**Araştırma Makalesi / Research Article**

# Impact of Financial Benchmarks Upon the Portfolio Distribution of Mutual Funds: The Evidence from Turkish Capital Market

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**Abstract**

*The purpose of the study is to examine how financial benchmark returns impact the portfolio distribution of mutual funds. The scope of paper is limited to Turkish mutual funds market. Method employed in the paper; Granger Causality Test based on the VAR model is used. Findings of the quantitative analysis: As the return on government debt securities (index) inclines, the demand on Government Domestic Debt Securities goes up, and then, weight of government debt securities increases in consolidated portfolio of mutual funds. The paper concludes that for bonds, benchmark returns are effective on portfolio distribution of mutual funds.*

***Keywords:*** *Funds, Portfolio Distribution, Benchmark*

***JEL Codes:*** *G10, G20, G23*

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## Finansal Karşılaştırma Ölçütlerinin Yatırım Fonlarının Portföy Dağılımı Üzerine Etkisi: Türkiye Sermaye Piyasası Örneği

**Öz**

*Bu çalışmanın amacı, finansal karşılaştırma ölçütü getirilerinin yatırım fonlarının portföy dağılımını nasıl etkilediği analiz edilmektedir. Türkiye'de faal olan yatırım fonları analiz edilmiştir. Çalışmada yöntem olarak, VAR modeline dayalı Granger Nedensellik Testi uygulanmıştır. Kantitatif analizin bulguları şöyledir; Devlet İç Borçlanma Senetleri getirisi (endeks) yükseldikçe DİBS'e olan talep artmakta ve daha sonra DİBS'lerin konsolide yatırım fonları portföyündeki ağırlığı artmaktadır. Makale bulgularına dayalı olarak şu sonuca ulaşılmaktadır; bonolar söz konusu olduğunda, benchmark getirileri toplam portföy dağılımında etkindir.*

***Anahtar Kelimeler:*** *Fonlar, Portföy Dağılımı, Benchmark*

***JEL Sınıflandırması:*** *G10, G20, G23*

### 1. Introduction

Mutual funds are of great significance in global financial world and also in Turkey. They enable investors with limited financial power (and relatively limited financial knowledge) to take part in capital market activities. Mutual funds together with (private) pension funds are said to be leading factor for improving capital markets. In particular, pension funds, as institutional investor, increase capital market activity by purchasing capital market products.

The importance of this study is that collective investment institutions are becoming popular and increasingly important all over the world and Turkey. In overall finance industry, with the contribution of collective investment institutions; capital markets are getting more share vis-à-vis the banking industry that has had the largest share. Under Turkish Capital Market legislation, collective investment institutions are part of capital market institutions. Mutual funds are important part of collective investment institutions, apart from mutual funds, pension funds are considered as other funds group. For the last 10 years, pension funds have become prevalent in regard to asset under management ('AuM') thanks to State Contribution mechanisms as well as very nature of these funds (being relatively a young industry).

**Table 1. Household Financial Investments (TRY Billion %)**

| | 03.20 | | 03.21 | | 09.21 | |
|---|---|---|---|---|---|---|
| | TRY Billion | GDP Share | TRY Billion | GDP Share | TRY Billion | GDP Share |
| Total Assets | 1966,8 | 44.1 | 2,700.7 | 50.3 | 3,045.0 | 47.6 |
| TL Savings Deposits | 771.9 | 17.3 | 900.4 | 16.8 | 1,069.8 | 16.7 |
| FX Savings Deposits | 672.4 | 15.1 | 910.8 | 17.0 | 1,011.2 | 15.8 |
| Precious Metal Deposits | 111.8 | 2.5 | 258.4 | 4.8 | 272.2 | 4.3 |
| Bonds and Bills | 44.2 | 1.0 | 61.2 | 1.1 | 70.3 | 1.1 |
| Pension Funds | 113.9 | 2.6 | 150.2 | 2.8 | 168.1 | 2.6 |
| Mutual Funds | 89.1 | 2.0 | 112.4 | 2.1 | 147.1 | 2.3 |
| Equity Securities | 84.2 | 1.9 | 238.8 | 4.5 | 226.9 | 3.5 |
| Repo | 2.6 | 0.1 | 5.7 | 0.1 | 4.5 | 0.1 |
| Currency in Circulation | 76.7 | 1.7 | 62.8 | 1.2 | 74.8 | 1.2 |

**Source**: Central Bank Republic of Turkey (Financial Stability Report November, 2021), MKK-Central Credit Agency, PMC-Pension Monitoring Centre.

Table 1 clearly indicates that although total share of mutual funds (excluding pension funds) composes only 2.3% of Gross Domestic Product (GDP) in Turkey, the rate of increase in mutual funds is considerable. Mutual funds, especially provide an investment alternative for those who have limited amount of savings. In this study, mutual funds in Turkey are covered. Therefore, the scope of the paper is limited to Turkey as an emerging economy.

