rate has affected canalization of excess funds into efficient investment areas unfavorably. Canalization of scarce excess resources into efficient investment areas which requires a professional analysis has contributed appearance of collective investment institutions. Collective investment institutions are formed by two groups: Mutual funds and Investment Trusts. The former which do not have legal entity is operated based on the rules stated in the internal statute of the fund, whereas the latter which are legal entities are founded as joint-stock corporations.

If perfect market assumption without frictions hold, cost of capital of the firms would be equal to return investors obtain. Nonetheless, market frictions exist. According to Bogle (2005), the difference between the return obtained by investors and cost of capital of firms equals to sum of all transaction costs caused by market frictions. On the other hand transaction costs and asymmetric information that are created by frictions also offer opportunities to generate abnormal returns. Nonetheless individual investors generally do not have superior investment skills which are required to benefit from those opportunities. By the use of mutual funds investment decisions are delegated to professional managers and individuals are able to exploit opportunities.

Pozen and Hamacher (2011) have used the phrase "investing through a fund" instead of "investing in a fund" since mutual fund is not a real investment itself, but rather it is just a financial intermediary. Word "mutual" comes from the fact that all fund returns including interest, dividend and capital gains, and all of the expenses are shared by fund investors.

Although investing through a mutual fund seems advantageous at the first sight, Jensen and Meckling (1976) assert that delegation creates a potential for conflict of interest. The reason for the assertion of Jensen and Meckling (1976) could be the fact that aim of parties varies. Investors try to maximize risk adjusted returns net of all costs; whereas portfolio manager attempts to maximize his lifetime income. On the other hand Investment Management Company attempt to maximize fee-income which is linearly related with total assets under management. As it is clear goal of performance maximization is not shared by all parties. This may be the reason of why average risk adjusted return investors obtain are generally around zero or even below. (Luckoff, 2011: 79)

Mutual funds can be defined as professionally managed pooled investment vehicles which combine small amounts of money into a large sum for investment. Such a pooling mechanism enables investors to benefit from economies of scale and risk reduction through diversification. By holding a single mutual fund, an investor is able to hold a portfolio which invests in a variety of instrument without taking the responsibility of monitoring individual performance of instruments. According to Shawky and Smith (2005), an equity mutual fund holds 90 stocks on average, and it invests one-third of its portfolio to ten stocks which are best performers. Consistently Haslem (2010) states that even most focused mutual funds hold at least twenty securities. Instead of holding a mutual fund an individual who attempt to hold a diversified portfolio on its own, would have to attain brokerage fees regarding buying relatively small amounts of many different stocks. Conversely by investing in mutual funds, they attain lower brokerage fees due to economies of scale.

The elements, which mutual funds require to have, are given by Tevfik (1995) as:

Tevfik (1995) has specified the elements which mutual funds require to have as follows:

- Fund target
- Instruments like stocks, bonds and other types of securities which could be included in the portfolio
- Daily Pricing of the instruments included in fund's portfolio which enable investors know value of investment
- Opportunity to make daily buy-sell transactions

1.2. HISTORY OF MUTUAL FUNDS

Although earliest predecessors of today's investment companies have been founded in 1800s in Europe, The Foreign and Colonial Government Trust that is founded in 1868 in London is assumed to be first one which pools money from small investors in order to benefit from economies of scale. (Gremillion, 2005: 14) It has invested mostly on bonds of foreign governments and diversification is assured by a promise in trust's prospectus stating that no more than 10% of trust assets would be invested on a particular security. (Hutson, 2005: 10) Favorable environment that is generated by British Law of Late 1800s has contributed foundation of eighteen trusts like Scottish American Investment Trust which resembles today's close end funds. First close end fund of America, The International Securities Trust of America, was formed in 1921. By the beginning of 1920s there are two types of investment trusts: British/Scottish investment trusts and Boston type investment trusts. Latter can be evaluated as open-end funds. Although a few open-end investment trusts was established before 1920s, none of them has been available to public. Because of that reason first open end fund is accepted as Massachusetts Investors Trust which is established by Edward Leffler in 1924. Initially mutual funds were shadowed by close end investment trusts. By 1929 there was only 19 mutual funds with 140 million $ net assets, whereas there was 89 close end investment trusts with 3 billion $ net assets.

Inherent problems of investment trusts have been realized with stock market crash of 1929. First of all investment trusts do not disclose their underlying portfolio holdings by this way they value their own shares at the price they want. Secondly

they use leverage which expose fund holders to potential loss of losing their stakes. Moreover they tend to purchase securities to help insiders who tries to unload undesirable stocks. With the effect of crisis, close end fund holders are hurt badly. Not surprisingly, open end funds have also lost value during crash but their policy regarding redemption upon demand at NAV safeguarded them against problems that devastated close end funds. (Gerber, 2008: 5)

With the serious crisis experienced by funds with the effect of crash, strict standards for investment companies including mutual funds are set. These standards are Prevention of Fraud (Investments) Act 1939 in Britain and The Investment Companies Act (1940) in the US. Afterwards in 1943 market share of mutual funds has exceeded market share of close end funds for the first time.

Standards have affected mutual fund industry favorably and a modest growth is experienced in industry between the years 1940-1970. In this period mutual funds tend to invest mostly in stocks which make them vulnerable to ups and downs of stock market. During 1950s and 1960s a growth is experienced since stock prices tend to rise. Growth has stopped in 1973 when stock prices plummet and a recession comes into place.

In Turkey, regulations regarding mutual funds have been made by Capital Markets Law. Capital Markets Law with Number 2499 has focused on balancing the relationship between relevant parties and protecting the rights and benefits of them. Essentials of application are regulated with notifications of CMB. Communiqué with number VII has included essentials regarding mutual funds. First regulation regarding mutual funds has been made with the Communiqué "Essentials regarding issuance of mutual fund participation certificates and essentials regarding public offering" on official register with number 19310 on 12.12.1986. Next communiqué is "Essentials of mutual funds", which is issued on official register with number 22852 on 19.12.1996. That communiqué has been applied until new communiqué "Essentials of mutual funds" is issued on official register with number 28702 on 09.07.2013.

In 1992 some changes are made regarding application. Within framework of these changes, not only banks but also financial intermediaries and insurance companies are given the authority to establish mutual funds. Funds are classified as

Type-A and Type-B and a tax regulation is made. Mutual funds are given the opportunity to merge with other mutual funds. Lastly, it has become compulsory for mutual funds to make contract with Settlement and Custody Bank with the aim of safekeeping fund assets. According to regulation amended 1994, pension funds are also allowed to establish mutual funds. With the regulation in 1996, fund types are determined based on holdings of fund portfolio. A distinction is made between fund founder and fund manager. Financial intermediaries, portfolio management companies and investment banks who have taken the certificate of portfolio manager from CMB are given authority to manage funds. Forward pricing is started to apply for A-type funds. In this type of pricing, fund price is not known during buy and sell transactions. Transactions are made from the price that takes place after one or two work days depending on the type of fund.

"MEBAN" which is accepted as the first Turkish mutual fund by many authors was founded in 1979 when legal infrastructure was not available in Turkey. On contrary according to Ural (2010) it is not possible to evaluate MEBAN as a real mutual fund. After MEBAN, second attempt was İş Yatırım whose participation certificates were supplied to market on 13.July.1987. After then until November 1988, 17 mutual funds were established by ten banks.

During the years when mutual funds are started to be established in Turkey, there was only limited number of financial instruments which can be invested by mutual funds. This case is a limitation for mutual funds which attempt to manage diversified portfolios. After approximately 30 years, it is still suspicious if there is sufficient number of financial instruments to provide price stability in mutual fund participation certificates.

Compared to financial markets of the world, development of mutual fund industry has been late in Turkey. Tuncer (1989) has counted reasons of this delay as:

- ISE has not been established until 1986. Since stock market has not established, securities cannot be traded with fair value.
- Notification regarding public offering of mutual fund participation certificates has been issued with a delay in December 1986. After this date public offering of participation certificates is made.

- Problems regarding taxes have also caused the delay. Mutual funds which were exempt from corporate taxes were exposed to withholding tax in the ratio of 10 %. This case has caused mutual funds not to issue participation certificates. That problem was eliminated on August 1987 and participation certificates have started to be issued after that date. Tekbaş (1989) has also attributed the delay in the development of mutual funds to problems regarding taxes.

1.3. MANAGEMENT PRINCIPLES OF MUTUAL FUNDS

According to general view, management principles of mutual funds can be examined under five headlines. These principles have revealed the benefits of mutual funds from the perspective of fund holders, fund founders and general economy. (Ural, 2010:13)

1.3.1. Diversification of Risk

In the basic level diversification is achieved by investing in many different securities. Before the paper of Markowitz who is the founder of modern portfolio theory, although risk concept is known there is not a tool for measurement. Investors were trying to find securities offering maximum return with minimum risk. Markowitz (1952) is the first one stating that there is a trade-off between risk and return. He has also asserted that variance is good proxy for risk. According to Markowitz, risk minimization can be achieved by not only investing in many securities but also investing in securities which have low correlations between each other.

In the context of portfolio theory, there are two types of risk which are diversifiable (nonsystematic) risk and non-diversifiable (systematic) risk. Although nonsystematic risk can be decreased by diversification, systematic risk cannot be decreased. Nonsystematic risk includes many risks that are faced and have to be managed by mutual fund managers. Some of these risks are liquidity risk (Mutual fund holders may demand to convert securities into cash), default risk (Risk that institution, which issues security invested, unable to make contractual interest or principal payments on its debt obligation), foreign exchange rate risk (A firm that is

sensitive to foreign exchange rate risk tend to be distressed and generally have higher volatility).

Risk reduction is achieved by diversification, since losses of particular assets are compensated by gains of other assets that are held on portfolio. Such a portfolio, which is hard and expensive for individual investors to form, is formed by professional mutual fund managers. In this respect, portfolio diversification and professional management which are generally available for only large financial institutions and wealthy investors are provided to small individual investors by mutual funds. (Kılıç, 2002: 11)

1.3.2. Professional Management Principle

Money invested in mutual funds is managed by professional managers who have access to wide range of resources and research data and who are also able to spot trends and opportunities in the market. Portfolio management strategy is explained on private statute even at foundation period. After it is registered on trade register, it is presented on prospectus in the period of public offering. Professional management refers to monitoring entire feasible set of investments, selection of securities, making economically justified decisions about buying and selling individual stocks and ensuring that each portfolio complies with the characteristics described on fund prospectus. (Haslem, 2010: 39) By investing in mutual funds individual investors delegate these tasks to professional manager. Yet this service is provided by professional managers in exchange of advisory fees.

1.3.3. Management of Portfolio of Securities

Mutual funds are pooled investment vehicles which buy securities based on investor needs and manage them in a way that minimizes risk and maximizes return. Fund managers attempt to profit from spreads created by the price difference between buy and sell price of securities held.

1.3.4. Fiduciary Ownership

There are two types of fund asset ownership that are joint ownership and fiduciary ownership. Although fiduciary ownership is not regulated in Turkish

legislation separately, it is accepted as a valid legal instrument by doctrines and convictions. Turkish Capital Markets Law has adopted fiduciary ownership.

Mutual fund is owned by the fund manager in a fiduciary way. Investors (People who believe) transfer fund ownership to fund manager (the one who is believed). This transfer is made through a fiduciary contract (fund private statute). Content of this transfer includes not only financial assets included in fund portfolio, but also diversification and dividend rights. Fund manager has to manage fund within framework of contract.

1.3.5. Preservation of Principle

According to item three of new Capital Markets Law that is issued on official register in 2013 with number 28702, mutual funds do not have legal entity. According to item five mutual fund wealth is separate from fund founder's personal wealth.

Fund assets cannot be used as collateral or pledged except for taking credit, derivatives/short selling transactions provided that these transactions are on the account of fund and a provision exists in fund rules. Moreover liabilities of fund founder cannot be offset by the receivables of fund from same party.

1.4. LEGAL PERSPECTIVE OF MUTUAL FUNDS

"Communiqué regarding fundamentals of mutual funds" which is issued on official register with number 28702 on 09.07.2013, is prepared based on Article 52 and Article 54 of New Capital Markets Law that is issued on official register with number 28513 on 30.12.2012. It has been applied since 01.07.2014. With that communiqué establishment of mutual funds, rules and principles regarding operation, fundamentals regarding shares, their issuance and public disclosure are given. That communiqué is not applied to exchange traded funds, real estate investment trusts and venture capital investment trusts.

In the Capital Markets Law mutual funds are defined under the name of investment fund. On first item of the article 52 of new capital markets law, investment fund is defined as given:

"The asset which is established by portfolio management companies within the fund rules in conformity with the fiduciary ownership principles on the account of the savers, with money or other assets gathered from savers pursuant to the provisions of this Law in return for fund units in order to operate the portfolio or portfolios consisting of instruments and rights determined by the Board and which does not have a legal entity is called an investment fund."

According to second item of article 52 in order to take permission for establishment of investment fund founder must come to an agreement with an institution that has been authorized by the board in order to give a portfolio depository service. Moreover fund rules must be approved by the board. The applications regarding the establishment of investment fund shall be concluded by the Board within two months starting from the full submission of the necessary documents to the Board and the state of affairs shall be notified to the interested persons.

The portfolio management company represents, manages or supervises management of the fund so as to protect the rights of the investment fund unit holders. The portfolio management company shall be entitled, in its own name and in the account of the investment fund, to dispose of the assets belonging to an investment fund in accordance with the legislation and fund rules and to exercise any rights attaching there. Fourth item of the same article enlightens the case where no provision takes place in this law, in the related legislation and in the fund rules, provisions of Article 502 to 514 of the Turkish Code of Obligations dated 11/1/2011 and numbered 6098 shall be applied by analogy to the relations between the portfolio management company and the holders of fund units.

According to fifth item of article 52, fund shall be deemed as a legal entity limited to registration with the land registry. The real estates in the portfolio of the investment fund, rights based on the real estates and the bills based on the real estates shall be registered to the land register in the name of the fund. The transactions to be performed in the land registry in the name of the fund shall be executed with the common signatures of the persons authorized in the name of the portfolio management company and the institution carrying out the portfolio depositary service. According to sixth item, by taking opinion of Central Bank of Republic of

Turkey and Under Secretariat of Treasury, board may authorize that purchase and redemption of fund units be made in terms of foreign currency. Sell and buy prices of foreign currencies are declared daily by Central Bank of Republic of Turkey.

According to first item of Article 53, fund assets are segregated from assets of portfolio Management Company and institution that would carry out portfolio depository service. Based on second item, fund assets cannot be used as collateral or be pledged, other than being used for taking credits, derivative instrument transactions, short selling transactions, or similar transactions realized as a party in the name of the fund, provided that these transactions are on the account of the fund and that a provision exists in the fund rules.

Fund assets cannot be disposed of for any other purpose, even when the management or supervision of the portfolio management company or of the institution carrying out the portfolio depositary service is transferred to public institutions. Moreover fund assets cannot be attached even with the purpose of collecting public receivables and cannot be included in the bankrupt's estate and cannot be subject to cautionary injunction. In the case of liquidation of fund assets, payments may only be made to holders of fund units. According to item 4 of Article 53, debts and liabilities of portfolio management companies to third persons and receivables of investment funds from same party may not be set off each other.

Based on Article 54 of new capital markets law, board determines principles and procedures related to following:

- The establishment of the fund, eligible assets that can be allowed in portfolios as of fund types, portfolio restrictions, valuation principles, rules regarding the determination of the fund profit and its distribution as well as principles concerning the activities and management of the fund, its merger, transformation, termination and liquidation,
- The preparation of the fund rules, management and depositary contracts, their scope, amendments, registration and announcements, the value of fund units, calculation and announcement of issue and redemption prices, purchase and sale principles, fund management and depositary fees,
- The issue of fund units,
- The prospectus of funds and other public disclosure requirements.

In the communiqué regarding fundamentals of mutual funds item 3 specifies definitions and abbreviations. Firstly, item 4 makes definition of umbrella fund as mutual fund that includes all funds whose shares are issued within framework of single standing rule. Umbrella funds are founded in order to manage portfolio or portfolios that consist of assets and transactions given below. They can't involve in any other transactions.

a. Shares of issuers who are founded in Turkey including those that are in privatization framework, public and private debt instruments,

b. Foreign private and public debt instruments and stocks allowed to be traded within the framework of article 32 of the Decision regarding the Protection of the Value of Turkish Currency and issuer shares,

c. Time deposits, participation account and certificate of deposits whose maturity is maximum 12 months,

d. Gold and other precious metals traded in national and international exchanges, as well as capital market instruments backed by such metals and traded in exchanges,

e. Fund shares

f. Repo and reverse repo transactions

g. Lease certificates

h. Real estate certificates

ı. Takas Bank money market transactions

i. Cash collaterals and premiums of derivatives transactions

j. Foreign investment vehicles that are specially designed and loan participation notes that are approved by the board

k. Other investment vehicles that are approved by the board.

Classification of umbrella funds based on instruments included in the portfolio is made on item 6. Details will be given on section 5.3.

According to Item 10 which explains fundamentals regarding foundation of mutual funds, it is compulsory for mutual funds to be founded as umbrella fund. Other steps in foundation of an umbrella fund are given as below:

-Fund founder applies to Capital Markets Board with application form whose fundamentals are determined by board, preliminary private statute and other relevant documents that are specified by the board. In order to get permission for foundation,

safekeeping contract that is made between founder and portfolio safe keeper is required to include umbrella fund that is about to be founded.

-Within the framework of foundation application, information that takes place in private statute is required to be consistent, clear and complete based on private statute standard specified by the Capital Markets Board.

- Foundation application results in two months from the date when relevant documents are delivered to the Capital Markets Board.

-Private statute that is approved by Capital Markets Board is registered to trade register in six days from the date when firm receive a notification regarding board decision and it is announced with Trade Registry Gazette on Public Disclosure Platform.

- Application is examined. If application is not approved by the board, it is declared to applicant with its reasons.

- Documents required for foundation o umbrella fund are specified and announced by the board.

Item 28 of the same communiqué explains termination process of funds. According to this item, fund terminates in the cases below:

- If a specified termination date exists in relevant documents,
- If a specified termination date does not exist, but founder denounce for six months later after he takes approval of the board,
- In the case when founder no longer has conditions required for operation,
- In the case when founder bankrupts or fall into a financial distress and cannot meet his financial obligations.
- In the case when fund no longer meets its financial liabilities or other case when Capital Markets Board states that operation of fund is not beneficial for investors any more.

1.5. CLASSIFICATION OF MUTUAL FUNDS:

Although classification of mutual funds differs in different resources, most frequent classification is made based on variability of fund shares and qualification of instruments included in the portfolio of mutual funds.

1.5.1. Classification Based on Variability of Fund Shares

1.5.1.1. Open End Mutual Funds:

Open end funds can be defined as funds whose number of share increases when investors demand and decreases when investors redeem their shares. (Tevfik, 1995: 5) Unlike close end funds, there is not a secondary market for open end funds. Characteristics of mutual funds are given as:

- Participation certificates can be bought from either fund founder or sales representative of the fund. (Karacabey,1998: 34)
- Number of fund shares changes since investors have opportunity to sell their shares back to fund from NAV.
- Open end funds are redeemable and buy-sell transactions are made from NAV that is calculated daily based on closing market prices of securities included in the portfolio. NAV is calculated as given:

$$NAV = \frac{\text{(Market value of securities that is hold by portfolio + Other Assets- Liabilities)}}{\text{Number of Shares Outstanding}}$$

- Buy-sell transactions of open end funds do not require buyer and seller to meet physically. Since open end funds are redeemable, cash or assets that can be easily converted to cash should be included in the portfolio. Due to that feature, open end funds are said to be liquid.
- Fund capital can be increased with the demand of investors.

According to Lückoff (2010), open end structure provides an efficient market-based governance mechanism which reduces agency conflicts and assures product-market efficiency since asset base of unskilled managers is reduced over time and these managers eventually disappear from market.

Despite advantages, there are also disadvantages of open end funds. According to Stein (2005), open end structure prevents fund managers to pursue long-term investment strategies since they face risk of outflows when convergence to fundamentals is unlikely to be smooth or rapid. Lückoff (2010) is in the same opinion with Stein and state that this case causes mutual funds to focus on short term

strategies when it is combined regular performance assessments. Especially arbitrage of large long term mispricings like technology bubble is almost infeasible for open-end fund managers. (Lückoff, 2010: 61)

1.5.1.2. Close End Funds:

Close end funds which has fixed amount of capital do not continuously offer their shares for sale. Rather, they sell a fixed number of shares at one time (in the initial public offering) after when shares are typically traded on a secondary market. (Mandacı and Soydan, 2002: 65) Because of that reason investors who want to purchase shares of close-end funds have to find counterparts who want to sell their shares on secondary market. Those transactions are made from the price that is determined by demand and supply on secondary market. This brings the conclusion that their price may be higher or lower than their NAV. Another point that is mentioned by Korkmaz and Ceylan (2006) is the commission which is required to be paid by investors to brokerage houses who want to purchase or sell participation certificates of close end funds.

An older study prepared by Süngü (1989) has highlighted the role of close end funds, which could invest in new companies and securities that are not listed in stock market, in allocation of resources in the economy.

Close end funds are evaluated as "Investment Trusts" in Turkey. They are called "Investment Company" in the US and "Investment Trusts" in England. "Investment trust" term has entered our legislation by Capital Markets Law with number 2499. Now it operates according to items of new Capital Markets Law with number 6362. Since they are founded as joint-stock corporations, they are subject to relevant regulations of Turkish Commercial Law in the cases when there is not a relevant regulation in Capital Markets Law.

Collective investment institutions are called "Investment Trusts" when they are founded as a separate legal entity; whereas they are called "mutual funds" when they are founded by other legal entity within framework of a contract.

Capital market institutions established as joint stock corporations on the principle of registered capital with the purpose of managing a portfolio of capital

market instruments and gold and other precious metals traded on national and international exchanges or other organized markets are defined as investment trusts.

Table 1.6: Number and Portfolio Value of Turkish Mutual Funds

12/2014	Number	Portfolio Value
Mutual Funds	483	35461062190.8
Close End Funds	45	1150935444

Source: Capital Markets Board, Portfolio Values, December 2015

Table 1.6 enables us to make comparison between mutual funds and close end funds. As it can be seen on table 1.6, number of mutual funds is higher than close end funds. Mutual funds also dominate close end funds in terms of portfolio value.

1.5.2. Classification based on qualification of instruments included in the portfolio of mutual funds

First of all it is essential to specify that mutual funds have to be founded as umbrella funds.

