DEVELOPING A REAL ESTATE-PENSION FUND INVESTMENT ECOSYSTEM: TURKEY REAL ESTATE FUND

by

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ABSTRACT

DEVELOPING A REAL ESTATE-PENSION FUND INVESTMENT ECOSYSTEM: TURKEY REAL ESTATE FUND

Real estate industry needs new and alternative financing tools for the sustainability of investments, and pension fund investors seek long-term investment instruments to invest in. Therefore, structuring a model that combines both may bring a momentum for co-development of both investment areas. This study aims to develop an investment ecosystem under the regulatory of newly introduced Turkey Real Estate Fund by integrating the real estate investment instruments with pension funds in order to finance investment projects and create a new investment area for investors by also including the interest-free investment options. Real estate based pension system and rental income based financing is also recommended. In that context, VAR analysis was employed among the returns of real estate and capital market investment tools, pension funds and selected macroeconomic variables. ARIMA method was conducted for forecast analysis of the returns of the studied parameters for 2017 in order to validate the model proposed. Based on the results of the VAR analysis, inflation is found the only but an important common variable that affect the returns. Hence, pension funds and real estate investments are considered as two important options that may provide hedge against inflation. According to the results of ARIMA forecasts, the returns of REIT and the housing sales indices overperform the average pension fund returns which means the pension funds may consider investing in real estate investment instruments which support the model empirically. This research is expected to bring an innovation in terms of creating alternative investment tools for investors, provide project financing and make a considerable contribution to Turkish real estate industry and capital markets through the help of newly developed model.

ÖZET

GAYRİMENKUL VE BİREYSEL EMEKLİLİK FONLARI İLE BİR YATIRIM EKOSİSTEMİ GELİŞTİRİLMESİ: TÜRKİYE GAYRİMENKUL FONU

Gayrimenkul sektörü, yatırımların sürdürülebilirliği açısından yeni ve alternatif finansman araçlarına ihtiyaç duymakta, bireysel emeklilik fonları ise uzun vadeli yatırım enstrümanlarına yatırım yapmaktadır. Bu bağlamda biri finansmana ihtiyaç duyan diğeri ise fonlama yapan bu iki önemli yatırım alanını bir modelde birleştirmenin her iki sektörün gelişimine fayda sağlayacağı düşünülmektedir. Bu çalışmada, düzenleyici ve finansman sağlayıcı bir mekanizma olarak tanıtılan Türkiye Gayrimenkul Fonu adı altında gayrimenkul yatırım araçlarını bireysel emeklilik sistemi ile birleştiren bir yatırım ve finansman ekosistemi önerilmektedir. Ekosistemin amacı faizsiz yatırım araçlarını da içine alacak şekilde yatırımcılara yeni alternatifler sunan sürdürülebilir bir finansman ve yatırım modeli oluşturmaktır. Ayrıca gayrimenkul yatırım araçlarına bağlı emeklilik sistemi ve kira getirisine dayalı bir finansman modeli de tavsiye edilmektedir. Bu çerçevede, seçili makroekonomik değişkenlerin gayrimenkul ve sermaye piyasası yatırım araçları ve emeklilik fonları ortalama getirilerine etkisi VAR modeli ile incelenmiş, ARIMA yöntemiyle de araştırmaya konu bağımlı değişkenlere ait getirilerin 2017 yılı tahminlemesi yapılmıştır. VAR sonuçlarına göre enflasyon getirilere etki eden ortak faktör olarak tespit edilmiştir. Bu bağlamda gayrimenkul ve bireysel emeklilik fonları yatırımcıları enflasyona karşı koruyabilecek iki önemli yatırım aracı olarak değerlendirilmektedir. Tahminleme sonuçlarına göre model ampirik olarak desteklenmiş ve bireysel emeklilik fonlarının gayrimenkul yatırım araçlarına yatırım yapması önerilmiştir. Bu özgün ve inovatif çalışmanın Türk gayrimenkul sektörüne ve sermaye piyasalarına önemli katkı sağlayacağı düşünülmektedir.

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LIST OF ACRONYMS/ABBREVIATIONS

ADF	Augmented-Dickey Fuller
AHP	Analytic Hierarchy Process
ALC	Asset Leasing Company
APT	Arbitrage Pricing Theory
AR	Autoregressive
ARIMA	Autoregressive Integrated Moving Average
ARMA	Autoregressive Moving Average
BDDK	Banking Regulation and Supervision Agency
BIST	Borsa Istanbul (Istanbul Stock Exchange)
BOOT	Build Operate Own Transfer
BOT	Build Operate Transfer
C&W	Cushman & Wakefield
CAPM	Capital Asset Pricing Model
CBB	Central Bank of Bahrain
CEE	Central Eastern Europe
CML	Capital Markets Law
CPI	Consumer Price Index
CV	Coefficient of Variation
DIFC	Dubai International Financial Centre
E&Y	Ernst & Young
EBRD	European Bank of Redevelopment and Construction
EPRA	European Public Real Estate Association
EUR	Euro
FOF	Fund of Funds
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GLA	Gross Leasable Area

GYODER	The Association of Real Estate and Real Estate Investment Companies
IREIC	Infrastructure Real Estate Investment Company
IFFIm	International Finance Facility for Immunization
IFSI	Islamic Financial Services Industry
IIFM	International Islamic Financial Market
IPO	Initial Public Offering
I-REIT	Infrastructure Real Estate Investment Trust
Is REIT	Islamic Real Estate Investment Trust
IsDB	Islamic Development Bank
ISE	Istanbul Stock Exchange
JLL	Jong Lang LaSalle
KES	Kenya Shilling
MA	Moving Average
MKK	Central Securities Depository of Turkey
MPT	Modern Portfolio Theory
M-REIT	Mortgage Real Estate Investment Trust
MYR	Malaysian Ringgit
NAV	Net Asset Value
NEST	National Employment Savings Trust
OECD	The Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
EGM	Pension Monitoring Center
PMCL	Pakistan Mobile Communication Limited
PPP	Public Private Partnership
REIC	Real Estate Investment Company
REIF	Real Estate Investment Fund
REIT	Real Estate Investment Trust
REPS	Real Estate Pension System
REC	Real Estate Certificate
RIBF	Rental Income Based Financing

SIB	Social Impact Bond
SP	Standard and Poor's
SPK	Capital Markets Board of Turkey
SRI	Sustainable and Responsible Investment
TBB	Banks Association of Turkey
TCMB	Central Bank of the Republic of Turkey
TKBB	Participation Banks Association of Turkey
TL	Turkish Lira
TREF	Turkey Real Estate Fund
TRY	Turkish Lira
TSWF	Turkey Sovereign Wealth Fund
TUIK	Turkish Statistical Institute
UAE	United Arab Emirates
UK	United Kingdom
US	United States
USD	United States Dollars
VAR	Vector Auto Regression
VAT	Value Added Tax
VCIF	Private Equity/Venture Capital Investment Fund
VCPET	Venture Capital Private Equity Investment Trust

1. INTRODUCTION

1.1. General

Investment tools and financing options have always been important and interesting topics for researchers. There are many investment instruments that both individual and institutional investors invest in such as bonds, stocks, funds, real estate, gold and forex. Investors can make investments either directly or indirectly in these vehicles. Pension funds are also accepted as common long term investment tools. Among different investment options, investing in real estate have always been preferred in the world as well as in Turkey. According to the Savills Report published in 2016, the estimated worth of all developed real estate in the world is about 217 trillion USD which covers residential, commercial, industrial, hospitality developments and agricultural lands.

Among all global assets including gold, bonds and equities, global real estate covers the 60% of the total assets in the world. The residential real estate is the major asset with a coverage of 75% of worldwide real estate value, this is followed by commercial and agricultural values 13% and 12% respectively. The total ever mined value of gold, which is 6 trillion USD, remain very insignificant investment tool compared to the total developed real estate value. This make real estate one of the most important investment tool which is affected by global economic conditions, and; on the other hand, influences the national and international economies strongly (Savills Report, 2016). From that perspective, it can be said that investing in real estate is an important tool both for governments to stimulate the economic growth and for investors to increase their returns. On the other hand, pension funds are also important options for those who seek long term and secured returns at their retirement ages.

The main purpose of this research is to develop a real estate-pension funds investment ecosystem under the regulatory of newly introduced Turkey Real Estate Fund, suggest a new tier pension system based on real estate investment tools, develop a new financing model for real estate investment projects, create alternative investment

tools for investors especially for pension funds, increase the returns of individual and institutional investors and develop interest-free real estate investment and financing options in order to bring an option for investors with religious concerns. In this context, current real estate investment and other investment tools including Real Estate Investment Trusts (REIT) Index, Housing Sales and Rent Price Indices, BIST 100 Index, Participating Banks and Pension Funds were analyzed in terms of their returns.

As a regulatory and financing mechanism of the real estate industry, "Turkey Real Estate Fund" (TREF) is suggested as a new umbrella fund to create a new source of investment tools for investors, as well as a new financing option for both residential investments of individuals and large private and public real estate projects. Based on the establishment of TREF, a real estate-pension fund investment ecosystem model is proposed. Then, in order to empirically support the model, in the lights of the related past studies, the factors that may affect the returns of the investment tools were selected, and the forecast analysis was conducted by using the monthly data collected from periodical statistics of the government institutions including Central Bank of the Republic of Turkey (TCMB), Turkish Statistical Institute (TUIK), Istanbul Stock Exchange, Pension Monitoring Center (EGM), Central Securities Depository of Turkey (MKK), Banking Regulation and Supervision Agency (BDDK), the US Energy Information Administration, as well as many global and prestigious sectoral and institutional associations and reports including Participation Banks Association of Turkey (TKBB), Banks Association of Turkey (TBB), Reidin Real Estate Market Information Center, World Bank, OECD, E&Y, JLL, C&W, EPRA and Savills.

The reliability and the validity of the model were assessed with time series analysis by using Vector Auto Regression (VAR) and Autoregressive Integrated Moving Average (ARIMA) methods.

This research is expected to bring an innovation in terms of creating alternative investment tools for investors, provide project financing and make a considerable contribution to Turkish real estate industry through the help of newly developed real estate-pension fund investment ecosystem. Introduction chapter of the thesis involves

the background of the research, problem determination, problem statement, related studies, aims and objectives, research method, scope and limitations, and organization of the thesis.

1.2. Background of the Research

Real estate industry is one of the major industries that is important for economic growth especially for emerging countries. Turkey, as a developing country ranked as the 18th largest economy in the world has focused on real estate investments in the last two decades. (World Bank Report, 2016). After the economic crisis in 2001, Turkish real estate industry started developing parallel to the economic growth. In addition to the private investments that concentrated mostly on the residential and commercial projects, the government made investments on infrastructure, healthcare and transportation projects and used different financing models including the public private partnerships (PPPs), build-operate-transfer (BOTs), and build-own-operate-transfer models (BOOTs). The periodic decrease in the interest rates, the high market expectations and the excess demand of the citizens attracted many firms to make more investments on real estate industry. The more the sizes and the numbers of the projects grew, the more need for financing increased. The available financing tools became insufficient to meet the requirements and developing new financing instruments became a must for sustainable growth. Although there are many researches made about real estate industry globally, the past studies mainly focusing on developing new financing tools especially for Turkish real estate industry are not enough to enlighten the way of developers and investors in that context.

1.3. Problem Determination

As the real estate industry is very fragile due to its integration to the economic indicators, the cyclical negative global economic conditions and volatile political situations also affect the Turkish real estate market, especially in terms of decrease in foreign direct investments and as a result, the availability of financing. Due to the adequateness of the limited financial resources to finance the growing needs of the real

estate projects, the industry suffers from shortfalls of the existing financing resources and has to find alternative financing instruments for sustainable growth.

In order to overcome the financing problems of the industry, the government aimed to attract both the local and foreign investors to invest in Turkish real estate market. In this context, The Capital Markets Board of Turkey (SPK) issued and amended different regulations including Real Estate Investment Trusts (REITs), Real Estate Investment Funds (REIFs), Real Estate Certificate, Infrastructure Real Estate Investment Trusts (I-REITs) and Real Estate Lease Certificate (Sukuk). All these regulations have advantages and disadvantages from investor's perspective. While some of them such as REITs and REIFs, have corporate tax exemptions, the returns of some of them, as in the REITs case, may easily get affected adversely from any negative economic conditions since they operate under Istanbul Stock Exchange. On the other hand, the REIFs have some investment limitations such as not being able to invest in uncompleted real estate projects (SPK REIF Communique, 2014). The sukuk market just started growing in Turkey in the last few years, yet there is only one I-REIT established, and one single real estate certificate issued as of April 2017.

These inadequateness of the real estate capital market instruments and the limitations mentioned are needed to be resolved within a newly developed investment ecosystem by increasing the alternative investment tools and co-integrating them.

1.4. Problem Statement

Among many investment tools, pension funds are one of the major alternative investment instruments that the governments stimulate the citizens to make savings by attracting them with additional incentives. In Turkey, the Personal Pension System came into effect in 2003, and since then the pension funds started raising funds (Aysoy, 2009). The rapid growth of the pension funds started in 2013, soon after the regulation issued by the government that add 25% state incentives to the invested amounts by the participants. Although enrolling in the system is based on voluntary basis, the number and the total accumulated assets of the pension funds have been growing

rapidly. Despite the high growth rate within the last few years, the total assets of the pension funds has reached only 5.5% of the total GDP of Turkey which is far below the OECD average (simple average: 49,5%, weighted average: 123,6%) (OECD Pension in Focus Report, 2016, Undersecretariat Treasury of Turkey Participating Finance Report, 2016).

In 2016, the government issued a new regulation to increase the size of the pension funds by auto-enrolling all the employees under the age of 45 to the system. Even though it is mandatory to be enrolled in the system for those who are actively working, it is free to exit after two months. The sustainability of the current pension system is questionable in that sense. This study aim to develop a real estate-pension fund investment and financing ecosystem based on considering the local and international pension funds as the primary long term investors. The other financial institutions such as conventional and Islamic banks, insurance companies and other global and local funds are also encouraged to be involved in the system. The more the pension funds invest in Turkey Real Estate Fund, the more real estate projects will be financed, and this situation will grow both the sizes and the returns of pension funds and Turkey Real Estate Fund. This win-win case will eventually increase the returns of the investors.

1.5. Related Studies

The pension funds in the world are able to invest in many investment tools such as bonds, bills, stocks, funds, gold, sukuk and many other capital market instruments as well as real estate. Although the pension funds history backs to nearly a hundred years, they became a factor in real estate financing after the equity real estate started taking part in the pension fund investments in 1970, by taking part in open-end funds such as Prudential Insurance Company's Real Estate Investment Separate Account (PRISA) (Wiedemer, 1980; Ennis and Burik, 1991).

Pension funds are considered the most significant sources of financing for real estate developments (Rosentraub and Shroitman, 2004). In many researches, a good tie between the pension funds and real estate investment tools is observed. While

some of the researchers such as French (2001) focusing on the investors' perceptions toward real estate and discussing their behavioral aspects on decision-making process for pension funds in terms of asset location role, some of them focus more on cost and performance factors of the pension funds investing in real estate as Brueggeman *et al.* (1992) and Andonov *et al.* (2013) made.

These researches are good examples to Turkish pension system which may initiate a new pension tier based on investing in a mix of different real estate investment instruments.

1.6. Aims and Objectives of the Research

In order to overcome the financing problems of the real estate industry and help to finance large investments including private real estate developments, urban transformation projects and government investments such as healthcare, education, infrastructure and energy projects, to grow the size of the pension funds and to increase the returns of the investors, a new financing and investment ecosystem which integrates the current and alternative real estate financing instruments with pension funds was developed. This study also aimed to increase interest-free real estate investment options in order to attract more investors with religious concerns to enter into the system. In the lights of the results of the analysis, new and amended regulations to Capital Markets Board of Turkey for real estate industry and current pension system are recommended.

In this study, Turkey Real Estate Fund (TREF) that cover all the other many sub-funds that consists of REIFs, REITs, sukuk, real estate certificate and some other investment instruments such as participating banks shares that are indirectly related to real estate industry is introduced under one "fund of funds" umbrella. If the required regulations are issued in Turkey for Islamic REITs and Islamic REIFs, together with the current Venture Capital Investment Funds and Venture Capital Private Equity Trusts are also recommended to be included as sub-funds of TREF. The TREF may optionally be structured under Turkey Sovereign Wealth Fund (TSWF), which was introduced by the government in 2016. TREF is planned to act as the main regulator of the real

estate industry in Turkey, finance large investment projects, play an important role in housing sector, have many sub-funds consists of a pool of real estate investment tools and attract both Turkish and international pension funds and other financial institutions to invest in.

The analysis of the study consists of 4 major parts:

(i) The comprehensive analysis of REIT Index operating under Istanbul Stock Exchange, BIST 100 Index, Housing Sales and Rent Price Indices, Participating Banking and Pension Funds by evaluating the variables that effect their returns including selected macroeconomic variables; foreign exchange rates (USD/TL), inflation (consumer price index-CPI), central bank overnight lending interest rates, weighted average home interest rates, and gold and oil prices.
(ii) Forecast analysis of the returns of REIT Index, BIST 100 Index, Housing Sales and Rent Price Indices and average Pension Fund returns,
(iii) Forecast analysis of parameters of housing sector and pension funds including, housing units sold to foreigners, the size of home loans, mortgaged units sales, the size of the pension funds, participant number of the pension funds and size of the state contribution to the pension funds for the year 2017,
(iv) Sample size analysis of the suggested model.