The purpose of the paper is to find out whether benchmark values have impact on consolidated portfolio structure of mutual funds. Specifically, investment in bonds (public debt instruments) and stocks (weights) are considered as dependent variable; then BIST-100 (Leading Index for Shares in Turkish Stock Market), USD/TL (exchange rate), 'GOVERNMENT DEBT INSTRUMENTS-ALL' ('DIBS-TÜM') are included as industry-level independent variables. Data are retrieved from official website of Capital Markets Board of Turkey for the period between July 2015 and July 2022. Benchmark data is from Borsa-Istanbul (Istanbul Stock Exchange). Inflation data is retrieved from TUIK-Turkish Statistical Institute.

This paper contributes to the literature by examining mutual funds in Turkey comprehensively given the very fact that there seems scarce literature upon mutual funds and major financial determinants of their portfolio distribution in Turkey.

This article is structured as follows: Section I is the introduction part. Section II provides a review of mutual fund market in Turkey and the World. Section III presents literature review. Section IV includes data, methodology and findings. Section V is the last part, conclusion part.

## 2. Mutual Funds in Turkey and the World

The total size of global mutual funds exceeded 71 trillion USD by the end of 2021 according to data of 46 countries (derived by US Investment Company Institute-ICI). USA is the leading country by 34 trillion USD.

**Table 2. Mutual Funds (2021) (Billion USD)**

| | Country | Fund Size | Share in Total (%) | Fund Portfolio/GDP (%) |
|---|---|---|---|---|
| 1 | USA | 34.155 | 48,1 | 148,9 |
| 2 | Luxembourg | 6.636 | 9,3 | 7922,1 |
| 3 | Ireland | 4.607 | 6,5 | 892,4 |
| 4 | China | 3.530 | 5,0 | 20,9 |
| 5 | Germany | 2.968 | 4,2 | 70,2 |
| 6 | Australia | 2.618 | 3,7 | 162,6 |
| 7 | Japan | 2.527 | 3,6 | 47,3 |
| 8 | France | 2.415 | 3,4 | 86,0 |
| 9 | UK | 2.326 | 3,3 | 74,8 |
| 10 | Canada | 1.918 | 2,7 | 95,1 |
| 34 | Turkey | 20 | 0,0 | 2,5 |
| | Total | 71.053 | 100,0 | 87,4 |

**Source**: ICI, https://www.icifactbook.org, date of access 20.06.2022

Luxembourg is located as the center of global mutual funds due to tax and regulatory advantages. Also, Ireland is moving in the same direction. The funds founded in these countries are sold to investor from all around the world. If Luxembourg and Ireland are excluded due to their particular position, it is seen that Australia and the USA come first and second respectively in terms of the size of mutual funds compared to GDP. The world average is 87% where Turkey stands only at 2,5%.

Equity funds compose 45% of total global funds according to ICI data. That number is 9% in Turkey. The country that equity funds have the largest share with 92% is Japan. Equity funds compose 56% of domestic mutual funds in the USA that has almost half of global mutual funds in size (Source: ICI, https://www.icifactbook.org, date of access 20.06.2022, https://www.

ici.org/statistics , date of access 20.06.2022). When we look closely at the mutual fund industry in Turkey, we see that mutual funds reached 267 billion TRY portfolio size with a growth rate of 108% in 2021. The number of funds increased 28%.

**Table 3. Mutual Funds (Million TRY)**

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2021/2020 Change (%) |
|---|---|---|---|---|---|---|
| Number of Funds | 456 | 489 | 560 | 681 | 874 | 28,3 |
| Portfolio Value | 54.208 | 48.238 | 113.777 | 128.483 | 267.389 | 108,1 |

**Source**: SPK, https://www.spk.gov.tr/SiteApps/Yayin/PeriyodikDokumanlar/PERD02, date of access 19.06.2022.

As you can see in Table 4, portfolio size grew 139 billion TRY in 2021 compared to the previous year. The largest contribution comes from hedge funds which increased from 35 billion TRY to 100 billion TRY at the end of 2021. The share of hedge funds in mutual funds increased from 27% in 2020 to 37% in 2021 due to cash inflows. Investor interest in foreign currencies helped hedge funds issued in foreign currencies grow. Besides cash inflows, rise in the value of the assets in foreign currencies in these funds had an influence in the growth of hedge funds. Similarly, fund basket funds reached 26 billion TRY with a growth rate of 190% with the capital flow into fund basket funds that invest in overseas as well. Equity funds are among the funds that gain traction with 130% growth rate and reached 24 billion TRY by the end of 2021.

Gold prices in foreign currencies remained stable during 2021 despite rising inflation and instabilities all around the world. However, precious metal funds approached to 9 billion TRY with a growth rate of 53% due to the fast depreciation of Turkish Lira through the end of year. Debt instrument –umbrella- funds also gain traction in Turkey. They grew by 12 billion TRY and reached 35 billion TRY at the end of 2021 with the contribution of both TRY denominated assets and growing Eurobond assets due to the rise in the exchange rate.