According to "Communiqué regarding fundamentals of mutual funds"

a. Funds which continuously invest at least 80% of the fund's total portfolio in;

1. Domestic or foreign public and/or private debt instruments shall be called "BONDS AND BILLS UMBRELLA FUND",
2. Umbrella funds which include funds that are invested in shares of domestic/foreign issuers shall be called "STOCK UMBRELLA FUND",
3. Umbrella funds that include funds invested in gold and other precious metals traded in exchanges and other capital market instruments backed by such precious metals, shall be called as "PRECIOUS METALS UMBRELLA FUND",
4. Umbrella funds that include funds which compose of shares of other mutual funds and exchange traded funds, shall be called "FUNDS OF FUNDS",

a. Umbrella funds that include funds which continuously invest in highly liquid money and capital market instruments with maximum 184 days to maturity date and whose weighted average maturity that is calculated daily is

maximum 45 days in their portfolio, shall be called "MONEY MARKET UMBRELLA FUND"

b. Umbrella funds which invest continuously in funds whose portfolio is formed by lease certificates, participation accounts, partnership shares, gold and other precious metals, money and capital market instruments that does not base on interest and approved by the board completely, shall be called "PARTICIPATION UMBRELLA FUND"

c. Umbrella funds which cannot be classified in any one of the types above with regard to portfolio restrictions shall be called "VARIABLE UMBRELLA FUND",

d. Umbrella funds which include funds whose units are distributed only to qualified investors are called "HEDGE UMBRELLA FUND",

e. 1. Umbrella funds which include funds where some or all of the initial investment of investor plus a certain return is guaranteed on the basis of an appropriate investment strategy and the guarantee provided by the guarantor, to be paid back to the investor within the framework of the principles specified in the prospectus at a specific term or periods, shall be called "GUARANTEED UMBRELLA FUNDS",

2. Umbrella funds which include funds where some or all of the initial investment of investor plus a certain return is targeted on the basis of an appropriate investment strategy and the best efforts strategy, to be paid back to the investor within the framework of the principles specified in the prospectus at a specific term or periods, shall be called "PROTECTIVE UMBRELLA FUNDS".

1.6. TYPES OF MUTUAL FUNDS

1.6.1. A-Type Mutual Funds

"A-Type Mutual Funds continuously maintain at least 25% of monthly weighted average value of the portfolio in investments in stocks of corporations established in Turkey, including State Owned Enterprises in privatization in accordance with legislation."

Since A-type mutual funds invest at least 25 % of their portfolio into stocks, they are affected from stock price fluctuations either favorably or unfavorably. That's why they are riskier than B-type mutual funds.

Gains obtained from mutual fund participation certificates are subject to withholding tax since 2006 when a regulation is made in Income Tax Legislation. According to that legislation when investor redeems its fund share to fund back, he is subject to withholding tax at the ratio of 10 %.

1.6.2. Type-B Funds

Funds other than A- type are classified as B type. They are less risky than A type funds since they generally include financial instruments with fixed income like domestic government bonds, repo. Although B type funds can also hold stocks in their portfolio, liquid funds cannot. Liquid funds have to be established as B type and they are not allowed to hold stocks in their portfolio. (Satır, 2012: 14)

Table 1.7: Number of A-type and B-type Mutual Funds and Their Portfolio Values

12/2014	Fund Number	Portfolio Value	Portfolio Share	CS	PDI	RR	MM	FS	Others
A-type	133	1880159193.89	0.053020386	73.7011	10.3903	5.1746	1.4041	0.4941	8.8356
B-type	350	33580902996.91	0.946979614	1.6346	11.1376	21.0843	12.723	1.3878	52.0323

Source: Capital Markets Board, December 2015

CS: Common Stock

PDI: Public debt instruments

RR: Reverse Repo

MM: Money Market Instruments

FS: Ratio of foreign securities

In the table 1.7, number of A- type and B -type funds, their portfolio values and shares are given. It is obvious that B- type funds dominate A- type funds in Turkey both in terms of number and portfolio value. Another highlighting point is that A- type funds tend to invest more on common stocks.

Liquid funds cannot be established as A- Type since they cannot include common stocks in their portfolio. Other type "Bonds and Bills Funds" are founded as B- type in practice.

Obligation of stock funds, sector funds, subsidiary funds and group funds to invest in stocks at least in the ratio of 51% makes them to be evaluated as A-type. Similarly it is not meaningful for index funds which have to invest in stocks at least in the ratio of 80 %, to be founded as B- type. (Özütürk, 2005: 7) Portfolio weights of mutual funds reported in table 1.8 supports these explanations.

If mutual funds are ranked based on risk-return levels from lowest to highest, ranking will be as given: liquid funds, bonds and bills funds, A-type variable funds, A-type stock/sector/group, subsidiary funds and A- type index funds. (Özütürk, 2005: 7)

Table 1.8: Number and Portfolio Values of Different Kinds of Mutual Funds

12/2014	Fund Number	Portfolio Value	CS	PDI	RR	MM	FS	Others
A- Type Variable Fund	47	334045729.6	83.6151	6.2275	3.5894	1.8166	0	4.7512
A- type Stock fund	29	317392281.2	93.188	0.9139	4.1372	1.7377	0	0.0231
A- Type Composite Fund	20	456512197.4	43.1192	28.0759	2.0343	0.2963	0	26.474
A- Type Sector Fund	1	320525.2	100	0	0	0	0	0
A- Type Subsidiary Fund	2	201773635.6	89.0802	0	9.4522	0	0	1.4674
A- Type Private Fund	4	232556017.9	59.2501	10.7206	11.8838	5.6	1.3452	11.1999
A- Type Index Fund	28	328589503.1	89.5193	5.4439	4.8145	0.1797	0.0423	0
A- Type Foreign Securities Fund	1	8969303.95	29.1667	0	4.3046	0	66.5285	0
A- Type Gold	0							
A -Type Funds of Funds	0							
B- Type Variable Fund	84	3564940559	5.898	18.9204	3.7051	5.2719	3.2991	62.9052
B -Type Bonds and Bills Fund	58	2839314386	0.5433	32.1275	1.4482	6.0932	2.5628	57.2246
B- Type Liquid Funds	40	12818600684	0	2.1962	47.0344	16.526	0	34.2432
B- Type	0							

Composite Fund								
B- Type Foreign Securities Fund	11	129375550.2	0	0.7824	0.974	0.8704	97.373	0
B- Type Private Fund	4	400931263.3	19.0665	53.6942	2.9932	3.8983	6.7536	13.5939
B- Type Index Fund	5	41076032.38	0	11.3865	0.0999	0	27.9029	60.6105
B -Type Gold Fund	13	428045060.5	0.0101	0	0.4661	0.579	0	98.9445
B -Type Funds of funds	7	48338038.98	3.4003	1.0975	6.9971	0.204	74.9545	13.3463
B -Type Guaranteed fund	20	0	0	0	100	0	0	0
B -Type Protective fund	33	0	0	38.8835	0	1.4414	0	59.675
B-Type Hedge Fund	37	445799947.8	31.1312	7.3379	6.0693	3.1996	10.111	42.1507

Source: Capital Markets Board, December 2015

CS: Common Stock

PDI: Public debt instruments

RR: Reverse Repo

MM: Money Market Instruments

FS: Ratio of foreign securities

Table 1.8 depicts number and portfolio values of different kinds of mutual funds. It is obvious in table 1.8 that A-type mutual funds invest more in common stocks. On the other hand B-type mutual funds invest in common stocks less compared to A-type funds.

1.7. ADVANTAGES OF MUTUAL FUNDS

Mutual funds which canalize individual savings into financing of real sector accelerate economic development via its function of fund creation. They provide financing to recently established foundations and municipalities. Ertaş (1997) has specified advantages of mutual funds in developing financial markets as:

- Mutual funds act as intermediary in wealth transfer to private sector by investing in stock market,

- Mutual funds contribute financing of budget deficit by investing in public debt instruments,
- Mutual funds lead stock market to deepen and lead trading volume to increase,
- Mutual funds contribute development of portfolio management activities,
- Mutual funds contribute canalization of small individual savings to investments.

According to Pozen and Hamacker (2011), four factors have to be considered in selection of mutual fund to invest. These factors are explained below.

1. Liquidity Needs: Asset allocation process begins with specification of liquidity needs. If an investor requires cash for immediate expenses, best alternative will be investing in money market funds which provide a stable NAV and checking privileges to investor. Nonetheless for an investor who has higher substantial savings than his current liquidity needs, investing in stock funds or bond funds will be more attractive.
2. Time Horizon: Another essential factor to consider is time horizon. The longer time horizon for investment, the larger portion of investor portfolio can be invested in stocks and other investments with higher risk in exchange for a higher return potential. On the other hand if an investor is planning to buy something and setting money aside, investing in bond funds which provide higher income than money market funds will be logical. But here there is also risk of losing money.
3. Return Expectations: Outlook for future returns of cash, bonds and stocks also affect investors' asset allocation decisions. To predict those returns investors process all available information including past return data. Another thing to consider is trends in the economy since future performance of mutual funds are affected by them. For instance an increase in interest rates will lower bond fund returns or vice versa. From perspective of stock funds, rising/falling corporate earnings lead returns to increase/decrease.

4. Risk Tolerance: If an investor is not sure about the way economy goes, they are more likely to hold a diversified portfolio of mutual funds including stock funds, bond funds and money market funds. Nonetheless if investor is voluntary to take on risk of losing money in exchange for getting a big deal, they will include stock funds.

In this chapter a general outlook to mutual fund industry is given. In the next chapter major studies which examine mutual fund performance will be given chronologically. Next chapter also includes some essential studies about performance persistence.

CHAPTER 2
LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1. STUDIES IN INTERNATIONAL LITERATURE

Portfolio management in other words investment management is the process by which money is managed. (Sharpe, Alexander and Bailey, 1998: 792) In this process there are two types of portfolio managers: Active managers and passive managers. Passive managers adopt a buy and hold strategy by which they aim to mimic performance of a market index. On contrary, active portfolio managers try to beat market index by investing in undervalued securities and short-selling overvalued securities.

"Competitive investor" assumption acts as a bridge between CAPM and "efficient markets" phenomenon. According to this assumption, new information is reflected on prices immediately due to competition between investors. This brings the conclusion that market stays always in equilibrium which means it is not possible to get abnormal return consistently. Same opinion is asserted by Fabozzi and Modigliani (1992) who state that investment strategies, which attempt to outperform market-index, will not get abnormal returns after adjustments for risk and transaction costs are made. Portfolio performance measurement can be associated with CAPM. If CAPM is valid, best thing to do is following passive market strategy. In this case implementation of active portfolio strategy will be useless due to cost of trading and research activities. Nonetheless active portfolio managers do not believe in continuous equilibrium in securities market and they attempt to beat the index. According to Elton et al (2014), there are three types of active portfolio managers:

1. Market Timers: They change their portfolio beta based on their forecast on how market will do. They tend to increase portfolio beta when they expect market to bullish, whereas they decrease portfolio beta when they expect market to bearish. By this way they get higher returns compared to market in increasing markets, but they lose less than market in decreasing markets. First paper regarding market timing is written by Treynor and Mazuy (1966) who conclude that mutual funds do not show any market timing ability.

2. Sector Selectors: They increase their exposure to certain sectors which are expected to have higher than average performance. Consistently, they decrease their exposure to certain sectors that are expected to have lower than average performance.

3. Security Selectors: This type of active manager attempts to identify securities with higher than average returns. Like all active strategies, security selection disregards concept of equilibrium prices that is suggested by CAPM. Both Sharpe (1966) and Jensen (1968) who investigates mutual fund performance state that mutual fund managers do not have stock picking ability.

Studies in the existing literature generally focus on either investment performance (Jensen(1968), Ippolito (1989), Elton et al (1993), Malkiel (1995)) or persistence in performance (Grinblatt and Titman (1992); Hendricks, Patel and Zeckhauser (1993); Brown and Goetzmann (1995); Elton, Gruber and Blake (1996)) Most of them indicates that mutual funds as a group do not outperform passive benchmarks. During this chapter studies which are most frequently cited in mutual fund performance literature will be mentioned.

Sharpe (1966) is one of the earliest papers which evaluate mutual fund performance. According to this paper, predicted performance of portfolio is described by two measures: expected rate of return (E_p) and predicted variability of risk (σ_p). In this paper, investors are assumed to be able to invest in funds at a common risk-free rate and they are also assumed to borrow from same rate. Based on another assumption, all investors share same predictions regarding future performance of securities. Under these conditions, all efficient portfolios will fall along a straight line of the form:

$$E(R_p) = r_f + \beta \ \sigma_p$$

If investors can borrow/lend at risk-free rate (r_f) and invest in a portfolio with predicted performance (E_p, σ_p), then by allocation of funds between portfolio and risk-free asset investors attain at a point on the line:

$$E(R) = r_f + [\frac{r_p - r_f}{\sigma_p}] \quad \sigma$$

Best portfolio will be the one with highest reward-to-variability ratio which is also known as "Sharpe Ratio" and calculated as $[\frac{r_p - r_f}{\sigma_p}]$.

Sharpe has investigated performance of 34 open end mutual funds for the period 1954-1963. Reward to variability ratios vary from 0.78 (Boston Fund) to 0.43 (Incorporated Investors). This difference is explained in two ways. According to those who view market as nearly perfect and managers as good diversifiers, that difference is either transitory or due to excessive expenditures of some funds. Other explanation asserts that mentioned difference is persistent and it is a result of management skill.

In the same year with Sharpe, ability of fund managers regarding outguessing the market has been questioned by Treynor and Mazuy (1966). By "outguessing", authors refer to adjustment of portfolio composition depending on rise/fall of market. Managers with outguessing ability are expected to shift their portfolio composition from more to less volatile securities including bonds if they expect market to fall, whereas they are expected to shift their portfolio in opposite direction if they expect market to rise. Authors have tried to answer the question "Is there evidence that fund volatility was higher in years when market did well then in years when it did badly?" in an attempt to test "outguessing" ability of managers. In the analysis, 57 funds are included for the period between 1953 and 1962. Fund rate of return is also plotted against rate of return for a suitable market index. In the end it is concluded that none of mutual fund managers can outguess the market.

Articles of Jensen (1968), Grinblatt and Titman (1989) and Malkiel (1995) are perceived as principal studies which evaluate fund performance. (Anderson and Ahmed, 2005: 13) Before Jensen (1968), studies have attempted to evaluate portfolio performance based on relative measures of performance. Nonetheless an absolute measure of performance is the real requirement of researchers. The model Jensen (1968) has developed, that can be perceived as an adaptation of CAPM, is the first one which measures the absolute performance of mutual funds. Jensen (1968) has

emphasized that word "performance" in this article only to refer fund managers' "forecasting ability". In this study author has used the data of 115 mutual funds for the period 1945-1964 and he has used returns of S&P index in order to proxy the market. At the end of the study he concludes that 115 mutual funds can not be able to predict security prices well enough to outperform a buy-the market-hold policy. He also specifies that this result does not change even fund returns gross of management fees are used. In conclusion he has specified that funds are not successful enough in their trading activities to recoup even their brokerage expenses.

In 1970, Carlson has intended to show that fund performance against the market is greatly influenced by fund type, time period and market index used. With this intention author has constructed indices for three types of mutual funds (common stock funds, balanced funds and income funds). Here each fund index reflects the average of yearly returns for all sample funds of that type. In the next step each fund index is compared with three popular market indices that are S&P index, NYSE Composite index and Dow Jones Industrial Average. On the basis of mean annual return and risk-adjusted performance, results are reported. According to Carlson (1970), it will be better for mutual funds to be grouped by broad investment objectives before their performance compared to market is questioned. In the second part author has stated that return per unit of market risk, that is based on regression of fund returns on market returns is another important measure of interest. In this respect a high amount of unexplained variance is indicated as a result of a regression of fund returns on returns of S&P composite index. Nonetheless a decrease is observed on average residual risk once a mutual fund index is used as market proxy. At the last section of the article potential determinants of mutual fund performance are examined. At the end author conclude that past performance of mutual funds seems to have little predictive value for future performance. Moreover net returns realized on 1958-1967 are found independent from fund size and expense ratios. Furthermore answer of the question asking if mutual funds outperform the market depends on time period and market proxy that is selected.

Next essential study is prepared by Mcdonald (1974). In this study he has investigated objectives and performance of 123 mutual funds for the period 1960-1969. In this article, firstly systematic risk of each fund is estimated over entire

period by regressing monthly excess returns of funds on monthly excess returns of market. In the next step performance characteristics of mutual funds are analyzed by four measures. First measure is mean monthly excess return which is used as non-risk adjusted measure of average return. According to that measure 46 of 123 mutual funds have a mean excess return that is higher than that of stock market index. Second measure is Treynor ratio that is calculated by division of mean excess return to beta. In the article of Mcdonald, 67 of 123 mutual funds have higher Treynor measures compared to market. Third measure is Jensen's alpha, whereas fourth one is reward to variability ratio (Sharpe ratio) which is basically mean excess return divided by standard deviation of fund return. For the period 1960-1969, 67 of 123 mutual funds have positive Jensen's alpha. On the other hand, 84 of 123 funds have lower reward to volatility compared to market. In conclusion, Mcdonald states that mutual funds show neither significantly "superior" nor "inferior" performance during investigation period.

In 1979, Kon and Jen have formulated an empirically tractable investment performance model by employing both Sharp-Lintner-Mossin and Black models of market equilibrium in evaluation of mutual fund stock selectivity performance when management is also engaged in market timing activities. Authors have used a switching regression model for 49 mutual funds with different objectives. After the implementation of both SML model and Black model, it is seen that many individual funds are able to generate significant superior selectivity performance. This case contradicts with efficient market hypothesis. Nonetheless mutual fund managers are unable to consistently forecast future prices on individual securities well enough to compensate research expenses, management fees and commission expenses.

Choice of benchmark is a sensitive topic in mutual fund performance measurement. Lehmann and Modest (1987) have examined that topic within framework of conventional measures of performance. Authors have investigated if conventional performance measures are sensitive to benchmark chosen. According to Lehmann and Modest (1987), there is a plenty of empirical evidence showing mean-variance inefficiency of usual indices that leads one to question the use of usual CAPM as market proxy as performance benchmark. Mentioned inefficiency of CAPM and concern over its testability has caused researchers to explore alternative

asset pricing theories. In that study, it is assumed that returns on individual securities are generated by a K factor linear model. Model is written compactly as:

$$R_{pt} = \beta_{pt} R_{mt} + \varepsilon_{pt}$$

In this formula β_{pt} shows average sensitivity of fund to common factors and deviations from targeted sensitivities. Stock selection ability is reflected in residual disturbance term and it is positive if manager has stock selection ability. If fund is absent from both market timing ability and stock selection ability, regression equation will indicate no abnormal performance:

$$E^*[R_{pt} \mid R_{mt}] = \beta_p R_{mt}$$

If manager possess stock selection ability but no market timing ability, regression will show superior performance since:

$$E^*[R_{pt} \mid R_{mt}] = \varepsilon_p + \beta_p R_{mt}$$

where $\varepsilon_p > 0$. Authors conclude that although Jensen measure indicates abnormal performance, it cannot be used to evaluate fund managers since it could be positive even if manager is not a good stock picker or perverse market timer. Additionally a quadratic regression is used in order to detect market timing ability:

$$E^*[R_{pt} \mid R_{mt}, R_{mt}^2] = \alpha_p + \beta_{1p} R_{mt} + \beta_{2p} R_{mt}^2$$

In the absence of market timing ability coefficient on R_{mt} will be target beta of the fund and coefficient on R_{mt}^2 will be zero.

Lehmann and Modest has constructed a few benchmark portfolios. In implementation of CAPM, CRSP equally weighted and value-weighted indices of NYSE stocks are used. In implementation of APT, a two-step procedure is used. In the first step sensitivities to the common factors are estimated for a collection of individual securities. In next step, these estimated factor loadings are used to construct basis portfolios to mimic common factors.

In conclusion, Jensen measure is found sensitive to choice of APT benchmarks. Because of that reason choice of benchmark portfolio constitutes an

important step in measurement of mutual fund performance via Jensen Measure. Nonetheless ranking of funds are found as insensitive to choice of number of common factors.

Study of Ippolito (1989) is another essential paper which attempts to test efficiency in capital markets when information is costly to obtain. Author has mentioned from the fact that index funds are characterized by low fees and turnover which are essence of passive investments, on contrary mutual funds are mostly actively managed. Author has explained central focus of his paper as given: "If the market is efficient, then mutual funds should make trades and therefore hold portfolios that earn risk-adjusted returns sufficiently higher than index funds to pay for the extra expenses." In this paper not only individual mutual fund performance but also overall efficiency of mutual fund industry is examined. In conclusion mutual funds net of all fees and expenses are found as outperforming index funds. Nevertheless although industry alpha is found positive, it is not large enough to overcome load charges. Results also indicate that mutual funds with higher turnover, fees and expenses earn rates of return sufficiently high to offset higher charges. This finding is consistent with Grossman and Stiglitz (1980) who asserts that mutual funds are efficient in their trading and information-gathering activities.

In the same year with Ippolito (1989), Grinblatt and Titman have compared abnormal returns of active and passive investment strategies both with and without transaction costs, fees and expenses. By using quarterly equity holdings of mutual funds, hypothetical portfolio returns which can be defined as the return investors realize by purchasing portfolios reported in fund's quarterly reports are calculated. An estimate of magnitude of mutual fund transaction costs is obtained by the difference between abnormal performance of hypothetical returns and actual fund returns. In the next step, Jensen measure is calculated with four sets of benchmark portfolios: Monthly rebalanced equally weighted and value weighted stock indices of all CRSP securities, 10 factor benchmark of Lehmann and Modest (1988), eight-portfolio benchmark developed by Grinblatt and Titman (1988) Findings can be summarized as given:

-Transaction costs of funds vary from 1% to 2.5% annually, which depends on benchmark selected.

-Estimates of surviving bias are obtained by taking differences between Jensen measures of sample of hypothetical returns for 274 funds that are not subject to survivorship bias and sample of 157 hypothetical returns that are subject to survivorship bias. According to results, positive bias is seen in performance estimates for samples that exclude non-surviving funds. Nonetheless size of the bias is fairly small which varies from 0.1 % to 0.4 % per year.

- Lastly, actual returns do not show positive abnormal performance. Nevertheless, gross returns of aggressive and aggressive growth funds are found significantly positive on average.

To conclude authors state that although superior performance may exist among growth funds, aggressive-growth funds and funds with smallest net asset values; these funds also have highest expenses. As a result of that case, their actual returns net of all expenses do not show abnormal performance. This means that investors cannot take advantage of superior abilities of fund managers by holding shares of those funds.

After four years from the study of Ippolito, Elton et al (1993) has emphasized the importance of Ippolito's study since it is the first test of Grossman definition of market efficiency by using data of managed portfolios. Authors have found study of Ippolito interesting, due to fact that results are different from those reached in other studies about mutual funds. Two findings of Ippolito (1989) is consistent with Grossman and Stiglitz (1980), but different from other previous studies are given as:

- Estimated risk adjusted returns are higher than zero even transaction costs and expenses are taken into account for mutual fund industry.
- There is no evidence showing that turnover, management fees or expenses are associated with inferior returns, net of management fees and expenses.

According to Elton et al (1993) results of Ippolito will become identical with prior studies once the fact that mutual funds holding non-S&P assets is accounted. Authors have aimed to examine effect of holding non-S&P equities and bonds on mutual fund alphas. In order to examine effect of holding non-S&P 500 assets and bonds on fund performance, authors have suggested use of three factor model as given below:

$$R_t - R_f = \alpha_i + \beta_{im}(R_m - R_f) + \beta_{is}(R_s - R_f) + \beta_{id}(R_d - R_f) + e_i$$

In this equation R_m represents return on S&P 500 index, R_s represents the return on non-S&P equity index that has been orthogonal to S&P index (by this way effect of other index is removed), R_d is the return on bond index that has been orthogonal to both S&P 500 index and non-S&P 500 index. As a proxy for non-S&P 500 stocks small stock index, which is basically value-weighted index of lowest quintile of stocks listed on NYSE, is used. As a proxy for bonds, a portfolio that consists of 80 % intermediate government bonds and 20 % long-term corporate bonds is used. After then they find that funds have average alpha of -0.88 % per year. This result contradicts with Ippolito's view stating that mutual fund managers are informed investors. Also consistent with prior literature it is stated that mutual fund managers underperform passive portfolios. Moreover funds with higher fees and turnover are said to underperform those with lower fees and turnover. In conclusion authors state that Ippolito is wrong and mutual fund performance does not provide evidence supporting Grossman view of efficient markets.