The data of this study is collected from periodical statistics of the government institutions including Central Bank of the Republic of Turkey (TCMB), Turkish Statistical Institute (TUIK), Central Securities Depository of Turkey (MKK), Banking Regulation and Supervision Agency (BDDK), the US Energy Information Administration, as well as many global and prestigious sectoral and institutional associations and reports including Participation Banks Association of Turkey (TKBB), Reidin Real Estate Market Information Center, World Bank, OECD, EY, JLL, C&W, EPRA and Savills. Followings are the core objectives of the research:

- Introducing a real estate-pension fund investment ecosystem under the regulatory of newly introduced Turkey Real Estate Fund,

- Suggesting a new 4th tier pension system based on real estate investments, called as Real Estate Pension System (REPS),
- Recommending alternative financing instruments for real estate investment projects,
- Creating an alternative investment tool for investors especially for pension funds and increase the returns of individual and institutional investors,
- Developing interest-free real estate investment options in order to attract more investors with religious concerns.
- Suggesting Rental Income Based Financing (RIBF) model as an interest-free home financing option.

1.7. Research Method

In order to structure the model, after determining the factors affecting the returns of aforementioned dependent variables by conducting an extensive literature review, a forecast analysis of those dependent variables is made; then, the model, by discussing it with a group of experts was established, and finally a sample size estimation of the model was made.

When deciding the most appropriate methodology, a detailed literature review is made in order to compare the different options of methods. Since the data consists of a series of monthly data, it is decided to make time series analysis and conduct Vector Autoregression Model (VAR) which is commonly used and suggested in the literature for analyzing the factors affecting the returns of the dependent variables. Autoregressive Integrated Moving Average (ARIMA) method, very common and reliable econometric method is also selected for forecast analysis.

1.8. Scope and Limitations

This research focuses on bringing a solution to real estate project financing problems and aiming to increase the returns of the investors. The studied independent variables are macroeconomic factors, and company specific microeconomic variables were not investigated in this thesis, because the analysis focused on real estate indices

including REIT and housing indices rather than the real estate investment companies. Another limitation is about the past return data of the studied investment instruments. Since there is only one real estate certificate issued and one infrastructure REIT established so far, and no past data about the returns of the real estate investment funds established are available, the introduced model was tested with the forecast of the returns of the REIT index, housing sales and rent price indices and pension fund returns based on their past values. Although this seem a limitation, the returns of the data collected about REIT, BIST 100 and housing indices, the size of the mortgage loans and the data about the size and the average returns of the pension funds are found enough to structure and recommend the model.

1.9. Organization of Thesis

This study consists of eight Chapters. After the introduction Chapter that covers the background of the research, problem determination, problem statement, related studies, aims and objectives, research method, scope and limitations, and organization of the thesis, in Chapter 2, the Real Estate Industry including the existing real estate investment instruments were discussed. Then, in Chapter 3, Islamic Finance, and in Chapter 4, Pension Funds were examined respectively. These chapters were followed by Chapter 5, covering the research methodology, and by Chapter 6, the data collected, the results of the analysis and the details of the model. In Chapter 7, the results of the analysis were discussed in details and finally, conclusions formed the last Chapter of this study.

2. REAL ESTATE INDUSTRY

Real estate is defined as the physical property consisting of land and the buildings on it. Real estate also includes the natural resources of the land including minerals, water, and crops. Residential, commercial, industrial and vacant land categories are the main real estate market groups based on its use (Peiser and Hamilton, 2012). Real estate provide shelter, protection, comfort, convenience and privacy. Homes, factories, stores, malls, farms, roads, streets, parks, office buildings, recreational areas are all defined as real estate resources (Weimer *et al.*, 1972).

The real estate industry is one of the major industries that contributes to the economic development of countries. The size of the all globally developed real estate is estimated around 217 trillion USD which covers offices, healthcare facilities, industrial plants, hotels, residences, commercial buildings and farm lands. The total real estate assets of the world owns is nearly three times its annual income. The worth of global property in 2015 is calculated as 2.7 times of the world's GDP and covers about 60% of all mainstream global assets. Around 33% of the value of the global real estate market is estimated as investable and the remaining two third are not being publicly traded (Savills Report, 2016).

The worth of the global real estate is not distributed equally. While Western countries have the larger portion of the total asset value, especially in commercial market (North America and Europe cover almost 75%), less developed nations have a lesser share from the pie. Residential real estate, compared to commercial real estate is slightly more equally distributed. While only 5% of the total population live in North America, 21% of the global total residential asset worth are there, whereas China covering 25% of total residential asset value with 20% of shares in total population. It is estimated that in the case residential properties in the countries located in Middle East, Africa and Asia reach the world average, the world's residential asset values would increase by 32% or 52 trillion USD (Savills Report, 2016).

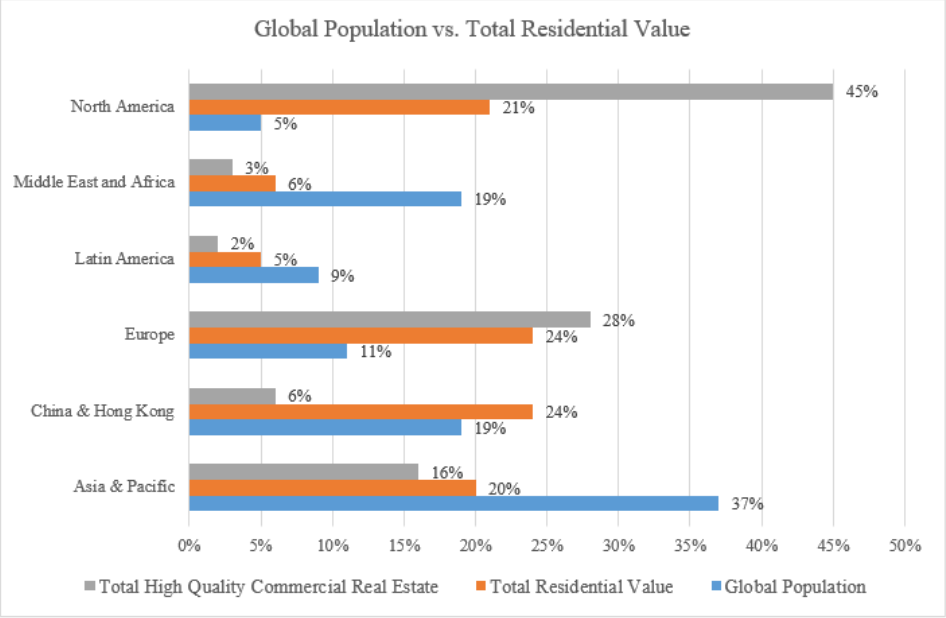


Figure 2.1. Global Population vs. Residential and Commercial Real Estate (Savills, 2016).

The real estate industry in Turkey started growing rapidly after the economic crisis in 2001. Increase in demand for both commercial market including high quality office and retail spaces and periodic decreasing interest rates have been the main facilitators for the remarkable development of the real estate industry. As of the end of 2016, there are currently 375 shopping malls with an 11.2 million sq. m GLA which is about 7% of the total GLA of shopping malls in Europe covering 156.3 million sq. m. By the end of 2019, the total number of shopping malls in Turkey will increase to 436 and the total GLA will reach to almost 14 million sq. m. The retail density (sq. m/1.000 inhabitants) is 142 as of 2016 and this density will be 166 by the end of 2019 (JLL Turkey Commercial Market Overview, 2016).

Despite these high levels of development, the density of shopping malls in Turkey is below the CEE average of 408.7 sq. m/1,000 inhabitants (C&W European Shopping Center Dev. Report, 2016).

Table 2.1. Retail Supply GLA Sq. m (JLL, 2017).

Retail Supply	**Active**	**Under Construction (end of 2019)**	**Total**
Istanbul	4.112.803	1.585.859	5.698.662
Ankara	1.496.806	223.668	1.720.474
Rest of Turkey	5.574.501	936.674	6.511.175
Total	11.184.110	2.746.201	13.930.311

Table 2.2. Retail Supply Units (JLL, 2017).

Retail Supply	**Active**	**Under Construction (end of 2019)**	**Total**
Istanbul	108	32	140
Ankara	38	7	45
Rest of Turkey	229	22	251
Total	375	61	436

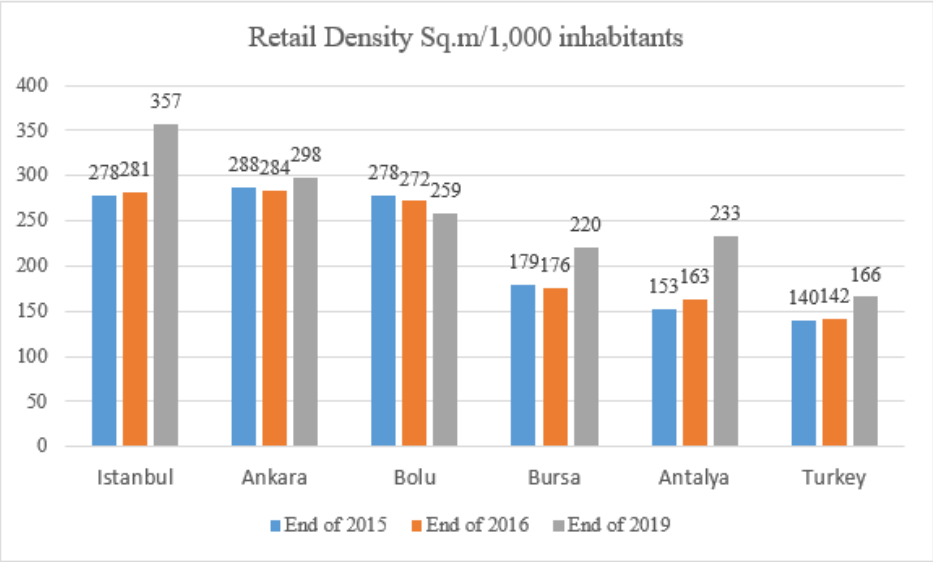


Figure 2.2. Shopping Center Development and Retail Density in Turkey (JLL, 2017).

The size of the office market in Turkey is 4.8 million sq. m with 253 units developed. After the current developments are completed, this number will reach to

282 and the GLA will increase to 6.9 million sq. m by the end of 2019. The rise in the size of the office market and the vacancy rates are evaluated in line with the demand of local and international companies investing in Turkey.

Table 2.3. Office Supply and Demand in Turkey (JLL, 2017).

S&D	**2016**		**2019**	
	Units	**GLA (sq. m)**	**Units**	**GLA (sq. m)**
Europe	139	3.077.543	154	3.910.189
Asia	114	1.739.963	128	2.998.374
Total	253	4.817.506	282	6.908.563

Housing sales is another important parameter for understanding the picture of the real estate industry. The total housing units sold has been increasing in Turkey. From 2013 to 2016, the yearly total housing units sold increased from 1.15 million units to 1.34 million units. The total number of mortgaged home sales and the units sold to foreigners are explained in details in Chapter 6.

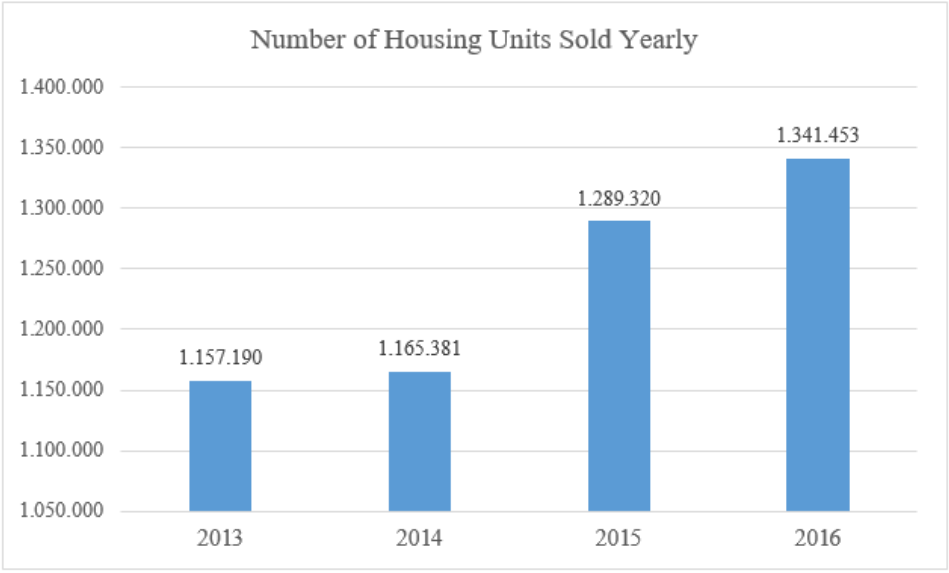


Figure 2.3. Number of Housing Units Sold Yearly in Turkey (TUIK, 2017).

Logistics market is also important indicators to have more detailed information about the industry side of Turkish real estate market. According to JLL Report, 2016,

logistics companies occupy 55%, retail covers 14%, and e-commerce companies cover 8% of total GLA of logistics area in Turkey, and the total vacancy rate is 11%. There are more than 9 million sq. m developed logistics area located in Istanbul and Kocaeli where around 2 million sq. m area are also planned. Although there is a decrease in the total developed area in 2016, the sector has a potential for new development.

2.1. Real Estate Investment Trusts

Real estate investment trusts (REITs) are important real estate capital market instruments. Brueggeman and Fisher (2011) define REIT as a real estate company or trust that distributes to its shareholders substantially all of its taxable earnings and any capital gains obtained from the sale or disposition of its properties. REITs are closed-end investment companies which manage a set of real estate based projects including real estate focused capital market vehicles. REITs are important facilitators of the fund flows for real estate markets. Since a very few investors have enough financing ability to own real estate directly, REITs are considered important investment tools in direct real estate ownership and lending. Equity REITs which own, operate and trade physical real estate assets; mortgage REITs which commercial and residential mortgages are traded by, and hybrid REITS as the combination of both are the three major types of REITs. Real estate property rents are the main source of revenue of equity REITs, while the mortgage REITs generate their revenues from interest through mortgage loans (Investopedia, 2017).

There are broad researches made about REITs worldwide. Fama and Schwert (1977) studied the hedging effects of various assets against inflation and concluded that private residential real estate provides hedge against both expected and unexpected inflation.

Liu and Mei (1992) examined equity REITs return predictability and their co-integration with other stocks, and they found that expected excess returns of equity REITs are more similar with the returns of small cap stocks than with those of bonds. Myer and Webb (1993) made a comparative study about the equity REIT returns,

common stock, closed end stock funds and unsecuritized commercial real estate. Their results exhibited that the similarity between the returns of equity REITs, stocks and closed-end funds are more than the unsecuritized commercial real estate returns. Redman and Manakyan (1995) made a study about risk-adjusted performance of REIT's and they used Sharpe ratio in their analysis. The factors that affect the risk-adjusted returns were found as the financial ratios, place of properties and investment types. Kuhle (1987) investigated diversification effects on the decrease of total portfolio risk in REITs and diversified assets. He also compared the performances of common stock, mixed assets and REITs. The results showed that except for a mixed asset portfolio that contains 8 or more equity REITs, the performance of mixed portfolio of common stock and REITs are similar to those of portfolios consists of just common stocks.

Newell and Osmadi (2009) compared three Islamic mortgage REITs and conventional mortgage REITs in Malaysia in terms of performance and portfolio diversifications for the period between 2006 and 2008, and they concluded that Islamic mortgage REITs do not exhibit similar investment characteristics with conventional mortgage REITs.

Ong *et al.* (2012) and Mohamad and Saad (2012) studied the conventional and Islamic REITs performances and although their analysis gave an insight about the Islamic REITs, they concluded that more data are required for further investigation.

Ro and Zibrowski (2011) compared the performances of the specialized and diversified REITs and found that specialized REITs slightly underperform diversified REITs. Their results also exhibited that specialized REITs are more risky than diversified REITs.

Case *et al.* (2012), compared the returns of publicly traded REITs and non-REIT stocks in three different time frames. Their results suggested that REIT-stock correlations were high when the REITs were started to trade publicly and this correlation was declined thereafter and increased in the last period.

Marcato and Brounen (2015) investigated whether the real estate stock are as liquid as common stocks in major developed countries that cover the 75% of the world's REIT market. They concluded that the most liquid real estate markets are U.S., Japanese and Australian markets. They also exhibited that when economy weakens, the listed real estate securities provide hedge against inflation in developed markets. The history of REITs backs to 1960's when the Real Estate Investment Trust Act was issued in 1960 in the US. In fact, the 1960 Trust Act was a development of the Massachusetts Business Trust Act of 1827. The REIT Act of 1960 essentially applied the business trust concept which was defined as an entity that is formed to hold property which is managed by trustees for the profit of stakeholders in the trust to real estate. In order to encourage a person to buy stock in a corporation that qualified itself as a REIT, the trusts were corporate tax exempted, provided that at least 90% of the profits is distributed each year as dividends (Wiedemer, 1980; Barclays US REIT Report, 2012; EPRA Global Real Estate Survey, 2016).

This law enabled individual investors to invest in a corporate structure and thus gain the profits of income-generating real estate ownership. Since REITs are publicly traded and no large and long-term financial commitment is required, the investors are able to transfer their ownerships of their shares. This provides an investment opportunity for them to gain the economic and other benefits of real estate investments. While small individuals are able to invest in REITs, large institutional investors such as pension funds are also considered important investors of REITs (Han and Liang, 1995).