**Table 4. Portfolio Values Based on Mutual Fund Type (Million TRY)**

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2021/2020 Change % |
|---|---|---|---|---|---|---|
| Debt Instruments Umbrella Fund | 22.832 | 17.864 | 27.449 | 23.409 | 35.466 | 51,5 |
| Corporate Debt Instruments Fund | | | | 1.911 | 3.294 | 72,4 |
| Eurobond and Foreign Debt Instruments Fund | | | | 5.198 | 9.379 | 80,4 |
| Other Debt Instruments Fund | 22.832 | 17.864 | 27.449 | 16.301 | 22.793 | 39,8 |
| Variable Umbrella Fund | 5.176 | 3.507 | 10.092 | 12.493 | 17.119 | 37,0 |
| Fund Basket Umbrella Fund | 1.528 | 1.496 | 2.635 | 9.111 | 26.132 | 186,8 |
| Foreign Fund Basket Fund | 219 | 280 | 497 | 2.066 | 5.699 | 175,9 |
| Fund Basket Fund | 1.309 | 1.216 | 2.138 | 7.045 | 20.432 | 190,0 |
| Equity Umbrella Fund | 2.231 | 2.314 | 3.826 | 10.607 | 24.418 | 130,2 |
| Precious Metals Umbrella Fund | 410 | 532 | 1.227 | 5.844 | 8.926 | 52,7 |
| Protection Oriented Umbrella Fund | 244 | 502 | 919 | 1.022 | 811 | -20,7 |
| Money Market Umbrella Fund | 13.837 | 12.848 | 39.942 | 26.599 | 40.661 | 52,9 |
| Hedge Umbrella Fund | 6.093 | 7.101 | 21.641 | 35.681 | 100.954 | 182,9 |
| Hedge Foreign Currency Fund | | | | 12.019 | 56.357 | 368,9 |
| Other Hedge Fund | 6.093 | 7.101 | 21.641 | 23.662 | 44.598 | 88,5 |
| Mixed Umbrella Fund | 521 | 487 | 553 | 1.316 | 4.873 | 270,2 |
| Participation Fund Excluding Gold | 570 | 1.533 | 5.761 | 2.250 | 7.569 | 236,4 |
| Total | 53.441 | 48.183 | 114.046 | 128.332 | 266.928 | 108,0 |

**Source**: Takasbank Corporate Investor Portfolio Statistics, https://www.vap.org.tr/fon-turleri-bazinda-nakit-akisi, date of access 19.06.2022

Turkey Electronic Fund Trading Platform (TEFAS) has an important position in growth of mutual fund industry in Turkey and it ensures accessibility and electronic trading of all mutual funds from all financial institutions with a few exceptions. Therefore, it resolves distribution channel challenge and it increases the competition by putting forward the most profitable funds. The size of funds traded on TEFAS system keeps growing. In 2021, trading volume on TEFAS is 233 billion TRY with an annual growth rate of 40%.

**Table 5. TEFAS Trading Volume (Billion TRY)**

| Type | 2017 | 2018 | 2019 | 2020 | 2021 | 2021/2020 Change % |
|---|---|---|---|---|---|---|
| Debt Instruments Fund | 10.8 | 9.6 | 16.6 | 35.6 | 34.7 | -2.4 |
| Variable Fund | 7.3 | 8.2 | 14.0 | 37.8 | 31.0 | -18.0 |
| Fund Basket Fund | 2.1 | 2.2 | 2.3 | 17.8 | 47.7 | 168.2 |
| Equity Fund | 3.1 | 3.8 | 3.9 | 24.6 | 36.4 | 47.7 |
| Mixed Fund | 0.2 | 0.1 | 0.1 | 1.6 | 6.5 | 299.9 |
| Participation Fund | 1.0 | 2.4 | 5.5 | 15.6 | 11.6 | -25.7 |
| Precious Metals Fund | 0.6 | 1.0 | 1.7 | 15.1 | 10.9 | -28.4 |
| Money Market Fund | 0.4 | 0.2 | 8.0 | 8.1 | 39.3 | 382.7 |
| Hedge Fund | | | 0.1 | 9.8 | 15.0 | 53.1 |
| Total | 25.5 | 27.4 | 52.2 | 166.1 | 233.0 | 40.3 |

**Source:** TEFAS, https://www.tefas.gov.tr/IstatistikiRaporlar/ToplamIslemHacmi.aspx

It can be said that capital markets gained traction in 2020 and 2021. The number of domestic investors who invest directly in stocks increased 19% and reached 2,355,070 while the number of domestic investors who invest in mutual funds increased only 3% in 2021. The number of domestic individual investors who invest in mutual funds increased about a hundred thousand in 2021. The total number of investors are composed almost totally of domestic individual investors in Turkey. Foreign investors show very little interest in Turkish mutual funds.