In 1993, Grinblatt and Titman have highlighted the criticism of Roll (1978) who asserts that Jensen measure could be sensitive to choice of benchmark and may give biased results for market timers. In order to answer that criticism they have developed a new performance measure called "Portfolio Change Measure". They emphasize that their paper is the first study that is not subject to benchmark problems addressed by Roll. Nonetheless a disadvantage of that measure exists. It requires observation of portfolio holdings which could be hard to reach in many countries. Portfolio change measure is calculated as below:

$$\text{PCM} = \sum \sum [R_{jt}(w_{jt} - w_{j,t-k})] / T$$

By using data of 155 funds for the period 1975-1984, authors have reported results that are similar to results of Grinblatt and Titman (1989b). In consistence with Grinblatt and Titman (1989b), strongest evidence of abnormal performance is found in aggressive growth funds.

In the same year, Hendricks et al (1993) have reassessed extent to which relative performance of mutual funds can be predicted by studying shorter evaluation

periods. They have used quarterly data of open-end, no load, and growth oriented equity funds for the period 1974-1988. Authors have distributed funds into eight performance ranked portfolios where first octile portfolio includes poorest performers of recent evaluation period and second-octile portfolio includes next best-performers. Two evaluation criteria are used that are Jensen's alpha and Spearman's statistics which is a parametric test of predictability of performance ranks in evaluation of active rank portfolios with respect to benchmarks. Three benchmarks are used which are: 1. equally weighted index of NYSE equities, 2. an eight portfolio benchmark (P8) that is formed by Grinblatt and Titman (1989b), 3. The equally weighted index of mutual funds included in their sample. Findings are reported as: 1. Mean excess returns increase monotonically with octile ranks. 2. Sharpe measure that is evaluated as a measure of total risk is found to be increasing with the octile ranks. 3. Jensen's alpha is also found to be increasing with octile rank, independent of the benchmark considered. 4. Jensen's alpha is found positive for top performers's octiles whereas it is negative for poor performer's octiles. 5. Evaluation of mutual fund portfolios is found to be affected by benchmark choice. Authors conclude that a strategy of selecting top performers based on last four quarters significantly outperform average mutual fund, but it only does marginally better than benchmark market indices. In other words hot hands phenomenon works here. Icy hands phenomenon is also observed in the sample included: funds which perform poorly in the most recent year continue to be inferior performers in near term. What is most interesting is that they are more inferior than hot hands are superior. Another fact authors points out that hot hands phenomenon is not driven by any known anomalies like size effect. Because superior performance is also observed relative to eight portfolio benchmark that takes effect of size, dividend yields and reversion in returns into account.

In the next year of Hendricks et al (1993), Goetzmann and Ibbotson (1994) have examined if past fund performance relative to mutual fund universe can be used in prediction of relative future fund performance. Namely, they have investigated "repeat-winner" phenomenon by using data of 728 mutual funds for the period 1976-1988 where they use not only raw returns but also risk adjusted returns. At the end of the study past returns and relative rankings of the funds are found useful in

prediction of returns and rankings. Authors have highlighted that survivorship bias is mitigated in this research since performance of survivors is compared with other survivors' performance rather than an absolute market index benchmark.

Performance of equity mutual funds has been investigated by Malkiel (1995) who has also studied persistence. Author who also takes survivorship bias into account states that even gross returns before expenses fail to match broad S&P stock market index. Another finding is the greater mean returns of surviving funds which lead analysis that exclude non-surviving funds to overstate returns received by fund investors. Average alphas are negative/positive when net returns/ gross returns are used, but they are not statistically significant. In terms of individual alpha values, it is stated that there are more negative and significant alphas than positive and significant alphas when net returns are used. Author who reports persistence has also examined if strategy of investing in top performers of previous 12 months works. He asserts that although strategy of investing in best performers works well for the period 1970-1981, it does not for the period between 1985 and 1991. For that period it even produces inferior returns.

In the same year, Brown and Goetzmann (1995) have investigated performance persistence by using data of all common stock funds for the period 1976-1988. Authors state that equally weighted average of defunct funds is lower than equally weighted average of entire sample. That difference is attributed to small funds which are poor performers and which either shut down or merged into other funds in the end. Other findings regarding fund disappearance are reported as 1. The bigger the fund, the less likely it is to disappear, 2. Funds with higher expense ratios have higher probability of disappearance. 3. Younger funds are more likely to disappear. 4. Relative returns and lagged relative returns are defined as significant predictors of fund disappearance, but new money is not. In terms of persistence it is reported that from 5144 funds, 1304 past winners are repeat winners whereas 1237 past losers are repeat losers. In this study, Brown and Goetzmann (1995) have also introduced cross product ratio which odds ratio of number of repeat performers to number of those that do not repeat. Based on cross product ratio significant positive persistence is reported in seven years, whereas significant negative persistence is observed in only two years. Authors have also tested the effect of a simulated

strategy of buying winners/selling losers. They state that benefit of such a strategy depends on poor returns of funds that take place in the lowest decile. When persistent losers (funds in lowest decile that are determined based on two-year returns) are eliminated, it is seen that mean excess return is positive but it is not significant any more.

Performance persistence is also investigated by Kahn and Rudd (1995) who use data of equity funds and fixed income funds. Kahn and Rudd (1995) have differentiated their paper from others by using style analysis in monitoring performance. In this paper performance is measured in terms of total return, selection return and information ratios; whereas persistence is examined by use of contingency tables and regression. Authors investigate performance by using equation below via regression analysis.

$$\text{Performance}_{t2} = a + b^{*}\ \text{Performance}_{t1} + \varepsilon$$

Here period 2 performance is regressed against period 1 performance. A positive and significant b constitutes an evidence of persistence. This means period 1 performance contains useful information in prediction of period 2 performance. At the end of the study no evidence of persistence is found for equity fund managers, whereas little evidence is found for fixed income funds.

In 1996, Ferson and Schadt have introduced "Conditional Performance Evaluation" in the study in which monthly data of 67 mutual funds is used for the period 1968-1990. Authors have mentioned from the problem of variation in mutual fund risks and risk premia which is interpreted as reflecting superior information or market timing ability. Authors point out the fact that unconditional performance measures will be no longer reliable, when expected returns and risks vary overtime. They have modified Jensen's alpha and market timing models of Treynor and Mazuy (1966) and Merton and Henriksson (1981) in order to incorporate conditioning information. After implementation authors state that use of conditioning information is both economically and statistically significant. Furthermore although unconditional Jensen's alpha is inclined to be negative rather than positive, conditional models of Ferson and Schadt (1996) have produced alphas which have a mean value of zero. Another finding is that perverse market timing which is reported by use of unconditional market timing models is eliminated when conditional market

timing models are used. To sum up, authors have attributed pessimistic results of traditional measures to common-time variation in conditional betas and expected market return. They assert that performance of mutual funds will look better, once common variation is controlled by using lagged instruments in conditional models.

Another essential study is written by Droms and Walker (1996) which is the first major study that addresses the multivariate relationship between investment performance and asset size. Authors assess not only the effect of asset size on fund performance but also the effect of expense ratios, portfolio turnover and load status. Even though a negative relationship is expected between investment performance and asset size, expense ratios and portfolio turnover based on conventional wisdom; results obtained are not in consistence with conventional wisdom. At the end of the empirical analysis fund returns are found unrelated with fund size. Mutual fund alphas are found statistically insignificant. Contrary to expectation, higher expense ratios are found as associated with higher returns. Moreover turnover rates are found as not related with investment performance. In the last resort, it is concluded that there is no reward for paying a load fee when investing in mutual funds.

Gruber (1996) has examined the factors which are appealing for investing in mutual funds. Author has listed appealing factors as customer services, low transaction costs, diversification and professional management. Fourth factor, professional management is accounted as a distinguishing factor for only active funds, not for passive funds. Models of performance measurement that are used by Gruber (1996) are given as:

$$R_{it} - R_{mt}$$

$$R_{it} - \quad R_{ft} = \alpha_i^1 + \beta_{mi}^1 (R_{mt} - \quad R_{ft}) + e_i$$

$$R_{it} - R_{ft} = \alpha_i^4 + \beta_{mi}^4 (R_{mt} - R_{ft}) + \beta_{si} (R_{st} - R_{lt}) + \beta_{gi} (R_{gt} - R_{vt}) + \beta_{di} \ (R_{dt} - R_{ft} \ ) + e_i$$

These models show:

1. A measure of return relative to market
2. Excess return from single index model
3. Excess return from four index model

Here ($R_{st} - R_{lt}$) represents the difference in return between a small cap portfolio and a large cap portfolio, ($R_{gt} - R_{vt}$) represents difference between a high growth portfolio and a value portfolio and ($R_{dt} - R_{ft}$) represents the difference in return between a bond index and risk free return.

During the analysis Gruber (1996) has used data set of 270 funds that is free of survivorship bias for the period 1985-1994. At the end of analysis, mutual funds are found to show underperformance. Magnitude of underperformance differs depending on the model used. By use of single index model underperformance is found as 1.56% annually, whereas it is found 0.65% annually by the use of four index model. Author has also reported some evidence of performance persistence.

Gruber (1996) has also examined smart money effect. It basically examines if investors are smart enough to invest funds which subsequently show higher performance. At the end of analysis, Gruber asserts that investors show fund-selection ability and they are smart enough to invest in mutual funds with subsequent higher returns.

Performance persistence has been examined by Carhart (1997) who has introduced four factor model. In the empirical part monthly data of equity funds for the period 1962-1993 is used. Performance is estimated relative to not only four factor model but also CAPM and three factor model. According to author, four factor model substantially improves on average pricing errors of CAPM and three factor model. Firstly author has formed fund portfolios based on lagged one-year returns on January 1st of each year. He has hold portfolios for one year and reform afterwards. Funds with highest past one year performance constitutes decile 1, whereas funds with lowest one year performance form decile 10. According to author although CAPM does not explain relative returns on portfolios, four-factor model explains most of the spread and pattern in these portfolios. Here sensitivities to size and momentum factors account most of the explanation. Author has also investigated the relationship between performance and expense ratios, portfolio turnover and load fees. A negative relationship is detected between variables. In conclusion Carhart (1997) states that findings are in consistence with market efficiency but interpretations of size, book-to-market and momentum factors notwithstanding.

Although top-decile funds earn back their investment costs, most funds underperform in the magnitude of their investment expenses. Case is worse for bottom-decile funds which underperform about twice of their investment costs.

Importance of survivorship bias in the assessment of mutual fund performance has been discussed by Hendricks et al (1997). According to Hendricks et al (1997), separation of mutual funds into two groups as superior performers and inferior performers in 1st period and examination of relative performance in 2nd period may result in spurious performance persistence, if funds' return variances differ. According to authors that spurious performance persistence is displayed by survivorship-biased samples. By spurious performance persistence authors refer to better performance of 1st period's superior performers in 2nd period, although there is no true performance predictability. Advice of authors to researchers who interested in performance persistence is estimation of a quadratic regression in performance ranks between periods in order to differentiate between J-shaped pattern attributable to survivorship bias and a monotone relation that is attributed to real performance persistence.

Based on Volkman (1999) although risk of a managed portfolio is not stationary, Jensen's alpha and four-factor model erroneously assume managed portfolio risk is stationary. In order to correct for biased performance measures created by non-stationary risk, Volkman (1999) has developed five-factor model. Five-factor model incorporates four-factor model of Carhart and quadratic-timing factor model of Bhattacharya and Pfleiderer in examination of stock selection and market timing abilities of mutual fund managers. Volkman (1999) has employed model for 332 funds for the period between 1980 and 1990. Findings are as given:
-Average mutual fund does not exhibit a significant ability to select undervalued investments and a negative ability to time market during period of analysis which is characterized by high volatility.

- Although some funds show a persistent ability to select undervalued investments, this is at the expense of timing performance.

- 38 funds have exhibited positive abnormal timing performance, whereas 151 funds have showed negative abnormal performance.

- A negative relationship is detected between management compensation and selectivity performance. Large funds show greater ability to select undervalued investments, but they do not have ability to time the market. Moreover low-risk funds have shown greater ability to time market relative to high-risk funds. Another finding is that average fund manager does not have ability to select undervalued investments. This finding is valid for both before 1987 crash and after 1987 crash.

Christopherson, Ferson and Glassman (1998) have extended model of Ferson and Schadt (1996) which allows not only betas but also alphas to be time-varying. Authors have studied performance persistence of 185 U.S. pension funds for the period 1979-1990. At the end of the study authors state that investment performance of pension fund managers persist over time. Furthermore low conditional alpha managers of the past tend to be abnormally low return managers in the future. Based on their results, authors state that conditional measures are more informative about future performance compared to traditional, unconditional measures.

Becker et al (1999) have tested market timing ability of mutual funds by using models that allow manager's utility function to depend on returns in excess of a benchmark and to distinguish timing based on publicly available information from timing based on superior information. At the end of analysis where data of 400 U.S. mutual funds is used for the period 1976-1994, it is concluded that U.S. equity fund mutual funds behave as highly risk averse, benchmark investors. Furthermore only little evidence regarding conditional market-timing ability is found when public information is controlled.

Smart money effect has been reexamined by Zheng (1999). Smart money effect basically examines if investors are smart ex ante, in that they move to funds that will perform better. GT measure that is developed by Grinblatt and Titman (1993) is applied and results that are consistent with smart money effect are found. It is stated that aggregate newly invested money in equity mutual funds are able to forecast short-term mutual fund performance. Funds which receive more money subsequently perform better than those that lose money. In order to investigate source of smart money effect, relation between smart money strategy and repeat-winner strategy is also examined. A significant percentage of performance variations in smart money strategy are found as explained by performance variations in "repeat

winner" strategy. By applying conditional method and style variables, it is also concluded that smart money effect is not due to macroeconomic information or style effect, but it is due to fund specific information.

Despite the years passed, topic of debates regarding mutual fund performance has not changed. Even in 2000, Wermers (2000) has been trying to answer if mutual fund managers who actively traded stocks add value. In this paper Wermers (2000) has decomposed performance into several components in order to analyze value of active management. By following Daniel et al (1997), he has estimated characteristic selectivity, characteristic timing and average style measure for the years 1975-1994. In the end it is found that mutual funds hold stock portfolios which outperform a broad market index by 1.3 % per year. Nonetheless mutual funds themselves are found as underperforming market index by 1 % per year. Of the 2.3% difference, 0.7% per year is due to lower average returns of non-stock holdings of funds whereas 1.6% is due to expenses and transaction costs. To sum up author specify that mutual fund managers hold stocks which beat market portfolio by almost enough to cover their expenses and transaction costs, but holdings of cash and bonds are said to be putting a substantial drag on net fund returns.

Many times, mutual fund performance is summarized by an estimate of alpha or Sharpe ratio which is usually estimated with historical returns on the assets that define them. Pastor and Stambaugh (2002) have demonstrated that estimate of alphas and Sharpe ratios could be made more precise by using historical returns on "seemingly unrelated" assets that are not used in the definition of those measures. Authors specify the fact that a typically reported OLS estimate of alpha ignores information provided by returns on non-benchmark assets. Pastor and Stambaugh (2002) have incorporated two sources of information into estimation. First one is alpha of a non-benchmark asset, in other words seemingly unrelated asset. This is generally a passive asset with known alpha of zero and said to be providing information about sampling error. In second source of information, additional information is provided through longer histories of passive asset returns. According to authors, additional information about α_A (alpha of the fund) is provided by the extent to which short history estimate of α_n (alpha of non-benchmark asset) differs from zero as well as from its long history estimate. (Pastor and Stambaugh,

2002:317) In this paper by using data of 2609 funds, authors demonstrate that returns on seemingly unrelated assets contain substantial information about fund performance.

Best model in measurement of mutual fund performance is still being discussed in 2004. In order to determine the best model, Otten and Bams (2004) have implemented nine models to data of 2436 open-ended equity mutual funds for the period 1962Jan-2000Dec. Models that are implemented include unconditional CAPM, unconditional Fama and French, unconditional Carhart, unconditional Carhart + bond, conditional CAPM, conditional Fama and French, conditional Carhart, conditional Carhart+bond, conditional Carhart + bond+ alpha. At the end of analysis, five conclusions are reported. Firstly a severe survivorship bias is documented if dead funds are not included in the data set. This results in overestimation of alphas up to 0.64 % per year. Secondly within framework of unconditional setting four- factor model is evaluated as the best in explanation of mutual fund returns. Thirdly all conditional models are found superior compared to their unconditional peers. Fourthly, only little evidence is found regarding time-variation in fund alphas. Lastly, in the aggregate level alpha estimate does not change from unconditional CAPM to conditional Carhart model.

In the same year with Otten and Bams (2004), Berk and Green (2004) have mentioned from the relevance of "decreasing returns to scale" in active portfolio management. They have developed a model of active portfolio management and fund flows that provide a natural benchmark against which to evaluate observed returns, flows and performance outcomes. According to authors, model combines three elements. Firstly there is a competitive provision of capital by investors to mutual funds. Secondly, managers have a differential ability to generate high average returns but decreasing returns to scale exists in deployment of these abilities. Thirdly, there is learning about managerial ability from past returns. Authors specify that investments with active managers do not outperform passive benchmarks since investors competitively supply funds to managers and there are decreasing returns for managers in deployment of their superior ability. Authors also state that failure of managers to outperform passive benchmarks does not an indicator of their lack of skill. Furthermore, lack of persistence does not mean that differential ability across

managers is unrewarded; it rather implies that provision of capital by investors to mutual fund industry is competitive.

Kosowski et al (2006) have developed a new bootstrap statistical technique in order to examine performance of 1788 equity mutual funds for the period 1975-2002. In this paper, bootstrap method is used in order to differentiate management skill from luck. Authors have tested if estimated four- factor alphas of "star" mutual funds are due to luck or stock picking ability of the fund manager. In empirical part statistical significance of the performance and performance persistence of "best" and "worst" funds is examined via bootstrap procedure that is implemented to unconditional and conditional factor models of performance. At the end it is concluded that performance of "best" and "worst" funds cannot be explained only by luck. Although strong evidence of superior performance and performance persistence is reported for growth oriented funds, there is no evidence of ability for income-oriented funds. According to authors well performing income oriented funds are only lucky.

Cuthbertson et al (2006), who have investigated the performance of individual funds, have used an approach called "False Discovery Rate". In this approach, firstly funds are classified as "significant" and then a question is asked: "What proportion of these significant funds are false discoveries?" False discovery rate measures the proportion of lucky funds among a group of funds which have been found to have significant individual alphas and hence measures "luck" among pool of significant funds. After implementation of FDR authors find a relatively high FDR for best funds ranges 58% to 67 % (at 5% and 10% significance level respectively) which indicates that less than half of significant funds exactly outperform benchmarks. When worst funds are the case, FDR observed is 10.4%/15.9% at 5% /10% significance level.

In 2009, Cremers and Petajisto have introduced a new measure of active portfolio management to literature called active share. Active share can be defined basically as the share of portfolio holdings which differ from benchmark index holdings. Cremers and Petajisto (2009) have calculated active share for domestic equity mutual funds for the period 1980-2003. Active share is found useful by authors since it provides information regarding fund's potential for beating market

index. It is a convenient measure of active management and can be used together with tracking error in order to draw a comprehensive picture of active management. At this point since active share represents the fraction of portfolio holdings that differ from benchmark index, it is said to be emphasizing stock selection. Whereas tracking error which is the volatility of fund return in excess of benchmark emphasizes bets on systematic risk. Types of active management are defined by authors as given:

- Closet Indexing : Low active share, low tracking error
- Factor Bets: Low active share, high tracking error
- Diversified Stock Picks: High active share, low tracking error
- Concentrated Stock Picks: High active share, high tracking error

Formulas of tracking error and active share are as given:

Tracking Error = Stdev $[R_{fund,t} - R_{index,t}]$

Active Share = ½ $\sum_{i=1}^{N} |Wfund, i - Windex, i|$

Active share is calculated by Cremers and Petajisto (2009) for 19 indexes and the one with lowest active share is assigned as index. Then panel regression of active share on a variety of explanatory variables including tracking error, portfolio turnover and expense ratios are run. From those variables tracking error is found as the one that is most closely related with active share. The relationship between active share and fund size is defined as non-linear and not economically significant. Moreover a statistically significant but economically small relationship is detected between expense ratio and active share. Lastly turnover is said to have neither statistical nor economic significance. Authors conclude that active management which is measured by active share significantly predicts fund performance relative to benchmark. Funds with highest active share outperform benchmarks both before and after expenses, whereas funds with lowest active share underperform when expenses are taken into account. Evidence of performance persistence is also reported for the funds with highest active share.

Fama and French (2010) have investigated mutual fund performance from the outlook of equilibrium accounting. According to authors, active investment is a zero-

sum game, in other words α is zero before costs. Active investors may have positive alphas before costs but it is at the expense of other active investors. Although authors report that value weighted portfolio of active funds produces α close to zero in gross returns, α that is estimated on net returns is negative by the amount of fund expenses. Fama and French (2010) have attempted to test if there are active mutual funds with positive true α, which is balanced by active funds with negative α. Here the challenge is distinguishing skill from luck. One approach could be testing for persistence in fund returns like Carhart (1997). Nonetheless authors state that ranking funds based on short term past performance is not a good way for examination of persistence, since allocation of funds to winner and loser portfolios mostly bases on noise. In this study, performance of 3156 funds is examined for the years 1984-2006 by using bootstrap simulations. In aggregate level, net underperformance is reported by authors independent from the benchmark used (CAPM, three factor model, Carhart model). Although on gross basis some funds that takes place at the extreme tails of the distribution show superior and inferior performance, individually only few funds can be able to cover their costs.

Ferreira et al (2012) have investigated determinants of mutual fund performance by using data of open-end actively managed equity mutual funds from 27 countries. Authors highlight that this is the first study which study mutual fund performance using a world-wide sample of funds. In the conclusion, underperformance on average 20 basis points per quarter is reported for equity mutual funds around the world after fees and four factors are controlled. According to other finding, small funds perform better compared to large funds in the case of USA, whereas large funds perform better than small ones in the case of non-US funds. Fund age is found as negatively related with fund performance in the case of non-US funds, whereas this relationship is not statistically significant in the sample of US funds. Short-run persistence is also reported for US funds. Furthermore a strong positive relationship is detected between fund performance and financial development level. As it is expected, funds show better performance in countries where there is high trading activity and low trading costs. Finally investor protection and law enforcement are said to have a statistically significant and positive relationship on fund performance.

In spite of the fact that three and four factor models concern with security selection skills, timing skills which are reflected in non-constant betas cannot be measured by these models. (Lückoff, 2011: 165) Rather timing skill is defined as positive correlation between factor exposure and realized factor returns. Intuition behind that is the tendency of fund managers to increase their portfolio beta if they expect a rising market or vice versa. Conditional models are used for mutual fund performance evaluation in order to take this time-variability into account. In these models, model betas vary depending on macroeconomic variables that are perceived to predict future state of the economy. Authors have found different empirical results after implementation of conditional models. Although Ferson and Schadt (1996) have found improved performance by applying conditional models compared to unconditional models, a recent study Bessler, Drobetz and Zimmermann (2009) have reported lower performance by implementation of conditional models. On contrary Christopherson, Ferson and Glassman (1998), Otten and Bams (2002) could not find any difference in performance.

