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Performance Evaluation of Fixed - Income and Money Market Funds in Turkey

MSC Banking & Finance

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Abstract

This project examined the performance of a number of open-ended Turkish mutual fund managers, over the period 2004:02 to 2012:12. Two categories of mutual funds are considered: twenty-two money market mutual funds and twenty-one fixed-income mutual funds. Initially, the performance of these funds is evaluated using the widely-used measures of performance, such as the Sharpe measure and the Treynor measure. As a benchmark portfolio a relevant index for the types of mutual funds considered. According to relative-return ratios of performance, almost all mutual-fund managers did not manage to beat their benchmarks. Subsequently, conditional and unconditional model specifications are used in order to derive alpha estimates and gamma estimates, i.e. evidence for the presence of selectivity and market-timing abilities on the part of mutual fund managers. Based on the aforementioned specification no Turkish mutual fund manager exhibited superior selectivity and market-timing skills.

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1 INTRODUCTION

The financial performance of mutual funds has captured the attention of finance academics and practitioners for decades. Many studies in the relevant literature have evaluated mutual-fund performance examining whether these funds outperform or underperform relative to a broad market index or a benchmark portfolio.

Carrying on this line of research, the dissertation's aim is to analyze, using monthly data, the performance of a sample of Turkish, closed-end, fixed-income and money market mutual funds over the period of 2004-2012. The objectives of the dissertation are to provide answers to the following questions

- Do Turkish fixed-income and money-market mutual funds managed to beat their benchmark portfolio over the period under examination?
- Do Turkish mutual-fund managers exhibit market timing and stock selection abilities?
- What is the impact of conditioning information on the aforementioned abilities of fund managers?

Two important criteria will be used for assessing mutual performance in relation to a benchmark portfolio: the Sharpe and the Treynor measure of performance.

Selectivity refers to the managers' ability in foreseeing the price movements of individual stocks, and hence to purchase or sell mispriced securities. **Market timing** indicates the managers' success in predicting bull and the bear markets, and adjusting the composition of the portfolio accordingly, i.e. increasing the portfolio's beta when a bull market is expected and reducing when a bear market is expected.

The presence of selectivity and market-timing abilities on the part of Turkish mutual fund managers will be examined both in an unconditional and in a conditional framework. On the one hand, in an **unconditional framework,** a **single-index** model is used where the fund's excess returns are regressed against the excess returns of the benchmark, usually a local fixed income market proxy index; no structural breaks in the beta coefficient of each fund are assumed throughout the period under consideration. On the other hand, in a **conditional framework**, a

single-index model is again used and the fund's excess returns are regressed against the excess returns of the benchmark and some "**conditional" variables**.

The Turkish mutual-fund market consists of two types of mutual funds. **Type A** mutual funds are required to invest at least 25 percent of their assets in equities issued by Turkish companies, while *Type B* mutual funds face no such restriction (Imisiker and Özlale, 2008). Type A mutual funds are fall into three categories: stock index, mixed, and variable funds. Stock index funds face restrictions when it comes to the risky assets they hold in their portfolios, whereas the variable funds have much more flexibility in changing the asset weights in their portfolios.

Type B mutual funds can freely invest on government bonds and treasury bills in an attempt to take advantage of the high real interest rates (Ozatay and Sak 2002), which prevail in fiscal imprudent states. In other words, to better assess the selectivity and market timing abilities of Turkish mutual fund managers, Type A mutual funds must be used.

The paper is structured as follows. Section 3 presents the various measures of performance that can be used to evaluate the work of mutual fund managers. Section 4 reports the empirical results of the study, and Section 5 presents the conclusions.

2 LITERATURE REVIEW

Imisiker and Özlale (2008) examined the selectivity and market timing skills of 49 Turkish managers of Type-A mutual funds amid an important financial crisis, which rattled the Turkish economy in February 2001. As it was pointed out previously Type-A mutual funds, i.e. funds that are required by Law to invest at least 25 percent of their assets in Turkish equities, better reflect selectivity and market-timing skills of managers, since these skills are required to outperform their counterparts, i.e. Type-B mutual funds, which face no investment restriction.

The authors employed weekly data spanning the period 2000:01-2003:10. The authors found weak support for selection abilities on the part of the managers and some evidence about superior market timing quality. Specifically, they found that just one mutual fund exhibited statistically significant selectivity skills, while twenty-two funds out of the forty-nine mutual funds had superior market timing skills.

Further, the authors examined the determinants of *selectivity* and *market timing* skills. So, they related alpha estimates to a number of explanatory variables, such as the fund's management fee ratio, institutional experience, the size of each mutual fund (proxied by the average portfolio value), and several dummy variables to reflect whether the mutual fund was a stock index fund or a variable fund. They found that management fees are negatively correlated with selection ability and market-timing ability. This means that the higher the management fee the lower the selection or the market-timing of the manager this suggesting that mutual fund managers receive fees inconsistent with their performance on those two areas. The size of the fund was found to exert no statistically significant effect on management abilities. Also, the managers of stock index funds were found to have worse selectivity performance than their counterparts. Another important result in this model is the role of experience, which was found to have a positive effect on both ability parameters. The fund's **institutional experience**, measured by the days between the fund's initial public offering and the first day of the sample period. This measure of experience does not necessarily reflect managers' personal expertise. Experience emerges as an important factor, especially for market timing ability.

A number of studies have been conducted for the performance of mutual funds in other developing markets.

Grose (2013) for example, using data spanning the period 2006-2010, assessed the performance of mutual funds in Poland, Hungary and the Czech Republic. The author found that Polish fixed-income funds exhibited significant underperformance before fees, since their average alpha estimate was 0.71%; the mutual funds from Hungary had average alpha estimates of -0.14%, and the fixed income funds from Czech Republic an average alpha of -0.21%. When management fees, on entrance or exit from open-ended fixed-income funds, were taken into consideration the results of negative outperformance become even more pronounced. When it comes to market timing no evidence of such ability was found. The only statistically significant market timing ability was reported in the case of Hungary, where the average estimate was 0.47, while there was no market timing ability on the part of fund managers in Poland and the Czech Republic.

n average high adjusted *R*-square of 0.85 suggests that the unconditional model fairly represents ex post fund performance tests. Inability of funds to replicate underlying indices was particularly evident during the 2008 crisis when single factor unreported results produced negative underperformance exceeding the 1 per cent threshold, which could be attributed to unit redemptions and the need for cash by fund managers leading them to untimely cash outs.