**Table 6. Mutual Fund Investor Numbers**

| Investor Type | 2017 | 2018 | 2019 | 2020 | 2021 | 2021/2020 Change % |
|---|---|---|---|---|---|---|
| Domestic | 2.983.100 | 2.853.808 | 2.977.403 | 3.055.145 | 3.158.788 | 3,4 |
| Individual | 2.872.888 | 2.740.507 | 2.859.652 | 2.925.897 | 3.025.445 | 3,4 |
| Fund | 132 | 224 | 296 | 394 | 545 | 38,3 |
| Companies | 99.421 | 102.836 | 107.448 | 119.114 | 123.135 | 3,4 |
| Investment Trusts | 8 | 16 | 13 | 18 | 24 | 33,3 |
| Other | 10.561 | 10.225 | 9.994 | 9.722 | 9.639 | -0,9 |
| Foreign | 20.935 | 19.634 | 19.469 | 19.595 | 20.809 | 6,2 |
| Total | 3.004.035 | 2.873.442 | 2.996.872 | 3.074.740 | 3.179.597 | 3,4 |

**Source**: MKK,
https://www.vap.org.tr/uyruk-bazinda-yatirimci-sayilari, date of access 21.06.2022

Mutual funds market that draws attention of investors pursuing portfolio diversification keeps growing in 2022. The number of investors in mutual funds market is 3 million 223 thousand 757 at the end of April 2022 and the total portfolio size in mutual funds is 357 billion 528 million TRY. (Source: MKK, https://www.vap.org.tr/uyruk-bazinda-yatirimci-sayilari, date of access 21.06.2022)

## 3. Literature Review

In this part, previous studies pertaining to mutual funds' portfolio distribution and its determinants are reviewed. There exists scarce literature upon the subject of this paper. Most of the literature is about return performance of mutual funds, therefore, papers in regard to mutual fund performance are also covered under this section.

From legal point of view, Yılmaz (2017) reviews mutual funds within the scope of collective investment instruments and argues that since investment funds are not legal entities, the assets of these funds are managed by portfolio management companies which are separate legal entities. The portfolio management companies manage portfolio that is created by collection from the clients in exchange for a share of fund on the basis of fiduciary ownership considering the principle of asset protection.

Before the literature about performance of the mutual funds, it is necessary to have a look at the determinants of the asset size: Khorana et al. (2005) aim to explain the size of the mutual fund industry around the world (in 56 countries) and examine where this product appeared. They argue in the paper that the fund industry is larger in countries with stronger rules, laws, and regulations, and particularly where mutual fund investors' (contributors) rights are better observed (protected). The industry is also larger in countries with wealthier and more educated states in which this sector is older, trading costs are lower. The paper ends up with argument that laws and regulations, supply-side and demand side factors simultaneously influence the size of this sector.

Regarding the performance of the funds and its main derterminants, Drobetz and Köhler (2002) analyse the contribution of asset allocation policy to portfolio performance. Therefore, the main aim of their paper is to assess the portion of the performance of a fund portfolio which may be attributable to asset allocation policy. The study concludes that asset allocation policy significantly influences portfolio performance. Regarding seasonality, market timing and performance amongst benchmarks and mutual fund evaluation, Matallin-Saez (2006) examines the relation between performance and seasonality and finds that positive seasonality at the beginning and middle of

the year enhances performance. It is also underlined in this paper that mutual fund performance is –in general- calculated by comparing results of active management with those obtained by one or more benchmarks that should represent the investment of the funds. In this framework, the study reviews the effect on mutual fund evaluation if a relevant benchmark is omitted, this impact is analysed in 3 components of active management; these are as 'stock selection', 'market timing' and 'seasonality'. Hoepner et al. (2011) study strongly-growing mutual fund type, Islamic funds and their performance for 20 countries. Islamic funds exhibit superior learning in more developed Islamic financial markets; while Islamic funds from these markets are much more competitive to international equity benchmarks, funds from especially Western nations with less Islamic assets tend to have low performance. Gökgöz and Günel (2012) evaluate the performance of investment instruments available in the Turkish Capital Market: 4 financial models of the single-index models (Sharpe Ratio, Sortino Ratio, Treynor Ratio and Jensen's Alpha) are reviewed, and then it is found that the single index models could provide significant results in determining Turkish mutual funds' performances. Özek (2014) analyses performance of mutual funds in connection with portfolio and calculates industry concentration index and security concentration index based on holdings information in monthly disclosures by equity mutual funds and valuation data provided for stocks for period between June 2012 and December 2013. She finds that the results of the analyses do not indicate any statistically significant relation between the fund performance and concentration variables. Moneta (2015) studies the performance of bond mutual funds in United States, and employs measures formed from a new data set of portfolio weights. It is found in the paper that active fund managers show high performance before costs and fees creating gross returns of 1% per annum over the benchmark portfolio formed thorough utilizing past holdings. It is maintained that there exists a proof of neutral ability to time different portfolio allocations (industry, credit quality, and portfolio maturity allocations). The paper argues that the results of the analysis provide the first evidence of the value of active management as far as bond mutual funds are concerned. Fulkerson and Timothy (2019) examine portfolio concentration and mutual fund performance and find that fund performance improves after concentration increases, they also find that the concentration-performance relation is stronger for those funds that have less institutional ownership and when investor sentiment is low. Kan and Wang (2020) in their research, review optimal portfolio choice and benchmark. They argue that if a benchmark is not efficient, including additional assets to the benchmark portfolios can enhance its performance. They suggest a combining portfolio strategy, optimally balancing the value of