2.2. STUDIES WHICH ARE WRITTEN IN TURKEY

First study which has examined performance of Turkish mutual funds is prepared by Tevfik (1995). Author has used data of 22 A-type mutual funds for 52 weeks. At the end of the study author conclude that neither average fund returns nor individual fund returns exceed average market return.

Another study has been prepared by Karacabey (1999) who has used data of 10 A-type mutual funds for the period Jan1997-Dec1998. At the end of the study security selection ability is detected for six funds under the assumption that fund betas are constant. Without the assumption of constant betas security selection ability is detected for all funds and market timing ability is reported for nine funds.

Kılıç (2002) has examined performance of Turkish mutual funds by using data of 75 A-type and 65 B-type mutual funds for the period Jan1999-Dec2000. Data sample used includes funds which operate continuously during 36 months, which do not merge with another fund and which is not sold out. At the end of analysis results of different measures are found similar to each other. Sharpe ratio and information ratio gives completely same order, whereas Treynor index and

Morningstar rating gives a similar order. When best performing funds are examined, it is observed that from six of eight best performing funds takes place in best performing funds according to all measures. Based on Jensen measure and information ratio, only two funds have over performance. Like Karacabey, Kılıç (2002) has applied dummy variable regression. In addition he has also applied quadratic regression. According to results of quadratic regression market timing ability is reported for seven A-type funds, whereas this number is only two according to results of dummy variable regression. This finding is consistent with previous foreign papers which rarely detect funds with market timing ability.

Security selection and market timing abilities of mutual funds are also investigated by Doğanay who has used data of 14 equity funds for the period July2000-August 2002. Doğanay (2004) has not only calculated unconditional / conditional alphas but also calculated unconditional and conditional version of Treynor and Mazuy (1966) model. In conditional model USD monthly return, monthly percentage change of IMKB domestic government bond index and index of industrial production are used as information variables. At the end of the study author could not find any statistically significant difference between unconditional alpha and conditional alpha. On the other hand better market timing coefficients are obtained by using conditional quadratic regression.

Most extensive study that investigates fund performance in Turkey is prepared by Akel (2007) who has used data of 51 A-type and 51 B-type mutual funds for the period Jan2000-Dec2004. According to single index models A-type funds provide lower returns compared to market index. Although they are not completely statistically significant; B- type funds tend to have positive Sharpe, Treynor and Jensen ratios. Author has also examined security selection and market timing ability of fund managers by using quadratic regression developed by Treynor and Mazuy (1966) and dummy variable regression developed by Henriksson and Merton (1981).

Results of quadratic and dummy variable regressions indicate that A-type fund managers have neither security selection nor market timing ability. On the other hand security selection ability is detected for B-type fund managers. Akel (2007) has also examined performance persistence including both relative persistence and absolute persistence. In examination of relative persistence, models of Malkiel

(1995), Brown and Goetzmann (1995) and Kahn and Rudd (1995) are used. Results of empirical analysis have shown that both absolute and relative persistence exists for A-type mutual funds in the short run. Nonetheless persistence is not detected in the long run for A-type mutual funds. Persistence is reported for B-type mutual funds both in the short run and in the long run.

Atan et al (2008) have also investigated mutual fund performance in Turkey for the period Jan2003 and April2008. Authors have calculated Treynor and Sharpe ratios. Moreover they have implemented DEA. According to results of DEA investors of A-type mutual funds can have best performance by investing in variable funds, whereas investors of B-type mutual funds can have best performance by investing in liquid funds, bond/bill funds and variable funds. When results of traditional performance measures are compared with results of DEA, results of Treynor index is found similar to results of DEA. Nevertheless results of Sharpe ratio are less similar to results of DEA compared to Treynor index.

Another paper about mutual fund performance is written by Ural (2010) who has used data of A-type mutual funds. In this extensive study TKYD O/N Net Repo index is used as risk-free rate, whereas TKYD A-type fund index is used as benchmark. Results of traditional measures including Sharpe, M^2 and Sortino ratios indicate that 16 of 27 variable funds show performance that is higher than average. But only 5 of 27 have provided a return that is higher than risk-free rate. Consistently according to measures of Treynor, T^2, Jensen's alpha, information ratio and Fama measure; 16 of 27 variable mutual funds show higher than average performance. Nonetheless Jensen's alpha and information ratio is found positive for only 12 funds, whereas Fama measure is positive for 14 variable funds. From 10 index funds, 8 have shown higher than average performance according to measures that take systematic risk into account. But all measures are negative which shows that none of the index funds provide a return that is higher than risk-free rate. According to Sharpe, M^2 and Sortino ratios, 6 of 11 stock funds indicate higher than average performance. However only 2 of them have provided a return that is higher than risk-free rate. According to other measures that base on systematic risk, 7 of 10 funds have shown higher than average performance. Finally when mixed funds are

examined, it is seen that 6 of 12 funds have higher than average performance based on all measures.

Like previous studies Ural (2010) has also investigated market timing abilities of mutual funds by using both quadratic regression model and dummy variable regression model. According to quadratic regression model, positive security selection ability is reported for 25 funds most of which are variable funds. But only 11 of them are statistically significant. Besides positive market timing ability is detected for 34 funds, but only 23 is statistically significant. According to beta coefficient, funds with maximum sensitivity to market are reported as index funds and stock funds respectively. Author has reported funds which have least sensitivity to market as variable funds and mixed funds. Based on results of dummy variable regression, 42 funds have security selection ability. But only 22 of them are statistically significant. In consistence with the results of quadratic regression, according to of dummy variable regression funds that are most sensitive to market are index funds and stock funds. Funds that are sensitive to market are reported as variable funds and mixed funds. Finally positive and statistically significant market timing ability is reported for 20 funds.

Like Atan et al (2008), Aydın (2013) has also used DEA where he has attempted to determine efficiency/inefficieny sources of mutual fund industry. When technical efficiency is considered, funds with best performance are reported as Halkbank A-type mixed fund and Global Menkul Değerler A-type mixed fund. On the other hand when super efficiency is considered, funds with best managerial performance are reported as Global Menkul Değerler A-type mixed fund and Türkiye Ekonomi Bankası A-type mixed fund for 2011. After author has highlighted the decrease in the efficiency of mutual funds in recent years, he has noted factors which increase efficiency of funds as: Liquid investments with low risk and return, magnitude of fund scale, increase in number of investors, portfolio diversification, investing in public debt instruments, increases the share that fund manager takes from returns.

Like previous studies this study has also calculated traditional measures. As it is the case in other studies, security selection and market timing abilities of mutual funds are questioned. After then multifactor models including three factor and

Carhart four factor models are implemented. It is essential to specify that multifactor models are used to constitute benchmarks against which mutual fund performance is compared. This study is the first one which calculates measures of characteristic selectivity, characteristic timing and average style for Turkish equity mutual funds. It also differentiates itself from other studies implemented in Turkey by the data set it used which includes the period Jan2003-Dec2013.

In the next chapter methodology which will be applied to Turkish mutual funds will be explained.

CHAPTER 3
METHODOLOGY

Competition between mutual funds facilitates the need for accurate portfolio performance measurement. Academic literature has focused on the following questions so far: "Do fund managers succeed in reaching their objectives?", "Do funds get returns sufficiently high enough to compensate risks taken?", "Do fund returns stem from luck or manager skill?" These questions are tried to be answered by many authors who have used a variety of methods. Many techniques most of which originate from modern portfolio theory are used in performance measurement.

Methods of risk-adjusted performance evaluation using mean-variance criteria come on stage with CAPM model. In following years Treynor, Sharpe and Jensen recognize implications of CAPM for rating performance of managers. (Bodie et al., 2009: 826) Within a short time period new measures including Sharpe measure, Treynor measure, Jensen measure, information ratio, M^2 have started to be used. In these measures, portfolio return is adjusted for the risk it bore over the period about issue. These measures will be explained in this chapter.

3.1. SINGLE INDEX PERFORMANCE MEASURES THAT TAKES TOTAL RISK INTO THE ACCOUNT

3.1.1. Sharpe Measure:

$$\frac{r_p - r_f}{\sigma_p}$$

r_p : Average portfolio return

r_f : Risk-free rate

σ_p : Standard deviation of returns

In calculation of this ratio portfolio return in excess of risk-free rate (in other words risk premium) is divided to total portfolio risk that is measured by standard deviation. Geometrically it is the slope of the line from risk-free asset through

expected return of managed portfolio. (Fischer and Wermers, 2013: 56) Since it gives the trade-off between reward (risk premium) and risk (standard deviation), it is also called reward to volatility ratio.

Nonetheless in the original article term "volatility" is used to refer regression coefficient of fund on market index; whereas term "variability" is used to refer standard deviation of the return.

Fischer and Wermers (2013) have summarized assumptions of Sharpe ratio as follows:

- Portfolio is the entire portfolio held by an investor.
- Investors take only mean and standard deviation of entire portfolio into account.
- Investors consider only outcomes of one-period and disregard impact of following periods, in other words they are myopic.

Sharpe measure behind which CAPM exists is widely used. Since it only requires time series of portfolio returns, it is easy to compute. According to Aragon and Ferson (2007), Sharpe ratio makes most sense when it is applied to total portfolio rather than any particular fund that represents only some portion of investor's portfolio. It is the case since investor cares about total portfolio volatility. When it is applied to a single fund in isolation, it ignores the correlation of fund with other investments. Because of that reason it could be misleading to make evaluation based on Sharpe ratio when only one fund is about issue. Fischer and Wermers (2013) also state that use of Sharpe ratio could be misleading when a fund manager provides a low Sharpe ratio, but it is part of a bigger portfolio.

Another point is that normal distribution is the only distribution that is fully defined through parameters (mean and standard deviation) used in calculation of Sharpe ratio. Nevertheless Kosowski (2006) has shown that many portfolio managers generate returns and alphas which are non-normal. This brings the conclusion that one period Sharpe ratio may result in poor portfolio choices by investor if standard deviation and expected return of managed portfolios vary overtime. Sharpe ratio also disregards agency problem which leads skilled managers to take on a lower than optimal level of risk taking as well as expected returns-that causes possibly low Sharpe ratio. From another perspective Goetzmann et al (2007) assert that some

clearly chosen trading strategies-"information-free trading strategies" may lead to improved Sharpe ratios. This is even the case for a manager without skill in security selection.

3.1.2. Risk Adjusted Performance Ratio: (M^2)

Modigliani and Modigliani (1997) state that it is hard to interpret traditional measures like Jensen measure or Treynor ratio for an average investor. Authors have proposed an alternative measure of "risk-adjusted performance (RAP)" that is grounded in modern finance theory and also easy for average investor to understand. That method developed by Modigliani and Modigliani entails firstly adjusting portfolio risk to risk of benchmark portfolio, after then calculating returns on mentioned "risk-matched" portfolio and at last comparing returns on new portfolio to benchmark returns. Bodie et al (2009) has defined same process as given: M^2 measure creates a hypothetical complete portfolio which includes managed portfolio and T-bills and also has same standard deviation with market index. Since market index and complete portfolio have same standard deviation, performance comparison is made simply by comparing returns.

Korkmaz and Ceylan (2012) have formulated M^2 as given:

$M^2 = r_p^* - r_m$

r_p^*: Adjusted return of portfolio p

r_m: Return on market

Leverage, which is defined as a key tool in achieving optimal investment performance by Modigliani and Modigliani (1997), is used in matching risk of evaluated portfolio to market portfolio. By this way following equation is obtained:

$$RAP_p(M^2) = r_f + \frac{\sigma_m}{\sigma_p} * (r_p - r_f)$$

RAP_p: Risk-adjusted performance of fund i

r_p: Average return on portfolio p

r_f: Risk-free return

σ_m : Standard deviation of market returns

σ_p : Standard deviation of portfolio p

This equation is reformulated by authors in order to obtain a risk-adjusted performance measure based only on excess returns, RAPA (Risk adjusted excess return):

$$\text{RAPA}_P = \sigma_M \left(\frac{r_p - r_f}{\sigma_p} \right)$$

As it is seen on the formula of RAPA, term in the brackets equals to Sharpe ratio. Because of that reason it is not a coincidence for RAPA (or RAP) and Sharpe ratio to give same ranking. Based on Modigliani and Modigliani (1997) unique difference is that RAP gives results in basis points which is easy to understand. Nonetheless Sharpe ratio assesses performance through ratio of excess return to risk. Relationship between Sharpe ratio and M^2 can be given as follows:

M^2 = Sharpe ratio (p)* σ_M + r_f

3.2. SINGLE INDEX PERFORMANCE MEASURES THAT TAKES SYSTEMATIC RISK INTO THE ACCOUNT

3.2.1. Treynor Ratio:

The equation of the Treynor measure is as follows:

$$\frac{\bar{r}_p - \bar{r}_f}{\beta_p} = \frac{riskpremium}{systematicrisk}$$

$\bar{r}_p$: Average portfolio return

β_p : Portfolio beta

$\bar{r}_f$: Risk-free rate

Treynor (1965) measure is calculated by division of portfolio return in excess of risk-free rate to portfolio beta. In other words it gives return in excess of risk-free rate per unit of systematic risk rather than total risk. It is the slope of the line from risk-free asset through expected return of managed portfolio on a graph that has expected return as a function of beta. Portfolios with higher Treynor ratios are more preferable since they claim more return for a certain level of systematic risk. Same conclusion can be reached by considering security market line whose slope also gives Treynor ratio. As Treynor ratio increases, portfolio ranking improves. This can be understood with the help of indifference curves of a risk-averse investor. With the increase in Treynor ratio, a higher indifference curve is reached by risk-averse investor whose utility will also increase.

Treynor ratio which is directly drawn from CAPM requires a reference index to be chosen in estimation of portfolio beta. This is the point that is criticized by Roll (1977). Selection of such a reference index will affect the result of performance measurement. Lückoff (2011) explains two cases where it is more appropriate to use systematic risk rather than total risk. First one is the case when fund i constitutes only a part of a well-diversified portfolio (in that case all unsystematic risk is diversified). Other case is explained by Sharpe (1966) as the time when result of performance evaluation is used to predict future performance since unsystematic return movement does not tend to repeat in the future. Resulting measure is Treynor ratio. (Lückoff, 2011: 143)

3.2.2. Jensen's Alpha: (Single Factor Alpha)

Jensen (1968) has developed a portfolio alpha that measures contribution of fund manager to portfolio's overall return. Unlike Sharpe ratio and Treynor index, Jensen measure is an absolute measure. Jensen alpha which is a variation of Treynor approach is the arithmetic difference of the portfolio's return from the return of a portfolio on the security market line with the same beta. (Jarrow, 1995: 583) Janovsky (2001) has defined it as incremental expected return resulting from managerial information. Basically it measures excess return of mutual fund over its expected return that is estimated by CAPM. Formula of Jensen alpha is as follows:

$$\alpha_p = r_p - [\overline{r_f} + \beta_p (\overline{r_m} - \overline{r_f})]$$

In this formula β_p gives responsiveness of portfolio return to changes in market portfolio return. In CAPM environment, appropriate risk measure of any asset or portfolio p is given by its beta: (Janovsky, 2001: 32)

$$\beta_p = \frac{Cov[r_p, r_m]}{Cov[r_m, r_m]} = \frac{Cov[r_p, r_m]}{Var[r_m]}$$

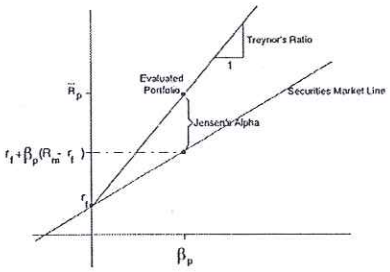
A positive alpha is an indicator of selection skills of fund manager. It refers to a higher fund return relative to hypothetical benchmark return at same level of risk. What is noteworthy here is that a positive alpha also implies a larger Treynor ratio compared to benchmark's Treynor ratio. Here is a critical point that forms central focus of Roll's paper. Roll (1978) has demonstrated that a single factor model can be manipulated by reweighting the benchmark.

Although Jensen's alpha is widely used in academic literature, it has some limitations. For instance when risk levels differ across funds, may be due to different degrees of leverage, fund alphas are not directly comparable and ranking based on alphas will not be meaningful in that case. To mitigate this problem, alpha could be divided by a risk measure. One alternative could be dividing alpha to idiosyncratic risk σ_{ε_i} which gives the appraisal ratio of Treynor and Black (1973). Another alternative could be adjusting alpha by the systematic risk, β, of the fund. Kosowski et al. (2006) suggest use of t-value of the alpha that is basically calculated by dividing alpha into its standard deviation. According to Lückoff (2011), that method is advantageous since t-values of different funds remain normally distributed in the cross section even in the presence of divergent levels of idiosyncratic risk.

There are some problems in application of Jensen model. Firstly, market portfolio which is used in estimation includes only traded securities therefore it cannot be a perfect proxy. Secondly fund manager may possess both timing skill and selection skill and fund's beta may change over time. If these problems are not taken into account, biased parameter estimates will be obtained. Another problem is the possibility of return distributions to deviate from normal distribution in which case

statistical measures like Jensen may not be powerful enough to differentiate between skill and luck.

Figure 3.1: Distinction between Jensen's alpha and Treynor ratio

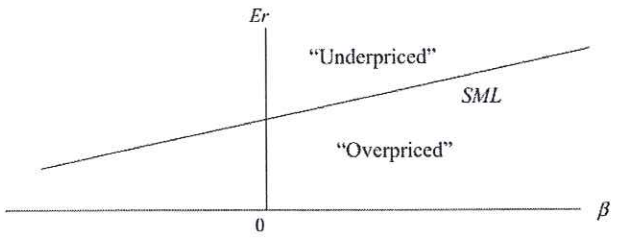


Source: Jarrow, 1995:583

As it is obvious in Figure 3.1 Jensen's alpha can be evaluated as deviation of portfolio from security market line, whereas Treynor ratio is the slope of the line from risk-free asset to evaluated portfolio.

Measures of Jensen, Treynor and Sharpe base on the assumption that CAPM holds. Jensen's alpha can be described as a derivation of CAPM to measure mutual fund performance. According to CAPM all assets are correctly priced and positioned on security market line. Moreover according to CAPM, expected CAPM risk premium explains expected value of assets expected return completely. This brings the conclusion that "Jensen's alpha", intercept term in time-series regression is zero for each asset. Nevertheless in the real world it is not the case and an asset's given price is compared with what it should be based on CAPM.

Figure 3.2: Pricing of Assets Based on CAPM



Source: Shapiro, 2003:11

Figure 3.2 depicts that based on CAPM; assets that plot above SML are underpriced since they offer a higher return than that is expected from securities with same risk. On the other hand a security that plot below security market line is overpriced; it provides a lower return than expected from securities in the same risk class.

Sharpe (1963) has benefited from insight of Markowitz which asserts that stocks are likely to co-move with market. The model he founds assumes that security returns are linearly related with fluctuations in a market-wide index. Sharpe's model is extended to embrace richer and more complex factor models of asset pricing. (Dimson and Mussavian, 1999: 1750)

According to Bodie et al. (2009) implications of CAPM are embedded in two predictions. According to first prediction market portfolio is efficient. According to second, security market line describes risk-return trade-off accurately. Central problem is that based on CAPM, market portfolio includes all risky assets in the economy. Although it can be reasonable in theory, it is too difficult to implement in testing CAPM. Easiest part is getting data of major world stock indexes. Nevertheless it won't be easy to find stock series for OTC market whose data is not complete. Moreover this portfolio also includes several bond series whose data availability may generate problem. Because of the difficulty in deriving series that are available monthly in a timely fashion for numerous assets mentioned, most studies have limited themselves to using a stock or bond series alone. (Reilly and Brown, 2002:266) In other words particular series which are used as proxy are assumed to be highly correlated with true market portfolio.

According to Roll (1977), use of indexes as market portfolio proxies could have serious implications in the test of model especially when model is used for portfolio performance evaluation. That problem is called "benchmark error" by Roll (1977). Highlighting point is that portfolio manager performance cannot be measured properly unless benchmark is accurately specified. A mistakenly specified portfolio could have two effects. Firstly beta that is computed for alternative portfolios would be wrong since market portfolio that is used to compute the portfolio's systematic risk is inappropriate. Secondly security market line will be wrong since it goes from risk-free rate through improperly specified M portfolio. (Reilly and Brown, 2002:

267) Consistently Roll (1977) asserts that CAPM theory is not testable unless exact composition of market portfolio is known and used in the tests. In spite of these criticisms CAPM is still widely used due to its simplicity.

3.2.3. T^2 Measure

A variant of Treynor measure can be used in expressing the difference in portfolio performance in terms of rate of return. (Bodie et al, 2004: 689) Development process of this measure is similar to development process of M^2. T^2 Measure makes risk adjustment by adding T-bills to portfolio under consideration in order to match market beta, 1.0. (In calculation of M^2, T-bills are added to portfolio under consideration in order to match standard deviation of the market) T^2 measure is calculated as follows:

$T^2 = R_p^* - R_m$

R_p^* : Adjusted return of portfolio p

R_m : Market return

Adjusted return of the portfolio based on market is calculated as:

$$R_p^* = [\, R_p \frac{\beta_m}{\beta_p} + [1 - \frac{\beta_m}{\beta_p}]\, R_f \,]$$

If R_p^* is placed into equation above, formula becomes:

$$T^2 = [\, R_p \frac{\beta_m}{\beta_p} + [1 - \frac{\beta_m}{\beta_p}]\, R_f \,] - R_m = [\frac{R_p - R_f}{\beta_p}]\, \beta_m - (R_m - R_f)$$

Since $\beta_m = 1$, final version of formula is as given:

T^2 = Treynor index - $(R_m - R_f)$

3.2.4. Information Ratio (Appraisal Ratio)

Modern portfolio theory that is developed by Markowitz (1952) has examined the concept of risk under two headlines: systematic risk versus non-systematic risk.

Systematic risk stems from the correlation between portfolio return and market return, whereas non-systematic risk stems from variability of portfolio's own return. Although Jensen's alpha and Treynor ratio make measurement by taking only systematic risk into account, information ratio makes risk adjustment by dividing portfolio alpha to non-systematic risk.

Index model developed by Sharpe (1963) has formulated total risk as given:

Total Risk = Systematic risk + Non-systematic risk

$$\alpha_{r_p}^2 = \beta_p^2 \sigma_{r_m}^2 + \sigma_s^2$$

In this equation β_p refers to sensitivity of portfolio return on market, whereas $\sigma_{r_m}^2$ symbolizes variance of market return.

$$\text{Information Ratio} = \frac{\alpha_p}{\sigma_s}$$

α_p : Jensen alpha of the fund

σ_s : Non-systematic risk of the fund

Information ratio and Jensen's alpha give similar results for funds with low non-systematic risk. Nevertheless results differ, when fund has high non-systematic risk.