3 METHOD OF ANALYSIS

3.1 RELATIVE RETURN MEASURES OF PERFORMANCE

Relative measures of performance are computed by dividing the portfolio's excess return by a relevant measure of risk

3.1.1 Treynor Measure

One relevant measure of risk is the portfolio's **beta coefficient** (Treynor, 1965; Treynor and Mazuy, 1966), in which case the measure of performance is known as the **Treynor index (TI).** So this index is computed as the ratio of the fund's excess return (risk premium) to its beta coefficient.

$$\text{TI} = \frac{E(R_i) - R_f}{\beta_i} \qquad 3.1$$

Where $E(R_i)$ and β_i the expected return and beta coefficient, respectively, of portfolio (or mutual fund) i. If this proposed measure is higher (or lower) than the market's excess return the fund had better (or worse) performance than that of the benchmark portfolio. Having a TI greater than the market risk premium also means that such a portfolio will lie above the security market line.

3.1.2 Sharpe Measure of Perfomance

Since the beta coefficient is used as the relevant measure of risk, this approach assumes that investors must hold a well-diversified portfolio and hence only systematic risk must be of great concerned to them.

Another measure of risk is the portfolio's **risk,** or standard deviation, (Sharpe, 1964), in which case the measure of performance is known as the **Sharpe index (SI).**

$$\text{SI} = \frac{E(R_i) - R_f}{\sigma_i} \qquad 3.2$$

Where $\sigma_i$the portfolio's total risk.

3.2 UNCONDITIONAL AND CONDITIONAL MODEL SPECIFICATION

3.2.1 Unconditional Model Specification

The model that has traditionally been used to assess the manager's **selection ability,** i.e. his ability to consistently buy (sell) and subsequently sell (buy) undervalued (overvalued) secuciries for a given risk class, was proposed by Jensen (1968) and it has as follows

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i \left(R_{M,t} - R_{f,t} \right) + U_{i,t} \qquad 3.3$$

For the ith mutual fund, observed over the period t spanning different estimation periods

Where

$R_{i,t}$: The actual return of mutual fund i in period t

α_i : The "**alpha" estimate** of mutual fund i

β_i: The **beta estimate of** mutual fund i

$R_{M,t}$: The return on the benchmark portfolio at time period t.

$R_{f,t}$: The risk-free rate of return in period t

$U_{i,t}$: A disturbance term for the return of mutual fund i in period t; this variable has an expected value of zero.

In the above model the variable $R_{i,t} - R_{f,t}$ stands for the **excess return** of mutual fund i in period t. Likewise, $R_{M,t} - R_{f,t}$ stands for the **market's excess return** in period t.

Taking expectations of both sides of Eq. (3.3) yields the **capital asset pricing model** (CAPM), as an equilibrium asset pricing model. More analytically, the model has as follows (Jensen, 1968)

$$E(R_i) = R_F + \beta_i \left[E(R_M) - R_F \right] \qquad 3.4$$

Where $E(R_i)$ and $E(R_M)$ are the expected return on portfolio i and the market portfolio, respectively, and β_i the asset's beta coefficient. Although the market portfolio is usually taken to be a wide stockmarket index, Roll (1977) suggested that the market portfolio should contain all risky investments, including stocks, bonds, real estate and commodities. For the purpose of this

project the market portfolio will be a benchmark portfolio.

So if average (historical) return for fund i, denoted by ($\bar{R}_i$), is higher than its expected return, based on the CAPM, then the manager has achieved a superior relative to what it is expected from him. In econometric model (3.4), the parameter α_i indicates whether the manager of the fund is capable of deriving above-average returns adjusted for risk. More specifically, mutual fund managers with superior selection skills will have a statistically significant positive "alpha" estimate, while managers with inferior selection skills will have a negative alpha estimation. Finally, the performance of manager with no selection skills will have an alpha of zero, in case he follows the naive buy-and-hold policy. Put differently, if mutual fund i is correctly priced we will have $\alpha_i = 0$ (this is the null hypothesis of no abnormal returns), while if it is mispriced we will have $\alpha \neq 0$ (this is the alternative hypothesis of abnormal returns).

Treynor and Mazuy (1966) proposed the following econometric specification in order to test for the managers' **market-timing abilities**

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i \left(R_{M,t} - R_{f,t} \right) + \gamma_i \left(R_{M,t} - R_{f,t} \right)^2 + U_{i,t} \qquad 3.5$$

The idea here is that when the market is expected to grow, fund managers must invest more heavily on a market portfolio comprised of risky assets, while when it is expected to fall the managers must hold a smaller proportion or risky assets. In econometric specification (3.2) the value of the parameter γ_i measures the manager's market-timing ability. Specifically, if γ_i is positive then the above parabola opens upward and the manager shows positive market-timing skills, otherwise it opens downward, and the managers presents negative market-timing skills.

Note if in the above model specification a statistically significant positive alpha results then one could conclude that market timing ability of fund managers is probably the driving force behind any selection abilities, indicated by the positive alpha estimate. Also, when the coefficient of the gamma parameter is positive but the coefficient of the alpha parameter is negative there there is a negative relationship between market timing and security selection abilities. Such as relationship was documented for example in the case of Hungarian and Czech mutual funds examined over the period 2006-2010 (Grose, 2013)

Another approach to test for market-timing skills has been suggested by Henriksson and Merton (1981), who proposed fitting the following econometric model in order to estimate any market timing effects.

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i \left(R_{M,t} - R_{f,t} \right) + \gamma_i \left(R_{M,t} - R_{f,t} \right) D_{i,t} + U_{i,t} \qquad 3.6$$

Where $D_{i,t}$ is an intercept dummy taking the value 1 if the market return exceeds the risk-free rate of return in a given month.