including test assets and the effect of estimation errors. Bacchetta et al. (2020) employ data on international equity portfolio allocations (for US mutual funds), and make an estimation of a simple portfolio expression derived from a standard Markowitz mean-variance portfolio model extended with portfolio frictions. They indicate that equity return differentials are predictable and use the expected return differentials in the mutual fund portfolio regressions. They find that the estimates imply significant portfolio frictions and a modest rate of risk-aversion. Evans et al. (2022) analyse the role of peer group performance versus pure benchmarks in fund manager compensation. They find that 71% of the managers are compensated according to peer-benchmarks solely or partly. After they examine investment advisors' option between benchmark types, they reach the conclusion that peer-benchmarking advisors have relatively more complicated investors with greater performance sensitivity.

The association between benchmark index and asset allocation, which is the main theme of this paper, Wurgler (2010) argues that index-linked investing is distorting stock prices and risk-return tradeoffs, that in turn may falsify corporate investment and financing decisions, investor portfolio allocation decisions, fund manager skill assessments. Raddatz et al. (2017) study how international equity and bond market indexes influence asset allocations, capital flows, asset prices and exchange rates across countries. They employ monthly micro-level data of benchmark compositions and mutual fund investments during 1996-2014. Their database contains 2837 equity funds and 838 bond funds that include global, global emerging and also regional funds. They find that movements in benchmarks have significant impacts on equity and bond mutual fund portfolio allocations. For Turkey, despite limited studies regarding the subject matter of this paper, Oğuz (2020) studies the impact of stock index return upon portfolio distribution (ratio) of stocks (share) in mutual funds. His study covers the period between January 2005 and June 2019 for 174 monthly data, and is limited to Turkish mutual funds market. The causality relationship is analysed. Upon the findings of the study, he argues that there is no causal relationship between the movements in the stock market index and the share ratio in the portfolio distribution. Portfolio choice is one part of the issue of portfolio distribution. Another study by İpekten et al. (2021) examine the relationship between mutual fund flows and stock returns by using VAR model, and upon the findings they argue that (according to the causality test results based on VAR model) one-way negative causality is obtained between securities mutual funds and stock returns, from stock returns to fund flows.

All in all, considering the literature review in regard to the connection between benchmark returns and portfolio distribution (in a way asset allocation) of the mutual funds, global study by Raddatz et al. (2017) confirms the significant impact of benchmark returns (for stocks and bonds) upon portfolio allocations. Despite this, as far as Turkish capital markets are concerned, the local study by Oğuz (2020) finds no significant relation between stock market index and the portfolio distribution.

## 4. Data, Method, Analysis, Findings

In this study, using the data of the Turkish Capital Markets Board and the Central Bank of the Republic of Turkey, how the changes in the BIST100 Index and the USD/TL exchange rate affect the Stock Investments is analyzed. Likewise, the effects of KYD GDDS Index and USD/TL exchange rate changes on Government Domestic Debt Securities investments, representing the Debt Market are investigated.

### 4.1. Data

The variables used in the econometric analysis, their definitions and period involved in the analysis are presented below in Table 7.

**Table 7. Research Data**

| Variable | Definition | Reference | Period | Access Date |
|---|---|---|---|---|
| **INV**[1] | Mutual Funds Investment on Stocks | | 06/2015-02/2022 | 30.06.2022 |
| ***BIST100*** | *BIST100 Index* | | 06/2015-02/2022 | 30.06.2022 |
| ***USD*** | *USD/TRY Exchange Rate* | | 06/2015-02/2022 | 30.06.2022 |
| **GDDS**[2] | Mutual Funds Investment on Government Domestic Debt Securities | | 06/2015-02/2022 | 30.06.2022 |
| ***GDDSI*** | *Government Domestic Debt Securities Index* | | 06/2015-02/2022 | 30.06.2022 |
| ***USD*** | *USD/TRY Exchange Rate* | | 06/2015-02/2022 | 30.06.2022 |

In Table 7, Normal Characters stand for Dependent Variables whereas *Italic Characters* refer to Independent Variables.

Data covers the period between June 2015 and February 2022 for Turkish Mutual Funds. Benchmark index values (independent variables) are received from BIST-Connect, a product of Borsa-Istanbul. The figures for asset allocation (weights of asset groups in entire pension funds) that are specified as dependent variables are extracted from website of Capital Markets Board of Turkey (Monthly Statistical Bulletin) are to be prepared using table tool within the Microsoft word and cited consecutively in the text.