3.2.5. Fama Measure

According to Fama (1972), portfolio performance depends on security selection and market timing ability of portfolio manager. Fama measure is calculated as:

$$\text{Fama Measure} = (R_p - R_f) - [\frac{\sigma_p}{\sigma_m}] (R_m - R_f)$$

In this equation σ_p refers to portfolio risk, whereas σ_m symbolizes market risk. A positive/ negative Fama measure refers to higher/lower return that fund earns

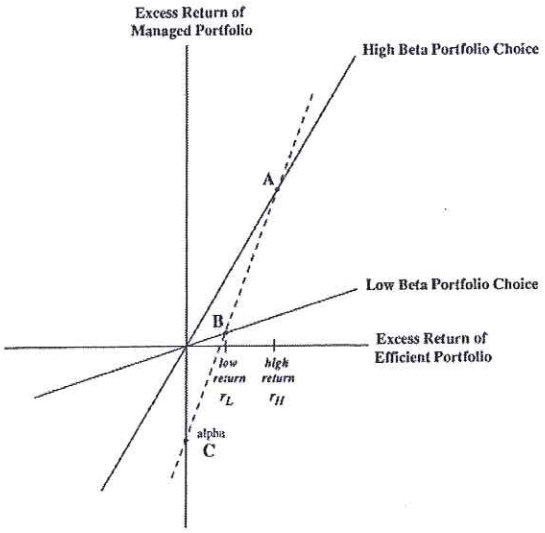
compared to expected returns. Also a fund with positive/negative Fama measure lies above/below CML.

3.3. TIMING AND SELECTIVITY PERFORMANCE MEASURES

Traditional performance measures, even multifactor models generally concern with measurement of security selection skills of fund managers. Nonetheless time-variability is a problem on performance evaluation. If fund manager possesses both security selection skill and timing skill, then beta varies overtime.

Market timing ability is tested by quadratic regression model and dummy variable regression model both of which base on Jensen model. Jensen model that measures the deviation of portfolio from security market line attempts to measure security selection skills of the manager. But it does not account for manager's ability to time the market. Grinblatt and Titman (1989a) have criticized Jensen measure since it bases on an upwardly biased estimate of systematic risk for a market-timing investment strategy. Because of that reason, it may assign negative performance to a market timer. This deficiency of Jensen measure is explained on a figure by authors where excess return of evaluated portfolio is graphed against excess return of benchmark portfolio. Figure 3.3 graphs that the portfolio manager is constrained to make a selection between high beta portfolio which is represented by steeper sloped solid line and low beta portfolio that is represented by gentler sloped solid line. A manager who acts as a market timer will select a high beta portfolio and be at point A upon receipt of high return signal, whereas he will be at point B if he receives a low return signal. Risk of this investment strategy is estimated as the slope of the dotted line which connects point A and point B and exceeds risk of the portfolio in either case. Furthermore it is even possible that Jensen measure that is the intercept of the dotted line at C, may be negative, erroneously showing that informed investor is an inferior performer.

Figure 3.3: An Example of Negative Jensen Measure for a Market Timer



Source: Grinblatt and Titman, 1989a: 395

Next step is examination of quadratic regression.

3.3.1. Treynor and Mazuy Measure (Quadratic Regression)

According to standard CAPM model, portfolio return is a linear function of market return. Nonetheless Treynor and Mazuy (1966) assert that if investment manager can forecast market returns, he will hold a higher/lower portion of market portfolio when market is up/down. This case led portfolio return to become non-linear function of market return.

Treynor and Mazuy (1966) assume that manager is a "proportional timer" which means he forecasts $(R_m - R_f)$ firstly, then adjusts his portfolio beta to be proportional to his forecasts of $(R_m - R_f)$. (Fischer and Wermers, 2013: 37) They state that managers with timing skills will increase/decrease their portfolio beta when market returns are high/low. According to authors, only way in which fund management can translate ability to outguess market into a benefit to shareholder is to vary fund volatility systematically in such a fashion that resulting characteristic line is concave upward. (Treynor and Mazuy, 1966: 134) Authors assert that inclusion of a quadratic term will pick up market timing ability. Model is formulated as follows:

$$(R_p - R_f) = \alpha_p + \beta_p (R_m - R_f) + \gamma_p (R_m - R_f)^2 + e_p$$

In this equation α_p symbolizes security selection ability of fund manager, β_p represents systematic risk of the fund and γ_p indicates market timing ability of the manager. According to Lückoff (2011), γ_p is biased when market return is negative.

As it is obvious in the equation relationship between portfolio return and market return will be linear if market timing does not exist. Nonetheless this relationship will be no longer linear when successful market timing exists.

3.3.2. Henriksson and Merton Measure (Dummy-Variable Regression)

Henriksson and Merton (1981) have developed a market timing model using a free put option on the market portfolio with its exercise price equal to risk-free rate. (Lee and Li, 2002:44) Authors have measured market timing ability by the correlation between portfolio beta and true market return. Based on this model manager adjusts portfolio to a higher beta when an up market is estimated, whereas he adjusts to a lower beta when forecast for the market is pessimistic.

This method assumes that fund manager has opportunity to make a selection between two types of securities that are stocks and bonds. According to Henriksson and Merton model although fund manager predicts when stocks outperform bonds and bonds outperform stocks, he does not predict the magnitude of superior performance. Model is formulated as follows:

$$(R_p - R_f) = \alpha_p + \beta_p (R_m - R_f) + \gamma_p [D (R_m - R_f)] + e_p$$

In this equation D is the dummy variable which takes value of one when $R_m > R_f$, whereas it takes value of zero when $R_m < R_f$. A positive γ_p is an indicator of timing skill. One of the shortcomings of that method is that it only allows for two different beta states. (On contrary in quadratic regression model, beta varies as market rise/fall.)

3.4. MULTIFACTOR MODELS

3.4.1. Fama-French Three Factor Model

An alternative to CAPM is Fama-French three factor model which is developed on Arbitrage Pricing Model of Ross (1976). Authors set out with the observation that two types of stocks tend to do better than market as a whole: small cap stocks and stocks with high book to market ratio. Following this, they add two factors to CAPM to reflect portfolio's exposure to these classes. According to three factor model portfolio risk premium is explained by three factors: market return over risk-free rate, small stock portfolio return in excess of large stock portfolio return and return of portfolio of stocks with high book to market ratio in excess of the return on portfolio of stocks with low book to market ratio. Model is as follows:

$$E(R_i) - R_f = b_i [\mathrm{E}(R_m) - R_f] + s_i \mathrm{E}(SMB) + h_i \mathrm{E}(\mathrm{HML})$$

In this equation $[\mathrm{E}(R_m) - R_f]$ represents expected market risk premium, E(SMB) symbolizes expected size premium and E(HML) refers expected book to market premium.

Rewritten model, which is more appropriate for measurement of mutual fund performance, is expressed by Fama and French (1996) as:

$$R_i - R_f = \alpha_i + b_i (R_m - R_f) + s_i\, SMB + h_i (HML) + \varepsilon_i$$

Here b_i, s_i and h_i indicate factor sensitivities and α_i represents performance measure.

CAPM is the first asset pricing model which shapes the way academicians thinks about average returns and risk. Central prediction of the model is that market portfolio of invested wealth is mean-variance efficient in the sense of Markowitz (1959). Efficiency of market portfolio implies that 1. Expected returns on securities are a positive linear function of their market betas, 2. Market betas suffice to describe cross section of expected returns. (Fama and French, 1992: 427) Nonetheless following years have shown that variables which do not take place in CAPM have reliable power in explanation of cross-section of expected returns. Most prominent variable is size. Banz (1981) has shown that market equity, that is calculated stock

price times shares outstanding, contributes explanation of cross section of average returns provided by market betas. Another variable that contributes explanation of cross section of average returns is book to market equity that is firstly reported by Statman (1980) and Rosenberg et al (1985). Other variables include leverage and earnings price ratio.

Fama and French (1992) have studied the joint roles of market beta, size, earnings price ratio, leverage and book to market equity in cross section of average stock return. They conclude that size and book-to market equity do a good job in explaining cross-section of average returns on NYSE, AMEX and NASDAQ stocks for the period 1963-1990.

In their next paper, Fama and French have included not only common stocks but also bonds. Fama and French (1992) have used cross section regressions of Fama and Macbeth (1973); cross section of stock returns is regressed on variables hypothesized to explain average returns. In this case it is difficult to add bonds to cross regressions since explanatory variables like size and book to market equity have no obvious meaning for bonds. Fama and French (1993) have used time series regression approach of Black, Jensen and Scholes (1972). Monthly returns on stocks and bonds are regressed on the returns to a market portfolio of stocks and mimicking portfolios for size, book to market equity and term structure risk factors in returns. Time-series regression slopes are factor loadings (unlike size or BE/ME) which have clear interpretation as risk-factor sensitivities for both bonds and stocks.

Fama and French (1993) have proxy risk in bond returns that arises from unexpected changes in interest rates under the factor TERM. It is the difference between monthly long-term government bond return and one-month T-bill rate measured at the end of previous month. For corporate bonds, shifts in economic conditions that change likelihood of default give rise to another common factor in returns. Authors have proxy this risk by the factor DEF which is the difference between return on a market portfolio of long-term corporate bonds and long-term government bond return. Authors find that TERM and DEF dominate common variation in government and corporate bond returns. But they also conclude that average premiums for DEF and TERM risks are too small to explain much variation in cross-section of average stock returns.

Fama and French (1993) have ranked all NYSE stocks on CRSP based on size for the years 1963-1991. After then NYSE, AMEX and NASDAQ stocks are split into two groups as small (S) and big (B). That split is made based on median of NYSE size. Authors have also broken NYSE, AMEX and NASDAQ stocks into three book to market equity groups based on breakpoints for bottom 30 % (low), middle 40% and top 30% (high). (Separation is made based on Fama and French methodology; they have arbitrarily split no other alternatives used) After then six portfolios are constituted from intersection of two market equity and three book to market equity groups. (S/L,S/M,S/H,B/L,B/M,B/H)

From the side of bonds, set of dependent variables used in time series regressions includes excess returns on two government and five corporate bond portfolios. (Government bonds with maturity from 1 to 5 years and 6 to 10 years) (Corporate Bonds for Moody' rating Aaa, Aa, A, Baa and below LG)

Fama and French (1993) have examined separately explanatory power of bond and stock market factors initially. After then they have examined joint explanatory power of bond and stock market factors to make inference regarding common variations in returns. When only bond market factors used as explanatory variables, it is seen that DEF and TERM capture common variation in both stock and bond returns. Slopes and R-square values are direct evidences in determination of risk factors capturing common variation in bond and stock returns.

Consistent with expectation return variance explained by TERM and DEF proxies are found higher for bonds. R-square value ranges from 0.49 (for low-grade corporate) to 0.97-0.98 (for high-grade corporate bonds). On the other hand it ranges between 0.06 and 0.21 for stocks. As it is clear although TERM and DEF identify shared variation in stock and bond returns, especially for stocks and low-grade bonds there is a plenty of variation left to be explained by stock market factors.

Slope of TERM is 0.45 for 1-to-5 year government bonds, whereas it is 0.72 for 6-to-10 year government bonds. It is near 1 for 4 of 5 long-term corporate bonds. According to this case, long-term bonds are more sensitive to shifts in interest rates measured by TERM compared to short-term bonds. Another interesting point is that 25 stock portfolios have TERM slopes like those for long-term bonds. This shows

that risk captured by TERM results from shocks to discount rates that affect long-term securities, bonds and stocks in the same way.

When DEF is examined, it is seen that returns on small stocks are more sensitive to risk captured by DEF compared to returns on big stocks. DEF slopes of stocks tend to be larger than those for corporate bonds, which are larger than those for government bonds. DEF is thus said to capture a common default risk in returns that increases from government bonds to corporate bonds, from bonds to stocks, and from big stocks to small stocks.

Fama and French (1993) have also examined role of stock market factors in three steps. In the first step they have used excess market return in explanation of excess bond and stock returns. In the second step SMB and HML (value-weighted, zero-investment factor-mimicking portfolios for size) are used as explanatory variables. Lastly excess market return, SMB and HML are jointly used as explanatory variables.

At the end of first examination excess market return (R_m - R_f) is found as capturing more common variation in stock returns compared to term-structure factors DEF and TERM. (R_m - R_f) is also found as capturing common variation in bond returns. In the second step SMB and HML are used alone and found as having little power to explain bond returns. Nonetheless in the absence of competition from market portfolio, SMB and HML still capture time series variation in stock returns. But especially for portfolios that take place in large size quintile, SMB and HML leave common variation in stock returns which is picked up by market portfolio. To conclude used alone, bond-market factors capture common variation not only in stock returns but also in bond returns. Similarly, used alone, stock market factors capture shared variation in bond returns as well as stock returns. Authors evaluate these results as existence of an overlap between stochastic processes for bond and stock returns. When stock-market and bond-market factors are used together to explain returns; it is seen that bond-market factors continue to have a strong role in bond returns and stock-market factors still have a strong role in stock returns. Nevertheless, it is a reality that adding TERM and DEF to regressions has little effect on the slopes on the stock-market factors. Same is also valid for bonds. Adding Rm-Rf, SMB and HML to regressions for bonds has little effect on the slopes on TERM

and DEF. Last regression (five-factor) seems to contradict with evidences served by previous regressions saying that there is a strong overlap between return processes for bonds and stocks. Based on last regression, only the low-grade bond portfolio continues to produce nontrivial slopes on stock market factors. Adding stock market factors to regressions for stocks wipe out strong slopes on TERM and DEF observed in two-factor regressions. Moreover bond returns no longer respond to stock market factors. In conclusion authors state that effect of three stock market factor is generally confined to stock returns, except for low-grade bonds. They also assert that links between stock and bond returns come largely from two shared term-structure factors.

3.4.2. Carhart Four Factor Model

Inadequacy of CAPM in explanation of cross-section of stock returns has given the rise of multifactor models which are developed along both strands of literature, asset pricing and performance measurement. First extension of CAPM is three factor model which has extended further by Carhart (1997). Carhart (1997) has introduced an additional factor to model of Fama and French (1993). Resulting four factor model is current empirical workhorse of performance evaluation and is also widely used in other fields of finance. (Lückoff, 2011: 150) Model is as follows:

$$r_{it} = \alpha_{it} + b_{it}\, RMRF_t + s_{it}\, SMB_t + h_{it}\, HML_t + p_{it}\, PR1YR_t + e_{it}$$

In this equation r_{it} refers to return on portfolio in excess of one-month T-bill return, $RMRF_t$ refers excess return on value-weighted aggregate market proxy; whereas SMB_t, HML_t and $PR1YR_t$ represents returns on value-weighted, zero-investment, factor mimicking portfolios for size, book to market equity and momentum in stock returns.

Momentum effect according to which a strategy based on buying past winners and selling past losers generates positive significant abnormal returns is firstly reported by Jegadeesh and Titman (1993). Analysis that is implemented by Carhart (1997) has indicated that Jegadeesh and Titman's (1993) one-year

momentum in stock returns accounts for Hendricks, Patel and Zeckhauser's (1993) hot hands effect in mutual fund performance.

Carhart (1997) has used monthly data of 1892 diversified equity funds for the period between Jan1962-Dec1993. (Sector funds, international funds and balanced funds are omitted from analysis.) In Carhart's study not only four factor model but also CAPM and three factor model are implemented.

Carhart (1997) has estimated individual fund performance α_{it} initially by the equation:

$$\alpha_{it} = R_{it} - R_{ft} - b_{it-1} RMRF_t - s_{it-1} SMB_t - h_{it-1} HML_t + p_{it-1} PR1YR_t$$

After then he has estimated a cross-sectional regression, by which he has examined if expenses and turnover have direct negative effect on performance:

$$\alpha_{it} = \alpha_t + b_t x_{it} + \varepsilon_{it}$$

According to Carhart (1997) funds that earn higher one-year returns do so not because fund managers successfully follow momentum strategies but because they hold larger positions in last year's winning stocks just by chance. On contrary to findings of Wermers (1996), Carhart states that hot-hand funds infrequently repeat their abnormal performance. Author has also reported that individual funds following one-year momentum strategy earn significantly lower abnormal returns when expenses are taken into account. Here author conclude that transaction costs consume gains from following momentum strategy in stocks. Expenses are demonstrated to have at least one-for-one negative impact on fund performance. Turnover is also found as having negative effect on performance. Little evidence is found which shows that fund manager has stock picking skill. Although funds with high past alphas demonstrate higher alphas and expected returns in subsequent periods, author attributes this to model misspecification. (Same model is used in ranking funds in all periods.) Moreover these funds earn expected future alphas which are insignificantly different from zero. Even funds with best past performance earn back their expenses and transaction costs, whereas majority underperforms by approximately their investment cost.

3.5. CHARACTERISTICS-BASED MODELS

Daniel et al (1997) have developed new performance measures that use benchmarks which take characteristics of stocks held by mutual funds into account. Authors have formed 125 passive portfolios (5*5*5 based on firm size, book-to-market ratio and prior year return) whose returns are calculated by value-weighting the stocks in the portfolio. In construction of relevant benchmarks, following steps are implemented:

- At the end of June all stocks are ranked according to their market capitalization.
- Quintile portfolios are constituted which are subdivided further into book-to-market quintiles. (Based on their book-to-market data as of the end of previous December)
- At last firms in each of the 25 size/book-to-market portfolios sorted into quintiles based on their preceding 12-month return. (Preceding 12-month return is calculated by the end of May)

By implementing steps that are explained, 125 portfolios with different combinations of size, book-to-market ratio and momentum characteristics are generated. Next step is computation of value-weighted returns for each of 125 portfolios. According to Fischer and Wermers (2000), benchmark for each stock during a given quarter is the buy-and-hold return of the portfolio in which that stock takes place during this quarter. After the procedure behind construction of benchmarks is explained, performance measures developed by Daniel et al (1997) will be explained.

3.5.1. Characteristic Selectivity (CS Measure)

First measure which is developed by Daniel et al (1997) is "Characteristic Selectivity Measure" which attempts to detect if managers successfully select stocks that outperform other stocks with same characteristics. It questions whether fund managers have additional selectivity ability. A zero CS measure refers that fund performance can be replicated by simply purchasing stocks with same characteristics. Nonetheless a significant positive CS measure is an indicator of additional selectivity ability of the fund manager.

Formula of CS is given as:

$$\sum_{j=1}^{N} w_{j,t-1}\ CS_t = \sum_{j=1}^{N} w_{j,t-1}\ (R_{j,t} - R_t^{b_{j,t-1}})$$

In this formula $w_{j,t-1}$ is the portfolio weight on stock j at the end of month t-1, $R_{j,t}$ is the month t return of stock j and $R_t^{b_{j,t-1}}$ is the month t return of characteristic-based passive portfolio that is matched to stock j during month t-1. Time series average of CS_t gives CS measure of the fund.

3.5.2. Characteristic Timing (CT Measure)

Second measure developed by Daniel et al (1997) is "Characteristic Timing Measure". Daniel et al (1997) have developed CT measure in order to determine if portfolio managers successfully time their portfolio weightings on mentioned characteristics. Fund manager can generate additional performance if size, book-to-market or momentum strategies have time-varying expected returns that manager can exploit by tilting portfolio toward stocks having these characteristics when returns on characteristics are highest. (Wermers, 2000: 1668) CT measure attempts to measure fund managers' ability to time stock characteristics. CT measure is calculated as given:

$$CT_t = \sum_{j=1}^{n} (w_{j,t-1}\ R_t^{b_{j,t-1}} - w_{j,t-13}\ R_t^{b_{j,t-13}})$$

Time-series average of CT_t gives CT measure for that fund.

3.5.3. Average Style Measure (AS)

Third measure is AS (Average Style Measure) which measures returns earned by a fund due to that fund's tendency to hold stocks with certain characteristics.

$$AS_t = \sum_{j=1}^{n} w_{j,t-13}\ R_t^{b_{j,t-13}}$$

In implementation of that formula each stock held by fund at month t-13 is matched with its characteristic based benchmark portfolio of month t-13. Then month t return of this benchmark portfolio is multiplied by the month t-13 portfolio weight. By summing resulting product over all stocks held by fund at month t-13,

AS component is obtained. At the last step by averaging all months, AS measure is obtained.

In the next chapter, these measures will be calculated for A-type Turkish mutual funds.

CHAPTER 4
EMPIRICAL STUDY

Mutual funds which are managed by professional managers are attractive instruments for individual investors who are able to invest in a diversified portfolio of securities by investing in mutual funds. Mutual fund managers are expected to monitor feasible set of financial instruments, select securities and maximize fund return by making optimal allocation between instruments. That expectation leads not only investors but also researchers to question ability of mutual fund managers in security selection, market timing. Fund performance could be perceived as a mirror of fund manager performance.

Do mutual fund managers have enough skill to realize superior returns compared to passive benchmark on risk-adjusted basis? This is an old discussion that takes place in finance literature for which answer is mostly no. Mutual fund performance is evaluated by comparing it against either other similar funds or against a benchmark. In this chapter the performance of A-type mutual funds will be examined by applying different techniques mentioned in the previous chapter.

4.1. DATA SET AND LIMITATIONS

In the empirical part of this study, firstly the results of the traditional performance measures for 72 A-type mutual funds are presented and then the results of quadratic regression and dummy variable regression are reported as an attempt to measure market timing and security selection ability of fund managers. In the next step empirical results, obtained from implementation of Fama-French three-factor model and Carhart four-factor model, will be given. In order to implement those models benchmarks are constituted whose work load is hardest part of the empirical analysis. In order to supply data conformity between statistical analyses, quarterly data is used for the period 2003Q1-2013Q4. In the last part CS, CT and AS measures that are developed by Daniel et al (1997) is calculated. Unlike Daniel et al (1997) who has formed 125 passive portfolios as benchmarks, 18 passive portfolios are constituted. Process will be explained further in next sections. Multifactor models, which are used in measurement of equity fund performance, are applied to

data of 9 equity funds. Characteristic measures are also calculated for 9 equity funds.

Due to limited data availability, this study has few limitations. Data period cannot be extended further since number of mutual funds decrease as we include prior years. That case stems from the fact that Turkish fund market is a developing market. Turkish mutual fund industry is not developed enough in terms of the number of funds when it is compared with the US and Europe. Unlike the developed countries, it is hard to reach the data for the researchers who aim to study the Turkish fund market. Although number of funds with significant empirical results is expected to increase as data set is extended, extension is mostly impossible. Carhart method cannot be implemented to gross returns since gross returns cannot be reached. Therefore the effect of management fees on fund performance cannot be investigated separately. Moreover since holdings data of mutual funds are available starting from June 2012 in Public Disclosure Platform; CS, CT and AS measures could be calculated only for this short time period.

In the analysis, logarithm of BIST-100 index is used as market return, whereas T-bill rate is used as risk-free rate. Quarterly data is used in the analysis, since market capitalization and book to market ratios could be reached in quarterly fashion. BIST-100 return is obtained from Central Bank of Turkey, whereas T-bill rate is obtained from Republic of Turkey Prime Ministry Undersecretariat of Treasury. Data period includes between the periods Jan2003-Dec2013. Descriptive statistics of the study is given in table 4.1.