Global market capitalization of REITs is approximately $1.7 trillion USD. The US covers 65% of the total REIT assets. Australia and Japan following the US are the second and third largest global REIT markets, respectively. Australia, New Zealand and the Netherlands are early adopters' countries among 36 countries in the world with REIT or REIT like regimes (Global perspectives: E&Y REIT Report, 2016; EPRA Global Real Estate Survey, 2016). Table 4.2. shows the major countries that adopted REITs.

REITs are regulated as Real Estate Investment Companies (REICs) in Turkey. REICs in Turkey aim to generate new financing options for the sector. In order to support the development of the real estate sector in Turkey, authorities have provided flexibility in managing their portfolios and some important tax incentives for REICs. Increasing the recorded rate of the real estate market and making the industry more transparent through independent SPK licensed appraisal companies are also two important goals of REIC regulations.

The past studies about REITs in Turkey focused on different aspects of the industry. Ekincioglu (2003) investigated the hedging effectiveness of Turkish REIT index by using Fama-Schwert model, and he concluded that the REIT index returns provide protection for the investors against inflation.

Erol and Tirtiroglu (2008), analyzed the hedging capabilities of REITs in Turkey and common stocks indices listed on the Istanbul Stock Exchange against inflation. The results of their study exhibited that the hedging abilities of Turkish REITs against both real and anticipated inflation is better than Istanbul Stock Exchange index. They also concluded that the hedging power of REITs are more in high inflation environment than under moderate inflation situations. Onder (2010) also examined the hedging behavior of real estate investment under high inflation, and she figured out that unlike the findings of Ekincioglu (2003) and Erol and Tirtiroglu (2008), real estate investments are not able to provide protection in inflationary environment because of the periodical adjustment of the interest rates on loans under inflationary situations.

Aydinoglu (2004) in his research discussed the general structures of REITs in Turkey and applied Modern Portfolio Theory (MPT) to examine the fitness of the REIT stocks individually and as an industry into optimal risky portfolios at various risk and returns preferences.

Akkaya *et al.* (2005) made a research about fundamentals of REITs in Turkey and discussed the general structures of REITs. Another study made by Ciller (2007) analyzed the Turkish residential real estate investments.

Yildirim (2008) analyzed the capital structures of Turkish REITs and aimed to understand the effects of institutional and country and firm specific factors on Turkish REITs sector. The results of the analysis showed similarities in terms of the significance of capital structure determinants for debt financing choices, but the Turkish real estate market and Turkish REITs have different institutional and country specific factors.

Hayta (2009) examined the REITs in Turkey and other countries from operational, legal and historical perspectives. According to the analysis of his results, REITs do not exhibit significant positive performance during the sample periods for all the models he used.

Kiyilar and Hepsen (2010) analyzed the risk adjusted return performances of REITs by comparing them with average performance of common stocks covering 8 REITs in between 2000 and 2008. They used Sharpe and Jensen performance measure and concluded that except two of eight REITs perform better than the overall market portfolio during the sample period. Another research made by Hepsen (2012) investigated the presence of calendar anomalies on the daily returns at Istanbul Stock Exchange REIT market by using ordinary least squares (OLS) model. The results proved the existence of daily, weekly and monthly effects.

Mandaci *et al.* (2014) studied the long-run relationships between the REIT indices of the UK, Turkey and Israel in the Euro-Med zone by using weekly data over the period of 6 years starting from 2003Q3 to 2009Q3, which included the US subprime mortgage crisis and its effects on global stock markets. Their results exhibited that while there is a long-run interaction between the REIT indices of UK and Israel with that of the US, no co-movement between REIT indices of Turkey and the US is observed. In addition, a perfect relationship between the UK and the US indices is found. Icellioglu (2012) made the econometric analysis of Istanbul housing market. She studied the relation between the housing price index and the rent index of the chosen districts of the city. The results of her analysis exhibited that an increase of 1 unit-price for the house prices causes an increase of 0.68 unit-price for the rents.

Table 2.4. The REITs in the World (EPRA, 2016).

Country	Enacted Year	REIT Type	Number of REITs	Market capitalization (Euro m)	% of Global REIT Index	Legal form	Minimum share capital
USA	1960	Corporate type	220	Euro 986770.0	65.19%	Any legal US entity	No
Australia	1985	Trust type	61	Euro 106458.0	7.47%	Unit trust	1 AUD
Japan	2000	Trust or corporate type	56	Euro 102695.0	7,43%	Corporation (in practice)	JPY 100 million
UK	2007	Corporate Entity	36	Euro 56585.0	4,58%	Listed closed-ended company	GBP 50.000 (if listed in UK)
Canada	1994	Trust type	46	Euro 41180.0	2,95%	Unit trust	No
Netherlands	1969	Corporate type (only for corporate taxpayers)	5	Euro 29124.0	2,64%	Dutch private limited liability company (BV). - Dutch public limited liability company (NV). - Open-ended mutual investment fund (FGR). Comparable foreign legal entity.	BV: None - NV: EUR 45.000 - FGR: None
France	2003	N/A	32	Euro 49357.0	1.93%	Joint stock company, Partnership limited by shares	EUR 15 million
Singapore	1999	Trust type	44	Euro 51236.0	1.68%	Trust	SGD 300 million
Hong Kong	2003	Trust type	13	Euro 28828.0	1.58%	Unit trust	No
South Africa	2013	Legally a company or trust		Euro 34.0	1,46%	Unit trust	to own at least R300 million of property and its debt must be kept below 60% of its gross asset value.
Mexico	2004	Trust	13	Euro 14261.0	0.65%	Trust	No
Belgium	1995	Corporate type	17	Euro 11027.0	0.57%	Belgian public limited liability Company. Belgian limited partnership with shares	EUR 1.25 million
Spain	2009	Corporate type	5	Euro 7806.0	0,53%	Listed join stock corporation (Sociedad Anónima).	EUR 5 million.
Turkey	1995	Corporate type National Stock Exchange Commission	31	Euro 6763.0	0,19%	Joint stock company	TRY 30 million
Germany	2007	Corporate type	4	Euro 2792.0	0,19%	Joint stock company	EUR 15 million
Malaysia	2002	Trust type	16	Euro 6381.0	0,18%	Unit trust	USD 25 million in Jul-16

Yildirim (2012) defined the risks in real estate industry and analyzed the risk return calculations. The results showed that any volatility in real estate sector affected the financial markets. The problems behind not being able to calculate the risks are determined as the insufficiency of valuation standards, the volatility of capital structures and political instability.

REICs operate in Turkey primarily under the administration of Capital Market Boards of Turkey (SPK), a regulatory and supervisory agency since 1995. First initial public offering was made in 1997 under the Istanbul Stock Exchange (BIST) earlier than many European countries. Since then, 31 REICs were established within 20 years period (SPK, 2017).

According to the SPK monthly statistics bulletin, as of December 2016, total market value of 31 REICs in Turkey is around 7.1 billion USD. Although Turkey is one of the earliest countries that adapted the REIC regime, the total share of its total assets among the global REIT industry is below 1%. (EPRA Global Real Estate Survey, 2016).

"The general guidelines of joint stock companies are regulated by Turkish Commercial Code. REIC specifics shall be determined by the Capital Markets Law (CML) and the Communiqué. "Real estate investment company" should be included in the company's name. The minimum capital requirement for a REIC is TRY 30 million for the year 2016. REIC's, within 3 months as of their registration of establishment, are obliged to offer at least 25% of their shares to the public" (SPK, 2017).

"At least 75% of the REIC's portfolio must consist of assets mentioned in its title and/or articles of association, in case a REIC is established with the purpose of operating in certain areas or investing in certain projects. Real estates, rights supported by real estates and real estate projects at a minimum rate of 51% of their portfolio values, time deposit and demand deposits in Turkish Lira or any foreign currency for investment purposes at a maximum rate of 10% of their portfolio values are the areas that REICs can invest in.

Table 2.5. Net Asset Value of REITs in Turkey (SPK, 2016).

NET ASSET VALUE OF REAL ESTATE INVESTMENT TRUSTS			
Market Value			
Year	**Number**	**Thousand TRY**	**Million $**
2011/12	23	11.708.492	6.224
2012/12	25	15.781.822	8.857
2013/12	30	18.632.452	8.730
2014/12	31	21.981.323	9.462
2015/12	31	21.279.729	7.279
2016/12	31	24.961.535	7.080

The rate of vacant lands and registered lands that are in the portfolio for a period of five years that have not been subject to any project development should not exceed 20% of the portfolio value. There are some limitations about the activities of REICs. They cannot be involved in capital market activities except for its own portfolio limited to the investment areas. They cannot be a constructor in a real estate investment project, they are not able to operate any facility including hospitals, shopping malls, business centers, tourism facilities, commercial parks and warehouses, residential buildings, groceries and similar type of real estates and employ any personnel for this purpose. It is forbidden for REICs to engage in commercial, industrial or agricultural activities other than the transactions permitted. Granting loan or committing in any debit/credit transaction which is not related to good/services purchase and sale with their participations, making undocumented expense or commission payments or which materially differs from the market value and selling or purchasing real estate for short-term consistently are also not allowed for REICs. Foreign real estate investment is limited for REICs with 49% of their portfolio value. REICs are free to decide whether to distribute profit/make dividend payment in accordance with the communiqués regarding dividend distributions" (EPRA Turkey REIT Survey, 2016). In Table 2.5, the number of REICs in Turkey is shown with an increase from 23 to 31 within last 5 years and a doubled market value (in TRY currency) in the same time frame.

Sumer and Ozorhon (2016) analyzed the returns of REIC index BIST 100 and other major indices of Istanbul Stock Exchange in between January 2011 and March 2016, and the results of their research exhibited that the returns of REIC index is strongly correlated with BIST 100 index which means REIC index and BIST-100 are integrated. This integration can be interpreted as a disadvantage and risk for shareholders of the REICs. Since REICs operate under stock exchange and is integrated with BIST 100, they can easily get affected from negative economic or political conditions. This may cause the investors to decrease or remove their investments from REICs in any sudden negative economic situation. Since REICs can develop different types of projects, they also bear the development, construction, legal and operating risks of the projects. This also seem another disadvantage of REICs.

2.2. Real Estate Investment Funds

A real estate fund, a form of mutual fund, primarily invests in securities offered by real estate companies. Although the main investment areas of real estate funds are commercial assets; raw land, residential buildings and agricultural spaces may also be included in their investments, as well as the REITs (Investopedia, 2017).

According to Preqin Real Estate Report (2016), there are 525 private real estate funds in the global market as of the beginning of 2017. In 2016, 225 real estate funds raised 108 billion USD, 36% of which was collected by the largest 10 real estate funds. The average size of the real estate funds are 499 million USD and average returns in three years by June 2016 is calculated as 14.9% .

Real Estate Investment Fund (REIF) is a very new and promising real estate investment vehicle in Turkey. The SPK issued the regulation in 2014 and although there are some funds that got permit for establishment, there are only 4 real estate funds that has established so far (SPK Monthly Statistics Bulletin, December 2016). REIF does not have a legal entity and is established by portfolio management companies or real estate portfolio management companies which hold an operating license from SPK.

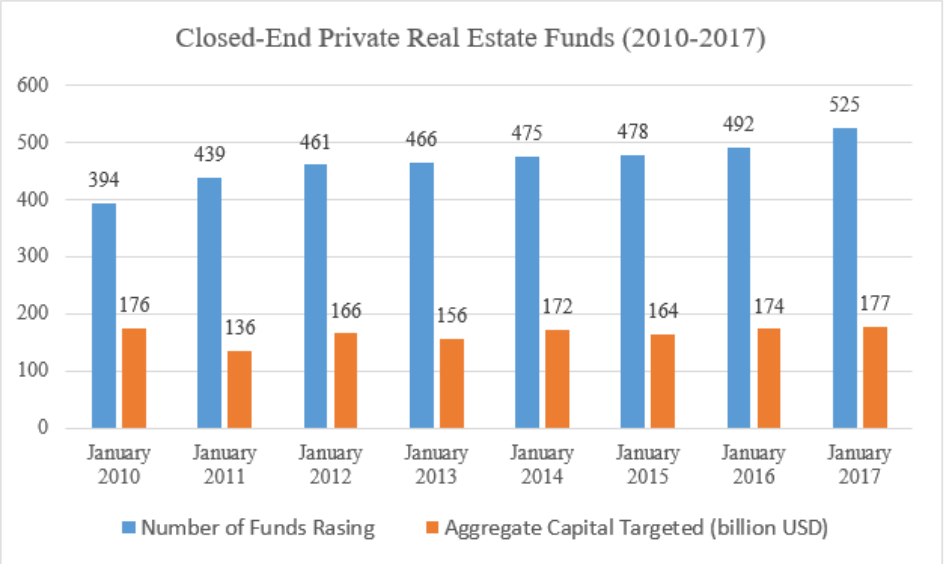


Figure 2.4. Closed-End Private Real Estate Funds 2010-2017 (Preqin Real Estate, 2017).

According to the regulation issued by SPK in 2014, real estate investment funds are able to manage portfolios comprised of the real estates and property rights, private and public debt instruments, and shares of joint-stock companies established in Turkey, including those in the privatization process, foreign private and public debt instruments and joint-stock company shares tradable within the framework of related laws, time deposit and participation account, investment fund units, repo and reverse repo transactions, warrants and certificates, lease certificates and real estate certificates, settlement and custody bank money transactions, cash collaterals and premiums of derivative transactions, specially designed foreign investment instruments and loan participation notes deemed appropriate by the Board, other investment instruments deemed appropriate by the Board. Fund portfolio value shall reach a minimum size of 10.000.000 TL within one year as of the establishment and the cash collected from fund holders shall be invested within the portfolio restrictions set forth in the Communique (SPK, 2017). Like the REITs, the REIFs are also corporate tax exempt, but main limitation which can be accepted as a disadvantage for REIFs is that the REIFs cannot make investment in an uncompleted real estate project. This limitation does not allow the REIFs to invest in and indirectly finance an ongoing investment project. Another

disadvantage of REIFs, especially for small investors, is that the investors should have at least 1 million TL asset in order to make investment to a REIF. This avoid small investors to make investment to real estate investment funds.

2.3. Real Estate Certificate

Real estate certificate is another instrument that the government issued for supporting the real estate industry. Real estate certificates is aimed to provide investors with the option to have the partial ownership of the property on condition that the purchaser of the certificate possesses sufficient investment size expressed in square meters. Investors may either retain the certificate until maturity or sell it off to another investor. Furthermore, investors may sell off the real estate certificates before maturity on the stock exchange or may ask the issuer of the certificates, to provide them with liquidity. The issuer of real estate certificates would provide investors with a repurchase guarantee in certain predetermined periods. Moreover, the issued certificates could be sold via the stock exchange either by the direct involvement of the issuer construction firm or via an intermediary financial institution. This enables the real estate certificates to gain a liquid characteristic through continuous transactions on the stock exchange in accordance with negotiations among investors.

Private firms are allowed to finance at most 50 percent of their residential and commercial projects through the issue of real estate certificates except for the urban transformation projects where all costs can be financed through these tools The Capital Markets Board (SPK) considered the use of real estate certificates first in 1995; however, despite many attempts to promote their use in the real estate sector, facing funding problems, these certificates were not demanded as a financial tool due to the common belief that the benefits for both the issuing firm and the investors are questionable. In this respect, through more detailed regulations, these uncertainties are trying to be eliminated. Since the use of this instrument is not common yet, it is needed to be monitored whether these financial instruments are going to be successful investment and financing tools (Communique on Real Estate Certificates SPK, 2017).

3. ISLAMIC FINANCE

Islamic finance is a financial system that operates under the principles of Islamic law. Promoting trading and commerce together with promoting fairness and social justice are the core concepts of the Islamic financial system (Alrifai, 2015). Islamic finance is an important tool for the development of finance industry not only for Muslim countries but also for the states including the UK, Luxembourg, South Africa, and Hong Kong. Islamic banking started in the early 1960s in Egypt in its modern form. Islamic Development Bank (IsDB) was founded in 1975 just after the launch of the Dubai Islamic Bank which is the first major Islamic commercial bank in the United Arab Emirates (Hussain *et al.* 2015). Main financial markets are discovering Islamic finance as a trending phenomenon has already been mainstreamed as an alternative to traditional finance within the global financial system.

The Islamic finance industry, by growing at 10-12% annually has expanded rapidly over the past decade. As of the end of 2015, Sharia-compliant financial assets reached to 1.88 trillion USD, covering banking assets, sukuk, Islamic funds' assets and insurance (Takaful) (IFSI Stability Report, 2016, World Bank, 2015).

Table 3.1. Breakdown of Islamic Finance by Region (IFSI, 2016).

Region	**Banking Assets**	**Sukuk Outstanding**	**Islamic Funds' Assets**	**Takaful**	**Total**
Asia	209.3	174.7	23.2	5.2	412.4
GCC	598.8	103.7	31.2	10.4	744.1
MENA (exc. GCC)	607.5	9.4	0.3	7.1	624.3
Sub-Saharan Africa	24	0.7	1.4	0.5	26.6
Others	56.9	2.1	15.2		74.2
Total (billion USD)	1.496.50	290.6	71.3	23.2	1.881.60

According to the Thomson Reuter Report (2017), as of 2015, there are 480 Islamic banks, 322 takaful company and 527 other Islamic financial institutions. In Figure 3.1.

the growth trend of the Islamic finance asset is shown. By 2021, it is estimated that the total size of the Islamic finance assets will reach to 3.4 trillion USD. Figure 3.2. shows the Islamic banking shares in total baking assets for different countries.