3.2.2 Conditional Model Specification

Ferson and Schadt (1996) demonstrated that mutual fund managers trade extensively on information coming from *public information* variables. This finding affects the calculation of average betas, since it implies their constant variation given this information (Chen and Knez 1996). In order to estimate the effect of public information variables on the funds' alphas normally lagged additional variables are contained in a vector $\mathbf{V}_{t-1}$. When multiplying each variable contained in the vector with the excess market return, an estimated coefficient for each information variable used. A vector of lagged public information variables is incorporated in the previous basic framework model to test the predictive ability of these included variables and the ensuing impact on security selection, as measured by the vector coefficient zeta($\boldsymbol{\zeta}_i$) containing the estimated coefficients.

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i \left(R_{M,t} - R_{f,t} \right) + \boldsymbol{\zeta}_i \mathbf{V}_{t-1} \left(R_{M,t} - R_{f,t} \right) + U_{i,t} \qquad 3.7$$

Previous research has suggested the use of conditional variables, considered suitable for equity mutual funds, to be used likewise as explanatory variables for fixed-income securities (Elton et al. 1995). As analysed in the second section, we use as conditional information variables, the term structure of interest rates, the short-term treasury yield return and the general stock index return to replicate general economic conditions in each market, as they have been previously used (Bauer et al. 2006). A study by Dritsakis et al. (2006) has shown that above conditional model specification does not yield significantly different estimates of alpha coefficients relative to the unconditional model specification.

For the purposes of the project the the Borsa Istanbul 100 Index (XU100) will be used as one conditional variable. This index is a capitalization-weighted index composed of National Market companies except investment trusts. The constituents of the BIST National 100 Index are selected on the basis of pre-determined criteria directed for the companies to be included in the indices. The base date is January 1986 and base value is 1 for the TL based price. An equity index is normally used to reflect the general economic conditions in the economy (Grose, 2013).

The other conditional variable is the Weighted Average Interest Rates for Turkish Lira Deposits. The variable indicated as 'Money market rate' shows the impact of lagged short-term interest rates in excess returns. Finally, the third conditional variable that will be used is a proxy for the **Term structure** indicating the effect of the term structure of interest rates. This variable is computed ast the difference between yield on the 10-year government bond and the yield on one-month money market rate.

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i \left(R_{M,t} - R_{f,t} \right) + \gamma_i \left(R_{M,t} - R_{f,t} \right)^2 + \zeta_i \mathbf{V}_{t-1} \left(R_{M,t} - R_{f,t} \right) + U_{i,t} \qquad 3.8$$

4 DATA

Monthly data from February 2004 to December 2012 have been used on 21 fixed-income mutual funds and 22 money-market mutual funds. We also evaluated various fixed-income and money market mutual funds which however they did not have complete return dates over the period 2004:02-2012:12. All our fund data has been obtained from Bloomberg database. The unit price for a fund is used to obtain the rate of return for this fund and represents the value of portfolios of each fund, net of all fees and expenses. The ISE-100 index's performance is used to proxy the market portfolio's return. The risk-free rate is measured by the rate of return on a ninety-one-day Turkish Treasury bill performance index. The excess return of each asset is calculated by subtracting the risk-free rate from the individual asset's return. All rates of returns are calculated by the following formula:

$$R_{it} = \frac{P_{it}}{P_{it-1}} - 1 \qquad \textbf{4.1}$$

where:

R_{it} **:** The return of mutual fund *i* during month *t* ; this return is net of expenses and taxes

P_{it} **:** The ending price for fund *i* during month *t*

5 EMPIRICAL RESULTS

5.1 DESCRIPTIVE STATISTICS AND MEASURES OF PERFORMANCE

5.1.1 Descriptive Statistics

Appendix A presents the results concerning the individual characteristics, i.e. the average rate of return and risk (on a monthly basis) of the money-market and fixed-income mutual funds under consideration.

Tables A-1 and A-2 show the **average** monthly **historical return** (measured by the arithmetic mean) and **risk** (i.e. standard deviation of monthly returns) of each of the money-market and fixed-income mutual funds under consideration. The aforementioned tables also report the **coefficient of variation** (i.e. ratio of standard deviation to average risk) , since in some cases the plain standard deviation can be misleading, especially when investments differ in terms of their expected return. So, the coefficient of variation can be used to compare alternative investments with widely different rates of return and standard deviations of returns

Table A-1 shows that all money-market mutual funds had a negative mean return. The maximum average monthly return was -0.22% (the fund "GLM") compared with 0.89% for the market return, while the minimum average monthly return was -056% (of fund "MEKB"). Likewise, the fund with the maximum risk was "MEKB" with an average monthly standard deviation of 0.18%, while fund with the minimum risk was "ECZB" with an average monthly standard deviation of 0.12%.

Using the relative measure of risk, which shows variability per unit of expected return, needs caution since all average returns are negatives, in which the coefficient of variation with the largest absolute value is "preferred". This is the mutual fund "GLM", which also happens to the highest level of historical return.

Table A-2 shows also that most fixed-income mutual funds had a negative historical monthly return. The maximum average monthly return was 0.12% (the fund "IBBI") compared with 0.89% for the market return, while the minimum average monthly return was -0.88% (of fund "KBOZ"). Likewise, the mutual fund with the maximum risk was "KBOZ" with an average

monthly standard deviation of 9.84%, while fund with the minimum risk was "IBBE" with an average monthly standard deviation of 0.13%. Using the relative measure of risk, which shows variability per unit of expected return, needs caution since all average returns are negatives, in which the coefficient of variation with the largest absolute value is "preferred". This is the mutual fund "ATYBT", which however had a very low average historical return.

Table A-5 also presents some data on various fixed-income mutual funds that had data available on various dates over the period 2004:02-2012:12. As it can be seen from the table, the maximum average monthly return was 1.12% (the fund "FIN") compared with 0.89% for the market return, while the minimum average monthly return was 0.46% (of fund "ETI"). Likewise, the mutual fund with the maximum risk was "IBE" with an average monthly standard deviation of 3.04%, while fund with the minimum risk was "ISY" with an average monthly standard deviation of 0.60%. Using the coefficient of variation, which shows variability per unit of expected return, coefficient with the lowest value, that is, the fund with the lowest variability per unit of expected return was achieved by the mutual fund "AKB", with a coefficient of variation of 0.58.