### 4.2. Methodology

In this part, it is aimed to analyze the variables that affect (weight or distribution of) Stock and GDDS investments (in overall mutual funds portfolio) with the Granger Causality Test based on the VAR model. For this purpose, first of all, we must test whether the series involved in the analysis are stationary or not. If the series are not stationary at level, either the difference operation or the logarithmic transformation can be performed. For Unit Root Testing, we will perform Augmented Dickey Fuller Test allows for an intercept, or an intercept and deterministic trend or none, in the test regression. The model for unit root test in each case is:

$$\Delta Y_t=(\rho-1)\, Y_{t-1}+u_t \quad \text{(None)} \quad (1)$$

$$\Delta Y_t=\delta Y_{t-1}+ u_t \quad \text{(Intercept)} \quad (2)$$

$$\Delta Y_t=\beta_1+\beta_{2t}+\delta Y_{t-1}+\alpha_i \Sigma_{i=1}\, \Delta Y_{t-i}+\varepsilon_t \quad \text{(Intercept and Trend)} \quad (3)$$

Unit root results revealed through the use of three models are compared with MacKinnon critical values according to 1%, 5%, 10% significance levels, and the results of the analysis are tested against null hypothesis and alternative hypothesis (MacKinnon, 1996). In the study, the series were analyzed according to the MacKinnon 5% significance level, which is the most commonly used significance level. The null hypothesis H0 and alternative hypothesis H1 represent the following situations:

$$\text{If } H_0: \delta = 0, Y_t \text{ has a unit root} \quad (4)$$

$$\text{If } H_1: \delta < 0, Y_t \text{ doesn't have a unit root} \quad (5)$$

If the series are stationary at level, we will estimate the models below:

$$INV = x_1*BIST100 + x_2*USD + c_1 \quad (6)$$

$$GDDS = x_3*GDDSI + x_4*USD + c_2 \quad (7)$$

The models above will be estimated by using VAR (Vector Auto Regressive) Specification. By performing ADF unit root tests, it is possible to ensure the stationarity of the series and to examine the direction of causality between the series with the Granger causality test. Granger causality test can be conducted with the series that are stationary as a result of performing unit root test. Prior to the Granger Causality Test based on the VAR model, first of all, it is necessary to determine the lag length. Granger causality test is the commonly used method due to its ease of applicability. The Granger causality

test is used to find out whether there is a relationship between the series and if there is a relationship, to find the direction of it. The test method states that causality is revealed by determining the current value of the dependent variable by both the dependent variable itself and the lagged values of the independent variable (Barışık & Kesikoğlu, 2004). The Granger causality test model can be formulated as follows:

$$Y_{1t} = \beta_{10} + \beta_{11}Y_{1t-1} + \ldots.. + \beta_{1k}Y_{1t-k} + \acute{\alpha}_{11}Y_{2t-1} + \ldots + \acute{\alpha}_{1k}Y_{2t-k} + U_{1t} \quad (8)$$

$$Y_{2t} = \beta_{20} + \beta_{21}Y_{2t-1} + \ldots.. + \beta_{2k}Y_{2t-k} + \acute{\alpha}_{21}Y_{1t-1} + \ldots + \acute{\alpha}_{2k}Y_{1t-k} + U_{2t} \quad (9)$$

Where $U_{it}$ is a white noise disturbance term with $E(U_{it}) = 0$, (i=1,2), $E(U_{1t}U_{2t}) = 0$

### 4.3. Empirical Findings

This part provides the analysis and empirical findings. The results of Augmented Dickey Fuller Unit Root Test are displayed below:

**Table 8. Results of Augmented Dickey Fuller Unit Root Test (Intercept and Trend)**

| Variables | T -Statistics | Variables | T-Statistics |
|---|---|---|---|
| LNINV | 1.957160 | ΔLNINV | (8.127847)* |
| LNBIST100 | 0.377415 | ΔLNBIST100 | (8.809652)* |
| USD | 2.025022 | ΔUSD | (7.384187)* |
| LNGDDS | (0.753786) | ΔLNGDDS | (6.925560)* |
| LNGDDSI | (0.690975) | ΔLNGDSSI | (8.135184)* |

When we examine the results of Augmented Dickey Fuller Unit Root Test in Table 8, None of the series are stationary at level, so we performed logarithmic transformation and difference process to the series to test if they become stationary. We observed that the series became stationary after these processes at %99 confidence level.