Table 4.1: Descriptive Statistics

	Mean	Median	Maximum	Minimum	St. Dev.	Skewness	Kurtosis
AAK	0.03337	0.04135	0.1898	-0.1415	0.07555	-0.22132	2.85095
ACD	0.01944	0.01968	0.19738	-0.13698	0.06289	0.0008	3.7700
AAD	0.03217	0.03731	0.35843	-0.2159	0.11678	0.51688	4.06542
ADP	0.04007	0.04935	0.2527	-0.1527	0.09259	0.05781	2.66096
AGF	0.04433	0.04815	0.3136	-0.2395	0.10198	-0.37363	4.34585
AK3	0.04402	0.05325	0.3777	-0.2454	0.11953	0.17665	3.6278
AKU	0.04653	0.05225	0.376	-0.295	0.13986	0.04642	3.08235
AN1	0.04224	0.05165	0.3282	-0.2198	0.09867	-0.17944	4.35341
ASA	0.04285	0.0503	0.3359	-0.2265	0.10283	-0.10043	4.24948
AYA	0.05027	0.063	0.351	-0.2729	0.128407	-0.14029	3.04839
DAH	0.0333	0.01925	0.3735	-0.2329	0.111873	0.349805	3.962659
DZA	0.03289	0.0342	0.2479	-0.1378	0.07823	0.1233	3.54291
DZE	0.04254	0.04775	0.3908	-0.2957	0.14054	0.07888	3.23448
DZK	0.03380	0.0276	0.1863	-0.0824	0.0529	0.46356	3.54948
EC2	0.023809	0.0216	0.1625	-0.1663	0.078677	-0.17903	2.621907
ECA	0.02664	0.0177	0.1488	-0.0465	0.04178	0.99601	4.23884
FAF	0.06110	0.05475	0.4267	-0.2543	0.13721	0.30148	3.48596
FI2	0.04749	0.0543	0.3471	-0.1518	0.10727	0.32501	3.04857
FYD	0.05803	0.0536	0.4149	-0.213	0.11713	0.42258	4.22717
GAE	0.04087	0.0446	0.3636	-0.2949	0.13986	0.04562	3.05101
GAF	0.03828	0.01255	0.3992	-0.263	0.13281	0.31555	3.74344
GAK	0.035159	0.01915	0.2741	-0.1421	0.07801	0.45051	4.05833
GBK	0.026832	0.0211	0.3372	-0.2237	0.09020	0.32405	5.67798
GL1	0.022755	0.01815	0.3751	-0.2971	0.10748	0.08309	5.63369
GMA	0.01339	0.01875	0.1594	-0.1874	0.06512	-0.59447	4.01394
GSA	0.03207	0.029	0.1716	-0.0726	0.05175	0.57070	3.44571
GHS	0.03991	0.031	0.2867	-0.2676	0.12024	-0.1967	2.89372
GSP	0.0561	0.04855	1.17	-0.3289	0.21655	2.95237	17.2665
GYH	0.04828	0.04435	0.4913	-0.2956	0.13720	0.36703	4.83317
HAF	0.05103	0.05195	0.3585	-0.1352	0.10695	0.40729	3.39371
HBU	0.04152	0.04245	0.3784	-0.2888	0.13907	0.09231	3.08296
HLK	0.04217	0.0455	0.1552	-0.1015	0.06521	-0.45849	2.74299
HSA	0.03993	0.04355	0.303	-0.1332	0.07948	0.68459	4.90124
IGD	0.04189	0.03575	0.2148	-0.0883	0.05939	0.63736	3.92050
IGH	0.04257	0.02815	0.2823	-0.1791	0.09903	0.17315	2.85705
IGU	0.04525	0.04935	0.3691	-0.2998	0.14132	0.02049	2.99307
IYD	0.03975	0.04805	0.2832	-0.1652	0.10136	0.06842	3.14381
KA2	0.02994	0.02975	0.174	-0.1342	0.06984	0.14019	2.8073
MAD	-0.0021	0	0.2158	-0.2703	0.09961	-0.35984	3.25978
NEK	0.04406	0.02895	0.4771	-0.2123	0.12244	0.89932	5.44483
SKH	0.0244	0.01695	0.2237	-0.159	0.082931	0.09906	3.40073
SMA	0.03142	0.02965	0.2166	-0.1707	0.08557	-0.33809	3.29514
ST1	0.08479	0.0881	0.6914	-0.274	0.17549	0.78988	4.94983

TAD	0.02573	0.01955	0.364	-0.122	0.06735	2.73599	16.11331
TAH	0.04671	0.0476	0.3403	-0.2071	0.11655	0.06015	2.95181
TAO	0.03664	0.0411	0.1709	-0.0771	0.05071	0.05619	3.26179
TAU	0.04822	0.057	0.4311	-0.3405	0.16021	0.07325	3.22524
TCD	0.03295	0.0389	0.2278	-0.1665	0.08904	-0.04156	2.92332
TE3	0.03549	0.04435	0.1668	-0.1999	0.07347	-0.79813	4.03010
TI2	0.04060	0.03105	0.297	-0.2452	0.11166	0.10128	3.25291
TI3	0.05077	0.04915	0.3435	-0.2497	0.13458	0.13374	2.97904
TI7	0.03043	0.0382	0.213	-0.2179	0.08466	-0.21353	3.99048
TIE	0.04669	0.0506	0.3802	-0.2836	0.13708	0.08696	3.09407
TKF	0.03626	0.04035	0.1861	-0.1567	0.0693	-0.1157	3.20006
TKK	0.04082	0.043	0.201	-0.1171	0.06742	-0.06109	3.03019
TMD	0.02591	0.0317	0.1981	-0.1757	0.08424	-0.21291	3.13712
TZK	0.03516	0.0347	0.1958	-0.1233	0.07039	-0.06884	2.89618
TTE	0.03110	0.00215	0.4311	-0.3255	0.16832	0.34382	2.98591
TUD	0.03119	0.02025	0.4219	-0.2542	0.12634	0.97923	5.37047
TZD	0.03071	0.0318	0.1874	-0.1238	0.07816	0.07844	2.53046
TYH	0.04727	0.0499	0.4088	-0.2456	0.12939	0.2558	3.47232
VAF	0.03619	0.03735	0.2572	-0.1576	0.08507	0.09322	3.13516
VEF	0.04578	0.04685	0.3733	-0.2856	0.13660	-0.01018	3.25382
YAD	0.02814	0.037	0.2471	-0.2237	0.08756	-0.33398	3.64287
YAF	0.03813	0.03705	0.3268	-0.1183	0.07874	1.07267	5.88657
YAK	0.03997	0.036	0.2271	-0.1067	0.07322	0.52593	3.10527
YAR	0.06236	0.063	0.3744	-0.2054	0.11412	0.15251	3.47653
YAS	0.05863	0.0648	0.4193	-0.2396	0.12624	0.40159	4.16085
YAU	0.04769	0.05835	0.401	-0.2738	0.13781	0.16266	3.35799
YEF	0.04912	0.04605	0.39	-0.2903	0.14194	0.10679	3.16422
YHS	0.04745	0.04275	0.355	-0.2284	0.11522	0.27528	3.62598
YOB	0.04322	0.04375	0.4053	-0.2933	0.12961	0.00551	3.69574

According to table 4.1, mutual fund returns mostly have positive mean values. Unique exception is MAD which has negative mean. When the difference between maximum and minimum values is taken as an indicator of volatility; GSP, ST1, GYH, TAU and TTE are found as most volatile funds. From the most volatile ten funds; 5 are index funds, 2 are variable funds, 2 are mixed funds and 1 is stock fund. When standard deviation is considered, most volatile five funds are listed as AAK, ACD, AAD, ADP and AGF. According to standard deviation most volatile ten funds include 4 variable funds, 2 index funds, 2 stock funds, 1 mixed and 1 special fund. In terms of skewness, 52 funds have positive skewness values, whereas 20 funds have negative skewness values. This indicates that 52 funds are skewed to left and 20 funds are skewed to right. Highest skewness is observed on GSP, whereas lowest is reported on TE3.

Kurtosis of normal distribution is 3. (Brooks, 2008: 163) Positive kurtosis indicates a "peaked" distribution and negative kurtosis indicates a "flat" distribution. All of the funds have positive kurtosis values. Except for 14 funds (IGU, TTE, TI3, TAH, TCD, TZK, GHS, IGH, AAK, KA2, HLK, ADP, EC2, TZD), all mutual funds have kurtosis values that are higher than 3. In other words they have leptokurtic distribution.

4.2. RESULTS OF SINGLE INDEX PERFORMANCE MEASURES THAT TAKES TOTAL RISK INTO THE ACCOUNT

4.2.1. Results of Sharpe Ratio

The results of Sharpe ratios of mutual funds are reported in table 4.2.

Table 4.2: Results of Sharpe Ratio

Fund Name	Sharpe Ratio
ST1	0.137895
YAR	0.015444
FAF	0.003685
YAS	-0.015564
GSP	-0.020765
FYD	-0.021878
TI3	-0.073049
TAU	-0.077236
AYA	-0.080400
YEF	-0.080822
HAF	-0.089454
GYH	-0.089789
YAU	-0.093684
AKU	-0.100564
THY	-0.103025
TIE	-0.107675
VEF	-0.108436
IGU	-0.108582
YHS	-0.114098
TAH	-0.119139
FI2	-0.122150
DZE	-0.128506
YOB	-0.134042
NEK	-0.135044
HBU	-0.137200
AK3	-0.138674
GAE	-0.141008
AGF	-0.159485
GAF	-0.168002
GHS	-0.172095
ASA	-0.172577
TTE	-0.175256
TI2	-0.179112
IGH	-0.182045
AN1	-0.186033
IYD	-0.205613
ADP	-0.221706
TUD	-0.232790
AAD	-0.243440
DAH	-0.243996
HSA	-0.259987
YAK	-0.281699
HLK	-0.282483
YAF	-0.285257
VAF	-0.286903
TKK	-0.293353
TCD	-0.310508
IGD	-0.314843
GAK	-0.326080
SMA	-0.340963
TKF	-0.351126
GL1	-0.352089
DZA	-0.354228
TI7	-0.356324
AAK	-0.360428
TZK	-0.361435
TE3	-0.365553
YAD	-0.370719
GBK	-0.374339
TZD	-0.382420
TMD	-0.411694
SKH	-0.436001
KA2	-0.438901
EC2	-0.467577
TAO	-0.472404
DZK	-0.506503
TAD	-0.517649
GSA	-0.551305
MAD	-0.629388
ACD	-0.654344
GMA	-0.724838
ECA	-0.812749

All of the mutual funds have negative Sharpe ratios except for ST1, YAR and FAF. Thus funds with best Sharpe ratios include 1 special fund, 1 stock fund and 1 variable fund. Average Sharpe measure of all funds is – 0.249444 for same period. Compared to that number, 40 of mutual funds show higher than average performance.

4.2.2. Results of Risk Adjusted Performance Ratio: (M^2)

The results of M^2 measure are reported in table 4.3.

Table 4.3: Results of M^2

Fund Name	M^2
ST1	0.078903
YAR	0.062647
FAF	0.061086
GAK	0.060596
YAS	0.058530
GHS	0.058109
GSP	0.057840
FYD	0.057692
TI3	0.050899
TAU	0.050343
AYA	0.049923
YEF	0.049867
HAF	0.048721
GYH	0.048676
YAU	0.048159
AKU	0.047246
TIE	0.047159
THY	0.046919
VEF	0.046201
IGU	0.046181
YHS	0.045449
DZE	0.043536
FI2	0.043446
YOB	0.042801
NEK	0.042668
TAH	0.042544
HBU	0.042382
AK3	0.042186
GAE	0.041877
AGF	0.039424
GAF	0.038293
ASA	0.037685
TTE	0.037330
IGH	0.036428
AN1	0.035899
IYD	0.033300
ADP	0.031163
TUD	0.029692
AAD	0.028278
DAH	0.028204
HSA	0.026081
YAK	0.023199
HLK	0.023095
YAF	0.022726
VAF	0.022508
TKK	0.021652
TCD	0.019374
IGD	0.018799
SMA	0.015331
TKF	0.013982
GL1	0.013854
TE3	0.013821
DZA	0.013570
TI7	0.013292
AAK	0.012747
TZK	0.012613
YAD	0.011380
GBK	0.010900
TZD	0.009827
TMD	0.005941
SKH	0.002714
KA2	0.002329
TI2	-0.001210
EC2	-0.001478
TAO	-0.002119
DZK	-0.006646
TAD	-0.008125
GSA	-0.012594
MAD	-0.022960
ACD	-0.026273
GMA	-0.035632
ECA	-0.047302

According to this table, ten mutual funds which have highest M^2 include 2 variable, 2 subsidiary, 2 index, 1 special, 1 sector, 1 stock and 1 composite fund. Average of M^2 measures of funds is 0.027829. According to that case 40 mutual funds have higher than average M^2 measure.

4.3. RESULTS OF SINGLE INDEX PERFORMANCE MEASURES THAT TAKES SYSTEMATIC RISK INTO THE ACCOUNT

4.3.1. Results of Treynor Ratio

The results of Treynor ratio are given in table 4.4.

Table 4.4: Results of Treynor Ratio

Fund Name	Treynor Ratio
ST1	0.021923
YAR	0.002621
FAF	0.000650
YAS	-0.002551
FYD	-0.003860
GSP	-0.006946
TI3	-0.013188
TAU	-0.013540
AYA	-0.013697
YEF	-0.013956
YAU	-0.015757
GYH	-0.016461
HAF	-0.017270
AKU	-0.017382
THY	-0.017609
VEF	-0.018717
TIE	-0.018796
IGU	-0.019007
YHS	-0.019506
TAH	-0.021040
FI2	-0.021431
DZE	-0.021674
AK3	-0.022899
YOB	-0.023816
HBU	-0.023839
GAE	-0.024447
NEK	-0.026718
AGF	-0.027128
ASA	-0.029145
GAF	-0.029482
GHS	-0.029721
TI2	-0.032062
AN1	-0.033740
TTE	-0.034320
IGH	-0.034506
IYD	-0.036991
ADP	-0.039248
DAH	-0.043094
HSA	-0.045068
YAK	-0.050215
VAF	-0.051324
YAF	-0.052058
TUD	-0.052763
HLK	-0.055342
AAD	-0.055989
TKK	-0.059703
TCD	-0.060538
GAK	-0.061174
AAK	-0.063083
TZK	-0.064209
YAD	-0.066029
DZA	-0.066123
TE3	-0.066332
TI7	-0.066915
GBK	-0.070266
SMA	-0.072829
TKF	-0.075225
IGD	-0.075696
GL1	-0.076035
SKH	-0.077963
TZD	-0.079390
KA2	-0.083217
TMD	-0.086764
TAO	-0.087030
EC2	-0.091400
DZK	-0.099459
ACD	-0.116582
TAD	-0.120080
MAD	-0.120177
GSA	-0.232862
ECA	-0.250646
GMA	-0.410476

According to Treynor ratio, ten funds with highest performance include 4 index, 2 variable, 2 subsidiary, 1 stock and 1 special fund. Average Treynor ratio of all mutual funds is - 0.054463. This means that 43 mutual funds have shown higher than average performance. Treynor ratio is positive for only three funds. But since Treynor ratio gives relative performance ranking rather than absolute performance ranking between funds, this case is not so important.

4.3.2. Results of Jensen's Alpha

Unlike Sharpe and Treynor ratios which give relative performance ranking between funds, Jensen's alpha is an absolute performance measure. Its results are reported in table 4.5.

Table 4.5: Results of Jensen's alpha

Fund Name	Jensen's Alpha
ST1	0.044021
FAF	0.014481
YAR	0.013840
YAS	0.011866
FYD	0.009360
GSP	0.007129
TAU	0.004038
TI3	0.003556
YEF	0.003290
AYA	0.003212
YAU	0.001804
GYH	0.001121
AKU	0.000466
HAF	0.000381
THY	0.000265
TIE	1.5514E-05
VEF	-0.000600
IGU	-0.000846
YHS	-0.001043
TAH	-0.002033
FI2	-0.002123
DZE	-0.003096
AK3	-0.003576
YOB	-0.004273
HBU	-0.004707
GAE	-0.005234
NEK	-0.005421
AGF	-0.005498
ASA	-0.006811
GHS	-0.008059
AN1	-0.008586
IGH	-0.008646
GAF	-0.008721
TI2	-0.008797
IYD	-0.010724
ADP	-0.011135
HSA	-0.012430
HLK	-0.012444
YAK	-0.013249
TKK	-0.013829
TTE	-0.014063
IGD	-0.014264
YAF	-0.014713
VAF	-0.015867
DAH	-0.015921
GAK	-0.017970
TZK	-0.018324
TKF	-0.018524
TE3	-0.018874
TAO	-0.019012
AAD	-0.019311
TUD	-0.019400
TCD	-0.019447
AAK	-0.019479
DZA	-0.020184
DZK	-0.021956
SMA	-0.021982
TI7	-0.022071
TZD	-0.023128
YAD	-0.023632
KA2	-0.024036
GBK	-0.025135
GSA	-0.026330
TMD	-0.027504
SKH	-0.027829
GL1	-0.028904
EC2	-0.029559
TAD	-0.029649
ECA	-0.031527
ACD	-0.034813
GMA	-0.045138
MAD	-0.053328

From 72 funds, only 16 funds have positive Jensen's alphas. Since positive Jensen's alpha is an indicator of selection skill of managers, 16 funds have such a skill. Average of Jensen's alpha of all funds is -0.011179. According to this average, 36 funds have higher than average performance.

Since alpha represents how much of the rate of return on the portfolio is attributable to manager's ability to derive above average returns adjusted for risk, superior risk-adjusted returns implies that manager is talented in either predicting market returns or selecting undervalued issues for the portfolio, or both. (Reilly and Brown, 2012: 1116)

4.3.3. Results of T^2 Measure

Results of T^2 measure are as given:

Table 4.6: Results of T^2 Measure

Fund Name	T-square
ST1	0.039881
YAR	0.020579
FAF	0.018608
YAS	0.015407
FYD	0.014099
GSP	0.011012
TI3	0.004771
TAU	0.004418
AYA	0.004261
YEF	0.004002
YAU	0.002201
GYH	0.001497
HAF	0.000689
AKU	0.000576
THY	0.000349
TIE	1.97553E-05
VEF	-0.000758
IGU	-0.001048
YHS	-0.001547
TAH	-0.003081
FI2	-0.003472
DZE	-0.003715
AK3	-0.004940
YOB	-0.005857
HBU	-0.005881
GAE	-0.006488
NEK	-0.008759
AGF	-0.009169
ASA	-0.011186
GAF	-0.011523
TI2	-0.014104
AN1	-0.015782
TTE	-0.016361
IGH	-0.016547
IYD	-0.019033
ADP	-0.021290
GHS	-0.024605
DAH	-0.025135
HSA	-0.027109
YAK	-0.032256
VAF	-0.033366
YAF	-0.034099
TUD	-0.034804
HLK	-0.037384
AAD	-0.038030
TKK	-0.041744
TCD	-0.042580
GAK	-0.043216
AAK	-0.045125
TZK	-0.046251
TE3	-0.046618
YAD	-0.048070
DZA	-0.048164
TI7	-0.048957
GBK	-0.052308
SMA	-0.054870
TKF	-0.057266
IGD	-0.057738
GL1	-0.058077
SKH	-0.060005
TZD	-0.061432
KA2	-0.065258
TMD	-0.068805
TAO	-0.069072
EC2	-0.073441
DZK	-0.081500
ACD	-0.098623
TAD	-0.102121
MAD	-0.102219
GSA	-0.214904
ECA	-0.232688
GMA	-0.392517

T-square measure, which expresses the difference in portfolio performance in terms of rate of return, is positive only for 16 funds. Funds with positive T^2 measure include 7 index , 4 variable, 2 subsidiary, 2 stock and 1 special fund. Average of T^2 measure for all funds is – 0.036646. According to that case, 43 of the funds have shown higher than average.

4.3.4. Results of Information Ratio

Information ratio is a measure which is developed as an attempt to compare and rank directly funds with different unsystematic risk levels. Results of information ratio are in table 4.7.

Table 4.7: Results of Information (Appraisal) Ratio

Fund Name	Information Ratio
ST1	0.455936
YAR	0.194682
FAF	0.160401
YAS	0.160272
FYD	0.121339
AYA	0.039910
TI3	0.038997
TAU	0.038593
YEF	0.036246
GSP	0.035867
YAU	0.021318
GYH	0.011843
AKU	0.005205
HAF	0.004913
THY	0.003247
TIE	0.000174
VEF	-0.006875
IGU	-0.009188
YHS	-0.014365
TAH	-0.026458
FI2	-0.030274
DZE	-0.035715
YOB	-0.049604
AK3	-0.050312
HBU	-0.052461
GAE	-0.058189
NEK	-0.059713
AGF	-0.086227
GAF	-0.100411
GHS	-0.106489
ASA	-0.107166
TTE	-0.113655
TI2	-0.117455
IGH	-0.122313
AN1	-0.127717
IYD	-0.156756
ADP	-0.181795
TUD	-0.189458
AAD	-0.202499
DAH	-0.215782
HSA	-0.243211
HLK	-0.259475
TKK	-0.270615
YAK	-0.271159
YAF	-0.272319
VAF	-0.278268
IGD	-0.288042
TCD	-0.298215
GAK	-0.326021
SMA	-0.327918
TKF	-0.340573
GL1	-0.340970
DZA	-0.367037
TI7	-0.368590
TE3	-0.376873
TZD	-0.384905
TZK	-0.391799
GBK	-0.394179
AAK	-0.395641
YAD	-0.404847
TMD	-0.420373
KA2	-0.482082
SKH	-0.500913
EC2	-0.511866
GSA	-0.535949
TAD	-0.536841
TAO	-0.540757
DZK	-0.563292
GMA	-0.712995
MAD	-0.744823
ACD	-0.830017
ECA	-0.835938

Based on table 4.7, 16 of 72 funds have positive information ratio. Funds with positive appraisal ratio include 7 index, 4 variable, 2 stock, 2 subsidiary and 1 special fund. For that period average appraisal ratio of all funds is – 0.204284. According to that average, 39 mutual funds show higher than average performance.

4.3.5. Results of Fama Measure

Results of Fama measure is given below:

Table 4.8: Results of Fama Measure

Fund Name	Fama Measure
ST1	0.047937
GSP	0.024797
FAF	0.019066
YAR	0.017200
YAS	0.015111
FYD	0.013281
TAU	0.009298
TI3	0.008374
YEF	0.007728
AYA	0.007046
GYH	0.006240
YAU	0.005731
HAF	0.004900
AKU	0.004854
TIE	0.004668
THY	0.004172
IGU	0.003772
VEF	0.003666
YHS	0.002440
TAH	0.001880
FI2	0.001408
DZE	0.000951
YOB	0.000159
NEK	2.78843E-05
HBU	-0.000268
AK3	-0.000407
GAE	-0.000802
AGF	-0.002469
ASA	-0.003836
GAF	-0.004347
GHS	-0.004427
IGH	-0.004632
TI2	-0.004895
AN1	-0.005008
TTE	-0.006730
IYD	-0.007130
HLK	-0.009600
HSA	-0.009913
TKK	-0.010658
IGD	-0.010666
YAK	-0.010721
ADP	-0.011135
YAF	-0.011810
DAH	-0.012163
TUD	-0.012320
AAD	-0.012632
VAF	-0.012900
GAK	-0.014885
TKF	-0.014959
TCD	-0.015604
TZK	-0.015918
TE3	-0.015947
AAK	-0.017011
TAO	-0.017096
DZA	-0.017128
SMA	-0.017601
TI7	-0.018715
TZD	-0.019317
DZK	-0.019638
YAD	-0.020616
KA2	-0.021204
GSA	-0.021530
GBK	-0.021563
TMD	-0.023287
GL1	-0.023303
SKH	-0.024940
TAD	-0.025752
EC2	-0.026145
ECA	-0.028308
ACD	-0.032645
GMA	-0.038394
MAD	-0.049221

As it is obvious in the table, Fama measure is positive for 24 mutual funds which imply that 24 funds earn higher returns compared to expected returns. Remaining 48 funds have negative Fama measure. Average Fama measure of all funds is – 0.007159 for the same period. Based on that average, 36 funds show higher than average performance.