5.1.2 Mutual Fund Performance based on the Treynor and the Sharpe Measures of Performance

Appendix A presents the results concerning the evaluation of money-market and fixed-income mutual funds based on the Sharpe measure and the Treynor measure of performance. As it was pointed out in Section 3, the Treynor measure of performance is the relevant measure for evaluating a well-diversified portfolio, or mutual fund, where the relevant measure of risk is the portfolio systematic risk, or beta coefficient.

The results for **Money-Market Mutual Funds** are presented in **Table A-3**. Over the entire estimation period, i.e. over the period 2004:02-2012:12, only three money-market mutual funds (GLMBLIK, IBNKMMF, and MEKBLIK), out of the 22 mutual funds under consideration, i.e. a meagre 13.6%, outperformed their benchmark, according to the Treynor measure of

performance, which ranks portfolios according to their *excess return per unit of systematic risk*. In the case of money-market mutual funds the benchmark portfolio is the *DSM Performance Repo Index.* As, it can be seen from Table A-3 all funds had a negative TI value, a fact that indicates a very poor performance of each mutual fund compared with the risk-free rate of interest.

Likewise, according to the Sharpe measure of performance (which shows the fund's excess return per unit of total risk) over the entire estimation period no money-market mutual fund managed to beat the benchmark portfolio.

Then we consider **Fixed-Income Mutual Funds** (see Table A-4). Over the entire estimation period, i.e. over the period 2004:02-2012:12, just **2** fixed-income mutual funds, out of the 21 mutual funds under consideration, that is, a mere **9.52%** outperformed the benchmark portfolio, according to the Treynor measure of performance. According to the Sharpe measure of performance over the entire estimation period no fixed-income mutual fund managed to beat the benchmark portfolio. Presumably this is down to the bad market performance of the Istanbul stock exchange.

Also, **Table A-6** presents the Treynor and the Sharpe measure of performance for various *Fixed-Income Mutual Funds,* which however they do not have complete return dates over the period 2004:02-2012:12. Using the Treynor measure of performance **8** fixed-income mutual funds, out of the 16 mutual funds under consideration, that is, **53 %** outperformed the benchmark portfolio. Likewise, according to the Sharpe measure of performance over the entire estimation period 12 fixed-income mutual fund, i.e. an 80%, managed to beat the benchmark portfolio

5.2 UNCONDITIONAL MEASURES OF PERFORMANCE

This section and the next presents the results from estimate unconditional and the conditional model specifications outlined in Section 3-2. All regression results reported have been tested and corrected for serial autocorrelation. The test statistic used for the detection of serial correlation is Durbin-Watson d statistic, which takes on values ranging from 0 to 4. The value of zero indicates the case of **perfect positive serial correlation**. Of course in real time-series data perfect positive serial correlation is highly unlikely to come across, but in general the closer d

stistic is to 0, the greater the evidence of positive serial correlation. In the case of **perfect negative serial correlation** the value of the d statistic will be $d \approx 4$. Again in real time-series data it is uncommon to have perfect negative serial correlation, but the closer d is to 4, the greater the evidence of negative serial correlation.

5.2.1 Selectivity Ability and Alpha Estimates

Appendix B presents the **alpha estimates** for each mutual fund**,** derived from the estimation of econometric model (3.3), over the whole estimation period.

The initial regression models for **Money Market Mutual Funds** all had problems with positive serial correlation. Given that we have around 107 returns for each money-market mutual, and there is only one explanatory variable (i.e. the excess market return) the lower and the upper critical values for the d statistic are $d_L = 1.65$ and $d_U = 1.69$, respectively. So, the null hypothesis of no serial autocorrelation (positive or negative) is accepted if $d_U < d < 4 - d_U$, that is, $\mathbf{1.69} < d < \mathbf{2.31}$. Further, the null hypothesis of no evidence of positive serial correlation is rejected at 5% confidence level if $d < d_L = 1.65$. The indecisive zones are when $2.31 < d < 2.35$. Initially, an $AR(1)$ correction was applied to each time-series regression indicated by model (3.3), but the autocorrelation problem remained, so an $AR(2)$ scheme was applied to residuals to deal with the autocorrelation problem.

The alpha estimates are presented in **Table B-1**. Over the entire estimation period, i.e. over the period 2004:02-2012:12, no money-market mutual fund had a statistically significant positive *alpha estimate*. On the contrary, 16 money market mutual funds had a statistically significant negative alpha estimate and 6 funds had no statistically significant alpha estimate over the aforementioned period. Further, as a whole, Turkish money-market mutual funds exhibited significant underperformance, since the average alpha estimate for the twenty-two mutual funds under consideration (taking into consideration on the statistical significant estimates) was -**1.09%**. This is a result to that found by Grose (2013), who in examining the performance of fixed-income mutual funds in Poland, Hungary and the Czech Republic, found that over the 2006-2010, Polish fixed-income funds has an average alpha estimation 0.71%.

The alpha estimates for fixed-income mutual funds are presented in **Table B-2**. All regressions had problem of first-order serial correlation, so an a AR (1) correction was applied to the econometric specification (3-3). Over the entire estimation period, i.e. over the period 2004:02-2012:12, no fixed-market mutual fund had a statistically significant positive *alpha estimate*. On the contrary, 18 fixed-income mutual funds had a statistically significant negative alpha estimate and 3 funds had no statistically significant alpha estimate over the aforementioned period. Further, as a whole, Turkish fixed-income mutual funds exhibited significant underperformance, since the average alpha estimate for the twenty-one fixed-income mutual funds under consideration (taking into consideration on the statistical significant estimates) was **-0.97%**.

5.2.2 Testing for Market Timing Skills

Appendix B also presents the estimates for **market-timing,** derived from the estimation of econometric model (3.5), over the whole estimation period.