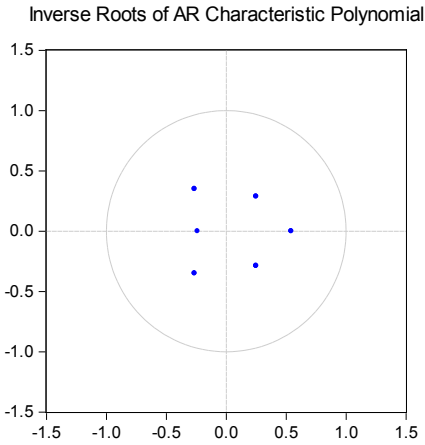



**Figure 1.** LNINV LNBIST100 USD

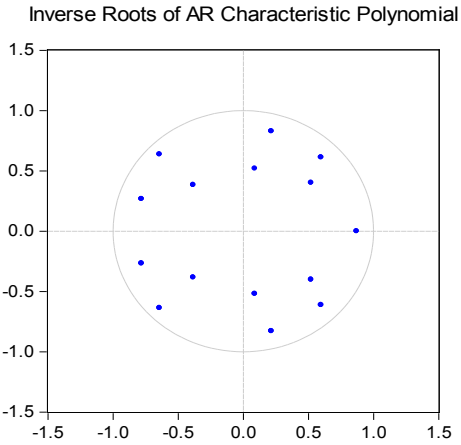



**Figure 2.** LNGDDS LNGDDSI USD

Figure 1 and Figure 2 show the graph of AR inverse root of the VAR Models involved in the analysis. The graph verifies that all the polynomial roots fall within the unit circle. This outcome implies that the VAR model is stable or stationary.

In order to run VAR System, we must first find the appropriate lag length for each equations. As the variables are known, we can easily determine the appropriate lags.

**Table 9. VAR Lag Order Selection Criteria for Each Model**

Endogenous Variables: DLNINV DLNBIST100 DUSD

| Lag | LogL | LR | FPE | AIC | SC |
|---|---|---|---|---|---|
| 0 | 125.23 | NA | 7.38e-06 | -3.304 | -3.210* |
| 1 | 140.86 | 29.57 | 6.17e-06* | -3.483* | -3.109 |
| 2 | 145.46 | 8.32 | 6.96e-06 | -3.364 | -2.710 |
| 3 | 150.69 | 9.05 | 7.73e-06 | -3.262 | -2.328 |
| 4 | 160.21 | 15.70 | 7.67e-06 | -3.276 | -2.062 |
| 5 | 174.49 | 22.38* | 6.71e-06 | -3.419 | -1.924 |

Endogenous Variables: DLNGDDS DLNGDDSI DUSD

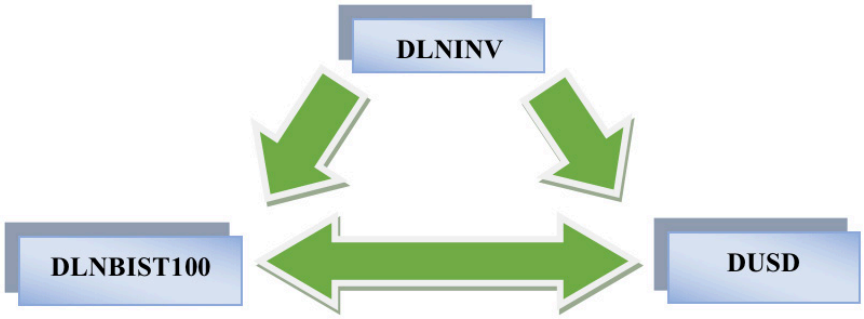
| Lag | LogL | LR | FPE | AIC | SC |
|---|---|---|---|---|---|
| 0 | 154.52 | NA | 3.72e-06* | -3.988* | -3.896* |
| 1 | 160.28 | 10.91 | 4.06e-06 | -3.902 | -3.534 |
| 2 | 166.09 | 10.55 | 4.42e-06* | -3.818 | -3.174 |
| 3 | 174.38 | 14.41 | 4.51e-06 | -3.800 | -2.880 |

In Table 9, we can see the values of various information criteria and other methods to detect appropriate lag length for each specific model. Although the appropriate lag length for each model is based on the criteria with the most stars in the table, no causal relationship was found between the series for these lag lengths. For this reason, in the first model, it was determined that there was a causal relationship between the series at the 5th lag according to the LR criterion. Likewise, in the second model, a causal relationship was found between the series at the 2nd lag, according to the FPE criterion.