4.4. BEST PERFORMING FUNDS BASED ON TRADITIONAL MEASURES

Table 4.9 presents the best performing funds based on traditional measures.

Table 4.9: Best Performing Funds Based on Traditional Measures

Measures	1st	2nd	3rd	4th	5th
Sharpe	ST1	YAR	FAF	YAS	GSP
M^2	ST1	YAR	FAF	GAK	YAS
Treynor	ST1	YAR	FAF	YAS	FYD
Jensen's alpha	ST1	FAF	YAR	YAS	FYD
T^2	ST1	YAR	FAF	YAS	FYD
Information ratio	ST1	YAR	FAF	YAS	FYD
Fama Measure	ST1	GSP	FAF	YAR	YAS

As it is obvious in table 4.9, best performing funds include mostly same funds based on all traditional measures. Without exception ST1 is the fund with best performance. Fund which has the second best performance is YAR according to Sharpe ratio, M^2, Treynor ratio, T^2 and information ratio. Nonetheless it is FAF according to Jensen's alpha, whereas it is GSP according to Fama measure. Fund with third best performance is FAF according to all measures except for Jensen's alpha based on which it is YAR. Fund which has fourth best performance is YAS according to most measures. Finally fund with fifth best performance is reported as FYD based on most performance measures.

4.5. WORST PERFORMING FUNDS BASED ON TRADITIONAL MEASURES

Table 4.10 depicts the worst performing funds according to traditional measures.

Table 4.10: Worst Performing Funds Based on Traditional Measures

Measures	Fund with worst performance	Fund with second worst performance	Fund with third worst performance	Fund with fourth worst performance	Fund with fifth worst performance
Sharpe	ECA	GMA	ACD	MAD	GSA
M^2	ECA	GMA	ACD	MAD	GSA
Treynor	GMA	ECA	GSA	MAD	TAD
Jensen's alpha	MAD	GMA	ACD	ECA	TAD
T^2	GMA	ECA	GSA	MAD	TAD
Information ratio	ECA	ACD	MAD	GMA	DZK
Fama Measure	MAD	GMA	ACD	ECA	EC2

According to table 4.10, fund with worst performance is ECA based on Sharpe measure, M^2 and information ratio. Nonetheless it is GMA based on Treynor ratio and T^2, whereas it is MAD based on Jensen's alpha and Fama measure. As it is clear in table 4.10, although ranking changes worst performing funds include mostly same funds according to all measures.

4.6. TIMING AND SELECTIVITY PERFORMANCE MEASURES

Existing researches which used return-based models have provided little evidence showing market timing ability of equity fund managers. Nonetheless if some managers have market timing skill, this may bias inference of selectivity abilities. There are returns-based modifications to models which try to capture timing skills separately from selectivity skills. (Fischer and Wermers, 2013: 73) First model is quadratic regression of Treynor and Mazuy, whereas second one is dummy variable regression of Henriksson and Merton.

4.6.1. Results of Quadratic Regression (Treynor and Mazuy Measure)

Table 4.11 presents the results of quadratic regression model.

Table 4.11: Quadratic Regression Results

Fund Name	Security Selection (α_p)	Beta (β_p)	Market Timing (γ_p)
AAD	-0.025897	0.535072*	0.400021
AAK	-0.021791*	0.464676*	0.164241
ACD	-0.034424*	0.352691*	-0.022317
ADP	-0.017119	0.57793*	0.394015
AGF	-0.001683	0.600065*	-0.215145
AK3	-0.011409	0.802239*	0.52235
AKU	-0.005515	0.855368*	0.385055
AN1	-0.005925	0.536399*	-0.158147
ASA	-0.005151	0.61913*	-0.083514
AYA	-0.000464	0.797341*	0.252091
DAH	-0.023654**	0.721869*	0.526984
DZA	-0.022037*	0.452701*	0.138879
DZE	-0.008558	0.882629*	0.358885
DZK	-0.02666*	0.293418*	0.290314**
EC2	-0.030405*	0.420517*	0.066127
ECA	-0.027252*	0.09937*	-0.278361
FAF	0.004191	0.863202*	0.668034
FI2	-0.007793	0.65341*	0.36315
FYD	-0.000261	0.74528*	0.626529
GAE	-0.010443	0.848938*	0.337358
GAF	-0.012802	0.806789*	0.281428
GAK	-0.020775*	0.434302*	0.177361
GBK	-0.022694*	0.458701*	-0.160177
GHS	-0.012225	0.731092*	0.263574
GL1	-0.021722	0.454002*	-0.450387
GMA	-0.046871*	0.142802	0.126197
GSA	-0.031206*	0.15156*	0.305129
GSP	0.033191	0.535191*	-1.587257
GYH	-0.003276	0.80377*	0.304811
HAF	-0.008042	0.633584*	0.557015
HBU	-0.010726	0.849077*	0.389724
HLK	-0.013782	0.358032*	0.101174
HSA	-0.020678*	0.5165*	0.525142*
IGD	-0.022107*	0.30176*	0.498888*
IGH	-0.013272	0.565945*	0.305684
IGU	-0.006607	0.854749*	0.373838
IYD	-0.016667	0.61719*	0.390576
KA2	-0.028086*	0.38965*	0.250581
MAD	-0.052363*	0.561243*	-0.014398
NEK	-0.009966	0.638704*	0.277045
SKH	-0.027981*	0.461394*	0.006137
SMA	-0.01648	0.346243*	-0.366221
ST1	0.026377**	1.257216*	1.153242*
TAD	-0.037616*	0.346197*	0.507156**
TAH	-0.007718	0.7072*	0.36933
TAO	-0.021175*	0.29568*	0.143011
TAU	-0.003624	0.966609*	0.486724
TCD	-0.016869	0.431552*	-0.171285
TE3	-0.017515*	0.406788*	-0.015862
THY	-0.009243	0.849803*	0.631679
TI2	-0.019408	0.70846*	0.685879**
TI3	-0.007973	0.836691*	0.744423
TI7	-0.031638*	0.521668*	0.612766*
TIE	-0.006759	0.838797*	0.447688
TKF	-0.02065*	0.324166*	0.120906

TKK	-0.020345*	0.3689*	0.406572
TMD	-0.029774*	0.412*	0.140784
TTE	-0.03172	1.07553*	1.217543**
TUD	-0.016507	0.512037*	-0.209614
TZD	-0.026886*	0.384434*	0.220482
TZK	-0.018958*	0.391561*	0.031084
VAF	-0.020823*	0.514837*	0.320038
VEF	-0.005957	0.82731*	0.339282
YAD	-0.027538*	0.526404*	0.256151
YAF	-0.02156*	0.48269*	0.439052
YAK	-0.018988*	0.463007*	0.37746
YAR	0.00851	0.715959*	0.345451
YAS	0.004546	0.857977*	0.503009
YAU	-0.003311	0.863587*	0.334107
YEF	-0.002719	0.866071*	0.384455
YHS	-0.006982	0.729326*	0.391935
YOB	-0.008528	0.783911*	0.295793

*Significant at % 5 significance level

**Significant at % 10 significance level

α_p, which is an indicator of security selection ability of fund manager, also measures success of fund manager in portfolio diversification. Although α_p is negative for most of the funds (67), it is statistically significant at 5 %significance level for only 28 funds. (At 10% significance level, this number increases to 30). Funds with statistically significant α_p include mostly variable and composite funds. On the other hand, α_p is positive for only 5 funds from which only 1 is statistically significant at 10% significance level. Beta, which is the sensitivity of fund to market index, is significant for 71 mutual funds. Market timing ability refers to success of fund managers in estimation of market movements. A statistically significant positive market timing ability is also preferred. In quadratic regression market timing ability is represented by γ_p. γ_p is positive and statistically significant for HAS, IGD, ST1, TI7 at 5 % significance level; whereas it is positive and significant for DZK, TAD, TI2, TTE (also funds that are significant at 5 %) at 10 % significance level. Most of the funds which have significant market timing ability are variable funds.

4.6.2. Results of Dummy Variable Regression (Henriksson and Merton Measure)

The results of dummy variable regression presented by Henriksson and Merton are depicted in table 4.12.

Table 4.12: Dummy Variable Regression Results

Fund Name	α_p	β_p	γ_p
AAD	-0.06066*	0.721061*	-0.70246
AAK	-0.07255*	0.669972*	-0.33774
ACD	-0.09648*	0.6121*	-0.53366
ADP	-0.05249*	0.744454*	-0.14642
AGF	-0.04002*	0.791691*	0.009669
AK3	-0.03082*	0.855621*	0.421801**
AKU	-0.01151	0.932523*	0.239814
AN1	-0.06111*	0.706863*	0.269502
ASA	-0.04548*	0.777325*	0.149616
AYA	-0.0024	0.93938*	-0.26742
DAH	-0.05049*	0.809853*	0.397917
DZA	-0.08043*	0.654658*	0.21218
DZE	-0.01292**	0.94784*	0.298986**
DZK	-0.11106*	0.48427*	-0.1019
EC2	-0.0769*	0.695524*	-0.35117
ECA	-0.11712*	0.46085*	-0.83404**
FAF	-0.00648	0.897025*	0.548772*
FI2	-0.0351*	0.792262*	-0.19851
FYD	-0.03728*	0.768054*	0.79871*
GAE	-0.01598**	0.936616*	0.193106
GAF	-0.03308*	0.875702*	0.489358
GAK	-0.07736*	0.636315*	-0.35325
GBK	-0.06244*	0.729297*	-0.94408*
GHS	-0.02813*	0.868016*	-0.12639
GL1	-0.06152*	0.758032*	-0.85107**
GMA	-0.13331*	0.475761*	-0.08499
GSA	-0.11989*	0.429042*	-0.60006
GSP	0.043783	1.050958*	-2.55332*
GYH	-0.03662*	0.834284*	1.15418*
HAF	-0.03685**	0.7723*	-0.03447
HBU	-0.01707*	0.931352*	0.2783
HLK	-0.07553*	0.613996*	-0.26024
HSA	-0.07337*	0.645659*	-0.01746
IGD	-0.10511*	0.490775*	0.332807
IGH	-0.04612*	0.761164*	-0.21345
IGU	-0.00895	0.949482*	0.182169
IYD	-0.05113*	0.760804*	0.056157
KA2	-0.10168*	0.556952*	0.059297
MAD	-0.0844*	0.796323*	-0.13324
NEK	-0.07707*	0.647944*	1.03023*
SKH	-0.09036*	0.641242*	0.060163
SMA	-0.07614*	0.648416*	-0.67464**
ST1	0.018589	0.947449*	1.649436*
TAD	-0.09678*	0.574208*	-0.65755
TAH	-0.04569*	0.761492*	0.264887
TAO	-0.09363*	0.55062*	-0.27197
TAU	0.003079	1.000818*	0.33302
TCD	-0.06448*	0.704639*	-0.53613**
TE3	-0.07315*	0.656876*	-0.32277
THY	-0.02193**	0.888839*	0.546836*
TI2	-0.04396*	0.799518*	0.23389
TI3	-0.02078	0.868586*	0.332583
TI7	-0.0793*	0.663471*	-0.01953

TIE	-0.01516**	0.915377*	0.288363
TKF	-0.09582*	0.550778*	-0.03902
TKK	-0.08342*	0.582291*	-0.23534
TMD	-0.09718*	0.590657*	-0.16828
TTE	-0.01221	1.01727*	0.515913
TUD	-0.06866*	0.711844*	-0.04817
TZD	-0.1008*	0.561834*	0.168208
TZK	-0.08837*	0.590105*	-0.12769
VAF	-0.06551*	0.698105*	-0.1607
VEF	-0.02093*	0.89255*	0.325842**
YAD	-0.05906*	0.749606*	-0.69356*
YAF	-0.07047*	0.658693*	-0.2829
YAK	-0.07823*	0.62719*	0.135851
YAR	-0.01306	0.827887*	-0.2063
YAS	-0.01389	0.869431*	0.47714
YAU	-0.01379**	0.921382*	0.391829*
YEF	-0.00906	0.933324*	0.277911
YHS	-0.03299*	0.822653*	0.297073
YOB	-0.0291*	0.875333*	0.60152*

*Significant at % 5 significance level

**Significant at % 10 significance level

Although α_p which shows selection ability of fund managers is positive for GSP, ST1 and TAU; none of them is statistically significant. α_p is negative for other 69 funds from which 54 is statistically significant at 5 % significance level. (That number rises to 60 at 10 % significance level) Beta is statistically significant for all funds. γ_p that represents market timing ability of fund manager is positive for 36 funds. Nevertheless only 8 of them is statistically significant at 5% (ST1, GYH, NEK, FYD, YOB, FAF, TYH and YAU), and 11 is statistically significant at 10 % (funds that are significant at 5 % plus AK3, VEF, DZE). γ_p is negative for other 36 funds. Funds which have positive and statistically significant market timing ability include 3 variable funds, 3 stock funds, 2 index funds, 2 composite funds and one sector funds. In consistence with the expectation, funds which have highest sensitivity to market are mostly index funds. (Nine of ten highest beta funds are index funds) On the other hand, ten funds with lowest sensitivity to market include 5 variable (TAD, TZD, KA2, IGD, GSA), 4 composite (DZK, GMA, ECA and TKF) and 1 (TAO) special fund.

4.7. MULTIFACTOR MODELS

4.7.1. Fama-French Three Factor Model

In implementation of three factor model, first step is construction of factor mimicking portfolios for size and book to market equity. Although factors can be

downloaded from website of Kenneth French for U.S. studies, researchers from other countries have to construct their own Fama-French factors. So that, factors are constructed by following methodology of Fama and French (1993). During the analysis quarterly data of not only stocks included in BIST-100 index but also data of all stocks traded on BIST in period about issue is used. Quarterly returns of each stock which will be used in formation of SMB and HML are calculated. Market capitalization is calculated as number of shares times share price. Book to market ratio is also calculated for each quarter.

Building Blocks: In each quarter all stocks are ranked based on their market capitalization (size). After then they are assigned into two groups as small and big where median of all stocks' size is used as breakpoint.

Same stocks are separated into three book to market equity (BTM) groups where bottom 30% represents low, middle 40 % represents medium and top 30 % represents high. Negative book-to-market firms are excluded from the data set. Next step is construction of six portfolios, which are intersections of two market capitalization groups (small and big) and three book to market groups (low, middle and high), that will be used in calculation of SMB and HML. Six portfolios can be defined as:

S/L: Stocks which are included in small market-cap group and also low book to market group

S/M: Stocks which are included in small market-cap group and also middle book to market group

S/H: Stocks which are included in small market-cap group and also high book to market group

B/L: Stocks which are included in big market-cap group and also low book to market group

B/M: Stocks which are included in big market-cap group and also middle book to market group

B/H: Stocks which are included in big market-cap group and also high book to market group

By this way all stocks are assigned to one of six portfolios based on its market capitalization and book to market ratio. Next step consists of the calculation

of quarterly value weighted returns for all groups. In order to calculate value weighted returns, first weight of each stock in total market capitalization is calculated. After then for all portfolios (S/L, S/M, S/H, B/L, B/M, B/H), returns of stocks included in each portfolio is multiplied by stock's weight in total market equity. By doing this value weighted return of each stock is calculated. By summing value weighted returns of stocks that are included in each portfolio, value weighted returns of each portfolio is acquired. In each quarter, portfolios are reformed and value weighted returns are recalculated for each portfolio. In other words for each quarter of 2003-2013 stocks traded on exchange are assigned to portfolios, value weighted returns of each portfolio is calculated. After then SMB and HML portfolios are calculated for each quarter of each year.

SMB and HML factors are calculated as follows:

$$\mathbf{SMB} = \frac{(SL - BL) + (SM - BM) + (SH - BH)}{3}$$

$$\mathbf{HML} = \frac{(SH - SL) + (BH - BL)}{2}$$

Once SMB and HML variables are calculated, three factor model can be implemented. Results of three factor model are given on table 4.13:

Table 4.13: Results of Three Factor Model

Fund Name	C	(RM-RF)	SMB	HML
ASA	-0.02378*	0.401429**	-0.041792	-0.46691
AK3	-0.00425	0.719913	-0.1902	0.13983
DAH	-0.00918	0.69483	-0.60197	0.931776
FAF	0.01851	0.816101	-0.26013	0.461797
GAF	0.0022	0.862132	-0.52839	1.08263
TAH	-0.02249	0.441315	0.169263	-1.23154
TI2	-0.00133	0.695486	-0.31826	0.700051
TYH	0.002021	0.769359	-0.39228	0.468299
YHS	0.005328	0.736195	-0.30909	0.631467

*Significant at % 5 significance level

**Significant at % 10 significance level

According to table 4.13, eight of nine regressions are statistically insignificant. From here it can be concluded that three factor model does not work. Model is only valid for ASA, but SMB and HML is still insignificant. The reason behind insignificant regressions could be short data set that cannot be extended further due to data scarcity. Data cannot be used in daily, weekly or monthly frequency, since book to market ratios can be found only in quarterly frequency. This study suffers from short time series of fund data like many other studies about mutual fund performance which leads to performance measures that are statistically insignificant. Although Busse and Irvine (2006) suggest use of daily data in an attempt to enhance statistical significance, unfortunately this is not possible most times like it is the case in this study.

4.7.2. Carhart Four Factor Model

Carhart (1997) has added a new factor to three factor model of Fama and French (1993). Although there is a discussion in the literature regarding if momentum is an adequate proxy for some unknown risk factor, four factor- model is widely used. Four factor- model can be perceived as a way of operationalizing behavioral biases as benchmark factors in performance evaluation. (Lückoff, 2011: 169)

In application of Carhart model, SMB and HML variables are calculated based on Fama and French (1993). In calculation of MOM variable, stocks are assigned to portfolios based on lagged one year return. Winner portfolio is formed from stocks whose return takes place in top 30 %, whereas loser portfolio is formed from stocks whose return takes place in bottom 30 %. MOM is the difference between winner portfolio return and loser portfolio return. By application of same procedure each quarter, a times series of MOM variable is obtained.

According to Elton et al (1996) using differential returns as in the case of Carhart methodology creates two advantages. First of all by this way indexes that are almost completely uncorrelated with each other are created. Furthermore effect of these indexes on risk-adjusted performance is easy to understand since they represent "zero investment portfolios". SMB, HML and MOM, which are generated within the framework of Carhart model, are "zero investment portfolios". Here SMB is a zero-

investment portfolio which is long on small-cap stocks and short on big-cap stocks. Similarly HML is a zero cost portfolio that is long on high book to market stocks and short on low book to market stocks. Lastly MOM is a zero-cost portfolio which is long in winners and short in losers.

Four-factor alpha can be perceived as an estimate of net returns earned by fund manager after risk adjustment is made which is done by controlling various characteristics. In the content of this study, four factor alphas are estimated in attempt to measure return earned by fund manager. Once MOM is constituted, it is time to calculate four-factor alpha. Since Carhart model is appropriate for only equity funds, model is applied to only 9 equity funds. Results are summarized in table 4.14.

Table 4.14: Results of Four Factor Model

Fund Name	C	(RM-RF)	SMB	HML	MOM
AK3	1.94E-15*	9.80E-16	-1.74E-16	-3.18E-15	1.000000*
ASA	0.006923	-0.631806	-0.251149	-0.470681	-0.053706
DAH	-0.004438	-0.890505	-0.475778	0.695813	-0.009132
FAF	0.004701	-1.179008	-0.011937	0.045063	0.381183
GAF	-0.021261	-1.057508	- 0.412041	0.752586	0.047329
TAH	-0.087334*	-0.688842	0.335663	-1.154285*	0.154024
TI2	0.016990	-0.973181	-0.127228	0.561682	-0.030070
TYH	0.024709	-1.081664	-0.176717	0.319925	-0.037979
YHS	0.035398	-0.967529	-0.153721	0.391119	-0.061459

*Significant at % 5 significance level

**Significant at % 10 significance level

As it is the case in Fama-French model, most of the regressions are not statistically significant due to short data set that cannot be extended. For TAH regression is significant and variable HML is also statistically significant. As the data set is extended, higher number of variables is expected to get significant.

4.8. CHARACTERISTIC BASED MODEL

4.8.1. Characteristic Selectivity (CS Measure)

CS measure is calculated based on methodology of Daniel et al (1997) for 9 equity funds. Unlike original article which has formed 125 passive portfolios, 18

passive portfolios are constructed. In order to form these portfolios, universe of all common stocks listed on BIST are grouped based on firm's size, book-to-market ratio and prior quarter return. Firms are grouped into two as small and big based on size, three as firms with high book to market ratio, firms with low book to market ratio and firms with middle book to market ratio based on book to market ratio. Lastly firms are grouped into three as winners, losers and middle ones based on previous year return. As it is mentioned before, quarterly data is used rather than monthly data, since monthly data is not available. From other side, CS measure is calculated for only six quarters since information regarding stocks invested by mutual funds is available starting from sixth month of 2012. 18 passive portfolios that are constructed are as follows:

SHW: Small winning stocks with high book to market ratios

SHL: Small losing stocks with high book to market ratios

SHN: Small stocks with high book to market ratios, which neither lose nor win

BHW: Big winning stocks with high book to market ratios

BHL: Big losing stocks with high book to market ratios

BHN: Big stocks with high book to market ratios, which neither lose nor win

BMW: Big winning stocks with middle book to market ratios

BML: Big losing stocks with middle book to market ratios

BMN: Big stocks with middle book to market ratios, which neither lose nor win

SMW: Small winning stocks with middle book to market ratios

SMN: Small stocks with middle book to market ratios which neither lose nor win

SML: Small losing stocks with middle book to market ratios

SLW: Small winner stocks with low book to market ratios

SLL: Small losing stocks with low book to market ratios

SLN: Small stocks with low book to market ratios, which neither lose nor win

BLW: Big winner stocks with low book to market ratios

BLL: Big losing stocks with low book to market ratios

BLN: Big stocks with low book to market ratios, which neither lose nor win

CS measure for one quarter is calculated as follows: (Let's say for 2012Q3)

Stocks that are invested by fund in 2012Q3 are noted. Then amounts that are invested by fund to each stock in 2012Q2 are noted and weight of each stock in total

stock portfolio of fund is calculated. Now it is time to find passive portfolio with which each stock is matched in 2012Q2. As matching passive portfolios are found, their return in 2012Q3 is noted. In the next step the difference between return of each stock in 2012Q3 and passive portfolio return (2012Q3) with which stock is matched in previous quarter is found. Then mentioned difference is multiplied by weight of each stock. By summing weight*difference for all stocks included in fund's portfolio, CS measure for 2012Q3 is obtained. Same procedure is repeated for all of the quarters for which fund portfolio content is available.

Results of characteristic selectivity measure are summarized in table 4.15.

Table 4.15: Results of CS

CS	2012Q3	2012Q4	2013Q1	2013Q2	2013Q3	2013Q4
AK3	0.044181868	0.031709226	0.066764925	-0.030342022	-0.109897562	0.092784328
ASA	0.126931906	-0.025064232	0.003227422	0.002770741	-0.058151416	0.057034748
DAH	0.221188544	0.125087821	0.076357782	-0.072784727	-0.120686608	0.001569259
FAF	0.182316865	0.04091459	0.028327128	-0.042600169	-0.136939883	0.092775374
GAF	0.082972104	0.083605993	0.082562859	0.049609705	-0.1476822	0.113599157
TAH	0.169796816	0.033567674	0.044034062	0.024385343	-0.062104092	0.080206558
TI2	0.217312433	0.051055463	-0.053508197	-0.018636728	-0.11661158	0.092553725
TYH	0.238510338	0.040548017	0.041417787	-0.020312862	-0.119326851	0.118911212
YHS	0.209019002	0.065688748	0.004948532	-0.032381339	-0.109619543	0.083286585

According to table 4.15, CS measure is negative in at least one quarter for all funds. As Daniel et al (1997) have specified time-series average of all periods give CS measure for the fund about issue. In the table 4.16, average CS measure for all funds is given.