Table B-1 shows the results concerning the market-timing skills in the case of **Money Market mutual funds**. As, in the case of alpha estimates the initial regression models faced problems with positive serial correlation, and $AR(2)$ correction scheme was applied to them. The results indicate all fund managers of money market funds did exhibit negative market-timing skills, over the entire period estimation period. A crucial point to note is the very high value for the negative estimate of the gamma coefficient, which was -336; this can be contrasted with the very low positive gamma coefficient of 0.47 found by Grose (2013) in his study of Hungarian fixed-income mutual funds.

The alpha estimates derived from this model are more or less the same with the estimates derived from estimating model (3-3). Again, no money-market mutual fund was found to have a statistically significant positive *alpha estimate*. On the contrary, 14 (compared with 16 funds in the previous model) money-market mutual funds had a statistically significant negative alpha estimate and 6 (compared with 8) funds had no statistically significant alpha estimate over the aforementioned period. Overall, the Turkish the average alpha estimate for the twenty-two mutual funds under consideration (taking into consideration on the statistical significant estimates) was **-1.24%** (compared with -1.09% in the model (3-3).

Table B-2 shows the results concerning the market-timing skills in the case of **Fixed-Income mutual funds**. As, in the case of alpha estimates the initial regression models faced problems with positive serial correlation, and $AR(1)$ correction scheme was applied to them. The results indicate all fund managers of fixed-income market funds did exhibit negative market-timing skills, over the entire period estimation period. A crucial point to note is the very high value for the negative estimate of the gamma coefficient.

The alpha estimates derived from this model are more or less the same with the estimates derived from estimating model (3-3). Again, no money-market mutual fund was found to have a statistically significant positive *alpha estimate*. On the contrary, 19 fixed-income mutual funds had a statistically significant negative alpha estimate and 2 funds had no statistically significant alpha estimate over the aforementioned period. Overall, the Turkish the average alpha estimate for the twenty-one fixed-income mutual funds under consideration (taking into consideration on the statistical significant estimates) was **-1.03%** (compared with -0.97% in the model (3-3).

5.3 CONDITIONAL MEASURES OF PERFORMANCE

5.3.1 Selectivity Ability and Alpha Estimates

The implementation of the conditional models specification for the alpha estimates, as outlined in Eq. 3-7 and 3-8, do not alter significantly the results of the conditional model

All regression estimates have been corrected for second-order positive serial correlation, since for all money-market mutual funds the d (Durbin-Watson) statistic was lower than 1.65, and as a result the null hypothesis of no evidence for positive serial correlation has to be rejected at the 5% confidence level.

The alpha estimates for money-market mutual funds in the case of the conditional model are presented in **Table C-1**. Again, over the entire estimation period, i.e. over the period 2004:02-2012:12, no money-market mutual fund had a statistically significant positive *alpha estimate*. On the contrary, 19 (compared with 16 funds in the case of the unconditional model) money market mutual funds had a statistically significant negative alpha estimate and 3 mutual funds (compared with 6 funds in the unconditional model) had no statistically significant alpha

estimate over the aforementioned period. Also, the average alpha estimate (based on their statistical significance) can be estimated to be **-1.13%**

When it comes to the conditional variables, none of these variables are statistical significant. For only one money market mutual fund, i.e. for mutual fund HAL, the coefficient is positive. This indicates a positive correlation between the fund's excessive return and the return on the general stock index. The down to the fact that equity market returns appear to influence negatively bond market returns, since bond funds investments are seen as an alternative investment to equity investments, with bond fund managers exhibiting inability to outperform when equity markets thrive. A statistically significant explanatory variable for fixed-income fund returns is also the treasury bill rate variable for the case of Poland alone. The negative relationship that appears to hold from our results becomes positive in the case of the Czech Republic and Hungary but significance levels are low.

5.3.2 Market Timing Ability and Gamma Estimates

Table C-2 shows the results of the conditional model for the estimation of market-timing effects. Again, over the entire estimation period, i.e. over the period 2004:02-2012:12, no money-market mutual fund had a statistically significant positive *alpha estimate*. On the contrary, 15 (compared with 16 funds in the case of the unconditional model) money market mutual funds had a statistically significant negative alpha estimate and 7 mutual funds (compared with 6 funds in the unconditional model) had no statistically significant alpha estimate over the aforementioned period. Also, the average alpha estimate (based on their statistical significance) can be estimated to be **-1.28%**

When it comes to the estimation of gammas, the results indicate all fund managers of money market funds did exhibit negative market-timing skills, over the entire period estimation period. A crucial point to note is the very high value for the negative estimate of the gamma coefficient, which was -348.

6 CONCLUSIONS

6.1 CONCLUSIONS

This project focused on the evaluation of two basic principles—selectivity and market timing abilities—which are used to evaluate the performances of Turkish mutual fund managers. Selectivity refers to the managers' performance in foreseeing the price movements of individual stocks, while market timing indicates their success in foreseeing the price movements

In this project, using various methods, I evaluated the performance of a number of Turkish managers of fixed-income and money-market mutual funds over the period 2004:02 to 2012:12. To this end, I employed relative return ratios, such as the Sharpe (1964) measure and the Treynor (1966) measure, which compare the portfolio's excess return to a measure of risk. The Sharpe ratio is similar to the Treynor index, the only difference being that the former uses the standard deviation and the latter the beta coefficient as a relevant measure of risk. Further the computation of these measures of performance does not require the use of a specific benchmark portfolio. So, according to these ratios, no mutual-fund managers managed to beat the market.

Also, I made use of unconditional econometric specification to test for the presence of Jensen's (1968) "alphas". In this specification the fund's excess return (over the return on a risk-free investment) is linearly related to the market's excess return in line with the Capital Asset Pricing Model. The empirical evidence revealed that the no fixed-income and money-market mutual fund managers deliver positive "alphas" over the entire estimation period. These alpha coefficients, in a sense, measure the difference between the fund's actual return and its expected return according to the Capital Asset Pricing Model. On the contrary, 72% of money-market mutual funds and 85% of fixed-income mutual funds exhibited negative "alphas", that is, the managers of these funds presented no *selectivity abilities*.