**Table 10. Results of VAR Granger Causality/Block Exogeneity Wald Tests**

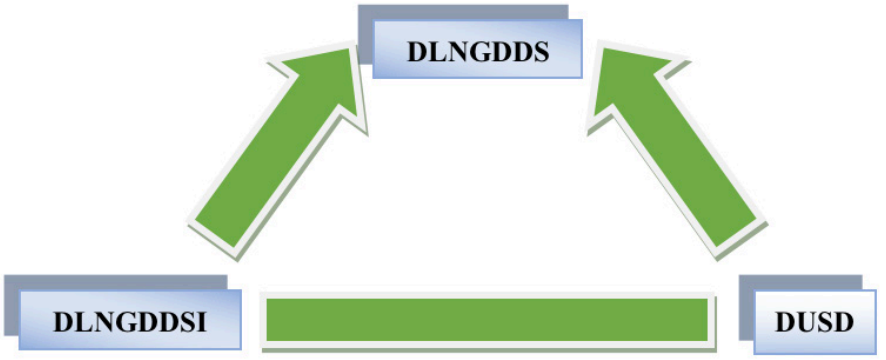
| **Causality Relationship for Model 2** | | | | **Causality Relationship for Model 1** | | | |
|---|---|---|---|---|---|---|---|
| **Dependent variable: DLNGDDS** | | | | **Dependent variable: DLNINV** | | | |
| **Excluded** | **Chi-sq** | **df** | **Prob.** | **Excluded** | **Chi-sq** | **df** | **Prob.** |
| *DLNGDDSI* | *7.787876* | *2* | *0.02* | DLNBIST100 | 1.346078 | 5 | 0.93 |
| *DUSD* | *6.632505* | *2* | *0.04* | DUSD | 2.858074 | 5 | 0.72 |
| **Dependent variable: DLNGDDSI** | | | | **Dependent variable: DLNBIST100** | | | |
| **Excluded** | **Chi-sq** | **df** | **Prob.** | **Excluded** | **Chi-sq** | **df** | **Prob.** |
| DLNGDDS | *1.046034* | *2* | *0.59* | *DLNINV* | *4.238543* | *5* | *0.00* |
| DUSD | *0.332108* | *2* | *0.85* | *DUSD* | *1.747127* | *5* | *0.04* |
| **Dependent variable: DUSD** | | | | **Dependent variable: DUSD** | | | |
| **Excluded** | **Chi-sq** | **df** | **Prob.** | **Excluded** | **Chi-sq** | **df** | **Prob.** |
| DLNGDDS | 2.873231 | *2* | 0.24 | *DLNINV* | *1.235689* | *5* | *0.03* |
| DLNGDDSI | 1.597148 | *2* | 0.45 | *DLNBIST100* | *1.082565* | *5* | *0.05* |

**Figure 3. Causality Relationship for Model 1**




In the first model, contrary to our suggestions, DUSD and DLNBIST are not Granger Cause of DLNINV. However, DLNINV and DUSD are both Granger Cause of BIST100. In other words, we can conclude that the higher the investment in stocks, the higher the stock index. Similarly, DLNINV and BIST100 are both Granger Cause of DUSD.

**Figure 4. Causality Relationship for Model 2**




In the second model, parallel to our suggestions, DUSD and DLNGDDSI are Granger Cause of DLNINV. According to this findings, it can be concluded that as the return on government domestic debt instruments (i.e. bonds) raises, the demand on Government Domestic Debt Securities rises up.

When findings of analysis and literature findings are compared, it can be seen that similar to literature findings that benchmark returns (especially for bonds) have impact on portfolio distribution, this paper shows that there is a significant relation between bond-return-index (that is, the return index of government domestic debt instruments) and bond share in total portfolio of funds. Regarding the association between stock returns and the share of stocks in overall portfolio, there is no statistically significant relation, which is in accordance with literature findings related to Turkey. Another way of saying, this paper confirms and argues that in line with literature there is significant association between the return of benchmarks (for bonds) and portfolio distribution in mutual funds.

## 5. Conclusion

Mutual funds, regarded as collective investment instituttions, are categorized under capital market institutions as far as Turkish application is concerned. Capital market institutions are composed of intermediary institutions, funds, investment trusts, portfolio management companies, independent auditing firms, real estate appraisal companies. This paper specifically deals with mutual funds. Despite total share of mutual funds composes only a small part of Gross Domestic Product in Turkey, the rate of increase in these funds is remarkable. Mutual funds make it available for those (investors) who have limited savings to invest in bonds, stocks or other major investment tools.

Research question of this paper is whether consolidated portfolio structure of all mutual funds are significantly affected by benchmark values -especially for debt instruments and stocks share in total portfolio-. The impact of BIST 100, USD/TL and GDS-ALL (All-Bond Return Index) upon the portfolio share of stocks and bond in consolidated mutual funds portfolio is analysed. This study is limited to the mutual funds in Turkey as an emerging economy. When we look at data, method and analysis; data is received from BRSA official web site statistics, Central Bank web site statistics and also Borsa-Istanbul Data Platform. Granger Causality Test based on the VAR model is employed in this paper.

The findings of the analysis is as follows; as far as Turkish mutual funds' total consolidated portfolio is concerned, when the return on government debt securities (index) goes up, the demand on Government Domestic Debt Securities rises up, in return, weight of government debt securities increases in consolidated portfolio of mutual funds. It is found that the same effect is not applicable for weight of stocks in consolidated mutual funds portfolio.

Considering all these, this study concludes that in consolidated portfolio distribution of the mutual funds, the return index of all government debt securities (called as 'GDS-All', 'DIBS-TUM') has statistically significant impact on the weight of bonds.

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