In Figure 3.3, the share of global Islamic assets are shown. According to the IFSI Report (2016), Iran (37.3%), Saudi Arabia (19%), Malaysia (9.3%), UAE (8.1%) and Kuwait (5.9%) are the top 5 countries which adopted and widely use Islamic banking. Although the low share of 2.9%, Turkey is considered as one of the major countries that Islamic financing will grow in the next decades.

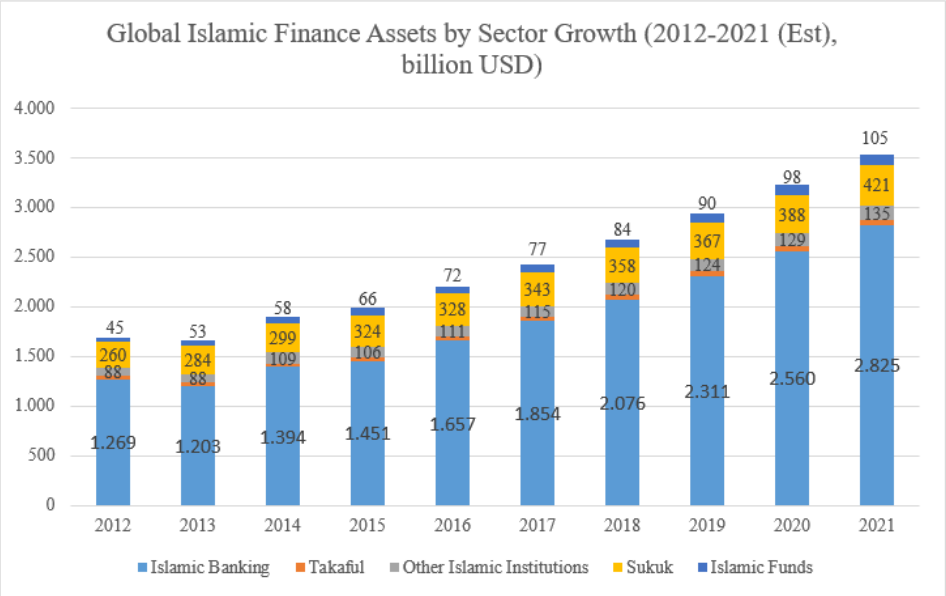


Figure 3.1. Islamic Banking Asset Growth Trend (ICD-Thomson Reuter, 2017).

In many majority Muslim countries, the growing rate of Islamic banking assets are faster than conventional banking assets. Islamic finance is backed by assets and is considered an ethical and sustainable finance tool. Risk sharing, which links the financial sector and real economy by emphasizing social welfare with its environmentally and socially responsible perspective is important in Islamic finance.

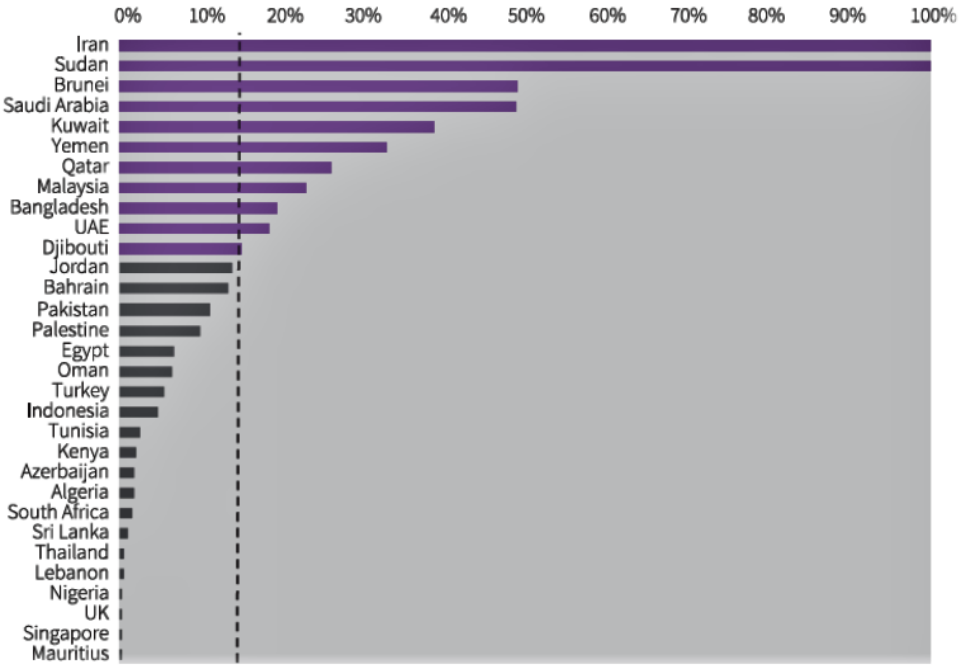


Figure 3.2. Islamic Banking Share in Total Banking Assets (IFSI, 2016).

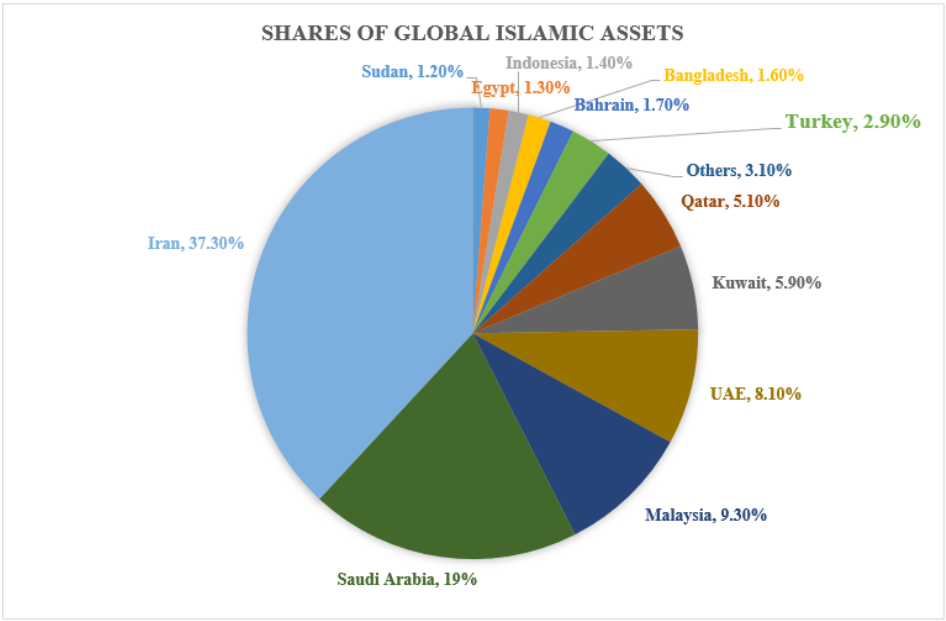


Figure 3.3. Islamic Banking Shares Globally (IFSI, 2016).

Figure 3.4 represents the number of components and the market capitalizations of the Islamic and conventional finance of Dow Jones index. Although the asset size is much smaller and the components are quite less than the conventional financial markets, the returns of Islamic Financial Market is higher than conventional index as

shown in Table 3.2.

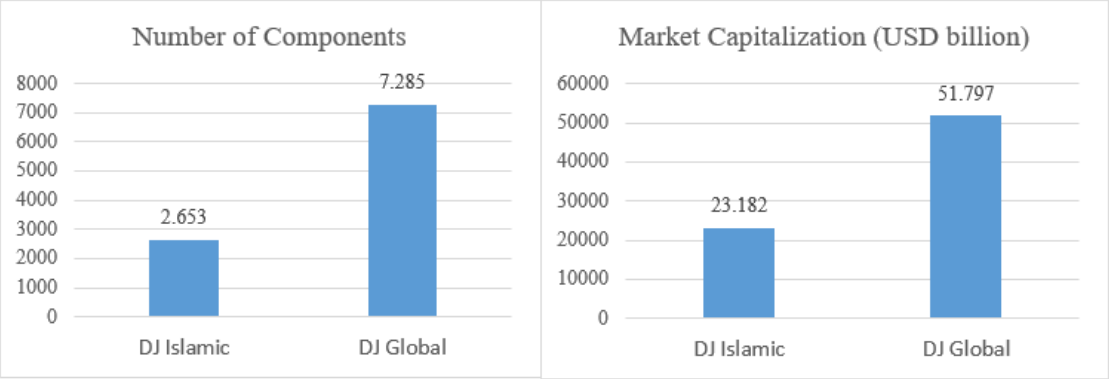


Figure 3.4. Dow Jones Islamic Banking vs. Global (IFSI, 2016).

Table 3.2. The Total Returns of Dow Jones Global vs. Islamic Market World (IFSI, 2016).

	Dow Jones Global Index	**Dow Jones Islamic Market World Index**
2015 YTD	-4.23%	-3.08%
3 Years	23.50%	25.70%
5 Years	32.80%	37.60%
10 Years	37.50%	59.90%

As of October 2015, there are 1220 publicly available Islamic funds with a total value of 71.3 billion USD. The average fund size is 58.4 million USD. As shown in Figure 3.5, Saudi Arabia is the main country for Islamic fund assets. Islamic funds invest in real estate and sukuk 6% and 7% respectively.

Islamic funds provide socially responsible and ethical investment opportunities to many institutional investors by using many Sharia-compliant financial tools (IFSI Stability Report, 2016). In Islamic finance, being converted into a productive activity is the main condition for money to make money (Alrifai, 2015).

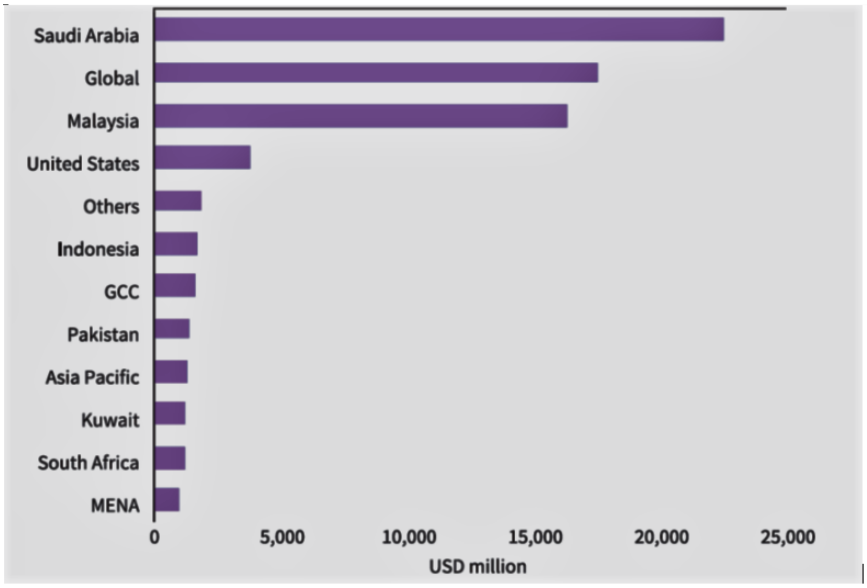


Figure 3.5. Islamic Fund Assets by Geographical Focus (IFSI, 2016).

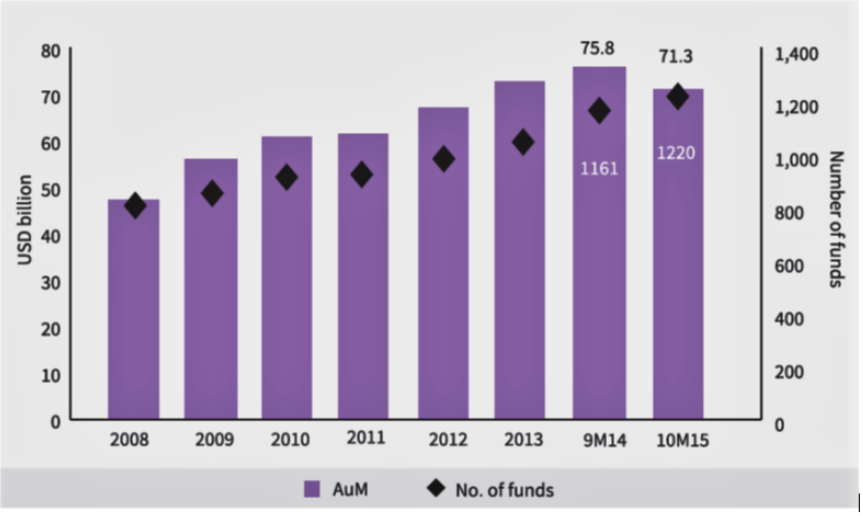


Figure 3.6. Assets under Management of Islamic Funds (IFSI, 2016).

According to World Bank Report 2015, the rate of the bank users among 1.6 billion Muslims is just 14%. Islamic finance is an option and opportunity to respond the requirements of the people who don't prefer to use conventional systems due to religious concerns.

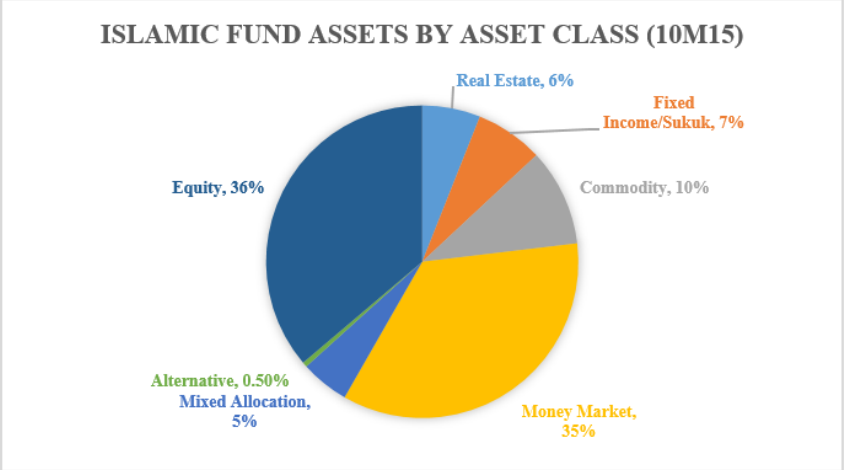


Figure 3.7. Islamic Fund Assets by Asset Class and Domicile (IFSI, 2016).

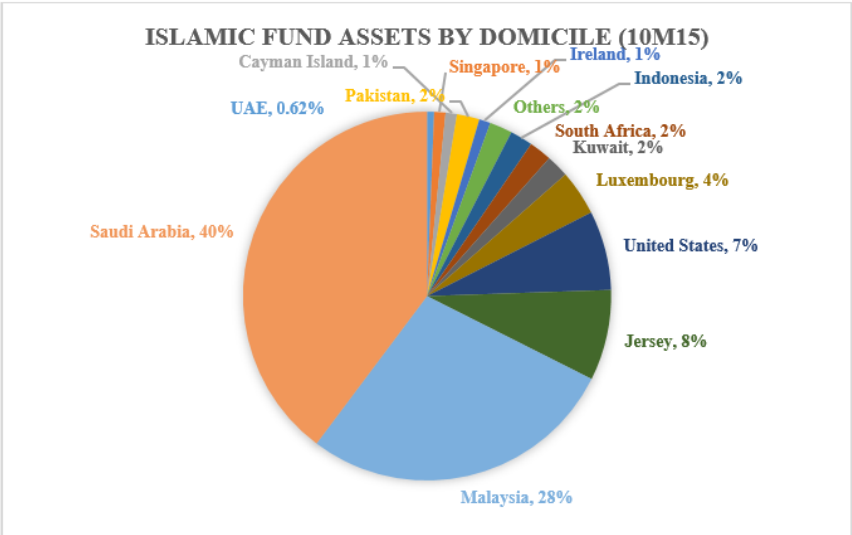


Figure 3.8. Islamic Fund Assets by Asset Class and Domicile (IFSI, 2016).

Prohibiting riba, which means the payment and receipt of all kinds of interest, materiality which is defined as linking the financing and returns with real assets, not engaging in corrupt or unethical industries such as pork meat or alcohol production and linking the return to risks, prohibiting the uncertainty or asymmetrical information (gharar) and gambling and speculating (maysir) are the key rules of Islamic finance which is required to follow the Islamic Law (Shariah). The risk sharing and speculation free rules of Islamic finance protected Islamic financial establishments from 2008 global financial crisis. This situation enhanced the interest-free investment vehicles (World

Bank, 2015).

Murabaha, ijara, mudaraba, ijara, musharaka, bai'muaccal, bai'salam and sukuk are the main tools of Islamic financing.

Murabaha (cost plus financing) is a property purchasing transaction with free and clear title. A percentage is added as profit which is not considered as an interest bearing loan for the purchased asset on behalf of client. The ownership of the property or the asset is remained with the purchaser until the client pays the loan completely. Ijara (leasing) means the sale of the right to use an asset for a determined time period. In ijara transactions, the leased asset is owned by the lessor until the end period of the lease. Assets are purchased by bank on behalf of the client and they are allowed to be used for a fixed rental payment. The financial institution keep the ownership of the assets but may progressively transfer to the client who may ultimately become the possessor (World Bank, 2015).