The same conclusion holds when it comes to market-timing abilities, since the empirical evidence showed again that the no fixed-income and money-market mutual fund managers had positive "gammas", i.e. market-timing abilities, over the entire estimation period. These gamma coefficients are obtained by adding a quadratic term in the model specification for testing for

selection abilities. Oddly enough, all money-market mutual funds and fixed-income mutual funds exhibited negative "gammas."

One possible limitation of the project has to do with the fact that a single-index model was used to account for the data generating process of the funds' excess returns; a multi-index model therefore could be tried instead. Another possible limitation is related to the implicit assumption that the fund's beta coefficient remains constant during the period under examination; one could take into consideration the possibility of structural breaks in the beta of the funds.

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APPENDIX A

Table A-1: Individual Characteristics for Money-Market Mutual Funds

Ticker Name	Symbol	Average Mean Return	Risk	Coefficient of Variation
ABKBLIK	ABK	-0.0031	0.0013	-0.4321
GLMBLIK	GLM	-0.0022	0.0016	-0.7090
TURBLIK	TURB	-0.0041	0.0018	-0.4361
ATYBLIK	ATYB	-0.0035	0.0014	-0.3858
VAKBLIK	VAKBL	-0.0041	0.0015	-0.3738
SERBLIK	SERBL	-0.0038	0.0014	-0.3709
YATFBLK	YAT	-0.0034	0.0013	-0.3881
HALBLIK	HAL	-0.0030	0.0015	-0.4826
GBBELIK	GBBE	-0.0043	0.0016	-0.3735
SANMBLK	SANM	-0.0025	0.0012	-0.4869
DEBKBLI	DEBK	-0.0029	0.0012	-0.4306
FIYBLIK	FIYB	-0.0037	0.0016	-0.4403
TCZBBLI	TCZBB	-0.0037	0.0013	-0.3645
TEKSBLK	TEK	-0.0042	0.0013	-0.3027
IBNKMMF	IBN	-0.0044	0.0015	-0.3459
ZIRBTLM	ZIRB	-0.0029	0.0012	-0.4043
AKBLIKT	AKBL	-0.0038	0.0015	-0.4102
ANABLIK	ANA	-0.0031	0.0016	-0.5124
FINBLIK	FINBL	-0.0030	0.0014	-0.4625
TSKBBLK	TSKB	-0.0034	0.0012	-0.3491
MEKBLIK	MEKB	-0.0056	0.0018	-0.3217
ECZBLIK	ECZB	-0.0037	0.0012	-0.3183
BENCHMARK	market	0.0089	0.0035	0.3959

Notes: These values have been estimated for the period 2004:02-2012:12

Table A-2: Individual Characteristics for Fixed-Income Mutual Funds

Ticker Name	Symbol	Average Mean Return	Risk	Coefficient of Variation
ABKBTAH	ABK	-0.0014	0.0080	-5.9011

EKIBDEG	EKI	-0.0020	0.0061	-2.9881
GLMBDEG_TI	GLMB	-0.0055	0.0380	-6.8967
HALBTAV	HALB	-0.0006	0.0069	-11.6333
KBKBTAV	KBKBT	-0.0002	0.0085	-42.0583
ATYBTAH	ATYBT	0.0001	0.0126	148.6609
FINBDEG	FIN	-0.0008	0.0034	-4.2764
GABBTAH	GAB	-0.0011	0.0073	-6.9431
IBBELIQ	IBBE	-0.0018	0.0013	-0.7558
KBOZPYD	KBOZ	-0.0088	0.0984	-11.1880
IBMETFD	IBME	-0.0040	0.0488	-12.2027
YATFBTV	YATF	-0.0004	0.0069	-18.2226
IBDOMBD	IBDOM	-0.0006	0.0060	-10.7197
AKBTAHV	AKB	0.0004	0.0086	19.5108
GMBTAHV	GMB	-0.0005	0.0109	-23.7528
VAKBTAV	VAKB	-0.0013	0.0083	-6.1770
IBBILLB	IBBI	0.0012	0.0091	7.4636
TEBBTAV	TEB	-0.0001	0.0105	-201.7720
ZIRBNBM	ZIRBN	-0.0007	0.0078	-11.6724
FINBTAH	FINB	0.0001	0.0078	68.7326
DEBKBBB	DEBK	-0.0007	0.0156	-23.0208
BENCHMARK	market	0.0089	0.0035	0.3959

Notes: These values have been estimated for the period 2004:02-2012:12

Table A-3: Treynor and Sharpe Measures for Money-Market Mutual Funds

Mutual Fund Name	Symbol	Treynor Measure	Sharpe Measure
ABKBLIK	ABK	-0.1633	-10.76
GLMBLIK	GLM	0.2511	-8.53
TURBLIK	TURB	-0.9183	-8.51
ATYBLIK	ATYB	-0.2106	-10.85
VAKBLIK	VAKBL	-3.9643	-10.10
SERBLIK	SERBL	-0.9893	-10.76
YATFBLK	YAT	-0.2522	-11.03
HALBLIK	HAL	-0.0843	-9.74
GBBELIK	GBBE	-0.2382	-9.72
SANMBLK	SANM	-0.2026	-11.29
DEBKBLI	DEBK	-0.1141	-11.41

FIYBLIK	FIYB	-0.0662	-9.17
TCZBBLI	TCZBB	-0.1700	-11.13
TEKSBLK	TEK	-0.1421	-12.16
IBNKMMF	IBN	2.9542	-10.23
ZIRBTLM	ZIRB	-0.1538	-11.97
AKBLIKT	AKBL	-0.1480	-9.71
ANABLIK	ANA	-0.0822	-8.99
FINBLIK	FINBL	-0.0654	-10.31
TSKBBLK	TSKB	-0.1478	-12.23
MEKBLIK	MEKB	0.0870	-9.30
ECZBLIK	ECZB	-0.1900	-12.72
BENCHMARK	market	-0.0023	-0.66