Table 4.16: Average CS Measures and their T-Statistics

	AK3	ASA	DAH	FAF	GAF	TAH	TI2	TYH	YHS
CS-avg	0.015867	0.017792	0.052516	0.027466	0.044111	0.048314	0.028694	0.049958	0.036824
t-stat	0.523953	0.664694	0.000522	0.612295	0.004872	0.017344	-0.0197	-0.00786	-0.00786

*Significant at % 5 significance level

**Significant at % 10 significance level

As it is obvious in table 4.16, CS measure is positive for all equity funds included in our sample. Nonetheless it is statistically insignificant based on t-statistics.

4.8.2. Characteristic Timing (CT)

CT measure is calculated by following methodology of Daniel et al (1997) for 2013Q1, 2013Q2 and 2013Q4. With this measure fund manager's success at timing different investment styles is attempted to be measured. Unfortunately CT measure could be measured for only three quarters since portfolio holding information is available starting from 2012Q2. 18 passive portfolios are also used as benchmark in calculation of CT measure.

CT measure is calculated for a specific quarter as: (Let's say for 2013Q2)

$$CT_t = \sum_{j=1}^{n} (w_{j,q-1} \; R_q^{b_{j,q-1}} - w_{j,q-3} \; R_t^{b_{j,q-3}})$$

Here $w_{j,q-1}$ represents weight of each stock in 2013Q1 invested by fund in 2013Q2, $R_q^{b_{j,q-1}}$ symbolizes the 2013Q2 return of characteristic based benchmark portfolio with which stock is matched in 2013Q1. $w_{j,q-3}$ is the weight of stock j in fund portfolio in three quarters ago (2012Q3), $R_t^{b_{j,q-3}}$ is the 2013Q2 return of passive portfolio with which stock j is matched three quarters ago. Unlike original article which has used returns that take place 13 month ago, returns that is seen in three quarters ago is used in this study. This way is preferred since portfolio content data of Turkish funds are available from second quarter of 2012Q2.

In table 4.17, results of CT measure are reported as:

Table 4.17: Results of CT Measure

CT	2013Q2	2013Q3	2013Q4
AK3	-0.001885607	-0.005731076	-0.003788743
ASA	-0.005058185	-0.007115717	-0.008040204
DAH	0.001489553	-0.00854942	0.001569259
FAF	-0.007860405	-0.002683979	-0.003971558
GAF	-0.006266912	-0.005023717	-0.003336074
TAH	-0.003458711	0.039011244	0.010538598
TI2	-0.010775171	-0.007833852	-0.013315919

TYH	-0.005874132	-0.009737668	-0.005884989
YHS	-0.01221668	-0.009798054	-0.008799349

Based on table 4.17, CT measure is generally negative for all mutual funds. In other words, mutual fund managers are not successful at timing. In the next step, time series average of CT measures for all funds and their t-stats are calculated. Results are given in table 4.18.

Table 4.18: Average CT Measures and Their T-Statistics

	AK3	ASA	DAH	FAF	GAF	TAH	TI2	TYH	YHS
CT-avg	-0.0038	-0.00674	-0.00183	-0.00484	-0.00488	0.015364	-0.01064	-0.00717	-0.01027
t-stat	-2.79627*	-6.24255*	-0.44479	-2.53915	-4.68727*	1.003944	-5.48559	-4.54938*	-8.26677*

*Significant at % 5 significance level

**Significant at % 10 significance level

According to table 4.18, time series average of CT measure is negative for all funds except for TAH. Nonetheless CT measure of TAH is statistically insignificant at 5% significance level. Negative CT measures of AK3, ASA, GAF, TYH and YHS are statistically significant. This validates the phrase that "Mutual fund managers do not generate additional performance by timing different investment styles."

4.8.3. Average Style Return Measure

By following Daniel et al (1997) methodology, AS measure is calculated. Unlike the original article that has lagged weights and benchmark portfolios by 13 months, weights and benchmark portfolios are lagged by three quarter. For instance in calculation of AS measure for 2013Q2, weights and benchmark portfolios of 2012Q3 are used. This way is followed since information regarding mutual fund portfolio content is available unfortunately starting from 2012q2. By lagging weights

and benchmark portfolios, returns due to timing characteristics are aimed to be eliminated.

Calculation process of AS measure is basically as follows: (Let's say it's calculated for 2013Q2)

Each stock held by fund in 2012Q3 is matched with its characteristic based benchmark portfolio of 2012Q3. 2013Q2 return of this benchmark portfolio is multiplied by 2012Q3 portfolio weight and once resulting product is summed for all stocks hold by fund at 2012Q3, AS measure of 2013Q2 is obtained.

Table 4.19: Results of AS Measure

	2013Q2	2013Q3	2013Q4
AK3	0.005800236	-0.001128458	0.014746083
ASA	0.001464	-0.0031981	0.011862
DAH	0.005521812	0.000349467	0.009443975
FAF	0.004383403	0.001176064	0.007851511
GAF	0.002777341	-0.000646192	0.007341405
TAH	0.000453265	0.00072105	0.00022383
TI2	0.00735425	0.003200151	0.020482312
TYH	0.005511581	0.003180201	0.017891133
YHS	0.010291037	0.002504877	0.0186353

As it is clear in table 4.19, AS measure is positive for all funds in most periods. By taking time series average of AS_{it} for a specific fund, AS measure for that fund is obtained. If a fund systematically holds stocks with certain characteristics in order to boost their portfolio return without trying to time the effect, returns coming from this holding will be assigned to fund's AS measure. In table 4.20, average AS measures of funds and their t-stats are reported.

Table 4.20: Average AS Measures and Their T-Statistics

	AK3	**ASA**	**DAH**	**FAF**	**GAF**	**TAH**	**TI2**	**TYH**	**YHS**
AS avg	0.006473	0.0033759	0.005105	0.00447	0.003158	0.000466	0.010345571	0.008861	0.010477
t-stat	1.15016	0.6192314	1.582724	1.893622	1.114305	2.648496*	1.621856997	1.584887	1.83676

*Significant at % 5 significance level

**Significant at % 10 significance level

According to table 4.20 although AS measure is positive for all equity funds included in the sample, it is statistically significant for only TAH. For TAH, it can be stated that fund manager get some return as a result of the particular style he follows.

CONCLUSION

While performance of mutual funds is widely investigated in developed markets, it is an undiscovered subject in emerging markets. The reason for this might be the late development of mutual fund industry in emerging economics. Late development process has also lead researchers to delay their researches regarding mutual fund performance. Moreover it cannot be possible to implement all methods used in developed markets to emerging markets due to limited data availability. For instance although implementation of multifactor models is easy for the US since benchmarks are provided on the website provided by Kenneth French, it is not easy to apply these models in emerging markets since implementation requires formation of benchmarks peculiar to market that is about issue.

In this study we aim to measure the performance of mutual funds by applying various fund performance measures in Turkey that is one of the most important emerging markets. We use quarterly data of 72 funds for the period 2003Q1-2013Q4. Our raw data consists of closing price of BIST-100 index, T-bill rate, closing prices of stocks that are traded on BIST. These are provided from Central Bank of Turkey, Republic of Turkey Prime Ministry Undersecretariat of Treasury and FİNNET respectively. Our results indicate that based on the results of different traditional methods, best and worst performing funds mostly include same funds, only ranking among funds changes. Based on results of quadratic regression, only one fund shows statistically significant positive security selection ability, whereas based on dummy variable regression no fund show statistically significant security selection ability. Our results on quadratic regression indicate a positive and statistically significant market timing ability for four (eight) funds at 5 % (10 %) significance level. Multifactor models are implemented on just equity funds. Since there are nine equity mutual funds that survive between 2003Q1-2013Q4, multifactor models are implemented on just nine equity funds. Unfortunately only one of nine regressions that are formulated based on Fama-French three factor model is statistically significant. According to that model statistically significant negative performance is observed for ASA. (Alternative Bank A-type equity fund) On the other hand, Carhart four factor model regressions for AK3 (Akbank A type equity fund) and TAH (Tekstil Bank A-type equity fund) are found statistically significant. According to

those regressions AK3 has shown positive performance, whereas TAH has shown negative performance. For TAH, HML is also statistically significant which indicates that HML has explanatory power on mutual fund return.

The last part of the empirical analysis consists of characteristic based models. Nonetheless since information of portfolio content is available from June 2012, characteristic measures could be calculated for a few quarters. In calculation of characteristic based measures, unlike Daniel et al (1997) who have formed 125 passive portfolios, only 18 passive portfolios are formed in this study. This way is preferred since number of stocks traded in Turkish stock market is not large enough. Time series average of CS measure is positive for all equity funds that are included in the data set. However they are not statistically significant. Time series average of CT measure, which shows fund managers success in timing, is negative for all funds except for TAH. But CT measure is statistically significant only for ASA, GAF and YHS. Average AS measure is positive for all equity funds, but it is statistically significant only for TAH. This case shows that manager of TAH gets some return as a result of the particular style he follows. In conclusion mutual fund managers are not successful as they are expected. This study is essential since it is one of the rare studies which examine mutual fund industry and performance from perspective of Turkey. Furthermore, it distinguishes itself from other similar studies by the data set it used and data period which is longer than others. Like Ural (2010) traditional measures and timing and selectivity performance measures are calculated. But additionally multifactor models and characteristic based models are implemented. Number of funds, for which statistically significant positive security selection and market timing abilities is observed, is fewer compared to results of Ural (2010). Results of this study are more similar with results of Kılıç (2002) according to which small number of funds have security selection and market timing abilities. Additionally it is one of the rare studies which use multifactor models in performance evaluation. Another distinguishing feature is that it is the first one which attempts to implement characteristic based performance measures to Turkish mutual fund industry.

This study aims to guide investors who invest in mutual fund industry by detecting funds with best performance based on various measures. Moreover it could

also enable mutual fund managers who could compare performance of fund he manages with performance of other funds.

According to efficient market hypothesis it is impossible for informed traders to outperform market since security prices reflect all available information. If this is the case mutual fund investors are playing a loser's game. They are paying mutual fund managers in order to trade on information that is already reflected in prices. Nonetheless information is costly to obtain in the real world. According to Grossman and Stiglitz (1980), perfect efficiency does not hold since arbitrage is costly and informed investors should be rewarded for processing information. According to Ippolito (1989), who tests efficiency of markets from the outlook of Grossman, informed traders "beat the market" before expenses but make no excess returns after netting out the expense of gathering information. Consistently Grinblatt and Titman (1989b) state that abnormal performance could be observed only by examining gross returns. According to results of this study in which net returns are used mutual funds cannot be able to beat the market. This result is consistent with expectation. Nonetheless same procedure cannot be applied to gross returns that are not available. Because of that reason an evaluation about informational efficiency of Turkish mutual fund market cannot be made.

For further study, multifactor models can be applied by using a data set that includes longer time period. Moreover conditional multifactor models can be applied. Results can be given in comparison with unconditional models. Furthermore same methods could be applied data of foreign mutual funds and results could be compared. During this study net returns are used in performance measurement. If gross returns could be reached, it will be interesting to implement same analysis to gross returns and give results comparatively. By this way it will be possible to make an evaluation about informational efficiency of Turkish mutual fund market. Finally in the following studies characteristic measures could be recalculated by using a longer data set as portfolio holdings data is continued to be announced.

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APPENDIX: NAME OF MUTUAL FUNDS

	Fund Name	Name of Fund at 01.01.2003	Name of Fund at 08.10.2013
1	AAK	Ata Yat. Men. Kıy. A Tipi Karma Fon	Ata Yat. Men. Kıy. A Tipi Karma Fon
2	ACD	Acar Yat. Men. Değ. A Tipi Değişken Fon	Acar Yat. Men. Değ. A Tipi Değişken Fon
3	ADD	Anadolubank A Tipi Değişken Fon	Anadolubank A Tipi Değişken Fon
4	ADP	Akbank A Tipi Değişken Fon	Akbank A Tipi Değişken Fon
5	AGF	Alternatifbank Anadolu Grubu A Tipi Özel Fon	Alternatifbank Anadolu Grubu A Tipi Özel Fon
6	AK3	Akbank A Tipi Hisse Senedi Fonu	Akbank A Tipi Hisse Senedi Fonu
7	AKU	Akbank A Tipi İmkb Ulusal 30 Endeksi Fonu	Akbank A Tipi İmkb Ulusal 30 Endeksi Fonu
8	AN1	Alternatifbank A Tipi Değişken Fon	Alternatifbank A Tipi Değişken Fon
9	ASA	Alternatifbank A Tipi Hisse Senedi Fonu	Alternatifbank A Tipi Hisse Senedi Fonu
10	AYA	Ata Yat. Men. Kıy. A Tipi İmkb Ulusal 30 Endeksi Fonu	Ata Yatırım Menkul Kıymetler A Tipi Değişken Fonu (Hisse Senedi Yoğun Fon)
11	DAH	Denizbank A Tipi Hisse Senedi Fonu	Denizbank A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
12	DZA	Denizbank A Tipi Değişken Fon	Denizbank A Tipi Değişken Fon
13	DZE	Denizbank A Tipi İmkb Ulusal 100 Endeksi Fonu	Denizbank A Tipi İmkb Ulusal 100 Endeksi Fonu (Hisse Senedi Yoğun Fon)
14	DZK	Denizbank A Tipi Karma Fon	Denizbank A Tipi Afili Bankacılık Karma Fon
15	EC2	Eczacıbaşı Men. Değ. A Tipi Değişken Fon	Eczacıbaşı Men. Değ. A Tipi Değişken Fon
16	ECA	Eczacıbaşı Men. Değ. A Tipi Karma Fon	Eczacıbaşı Men. Değ. A Tipi Değişken Analiz Fonu
17	FAF	Finansbank A Tipi Hisse Senedi Fonu	Finansbank A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
18	FI2	Finansbank A Tipi Değişken Fon	Finansbank A Tipi Değişken Fon (Hisse Senedi Yoğun Fon)
19	FYD	Finans Yat. Men. Değ. A Tipi Değişken Fon	Finans Yat. Men. Değ. A Tipi Değişken Fon (Hisse Senedi Yoğun Fon)
20	GAE	T. Garanti Bankası A Tipi İmkb Ulusal 30 Endeksi Fonu	T. Garanti Bankası A Tipi İmkb Ulusal 30 Endeksi Fonu (Hisse Senedi Yoğun Fon)

21	GAF	Gedik Yat. Men. Kıy. A Tipi Hisse Senedi Fonu	Gedik Yat. Men. Kıy. A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
22	GAK	Gedik Yat. Men. Kıy. A Tipi Karma Fon	Gedik Yat. Men. Kıy. A Tipi Karma Fon
23	GBK	Global Men. Değ. A Tipi Karma Fonu	Global Men. Değ. A Tipi Karma Fonu
24	GL1	Global Men. Değ. A Tipi Değişken Fon	Global Men. Değ. A Tipi Değişken Fon
25	GMA	Bayındır Men. Değ. A Tipi Karma Fon	Global Men. Değ. A Tipi Karma Aktif Strateji Fonu
26	GSA	Bayındır Men. Değ. A Tipi Değişken Fon	Global Menkul Değerler A Tipi Şemsiye Fonu'na Bağlı Hedef Alpha Değişken Alt Fonu (Hisse Senedi Yoğun Fon) (1.Alt Fon)
27	GHS	T. Garanti Bankası A Tipi İmalat Sektörü Fonu	T. Garanti Bankası A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
28	GSP	Global Men. Değ. A Tipi İmkb Ulusal 100 Endeksi Fonu	Global Menkul Değerler A Tipi Şemsiye Fonu'na Bağlı Formula Kar Payı Hisse Senedi Alt Fonu (Hisse Senedi Yoğun Fon)
29	GYH	Garanti Yat. Men. Kıy. A Tipi Portföy Yönetimi Hizm. Değişken Fonu	Garanti Yat. Men. Kıy. A Tipi Portföy Yönetimi Hizm. Değişken Fonu
30	HAF	Pamukbank A Tipi Değişken Fon	T. Halk Bankası A Tipi Değişken Yatırım Fonu
31	HBU	Hsbc Yat. Men. Değ. A Tipi İmkb Ulusal 30 Endeks Fon	Hsbc Yat. Men. Değ. A Tipi İmkb Ulusal 30 Endeks Fon
32	HLK	T. Halk Bankası A Tipi Karma Fon	T. Halk Bankası A Tipi Karma Fon
33	HSA	Hsbc Bank A Tipi Değişken Fon	Hsbc Bank A Tipi Değişken Fon
34	IGD	Ordu Yardımlaşma Kurumu A Tipi Değişken Fon	Ing Bank A Tipi Değişken Fonu
35	IGH	Oyak Bank A Tipi Değişken Fonu	Ing Bank A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
36	IGU	Oyak Yat. Men. Değ. A Tipi İmkb Ulusal 30 Endeksi Fonu	Ing Bank A Tipi İmkb Ulusal 30 Endeksi Fonu
37	IYD	İş Yat. Men. Değ. A Tipi Değişken Fon	İş Yat. Men. Değ. A Tipi Değişken Fon (Hisse Senedi Yoğun Fon)
38	KA2	T. Kalkınma Bankası A Tipi Değişken Fon	T. Kalkınma Bankası A Tipi Değişken Fon
39	MAD	Meksa Men. Değ. A Tipi Değişken Fon	Meksa Men. Değ. A Tipi Değişken Fon
40	NEK	Evgin Yat. Men. Değ. A Tipi Karma Fon	Neta Yatırım Menkul Değerler A Tipi Karma Fon
41	SKH	Şekerbank A Tipi Değişken Fon	Şeker Bank A Tipi Hisse Senedi Fonu
42	SMA	Sanko Men. Değ. A Tipi	Sanko Men. Değ. A Tipi Değişken Fon

		Değişken Fon	
43	ST1	Strateji Men. Değ. A Tipi Değişken Fon	Strateji Men. Değ. A Tipi Değişken Fon (Hisse Senedi Yoğun Fon)
44	TAD	Taib Yat. A Tipi Değişken Fon	Taib Yat. A Tipi Değişken Fon
45	TAH	Tekstilbank A Tipi Hisse Senedi Fonu	Tekstilbank A Tipi Hisse Senedi Fonu
46	TAO	Abn Amro Bank Alarko A Tipi Özel Fon	T. Ekonomi Bankası Alarko A Tipi Özel Fonu
47	TAU	T. İş Bankası A Tipi İmkb Ulusal Mali Endeks Fonu	T. İş Bankası A Tipi İmkb Ulusal Mali Endeks Fonu (Hisse Senedi Yoğun Fon)
48	TCD	Tacirler Men. Değ. A Tipi Değişken Fon	Tacirler Men. Değ. A Tipi Değişken Fon
49	TE3	T. Ekonomi Bankası A Tipi Karma Fon	T. Ekonomi Bankası A Tipi Karma Fon
50	TI2	T. İş Bankası A Tipi Hisse Senedi Fonu	T. İş Bankası A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
51	TI3	T. İş Bankası A Tipi İştirak Fonu	T. İş Bankası A Tipi İştirak Fonu (Hisse Senedi Yoğun Fon)
52	TI7	T. İş Bankası A Tipi Değişken Fon	T. İş Bankası A Tipi Değişken Fon
53	TIE	T. İş Bankası A Tipi İmkb Ulusal 30 Endeks Fonu	T. İş Bankası A Tipi İmkb Ulusal 30 Endeks Fonu (Hisse Senedi Yoğun Fon)
54	TKF	Tacirler Men. Değ. A Tipi Karma Fon	Tacirler Men. Değ. A Tipi Karma Fon
55	TKK	T. İş Bankası A Tipi Karma Kumbara Fonu	T. İş Bankası A Tipi Karma Kumbara Fonu
56	TMD	Tekstil Men. Değ. A Tipi Değişken Fon	Tekstil Men. Değ. A Tipi Değişken Fon
57	TZK	T.C. Ziraat Bankası A Tipi Karma Fonu	T.C. Ziraat Bankası A Tipi Şemsiye Fonu'na Bağlı Karma Fonu (3.Alt Fon)
58	TTE	T. İş Bankası A Tipi İmkb Ulusal Teknoloji Endeksi Fonu	T. İş Bankası A Tipi İmkb Ulusal Teknoloji Endeksi Fonu (Hisse Senedi Yoğun Fon)
59	TUD	Turkish Yatırım A Tipi Değişken Fon	Turkish Yatırım A Tipi Değişken Fon
60	TZD	Ziraat Yat. Men. Değ. A Tipi Değişken Fon	Ziraat Yat. Men. Değ. A Tipi Değişken Fon
61	TYH	Teb Yat. A Tipi Hisse Senedi Fonu	Teb Yat. A Tipi Hisse Senedi Fonu (Hisse Senedi Yoğun Fon)
62	VAF	T. Vakıflar Bankası A Tipi Değişken Fon	T. Vakıflar Bankası A Tipi Değişken Fon
63	VEF	T. Vakıflar Bankası A Tipi Gıda-İçecek Sektörü Fon	T. Vakıflar Bankası A Tipi İmkb Ulusal 30 Endeksi Fonu (Hisse Senedi Yoğun Fon)
64	YAD	Yat. Finansman A Tipi Değişken Fon	Yat. Finansman A Tipi Değişken Fon
65	YAF	Yapı Kredi Yat. Men. Değ. A Tipi Değişken Fon	Yapı Kredi Yat. Men. Değ. A Tipi Şemsiye Fonuna Bağlı Değişken Alt Fonu Birinci Alt Fon

66	YAK	Yapı Kredi Bankası A Tipi Karma Fon	Yapı Kredi Bankası A Tipi Şemsiye Fonu'Na Bağlı Karma Alt Fonu (3.Alt Fon)
67	YAR	Yat. Finansman A Tipi Resan Özel Fonu	Yat. Finansman A Tipi Resan Özel Fonu
68	YAS	Koç Yat. Men. Değ. A Tipi Koç Şirketleri İştirak Fonu	Yapı Kredi Yat. Men. Değ. A Tipi Şemsiye Fonu'Na Bağlı Koç Şirketleri İştirak Alt Fonu Üçüncü Alt Fon
69	YAU	Koçbank A Tipi İmkb Ulusal 30 Endeksi Fonu	Yapı Kredi Bankası A Tipi İmkb Ulusal 100 Endeksi Fonu (Hisse Senedi Yoğun Fon)
70	YEF	Yapı Kredi Yat. Men. Değ. A Tipi İmkb Ulusal 30 Endeksi Fonu	Yapı Kredi Yat. Men. Değ. A Tipi Şemsiye Fonu'Na Bağlı İmkb Ulusal 30 Endeksi Alt Fonu Dördüncü Alt Fon
71	YHS	Koçbank A Tipi Hisse Senedi Fonu	Yapı Kredi Bankası A Tipi Şemsiye Fonu'Na Bağlı Hisse Senedi Alt Fonu (Hisse Senedi Yoğun Fon) (2.Alt Fon)
72	YOB	Koçbank A Tipi Karma Fon	Yapı Kredi Bankası A Tipi Özel Bankacılık İmkb Ulusal 30 Endeksi Fonu (Hisse Senedi Yoğun Fon)