Mudaraba (profit sharing) is defined as a trust financing contract. It is a partnership where the mudarib provides the know-how and labor, and the other party is responsible for providing the financing. In mudaraba, the parties share the profit in accordance with a predetermined ratio and return is not guaranteed for investor, yet they may bear financial losses if any. Musharaka means a profit-loss partnership, not necessarily in relation to contributions, but the parties share the losses in percentage to their capital contributions. Bai'Muajjal, which means deferred payment sale contract. At Bai'Muaccal, no delayed payment is requested from the buyer in which the seller makes a profit on his purchase he made for the buyer where he receives his payment at future date at once or in installments. At Bai'Salam, the payment is made in advance but the delivery of the product is made later. Istisna'a is a contractual agreement used for financing construction projects including houses, plants, bridges, roads and highways. The customer/investor pay the contractor in installments for the build delivered (State Bank of Pakistan, 2017).

Sukuk are called as the certificates of ownership which gives the investor a share of an asset, along with the appropriate cash flows and risk by following the Islamic laws (Islamic Development Bank, 2017).

Among these non-interest financial instruments, sukuk, also named as interest free bonds started being used commonly both in the world and in Turkey. Sukuk is defined as a project financing instrument issued in accordance with the Shariah principles in the Islamic capital market. The Arabic origin of the term sukuk is plural for the word sak which means certificate or certificate of property (Saripudin *et al.* 2012).

Sukuk is recognized as an alternative tool for financing and investment which follows the Islamic laws. Sukuk is based on tangible assets (Hussin *et al.* 2012).

The differences between traditional bonds and sukuk can be categorized in 5 main points.

Table 3.3. Sukuk vs. Traditional Bonds.

Sukuk	**Bonds**
Ownership of assets	Debt obligation
Sharia compliant	Non Sharia complaint
Based on the value of the assets backing	Based on credit rating
The value of sukuk can increase	Profits corresponds to fixed
when the value of asset increases	interest rates
Sale of ownership	Sale of debt

A Malaysian company, issued the first sukuk in 1990. Then, in 1996, Kuala Lumpur Airport Company used sukuk for financing (Hussain *et al.*, 2015).

The major sovereign sukuk issuances are Malaysia, United Arab Emirates, Saudi Arabia, Indonesia and Turkey. The UK, South Africa, Hong Kong and Luxembourg

are the new players in the sukuk world.

Globally, corporate sukuk issuances constituted 36% and 39% of the total volume of international sukuk issuances in 2014, and 2015 respectively. Participation by the UK and Luxembourg, as well as other newcomers have been kindly welcomed by other market participants because sovereign participation in those countries open the way for corporate involvement therein. Between 2012 and 2014, two corporate sukuk issuances originated in France, one potential issuance received approval in Turkey and one in Germany. Among sukuk issued by corporations in the GCC and Malaysia, 49 are listed in the London Stock Exchange, 29 are listed on the Irish Stock Exchange, 16 are listed on the Luxembourg Stock Exchange and 13 are listed on the Frankfurt Stock Exchange (IIFM Sukuk Report, 2015). In 2012, the yearly global sukuk issuance reached to 137.6 billion USD. According to IIFM Sukuk Report (2015), in between 2001 and 2015, the majority of sukuk issuance took place as ijara sukuk (28%). This was followed by wakala and musharaka sukuk with 19% and 16% respectively. In Table 3.4 some of the main sukuk issuance greater than 200 million USD and longer than 1 year tenor in 2015 are listed.

Malaysia, with 67.4% issuance is the dominant player in the sukuk market. Malaysia is followed by UAE and Saudi Arabia with 8.1% and 7,6% respectively. The total sukuk issuance in Turkey covers only 1.5% of the total sukuk market. In Malaysia, there are 1.760 outstanding sukuk issuance with a 188.7 billion USD, whereas in Turkey, this number is 22 and the outstanding value is just 10 billion USD (IIFM Sukuk Report, 2015).

Turkey is one of the top emerging markets with a dynamic and strong growth market that offers a wide range of profitable investment opportunities. Istanbul, particularly due to its geographical and political position integrating the east and west, is believed to be an international financial center especially in terms of Islamic capital markets. In order to reach more local and global investors, diversifying the range of products is important in that context.

Table 3.4. Landmark Sukuk Issuances for 2015 (IIFM, 2015).

Issuer	Type of Sukuk	Sukuk Issuance Currency	International /Domestic	Structure	Millions USD or Equivalent	Rate of Return	Average Tenor Years
Albaraka Turk	Corporate	USD	International	Sukuk Al Wakalah	250	10.5	10
Government of Oman	Sovereign	OMR	Domestic	Sukuk Al Ijarah	647	3.5	5
Government of Bahrain	Sovereign	BHD	Domestic	Sukuk Al Ijarah	530	5	5
Islamic Development Bank	Quasi-Sovereign	SAR	Domestic	Sukuk Al Wakalah	514	1.83	5
Benth Restu Berhad	Corporate	MYR	Domestic	Sukuk Al Murabahah	235	4.62	10
Garuda Indonesia	Corporate	USD	International	Sukuk Al Wakalah	500	5.95	5
TH Plantations Bhd	Corporate	MYR	Domestic	Sukuk Al Murabahah	233		5
Dubai Islamic Bank	Corporate	USD	International	Sukuk Al Wakalah	750	2.92	5
Khaznah Nasiona Berhad	Sovereign	MYR	Domestic	Sukuk Al Musharakah	824	4.88	10
Government Investment Issue	Sovereign	MYR	Domestic	Sukuk Al Murabahah	6824	4.25	9.75
DanaInfra Nasional Berhad	Sovereign	MYR	Domestic	Sukuk Al Murabahah	235	5.05	30
Prasarana Malaysia Berhad	Sovereign	MYR	Domestic	Sukuk Al Murabahah	259	4.64	15

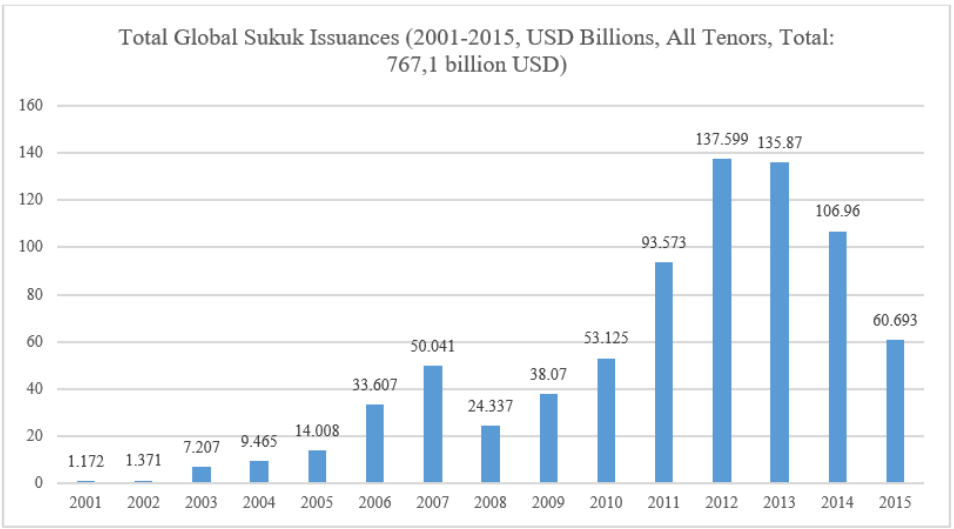


Figure 3.9. Yearly and Total Sukuk Issuances (IIFM, 2015).

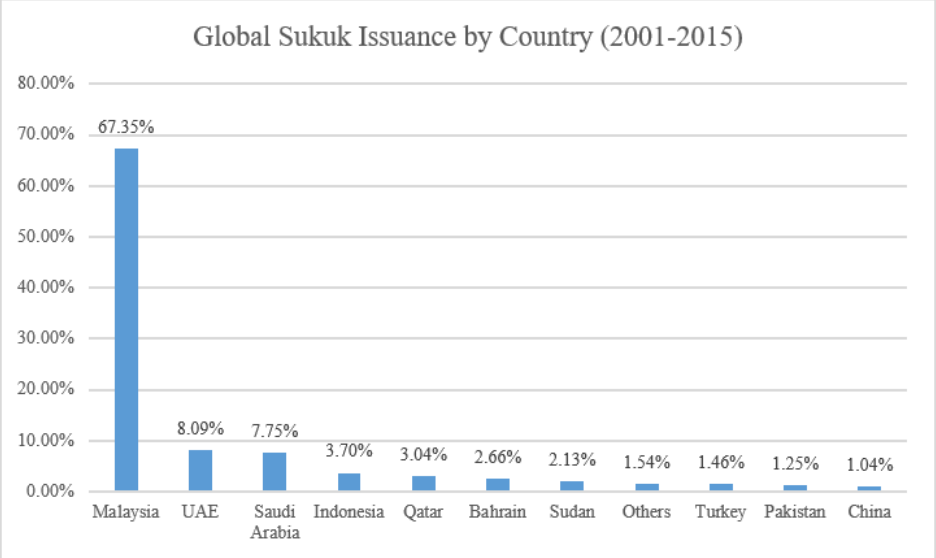


Figure 3.10. Global Sukuk Issuances by Country (IIFM, 2015).

Table 3.5. Countries in Sukuk Volume Outstanding (IIFM, 2016).

Countries	**Number of Sukuk**	**Volume of Sukuk (USD Billion)**
Malaysia	1760	188.7
Saudi Arabia	71	52.07
UAE	57	30.68
Indonesia	248	24.74
Qatar	25	14.97
Turkey	22	10.01
Bahrain	18	4.8
Iran	18	4.1
Pakistan	17	2.92
Hong Kong	3	2.1

Participation banking industry in Turkey has a history of nearly 30 years, but its development has been limited. However, current regulatory environment that is established with the Banking Law in 2008 enabled more efficient functioning of participation banking.

Table 3.6. Countries in Sukuk Volume Issuances (IIFM, 2016).

Countries	**Number of Sukuk**	**Volume of Sukuk (USD Billion)**
Malaysia	388	33.44
Indonesia	84	8.31
Saudi Arabia	17	6.99
UAE	10	5.35
Bahrain	27	3.54
Qatar	6	2.16
Turkey	10	1.78
Hong Kong	1	1
Bangladesh	34	0.77
Brunei	10	0.68

Participation accounts are defined in the Banking Law as: "Accounts constituted by funds collected by participation banks that yield the result of participation in the form of loss or profit to arise from the use of funds by these institutions, and which do not require the payment of a pre-determined return to their owners and that do not guarantee the payment of the principal sum" (Participating Finance Report, Undersecretariat Turkey, 2016).

From 2005 to 2016, the total assets of participation banks reached from 10 billion TL to 133 billion TL. The participating banking assets cumulative average growth is 24.78% in the last 12 years (2005-2016), but the share of participation banking counts only for 4.87% of the total banking sector of Turkey (Participating Banking Report, 2016). Despite its large Muslim population and its long presence in the international capital markets arena as an issuer of conventional bonds, Turkey did not take a significant share from the Islamic finance market for Shariah compliant instruments prior to 2010, principally due to the lack of legislative infrastructure in place to accommodate Islamic finance. Cobankaya (2014) in her study observed that although the participation banks are considered different from conventional banks, and the awareness increased recently, the ratio of the people who know the working principles of the

participation banks is low.

Table 3.7. The Total Assets and Growing Rate of Participating Banking Industry (TKBB, 2016).

Years	**Participating Banks Total Assets (thousand TL)**	**Growth Rate (%)**	**Banking Industy Total Asset (thousand TL)**	**Participating Banking Total Share (%)**
2005	9.945.431	36.28	406.915.000	2.44
2006	13.729.720	38.05	498.587.000	2.75
2007	19.435.082	41.55	580.607.000	3.35
2008	25.769.427	32.59	731.640.000	3.52
2009	33.628.038	30.5	833.968.000	4.03
2010	43.339.000	28.88	1.006.672.000	4.31
2011	56.076.929	29.39	1.217.711.000	4.61
2012	70.279.000	25.33	1.370.614.000	5.13
2013	96.086.000	36.72	1.732.413.000	5.55
2014	104.319.000	8.57	1.994.329.000	5.23
2015	120.253.000	15.27	2.357.453.000	5.1
2016	132.874.000	10.5	2.730.942.000	4.87

Turkish Sukuk market has experienced notable growth in recent years following the development of participation banking and growing appetite for interest free instruments, yet there is a long way for increasing its 1.5% shares.

Gunaydin (2013) analyzed sukuk as an alternative financial instrument for project finance and assessed the efficiency of sukuk in Turkish financial markets. He concluded that parallel with the international markets, the importance of sukuk will increase in Turkish financial markets.

In order to develop regulatory framework for private Turkish sukuk market, important milestones has been completed in the last couple of years. The first sukuk regulation was introduced after the Capital Market Board (SPK) Communique in April 2010, and the first sukuk (named as lease certificate) was designed basically to enable

interest-free financing and investment in the form of a leasing (Ijarah) transaction. In the first regulation Asset Leasing Company (ALC) was contemplated as an issuer to fulfill the SPV's (special purpose vehicles) role for issuances. Then, amendments to tax legislation were introduced in order to provide certain exemptions that made sukuk more attractive to foreign investors. Following in 2011, tax inequalities on Ijarah Sukuk compared to conventional products were solved. At the end of 2012 new capital market law came into effect and regulation regarding Sukuk issues has been entirely changed in parallel to new Capital Market Law. With the new Capital Market Law, ALC has been counted as a Capital Market Institution which makes ALCs regulated and supervised by Capital Markets Board (SPK), and additional protection and confidence for investors has been brought (International Islamic Financial Market Sukuk Report, 2014&2015).

Table 3.8. Private and Sovereign Sukuk Issuances in Turkey (IFFM, 2015).

Sukuk Issuances (2011-2015/9)		**Cross Border**	**Domestic**	**Total**
Private Sukuk	Issue Amount (USD Billion)	2.67	1.4	4.07
	Average Maturity (Years)	5.01	0.78	
Sovereign Sukuk	Issue Amount (USD Billion)	3.75	3.96	7.71
	Average Maturity (Years)	6.83	2.14	

According to IIFM Report, 2015, as of the end of November 2015, around 12 billion USD valued sukuk was issued in Turkey, where half of it issued cross border. In addition to providing an alternative financing source for Turkish corporations, the newly introduced sukuk structures is planned to fill the project financing gap in Turkey, particularly for infrastructure projects and PPPs. Islamic financing shines to be a solution in this context. Islamic Development Bank's (IsDB) sukuk which are already being traded in London, Dubai and Malaysia stock exchanges have also been listed in Istanbul Stock Exchange which is an important milestone as it underlines Istanbul's place as a global financial center.

4. PENSION FUNDS

Pension is mainly an investment option to prepare people with an income when they are no longer getting a regular income. Ruzgar (2008), defined the private pension plans as the combination of ratios of different investment tools. Mitchell and Fields (1996) defined pensions as a benefit paid to employees who retire from their jobs after reaching a prearranged age. They named this benefit as "annuity" when it is paid periodically and regularly from the time the employees retire until their death. Alternatively, if a single payment is made upon retirement, it is called a "lump-sum benefit". If a payment is made to an employee who leaves the company before reaching retirement age, this is not considered as a pension; but called as a "severance payment".

There are very wide researches in the world that focus on different aspects of pension funds. Howell (1958) listed the major points one should take into consideration when investing in pension funds as; safety of principal, certainty of return, adequacy of return, tax aspects, marketability, liquidity, capital appreciation, collateral value, freedom from care and maturity. Ambachtsheer *et al.* (1998) studied the main parameters that affect the fund performance as fund size, passively managed asset rates, and the quality of the fund's organization structure. They suggested that if the elements of the fund organization is developed, the pension fund performance can get improved. Shehu (2011) listed the financial risks of pension funds as labor income risk, inflation risk, interest rate risks, investment and annuity risk, pension fund manager's risk not being company owners, longevity risks, lack of intergenerational risk transfer, asset mix policy risks and exchange rate risks and recommended an establishment of enterprise risk management unit in the pension funds.

According to the research Mitchell and Fields (1996) made about designing pension systems in developing countries, in order to reduce the individual, employer, investment and national risks, the pension systems should be compulsory, should maintain a strong tie between benefits and contributions at both the individual and generational levels, should be able to invest the contributions in a reasonably globally-diversified

portfolio, should be fully financed, only the elderly people should be benefited, should make monthly payments rather than making payments at once. Murphy and Musalem (2004) analyzed the effect of the accumulated savings of pension funds financial assets on national saving by conducting a panel data of 43 countries including several developed and developing countries. They concluded that while the voluntary based pension systems do not positively affect the national savings, the mandatory based system might have a positive impact on national savings.

Attah-Bochwey (2014) analyzed different pension models in order to figure out the best-practices and find out the weaknesses of the existing systems. He examined the systems in Chili, Switzerland and Singapore and concluded that all the three systems are mandatory systems and cover all the employees except for self-employed, the financial resources collected in pension funds are very closely related with the national income in all three countries and the financial performances of the pension funds are remarkable including Chili which is experiencing high inflation problems. He also recommended that decreasing the cost of operation and improving its investment income are important to extend the life of the reserves of the social security pension funds and in order to increase the long term savings, increasing the fund choices is important.

Ionescu (2013) suggested that the pension systems should consists of five pillars: social pension which provides a minimum protection, contributory system tied to wages; mandatory system corresponds to savings accounts, voluntary system based on individual payments, defined benefits or defined contributions paid by the employer and finally an access to healthcare and housing for supporting the senior people. According to Park and Estrada (2012), the last pillar is important in countries where parents used to be supported by their children in their old age. In their studies they made about the challenges and reform efforts for public pension systems in Asian countries, they defined the biggest failure of Asian pension systems as the high costs of transactions, nonexistence of robust governance, poor-designed adequacy, affordability, robustness and sustainability of the system and inadequate coverage of the population.