Notes: I These values have been estimated for the period 2004:02-2012:12

Table A-4: Treynor and Sharpe Measures for Fixed-Income Mutual Funds

Ticker Name	Symbol	Treynor Measure	Sharpe Measure
ABKBTAH	ABK	-0.0064	-0.1848
EKIBDEG	EKI	-0.0705	-0.3547
GLMBDEG_TI	GLMB	0.0600	-0.1482
HALBTAV	HALB	-0.0036	-0.1038
KBKBTAV	KBKBT	-0.0143	-0.0382
ATYBTAH	ATYBT	0.0001	-0.0030
FINBDEG	FIN	-0.0118	-0.2704
GABBTAH	GAB	-0.0372	-0.1607
IBBELIQ	IBBE	-0.0273	-1.4148
KBOZPYD	KBOZ	0.0053	-0.0906
IBMETFD	IBME	0.0035	-0.0845
YATFBTV	YATF	-0.0058	-0.0726
IBDOMBD	IBDOM	-0.0057	-0.1138
AKBTAHV	AKB	0.0106	0.0370
GMBTAHV	GMB	0.0051	-0.0533
VAKBTAV	VAKB	-0.0102	-0.1767
IBBILLB	IBBI	-0.0242	0.1205
TEBBTAV	TEB	0.0006	-0.0166
ZIRBNBM	ZIRBN	-0.0129	-0.1014
FINBTAH	FINB	0.0001	-0.0013

DEBKBBB	DEBK	0.0016	-0.0513
BENCHMARK	market	0.0088	2.4914

Notes: These values have been estimated for the period 2004:02-2012:12

Table A-1: Individual Characteristics for Fixed-Income Mutual Funds (Various Dates)

Ticker Name	Symbol	Average Mean Return	Risk	Coefficient of Variation
SEKRBTB	SEK	0.0064	0.0080	1.2660
TEBBTIB	TEBBT	0.0099	0.0133	1.3388
TURBBTB	TUR	0.0076	0.0094	1.2307
ECZBTVL	ECZ	0.0085	0.0112	1.3160
TEBBDIK	TEB	0.0090	0.0068	0.7495
VAKBTBE	VAK	0.0053	0.0272	5.1495
IBEBNDD	IBE	0.0069	0.0304	4.3903
TEBBTTB	TEBB	0.0098	0.0169	1.7189
ETIMBDG	ETI	0.0046	0.0094	2.0468
TEBAGSO	TEBA	0.0105	0.0140	1.3242
GBGARBO	GBG	0.0107	0.0110	1.0265
FINUZUN	FIN	0.0112	0.0089	0.7935
TURBDEG	TURB	0.0054	0.0063	1.1596
ISYBTBB	ISY	0.0081	0.0060	0.7410
AKBPRTB	AKB	0.0105	0.0061	0.5838
BENCHMARK	market	0.0089	0.0035	0.3971

Notes: These values have been estimated for the period 2004:02-2012:12

Table A-1: Treynor and Sharpe Measures for Fixed-Income Mutual Funds (Various Dates)

Ticker Name	Symbol	Treynor Index	Sharpe Index
SEKRBTB	SEK	-0.0049	-0.4825
TEBBTIB	TEBBT	-0.0004	-0.0248
TURBBTB	TUR	-0.0021	-0.2804
ECZBTVL	ECZ	-0.0024	-0.1517
TEBBDIK	TEB	-0.0015	-0.1792

VAKBTBE	VAK	0.0071	-0.1825
IBEBNDD	IBE	0.0032	-0.1088
TEBBTTB	TEBB	-0.0007	-0.0243
ETIMBDG	ETI	-0.0058	-0.5979
TEBAGSO	TEBA	0.0003	0.0220
GBGARBO	GBG	0.0006	0.0463
FINUZUN	FIN	0.0014	0.1107
TURBDEG	TURB	-0.0056	-0.7752
ISYBTBB	ISY	-0.0024	-0.3607
AKBPRTB	AKB	0.0003	0.0464
BENCHMARK	market	-0.0014	-0.3885

APPENDIX B

Table B-1: Unconditional Estimate for Selectivity and Market-Timing Abilities of Money-Market Mutual Fund Managers

Ticker Name	Symbol	Selectivity Model	Market-Timing Model	
		Alpha estimates	Alpha Estimates	Gamma Estimates
ABKBLIK	ABK	-0.0093	-0.0100	-384.1268*
GLMBLIK	GLM	-0.0093*	-0.0109*	-381.1273*
TURBLIK	TURB	-0.0107*	-0.0117*	-304.7522*
ATYBLIK	ATYB	-0.0103	-0.0113	-286.3585*
VAKBLIK	VAKBL	-0.0093	-0.0096	-314.7383*
SERBLIK	SERBL	-0.0111*	-0.0120*	-253.1023*
YATFBLK	YAT	-0.0102*	-0.0110	-366.4732*
HALBLIK	HAL	-0.0113*	-0.0129*	-337.8731*
GBBELIK	GBBE	-0.0108	-0.0114	-306.6820*
SANMBLK	SANM	-0.0102*	-0.0120*	-404.0271*
DEBKBLI	DEBK	-0.0106*	-0.0121*	-394.7937*
FIYBLIK	FIYB	-0.0119*	-0.0130*	-248.1397*
TCZBBLI	TCZBB	-0.0111*	-0.0126*	-417.3832*
TEKSBLK	TEK	-0.0117*	-0.0128*	-302.2366*

IBNKMMF	IBN	-0.0103	-0.0106	-359.0201*
ZIRBTLM	ZIRB	-0.0106*	-0.0120*	-356.9081*
AKBLIKT	AKBL	-0.0109*	-0.0120*	-383.5723*
ANABLIK	ANA	-0.0120*	-0.0139*	-371.6386*
FINBLIK	FINBL	-0.0117*	-0.0130*	-246.8699*
TSKBBLK	TSKB	-0.0101*	-0.0107	-271.6882*
MEKBLIK	MEKB	-0.0067	-0.0057	-301.6427*
ECZBLIK	ECZB	-0.0111*	-0.0127*	-398.8431*

Notes: Statistically significant estimate at the 5% confidence level. **Alpha estimates** are based on econometric specification (3-3) with AR(2) correction for positive serial correlation.

Table B-2: Unconditional Estimate for Selectivity and Market-Timing Abilities of Fixed-Income Mutual Fund Managers

Ticker Name	Symbol	Selectivity Model	Market-Timing Model	
		Alpha estimates	Alpha Estimates	Gamma Estimates
ABKBTAH	ABK	-0.0109*	-0.0113*	-321.6983
EKIBDEG	EKI	-0.0106*	-0.0109*	-216.1014
GLMBDEG_TI	GLMB	-0.0142	-0.0183*	-3383.8350
HALBTAV	HALB	-0.0094*	-0.0085*	691.3874
KBKBTAV	KBKBT	-0.0087*	-0.0091*	-295.3390
ATYBTAH	ATYBT	-0.0083*	-0.0091*	-668.8279
FINBDEG	FIN	-0.0098*	-0.0102*	-270.4579
GABBTAH	GAB	-0.0104*	-0.0106*	-200.2622
IBBELIQ	IBBE	-0.0108*	-0.0113*	-202.8165
KBOZPYD	KBOZ	0.0083	-0.0079	-13589.1200
IBMETFD	IBME	-0.0161	-0.0175	-1208.0180
YATFBTV	YATF	-0.0097*	-0.0099*	-139.1868
IBDOMBD	IBDOM	-0.0097*	-0.0102*	-359.8276
AKBTAHV	AKB	-0.0090*	-0.0094*	-292.0629
GMBTAHV	GMB	-0.0099*	-0.0104*	-353.7136
VAKBTAV	VAKB	-0.0094*	-0.0098*	-260.8791
IBBILLB	IBBI	-0.0079*	-0.0087*	-575.3909
TEBBTAV	TEB	-0.0085*	-0.0074*	851.6498

ZIRBNBM	ZIRBN	-0.0097*	-0.0106*	-612.8999
FINBTAH	FINB	-0.0096*	-0.0102*	-440.6885
DEBKBBB	DEBK	-0.0131*	-0.0126*	370.1661

Notes: Statistically significant estimate at the 5% confidence level. **Alpha estimates** are based on econometric specification (3-3) with AR(2) correction for positive serial correlation.

APPENDIX C

Table C-1: Conditional Estimate for Selectivity Abilities of Money-Market Mutual Fund Managers

Ticker Name	Symbol	Selectivity Model	Conditional Variable		
		Alpha estimates	Equity Returns	Time-Deposit Rate	Term Structure
ABKBLIK	ABK	-0.0101*	11.9838	-0.3152	-2.8392
GLMBLIK	GLM	-0.0103*	13.4144	-0.7658	-6.4408
TURBLIK	TURB	-0.0120*	2.7824	-0.5775	-6.7356
ATYBLIK	ATYB	-0.0100	12.0043	-0.5059	0.8870
VAKBLIK	VAKBL	-0.0104	8.9240	-0.4074	-3.5984
SERBLIK	SERBL	-0.0112*	3.8856	-0.4291	-0.8784
YATFBLK	YAT	-0.0106*	11.0408	-0.4269	-2.1501
HALBLIK	HAL	-0.0117*	21.1413*	-0.3789	-3.6327
GBBELIK	GBBE	-0.0117*	11.4360	-0.2645	-3.3957
SANMBLK	SANM	-0.0104*	15.1779	-0.8481	-2.2198
DEBKBLI	DEBK	-0.0110*	11.4889	-0.4487	-2.2859
FIYBLIK	FIYB	-0.0121*	2.9026	-0.4479	-0.6798
TCZBBLI	TCZBB	-0.0123*	7.0265	-0.7154	-6.2037
TEKSBLK	TEK	-0.0118*	8.1103	-0.3510	-0.6809
IBNKMMF	IBN	-0.0108*	10.7123	-0.3148	-2.1587
ZIRBTLM	ZIRB	-0.0112*	13.0007	-0.5969	-3.3826
AKBLIKT	AKBL	-0.0113*	15.4449	-0.3742	-2.5141
ANABLIK	ANA	-0.0120*	15.9595	-0.9392	-1.5600
FINBLIK	FINBL	-0.0117*	5.0342	-0.2372	-0.0712
TSKBBLK	TSKB	-0.0103*	4.4826	-0.2516	-0.5719
MEKBLIK	MEKB	-0.0080	11.9762	0.0977	-4.2752
ECZBLIK	ECZB	-0.0117*	11.0002	-0.3567	-3.0458

Notes: Statistically significant estimate at the 5% confidence level. **Alpha estimates** are derived from the estimation of econometric specification (3-7) with AR(2) correction for positive serial correlation.

Table C-2: Conditional Estimate for Market Timing Abilities of Money-Market Mutual Fund Managers

		Alpha estimates	Gamma Estimates
ABKBLIK	ABK	-0.0109	-402.9378*
GLMBLIK	GLM	-0.0120*	-388.6221*
TURBLIK	TURB	-0.0134*	-310.4479*
ATYBLIK	ATYB	-0.0108	-294.3376*
VAKBLIK	VAKBL	-0.0111	-324.6727*
SERBLIK	SERBL	-0.0122*	-253.4982*
YATFBLK	YAT	-0.0116*	-381.2112*
HALBLIK	HAL	-0.0133*	-363.2296*
GBBELIK	GBBE	-0.0125	-323.3199*
SANMBLK	SANM	-0.0122*	-413.8968*
DEBKBLI	DEBK	-0.0125*	-408.2189*
FIYBLIK	FIYB	-0.0131*	-246.9129*
TCZBBLI	TCZBB	-0.0138*	-419.8657*
TEKSBLK	TEK	-0.0129*	-314.9187*
IBNKMMF	IBN	-0.0112	-387.6775*
ZIRBTLM	ZIRB	-0.0126*	-364.0850*
AKBLIKT	AKBL	-0.0125*	-408.0350*
ANABLIK	ANA	-0.0138*	-375.2990*
FINBLIK	FINBL	-0.0128*	-255.9082*
TSKBBLK	TSKB	-0.0109	-281.2418*
MEKBLIK	MEKB	-0.0074	-342.5579*
ECZBLIK	ECZB	-0.0133*	-416.5679*

Notes: Statistically significant estimate at the 5% confidence level. **Alpha estimates** are based on econometric specification (3-3) with AR(2) correction for positive serial correlation.