World Bank Human Development Network prepared a study in 2008 about the impacts of the financial crisis on the pension systems in emerging countries. According to the report, the pension funds as long term investment instruments should be protected from sudden strategy changes and in order to be able to manage risks, the pension systems should be diversified and strengthened.

The relationship between the governance of public pension fund management and investment performance was analyzed by Impavido (2002). He concluded that the focus area of the public pension funds should be affordable and emphasized the independency of the governors as well as the fund performance evaluators. Aysoy, 2011, in her study measured the performances of daily returns of pension funds in 2010, and she concluded that in addition to the returns, different factors that should be taken into consideration in order to measure the performances of the pension funds.

Bikker *et al.* (2012), analyzed and compared the administrative costs of pension funds in Australia, Canada, Netherlands and the US. They used the size, complexity and service quality data of 90 pension funds and investigated their effects on the administrative costs. Their findings exhibited that the higher service quality and more complex pension plans, the higher costs paid.

There are two important studies that needed to be highlighted for interest free pension funds made in the US and the UK. Moran (2012), in his study seek the answer for whether Muslims can make investments in their employers' private pension plans by taking into consideration their religious principles in the US. He pointed out that most of the investment tools included in the American pension plans are not appropriate retirement instruments for Muslims. This situation make the Muslims either to violate their religious beliefs or losing investment opportunity as they wait for the capital markets to provide alternative instruments compliant to their religious expectations. Manjoo (2012), investigated whether the pension system is suitable for Muslim philosophy and its compliancy with Sharia rules in the UK. The results of the study exhibited that the idea behind the pension system is appropriate to the rules of Sharia which includes protection of life, family and wealth in the condition to be careful to annuities

and nominees which are not allowed in Islamic law. The author also suggested a model including Sharia compliant fund offered to British Muslims via National Employment Savings Trust (NEST).

In the literature, there are also important researches that combined the pension funds with real estate investments. Ennis and Burik (1991) studied the effect of non-risk factors on pension funds investing in real estates. Liquidity, information availability, divisibility of ownership interests, conflicts of interest, investor liability and owner involvement were evaluated as non-risk factors. In order to increase the less than 5% real estate investments proportion of the US pension funds to 10-15%, their results emphasize on tax exemption issues as well as the securitization of the real estates. Ennis and Burik in another study they made in 1991, classified the returns generated by real estate investments in two categories: property appraisals and employing real estate securities index, which are traded in stock markets. The investment performance of two commingled real estate investment funds in between 1972 and 1991 was examined by Brueggeman *et al.* (1992). The results of their analysis exhibited that these funds provided an anticipated hedge against inflation and offered diversification potential by reducing risk and increasing returns.

French (2001), analyzed investors' attitudes and perceptions towards real estate and discussed the decision criteria of the UK pension funds about their ass *et al.*, locations. His analysis based on decision theory exhibited that the fund mixes should be pragmatically possible, institutionally acceptable, and the constraints of business risk should be taken into considerations. Andonov *et al.* (2013), in their researches, studied the investment style of the pension funds in real estate and demonstrated the cost and performance factors. Their results showed that while large pension funds chose to invest in indirect real estate with a combination of direct real estate, the small pension funds focus on direct real estate investments only. Another finding of their study is that the better performances and lower costs were observed at large pension funds compared to the small ones. Akgiray *et al.* (2016), in the study they compared the pension systems of Chili and Turkey suggested that by attracting infrastructure and real estate funds to invest in Turkish real estate markets through the auto-enrollment

pension funds will help for sustainable and high growth and will contribute to weaken the dependency of financial markets to the banking system.

As of the end of 2015, the total size of the global private pension assets reached to 38 trillion USD. 35 OECD countries cover almost the total assets with a value of 36, 9 trillion USD in 2015. In the OECD area, pension funds or their management companies, banks and investment companies, insurance companies cover the 67.2%, 21% and 11, 3% of the total, assets of pension funds (OECD Pension in Focus Report, 2016).

According to Global Pension Funds Report of Price Waterhouse Coopers (2016), the estimated size of global pension fund size will reach to 56.5 trillion USD in 2020 with a 7.5% annual growth rate.

The size of investments through pension vehicles differs across countries. Figure 4.1 represents the global distribution of the pension fund size. The United States, Canada, United Kingdom, the Netherlands, Switzerland, Australia and Japan are the top countries with the largest values of invested assets in USD. Chile, Denmark and South Africa are some of the countries where the rate of the private pension invested assets over GDP is high (70%, 206% and 97% of GDP in 2015, respectively). For the OECD area, the simple and weighted average of the total assets per GDP are 49.5% and 123.6% respectively (OECD Pension in Focus Report, 2016).

In Figure 4.2, the pension funds as a percentage of GDP are shown. Canada, Denmark, Iceland, the Netherlands and the United States are the top 5 countries in terms of the highest ratio of pension-related assets to GDP.

The main investment areas of pension funds are stocks, bonds and bills, cash and deposits. In Figure 4.3, the pension fund asset locations are shown. Pension funds real estate average allocations are 7.3% and 8.8% in the US and in the world respectively (Preqin Real Estate Report, 2016).

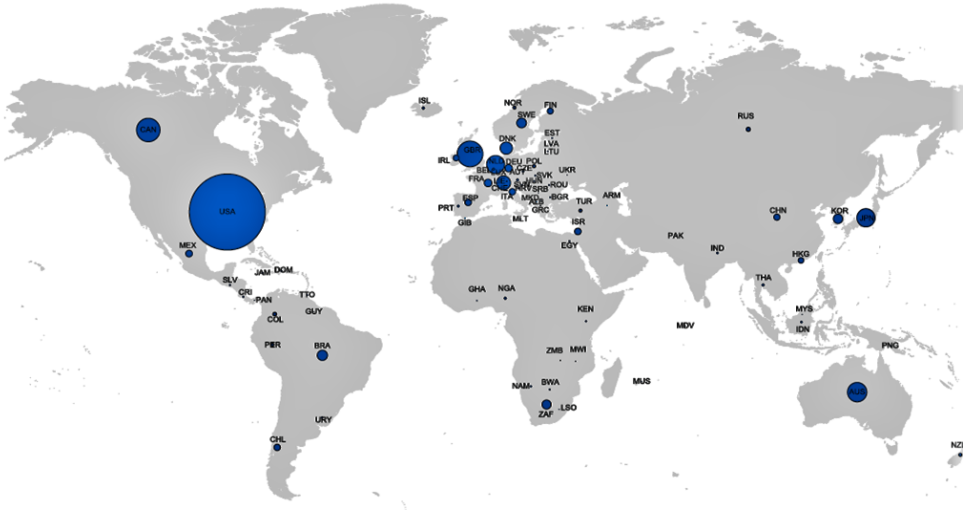


Figure 4.1. The Size of Pension Funds Globally (OECD, 2016).

The history of individual pension system in Turkey backs to 2003. Although in the early years, it could not attract the interests of the citizens, pension funds started growing in the last few years after the state contribution incentive which started in 2013. In the new regulation issued in 2013, the state started depositing 25% of the investment amounts of the participants' savings. Since then, the size of the pension funds doubled, and as of the end of 2016, the number of the participants reached from 4 million to 6.5 million in the last 4 years (Pension Monitoring Center Report, 2016). Although there is a sharp increase in the total size and the number of the participants, as shown in the Figure 4.2., the total assets of the pension funds is still 5,5% of the total GDP of Turkey which is far below the OECD simple and weighted average. In 2016, the government issued a new regulation to increase the size of the pension funds by auto-enrolling all the employees under the age of 45 to the system. Even though for those who are working it is mandatory to be enrolled in the system, it is free to leave it after two months. In this new regulation, In addition to the 25% incentives, the government deposits 1.000 TL to each participant's pension account under some certain conditions. If an employee prefers to stay in the system after getting right for retirement and ask for annuity instead of lump-sum payment, the government deposit additional 5% incentive to the participant's account (Pension Monitoring Center Report, 2016).

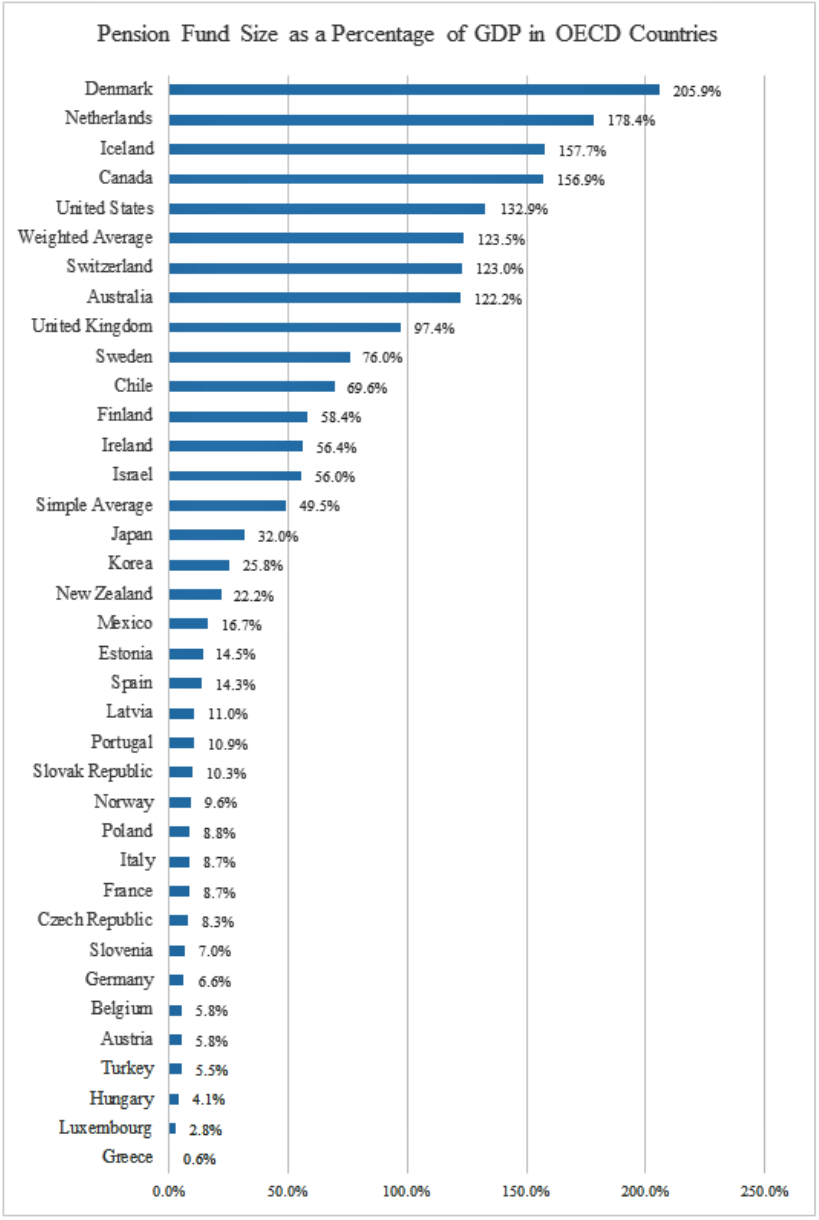


Figure 4.2. Pension Funds as a Percentage of GDP (OECD, 2016).

The pension funds in Turkey are also very widely studied from different aspects. Sonmez (2012), by using Analytic Hiearchy Process (AHP) studied the criteria that determine the choices when entering a private pension system, and he concluded that minimum payment amount, fee for enrollment, level of risk, management costs reductions, fund operating annual costs and company reputation are the most important criteria for the people when they decide to enter the system.

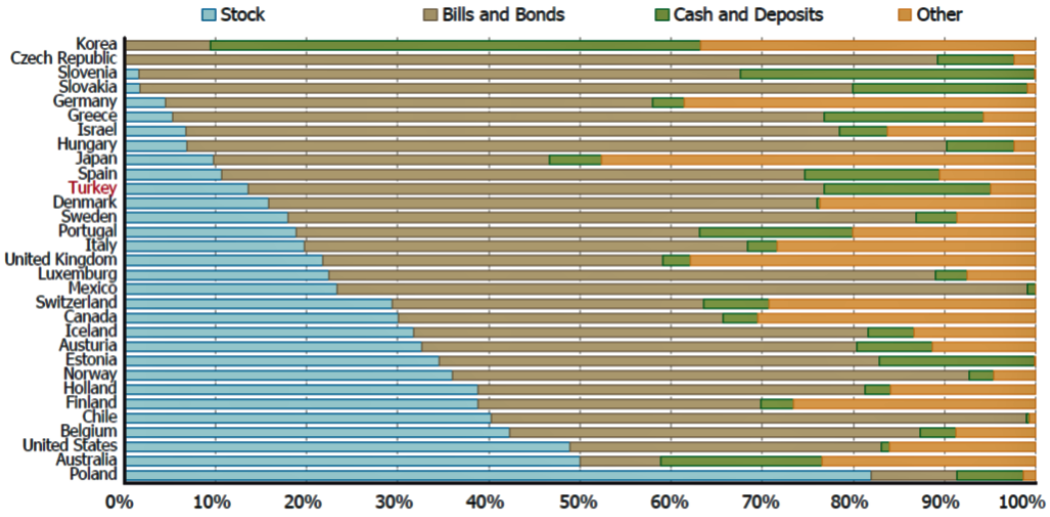


Figure 4.3. Pension Fund Asset Allocation for Selected OECD Countries (OECD, 2016).

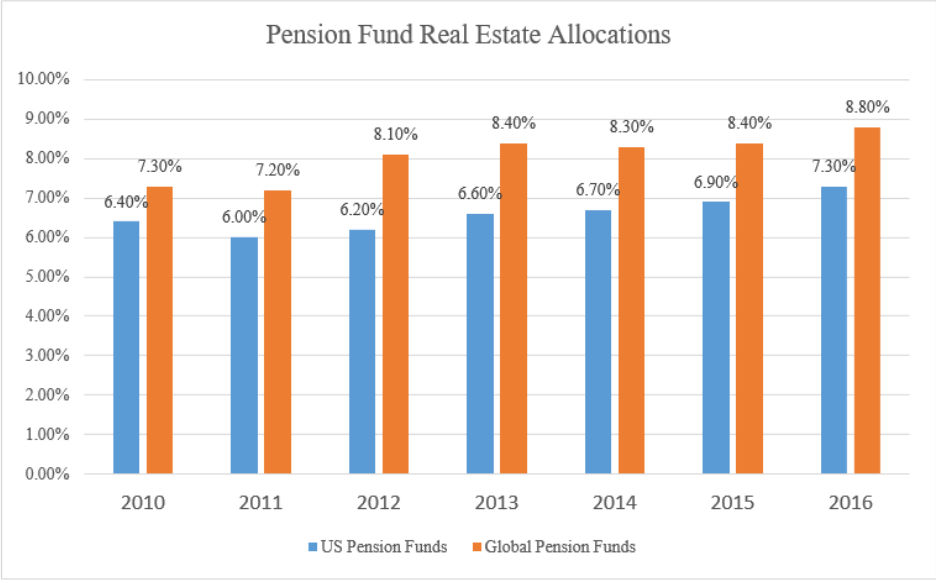


Figure 4.4. Pension Fund Real Estate Allocations (Preqin, 2017).

Ural and Adakale (2009) analyzed the risks for the individual pension funds and concluded that while the stock funds are the factors which increase the total risk maximally; the public borrowing instruments increase the risks minimally. Korkmaz *et al.* (2010), studied the factors that affect the amount of contributions paid by the participants to pension funds during January 2004 to July 2009 in Turkey. According to the results of their analysis, they concluded that the financial and macroeconomic

factors has an influence on the contributions on the payments made by the participants for individual pension system. Increase in the value of Euro, Istanbul Stock Exchange Index (BIST) and industrial production parameters were listed as having a statistically positive effect on the contribution.

Korkmaz and Uygurturk (2007), measured the performances of 46 Turkish pension funds for the period between January 2004 and June 2006. They used single and multi-regression analysis. The results of their study exhibited that pension funds are found to be successful in single and two variable analyses, but not to be successful in three variable analyses. They also concluded that pension funds' performance level decrease when the number of variables increase. Ozkan and Demirkale (2015), compared the profits of investment instruments including BIST 100, gold, deposit and currency basket (USD+EUR) and individual pension funds in Turkey in between 2004 and 2014, and they concluded that due to inflation, the personal retirement funds lost value considerably. Gundogdu (2010) categorized the fees deducted from the contributed amounts as the enrollment fees, fund operational expenses fees and management fees.

Pension system targets long term savings. In Turkey, the average contracts term is 3.1 years. The average termination rate (excluding the reasons of merging or transferring contracts) of the pension contracts in terms of number and total contribution is 33% and 27% respectively. In that context, it is important to extend the average duration and decrease the terminations for a sustainable pension system. In the last few years, after the state contribution, the yearly rate of the termination started decreasing and in 2015 it decreased to below 10% in 2015. One another ratio is the re-entering the system after opting out. Ratio of the participants who reentered the system after voluntary opt out is 6.5% of all entrance as of the end of 2015. This ratio is 8.2% for the contributors whose contracts come in force in 2015 (Individual Pension System Progress Report, 2015) Table 4.1 shows the yearly and cumulative enrollment and the size of the pension funds.

The distribution of the number pension fund participants according to their age ranges is shown in Table 4.2. While 70% of the total participants are below 45 age,

the ratio of the people with age range 45-55 with 22.2% is remarkable.

From the beginning of the system, 15.6% of the participants bought a new contract although they had an existing contract in the system before 2015, this ratio is 22.8% for year 2015. 95.1% of the participants until the end of 2015 prefer to contribute monthly payments, whereas annually, quarterly and semi-annually payment preference rates are 3.2%, 1.2% and 0.5% respectively. When analyzing the monthly contribution amounts, the highest payment is made in Istanbul with more than 240 TL/month. Istanbul is followed by Ankara, Izmir and Antalya. It is also important to mention that the 27.3% of the total participants pay more than 550 TL/month, although the country average is 213 TL/month (Individual Pension System Progress Report, 2015).

According to the HSBC Future of Retirement Turkey Report (2015), 81% and 79% of the people who are both retired and working perceive the real estate investments as creating an income for their retirement ages respectively. Although the real estate is widely accepted as an investment tool by the majority of the people in Turkey, and despite the growing size of the industry compared to the last decades, the investment level of the industry is far below the developed countries.

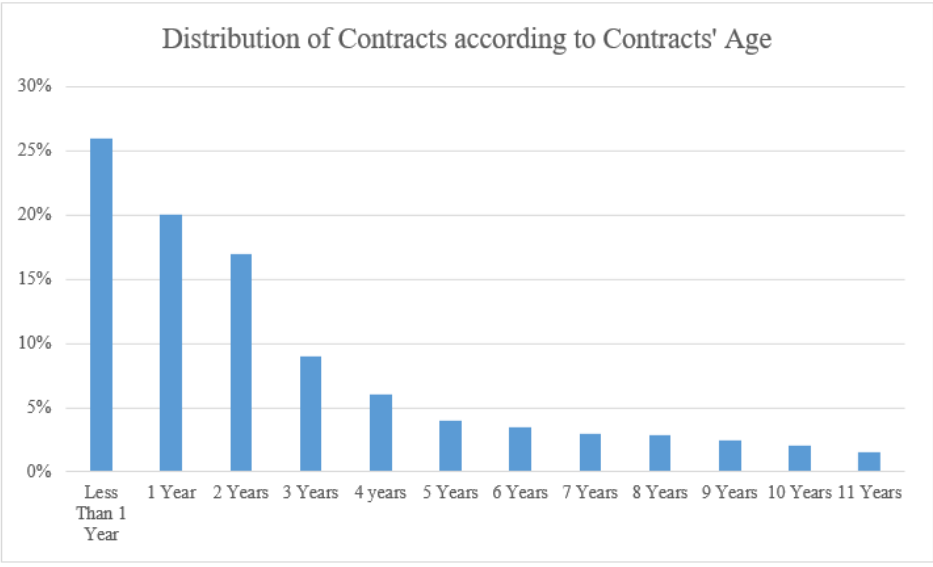


Figure 4.5. Distribution of Contracts According to Contract's Age (EGM, 2015).

Table 4.1. Pension Funds Enrollment and Assets in Turkey (EGM, 2016).

Date	Cumulative Number of Participants	Yearly Enrollment	Total Fund Size of the Participants (TL)	Yearly Fund Size of the Participants (TL)	Cumulative State Contribution (TL)	Yearly State Contribution (TL)	Contributed Amount of the Participants (TL)	Yearly Contributed Amount of the Participants (TL)
2003	15.245	15.245					5.866.764	5.866.764
2004	314.257	299.012					288.325.706	282.458.942
2005	672.696	358.439					1.117.233.826	828.908.120
2006	1.073.650	400.954	2.814.938.925	2.814.938.925			2.592.508.977	1.475.275.151
2007	1.457.704	384.054	4.566.383.316	1.751.444.391			3.917.061.211	1.324.552.234
2008	1.745.354	287.650	6.372.756.623	1.806.373.307			5.467.695.761	1.550.634.550
2009	1.987.940	242.586	9.097.436.467	2.724.679.844			7.102.007.561	1.634.311.800
2010	2.281.478	293.538	12.011.986.651	2.914.550.184			9.515.230.234	2.413.222.673
2011	2.641.843	360.365	14.329.771.986	2.317.785.335			12.393.688.644	2.878.458.410
2012	3.128.130	486.287	20.346.290.278	6.016.518.292			16.177.757.755	3.784.069.111
2013	4.153.055	1.024.925	25.145.718.418	4.799.428.140	1.151.765.932	1.151.765.932	21.921.860.114	5.744.102.359
2014	5.092.871	939.816	34.793.077.808	9.647.359.390	3.019.076.239	1.867.310.307	28.346.503.495	6.424.643.381
2015	6.038.432	945.561	42.979.056.589	8.185.978.781	5.020.000.071	2.000.923.832	37.119.095.559	8.772.592.064
2016	6.625.759	587.327	53.409.338.756	10.430.282.167	7.438.167.182	2.418.167.111	44.351.386.577	7.232.291.018

Table 4.2. The Number of Pension Fund Participants According to their Age Range (EGM, 2016).

Age Range	Number of Investors	Distribution
0-24	401934	6.10%
25-34	1971717	29.80%
35-44	2250824	34.00%
45-55	1473121	22.20%
56+	528163	8.00%
Total	6625759	100%

Figure 4.6. Distribution of Contracts in Force and Terminated (EGM, 2015).

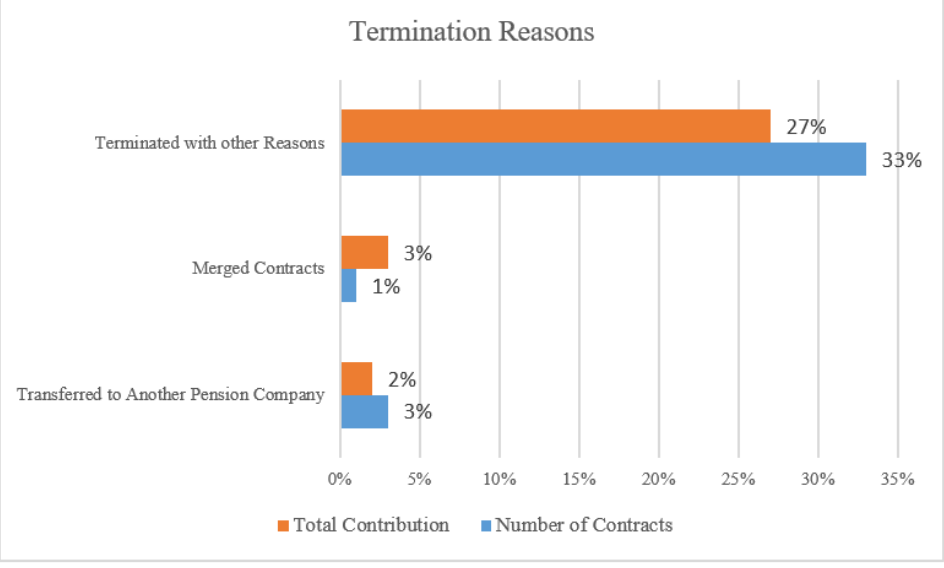


Figure 4.7. Termination Reasons (EGM, 2015).

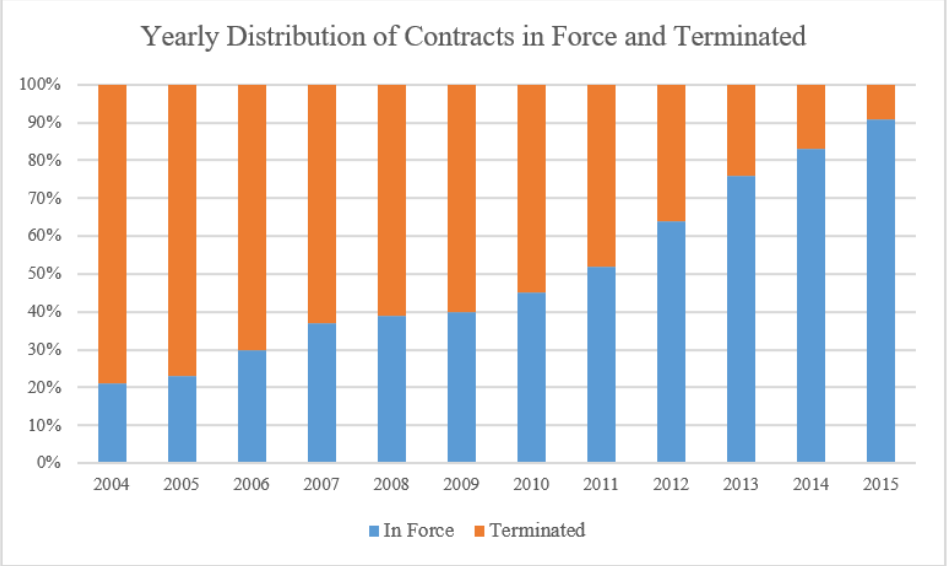


Figure 4.8. Distribution of Contracts in Force and Terminated (Yearly) (EGM, 2015).

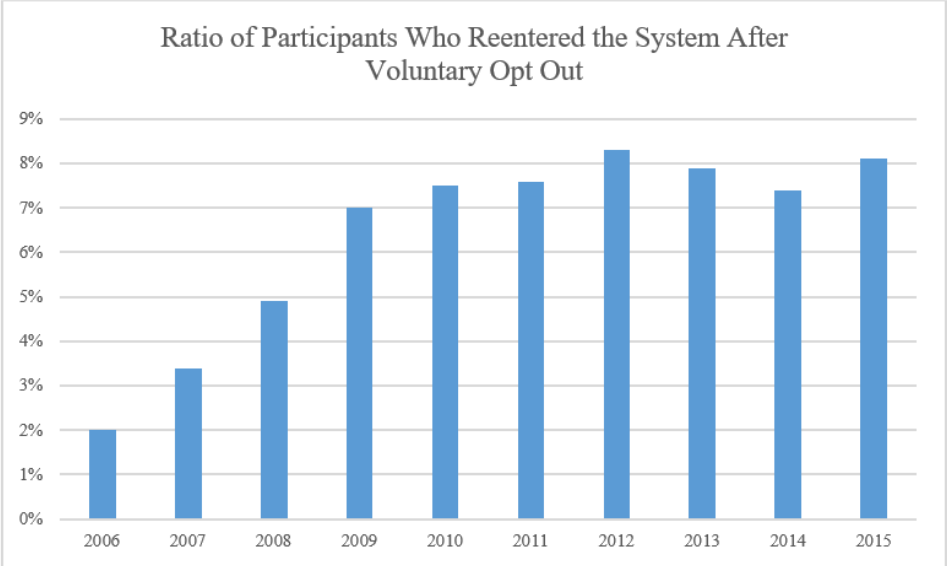


Figure 4.9. Ratio of Participants Who Reentered the System after Voluntary Opt-Out (EGM, 2015).

Real estate industry needs long term and sustainable financing tools and investment mindsets by providing reasonable profits compared to traditional investment vehicles. From local investors' perspective, especially in terms of residential investments, the main reasons that prevent or slow down the investors from investing in real estate are the high land costs and interest rates.

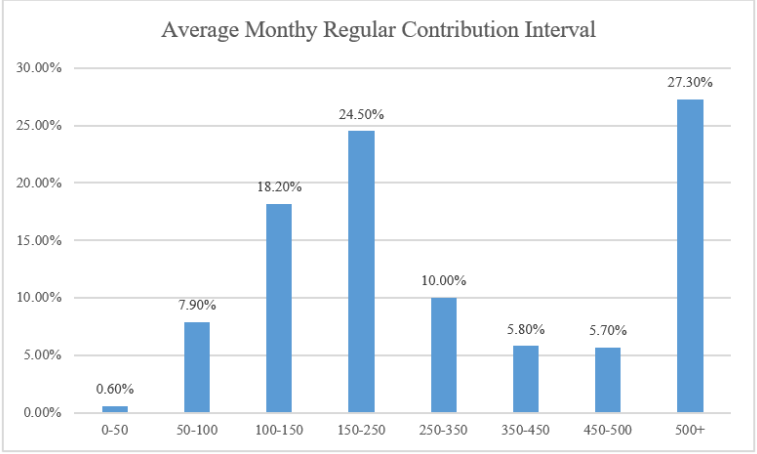


Figure 4.10. Distribution of Total Amount of Contributions According to Average Monthly Regular Contribution Intervals (EGM, 2015).

People want to buy residential units to live in or for investment purposes, but high sales prices due to high land and financing costs make it difficult for the people to afford such investments. For those who can't invest in real estate, prefer to make investments through pension funds. According to the same report prepared by HSBC (2015), pension funds are the second choices of both for working and retired people in Turkey for future investments. In Turkey, the portfolio distribution of the pension funds consist of stocks, government bonds and bills, precious metals and bank deposits. 33.2% of the people investing in funds are flexible to invest in different instruments (Pension Monitoring Center Report, 2015). Table 4.2 shows the pension fund investment distribution in Turkey.

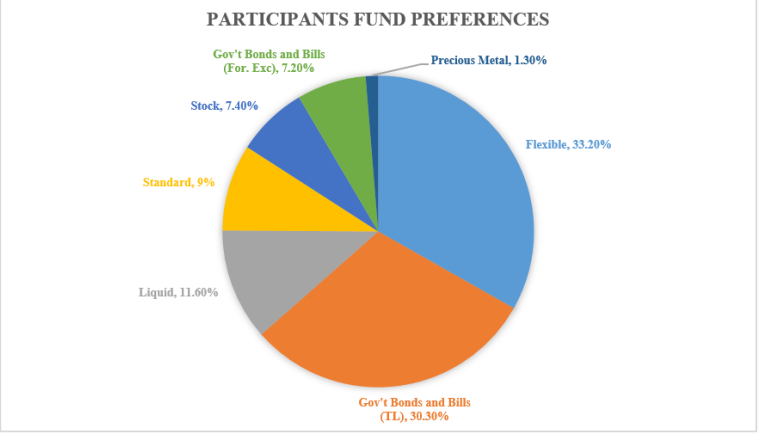


Figure 4.11. Participant's Fund Preference per Fund Group (EGM, 2015).

Although the investors can invest in REITs and lease certificate (sukuk) within other pension fund mixed options, there is no private regulation that promotes the pension funds to invest directly in real estate investment tools. The main reason that prevent pension funds to invest in real estate investment tools is mid and long-term financing need of the real estate investment projects. The average period of the pension contracts by the end of 2015 which is 3.1 years seem enough to finance a mid-size project with the investments of pension funds within that time frame, but under current non-mandatory pension system, the participants can withdraw their money at any time, and this may seem to create a problem when using pension funds to finance real estate projects and is needed to be fixed with some additional regulations. One another point that is needed to be underlined in this study is the rate of the interest-free pension funds. There is a sharp increase in the size of the interest free pension funds from 2012 to 2015. Although its share became 5.22% among the total size of the pension funds by the end of 2016, this share rate is still too low (Katilim Emeklilik Report, 2016, Undersecretariat Treasury, 2016). Kaya (2013) compared the participating banking with conventional banking in terms of pension fund returns and recommended more interest free investment option with stable returns. The inadequateness of interest free fund options for those who have religious concerns while deciding to involve in the pension system is another point that is needed to be discussed because this situation may avoid the new entrance of the majority of the citizens in Turkey.

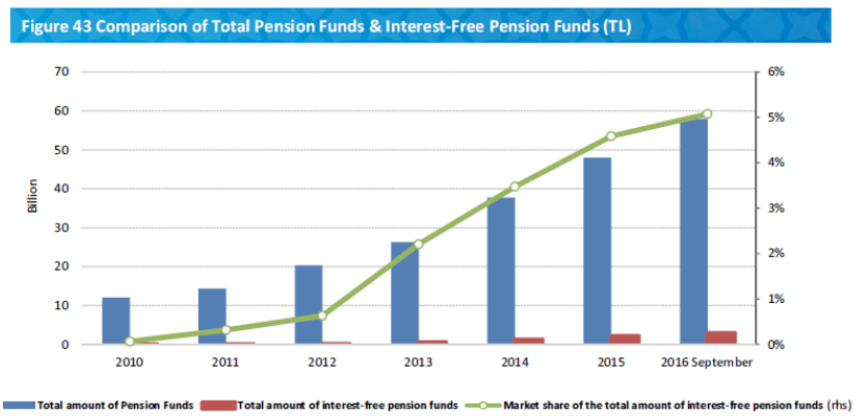


Figure 4.12. The Interest Free Pension Funds vs. Total Size of the Pension Funds (Undersecretariat of Treasury, 2016).

Table 4.3. The Investment Distributions of Pension Funds in Turkey (SPK, 2017).

Year	**Month**	**Number of Funds**	**Net Asset Value (Million TL)**	**Number of Investors**	**Stocks (%)**	**Treasury Bills & Gov. Bonds (%)**	**Reverse Repo (%)**	**Money Market Instruments (%)**	**Foreign Securities (%)**	**Corporate Bonds (%)**	**Others (%)**
2015	7	250	43.353,47	5.642.242	12.89	50.39	6.79	1.91	7.08	10.11	10.83
2015	8	248	43.685,36	5.708.314	12.28	49.48	7.79	2.25	7.52	9.78	10.9
2015	9	248	44.151,82	5.773.243	12.83	49.11	6.84	2.25	7.93	9.95	11.09
2015	10	248	46.175,87	5.840.697	13.36	48.99	6.28	2.07	7.91	10.16	11.23
2015	11	249	46.760,62	5.927.067	13.95	49.46	5.71	2.08	7.81	9.95	11.04
2015	12	249	47.918,20	6.004.152	14.08	48.29	6.17	1.94	7.99	9.73	11.8
2016	1	250	48.960,58	6.076.901	13.96	46.75	6.95	2.12	8.15	9.7	12.37
2016	2	250	49.832,98	6.137.144	13.56	46.97	7.39	1.58	8.23	9.74	12.53
2016	3	250	51.699,12	6.210.607	12.8	47.23	7.02	1.44	8.25	9.67	13.59
2016	4	250	53.483,59	6.261.947	12.31	47.81	7.09	1.62	8.26	9.16	13.75
2016	5	250	53.479,28	6.320.037	12.25	47.33	6.49	1.66	8.78	9.15	14.34
2016	6	250	54.799,47	6.373.401	12.49	47.89	5.68	1.65	8.57	9	14.72
2016	7	250	55.741,35	6.413.130	12.35	47.28	6.23	1.46	8.82	8.87	14.99
2016	8	250	55.504,18	6.447.344	12.3	46.79	6.07	1.46	8.57	9.46	15.35
2016	9	253	57.943,05	6.484.665	12.36	46.34	6.27	1.36	8.45	9.37	15.85
2016	10	253	58.629,58	6.514.155	12.07	46.58	5.42	1.22	8.72	9.84	16.15
2016	11	253	58.954,74	6.566.391	11.51	45.6	5.93	1.32	9.33	10.01	16.3
2016	12	263	58.439,20	6.625.759	12.11	45.24	6.78	1.41	9.43	9.66	15.37

Table 4.4. The Interest Free Pension Fund Size (Katilim Emeklilik, 2004-2016).

Date	**Interest Free Pension Fund Size (billion TL)**	**Interest-Free/Total Size (%)**
Nov-14	1.18	3.34%
Dec-14	1.28	3.51%
Jan-15	1.4	3.67%
Feb-15	1.46	3.71%
Mar-15	1.29	3.30%
Apr-15	1.32	3.29%
May-15	1.5	3.70%
Jun-15	1.63	3.94%
Jul-15	1.7	4.01%
Aug-15	1.76	4.09%
Sep-15	1.85	4.23%
Oct-15	1.91	4.28%
Nov-15	2.01	4.36%
Dec-15	2.08	4.40%
Jan-16	2.2	4.59%
Feb-16	2.29	4.67%
Mar-16	2.39	4.80%
Apr-16	2.49	4.82%
May-16	2.61	4.88%
Jun-16	2.66	5.00%
Jul-16	2.77	5.01%
Aug-16	2.85	5.12%
Sep-16	2.86	5.07%
Oct-16	2.94	5.08%
Nov-16	3.00	5.13%
Dec-16	3.07	5.21%

5. RESEARCH METHODOLOGY

In this study, a new investment and financing model is suggested to overcome the problems related to real estate industry and pension system mentioned above by establishing a pension fund-real estate investments ecosystem. Turkey Real Estate Fund is introduced as a regulatory umbrella fund that aims to attract financial institutions especially the local and international pension funds as well as participating banks, insurance companies and other financial institutions. The analysis of this study consists of 4 major parts:

(i) The comprehensive analysis of REIT Index operating under Istanbul Stock Exchange, BIST 100 Index, Housing Sales and Rent Price Indices, Participating Banking and Pension Funds by evaluating the effects of foreign exchange rates (USD/TL), inflation (CPI), central bank overnight lending interest rates, average home loan interest rates, and gold and oil prices on their returns.
(ii) Forecast analysis of returns of REIT Index, BIST 100 Index, Housing Sales and Rent Price Indices and average Pension Fund returns,
(iii) Forecast analysis of parameters of housing sector and pension funds including housing units sold to foreigners, mortgage loans, mortgaged units sales, size of the pension funds, participant number of the pension funds and state contribution to the pension funds for the years 2016 and 2017,
(iv) Sample fund size estimation of the suggested model.

5.1. The Analysis of Independent Variables that Affect REIT Index, BIST 100 Index, Housing Price Index, Participating Banking and Pension Funds

5.1.1. Selecting the Independent Variables

In order to select the factors to analyze effects of, the past studies about the variables affecting the returns of stocks, REIT index, housing index, participating

banks share of profits and pension funds were evaluated.

5.1.1.1. Stock Prices. There are many researches made both worldwide and in Turkey about the factors affecting the returns of stock prices. Inflation is one of the most important factors that has been a subject of research in terms of its effects on returns. Simpson and Ramchander (2012) investigated the relationship between changes in expected and unexpected inflation, and extension and contraction economy policy conditions with stock returns. Their results indicated that a positive impulse to both expected and unexpected inflation has a remarkable effect on returns of stocks through monetary expansion, but not during monetary tightening.

Gold prices has always been an alternative investment tool for investors, in that context, its influence to returns was studied by many scholars. The casual relationship between stock market performance and gold was studied by Miyazaki and Hamori (2013), and they did not find direct relationship between gold prices and stock market. Liu *et al.* (2016) examined whether gold and USD as effective hedge tools against stock prices for seven developed markets covering the period in between 2000 and 2013. Their results exhibited that when there is a stock market crush, both assets provide good hedging option, but investors prefer USD to gold while during regular market conditions.

Oil prices, as one of the most important factors that is affecting the world's economy, is another variable that was investigated in many academic researches. Odusami (2009) analyzed the effects of unexpected crude oil shock on US stock returns. His results showed that there is a non-linear effect of the unexpected crude oil shocks on excess US stock market return. Reboredo (2010) investigated the relation between the oil price shocks and stock returns. His finding exhibited that stock prices in one country is significantly negatively affected from an increase in oil prices, whereas this effect is considerably reduced in another country. Louis and Balli (2014) found a low to mid-level of integration between oil prices and stock market returns in GCC countries. Rafailidis and Katrakilidis (2014) investigated the relations between oil prices and the

US stock prices. Their results exhibited that in the short run, the stock returns are affected from oil price changes negatively, but in the long run stock and oil prices may co-move in order due to the future demand expectations. Xu (2015) examined the behavior of oil prices in order to predict the disaggregated industry-level stock market indices. His findings showed a strong effect of the changes in oil prices as a predictor for the returns of UK stocks but not homogenous in all industries.

Mattessini and Becchetti (2009) investigated the reaction of the Federal Reserve to developments in the stock market, and their findings exhibited that when stock prices decrease to below their fundamental value, the Fed is likely to decrease the Fed funds rate.

The impact of politics is as important as the economic factors when analyzing the parameters that affect stock returns. Fernandez (2007) studied the effects of political problems in the Middle East on global stock markets, and his findings exhibited that the stock markets of Turkey, Morocco, Egypt, Pakistan, and Indonesia are affected from Middle East conflicts. Hung *et al.* (2007) examined the volatility and jump intensity of Taiwan stock and foreign exchange markets during a Presidential election period. Their findings exhibited that the Presidential election events has a positive effect on jump intensity of both markets. Wang and Lin (2008) examined the relationship between Taiwan stock market behaviors and political activities by using the asymmetric GARCH. Their findings showed a negative impact of congressional effect on stock returns but insignificant volatility.

The economies of developed and emerging countries are linked to each other from several aspects. Exchange rates is one of the main parameter that affect the global stock prices due to the interconnections of the economies. Ajayi and Mougoue (1996) studied the interrelationships of the exchange rates and the stock prices. They concluded that stock market is negatively affected from currency depreciation both in short and long-run. Maheen and Ullah (2013) analyzed the impact of US Dollars to Pakistan Rupee exchange rate on the stock return market in Pakistan. Their results exhibited that the two variables are correlated for a short period in Pakistan. Fredrick

et al. (2014) and Richards *et al.* (2009) investigated the relationship between stock prices and exchange rates in Kenya and Australia respectively and the results of their study exhibited similar results with what Maheen and Ullah (2013) concluded.

The studies that focus on the effects of macroeconomic variables on stock exchange index in Turkey is very broad. Köroglu (2009) studied the relationships between macroeconomic variables including inflation rate, money supply, oil prices, global gold prices and exchange rate (USD) and the Istanbul Stock Exchange BIST-100 index for the periods in between 1998 January and 2009 November. The outcome of his analysis exhibited that while there is a positive link between BIST 100 index and exchange rate and oil prices, negative relationship was found with money supply and inflation. The effect of gold was determined statistically insignificant. Ozbay (2009)'s study exhibited a bit different results than Koroglu's research (2009). The results of his study indicated that there is a negative relation between stock prices and interest rates and a positive relation with foreign investor transactions. However, the relationship between money supply, inflation, industrial production and exchange rate with stock returns were found statistically insignificant.

Ayaydin and Dagli (2012) studied the macroeconomic variables including S&P 500 Index, interest rates, inflation, industrial production index, exchange rates and money supply affecting the stock returns in emerging markets and they used panel data analysis in order to test the interaction among the stock returns and these parameters. Their results exhibited that while the stock returns of all emerging market samples are positively affected by SP 500 Index, they are negatively affected by the exchange rates and global financial crises. Their findings also suggested that interest rates do not affect the stock returns of all emerging markets they studied.

Dogan and Yalcin (2007) used VAR model in order to study the effects of exchange rate movements on the stock market in Turkey for the period between 1997 and 2003 by dividing their analysis into two sub-periods in accordance with the exchange rate policy changes in 1999. Their findings exhibited two different results; while the first period results showed positive effect of currency depreciation on most of the market

indices, in contrast, in the second period it showed a negative effect.

Kaya *et al.* (2013) investigated the relationship between the return of BIST 100 index and macroeconomic variables including money supply, interest rate, exchange rates and industrial production index by using OLS method of multiple regression models. Parallel to the results of Ayaydin and Dagli (2012), the results of their study indicated a negative relationship between stock returns and exchange rate, while a positive relation with money supply. Gungor and Kaygin (2015) discussed the micro and macroeconomic factors that affect share prices of companies operating under Istanbul Stock Exchange by using dynamic panel data analysis. Their results exhibited that there is a positive relation between stock prices and exchange rate, money supply, oil prices and industrial production index, whereas a negative relation with inflation, interest rates, GDP, gold prices and foreign trade balance.

Aktas and Oncu (2006) searched the effects of major political events on the pricing behavior of Turkish stock market, and they concluded that there is a strong economic implication for market participants of such political events. Onder and Mugan (2006) investigated the effects of economic or political news on stock market activities in Argentina and Turkey. Their results indicated that both the volatility of returns and trading volume of both markets are affected by political and economic news.

Ikizlerli and Ulku (2012) investigated how the foreign investor's investments in emerging stock markets are affected from the political risks. Their results indicated that political risks affect the stock returns, macroeconomic variables and net foreign flows.

5.1.1.2. REIT and Housing Indices. Simpson *et al.* (2007) studied the response of equity REIT returns against the increase and decrease of the inflation. The results of the study exhibited both increases and decreases in inflation affect equity REIT returns in upward direction. Another study about the effects of monetary policies and inflation was made by Glascock *et al.* (2002). A vector error correction model was employed in

order to test the relationships among REIT returns, real activity, monetary policy and inflation. In contrast to Simpson *et al.* (2007), negative relationship between REIT returns and inflation were found due to the manifestation of the effects of changes in monetary policies.

Ewing and Payne (2005) focused on the response of REIT returns to the unexpected shocks in the real output growth, the inflation, and monetary policy. They concluded that a monetary policy shock, inflation and unexpected changes in economic growth has a negative effect on real estate investment returns. Hardin *et al.* (2012) examined the relationship between REIT dividend yield and expected inflation. The results exhibited a positive relation between the inflation and dividend yield. Swanson *et al.* (2002) investigated the relationship between interest rates and daily REIT returns, and their results indicated that REIT returns are affected from interest rates.

Allen *et al.* (2002) studied the REIT characteristics and the sensitivity of REIT returns and they found robust signs to suggest that long or short-term interest rate changes affect REIT returns. He *et al.* (2003) analyzed 7 different interest rate proxies to determine the effects of interest rate proxies on equity and mortgage REITs. Their results exhibited that mortgage REITs were sensitive to all 7 interest rate proxies.

Chang and Chen (2014) studied the effects of contagion in global REITs returns and their results supported the presence of contagion in global REITs markets during the global financial crisis.

Wang *et al.* (1995) examined the microstructure of REIT market and its correlation with stock returns. They concluded that the ownership structure affects the value of the firm. The institutional investor rate is relatively less in REIT stocks, and the more the institutional investors rate in REIT stocks increase, the more their returns exceed the returns of other stocks.

The study of Chan *et al.* (1998) exhibited that the rate of the institutional investors investing in REITs increased compared to stock exchange after 1990. Chun

et al. (2004) analyzed how the real estate market takes place in institutional investor's portfolio and concluded that the real estate market is predictable about the same as in stock returns, and the rate of loss in a long term is small for real estate stocks, but couldn't find an answer why the institutional investors hold only between 2-3 percent of their assets in real estate.

Wiley and Zumpano (2008) empirically tested how the REITs end of the month effect is affected from the level of institutional investments, and their results exhibited that institutional investors affect the turn-of the- month returns but is not the only reason for that calendar anomaly. Chung *et al.* (2012) explored the influence of institutional ownership on improving the firm efficiency of equity REITs. Their results exhibited that the corporate governance and efficiency may be enhanced by institutional ownership.

Ngo (2017) investigated the impact of exchange rates on the returns of REITs in the US. Her analysis exhibited different outcomes according to the type of the REITs. While the returns of mortgage and hybrid REITs were not affected, an impact on equity REITs was found.

In Turkey, Kirdok (2012) examined the dynamic relationship between the returns of REITs and macroeconomic variables including inflation, interest rate, industrial production, default risk premium. She used vector autoregressive model for her analysis and the results of her study exhibited that the REIT returns are not significantly affected from shocks to inflation and industrial production.

According to the results of the study Onder (2010) made, the relationship between returns on real estate and both anticipated and unanticipated inflation is insignificant, but there is a different relationship between real returns and changes in inflationary expectations in low and high income regions.

There are also many researches that focused on the factors effecting the housing prices and their returns. Padilla (2005) investigated the impacts of oil prices,

exchange rates, interest rates and employment levels on house prices and rents in Calgary, Canada. The results exhibited an effect of all the variables on housing prices.

Grum and Govekar (2015) investigated the effects of unemployment rate, the stock exchange index, GDP and industrial production on property prices in Slovenia, Greece, France, Poland and Norway. Their results exhibited different results in different countries. Unemployment rate and stock index were determined the main parameters that affect the unit square meter price of residential units.

Adminis and Zvanitajs (2011) described the factors that influence the real estate market prices. They suggested that mortgage lending, employment and unemployment, inhabitant's income, demographic situation and government decisions are important parameters for real estate market prices.

The impacts of home loan rates, inflation and employment on the value of new homes in Greece were analyzed by Apergis (2003) by using error correction vector autoregressive model. The results of the study exhibited that housing loan rate is the most influential factor for determining new house prices followed by inflation and employment.

Feng *et al.* (2010) searched the relationship between macroeconomic factors including GDP, population, income per capita, fixed asset investment, consumer price index, loans of financial institutions, average construction costs and housing stocks and the housing market cycle in China and concluded that the house prices are determined by GDP, and in the long run, they exhibited a balanced relationship between macroeconomic factors and house prices.

Li and Chen (2015) investigated the dynamic interaction between the macroeconomic environment of China and the real estate market. Their empirical results show that long-run interest and employments, as well as money supply are the main factors affecting the real estate market followed by inflation and economic growth rates.

Pillaiyan (2015) studied the effects of GDP, bank lending rate, consumer feelings business environment, money supply, quantities of approved loans, stock market and inflation, on the house prices in Malaysia. Inflation, stock market, money supply and the number of approved home loans were found the most important factors.

Brooks and Tsolacos (1999) used VAR model to analyze the effect of macroeconomic factors on the UK real estate returns, and their results exhibited that unexpected inflation and the interest rate affect the property market.

Ong (2013) analyzed the relationship between GDP, population, inflation rate, costs of construction, interest rate and real property gains tax and the residential unit prices in Malaysia, and his results exhibited that housing prices are mostly affected by GDP, population and real property gains tax.

Xiao (2015) used VAR model to examine the macroeconomic parameters that have an impact on the real estate prices in China. The findings of the study exhibited that the real estate prices are mostly influenced by money supply, expected prices of real estates, real estate development investment and household income.

Pashardes and Savva (2009) examined the effects of GDP per capita, unemployment, inflation rates, interest rates, population, number of expatriates, tourist numbers, the index of the Cyprus Stock Exchange, the Euro/British Pound exchange rate and the cost of materials and labor in construction on house prices in Cyprus. Their results exhibited that island's population, materials and labor costs, economic growth and the pound-euro exchange rate affect the housing prices.

Panagiotizis and Printzis (2015) examined the housing price index and its macroeconomic elements. Home loans and retail trade are found the major determinants of variation of the housing price index.

Zheyu (2015) analyzed the macroeconomic factors affecting the housing price index in China. His findings exhibited that the housing prices are positively affected

by financial mortgages. On the other hand, land supply, the vacancy ratio of houses, the area of units sold have adverse effects on housing prices.

Galati *et al.* (2011) studied the macro and micro economic factors of house prices in Netherland. Their results exhibited that construction date, the level of education, income level of the residents, mortgage types and rates, long term interest rates, location, urbanization level, financing conditions and income expectations are important determinants of housing prices.

Ucal and Gokkent (2009) analyzed the macroeconomic variables that influence the real estate markets in Turkey by using VAR model. The results of the study indicated that the home ownership is a hedging tool against inflation.

Badurlar (2008) analyzed the dynamic effects of GDP, exchange rates, short term interest rates and money supply on the housing prices in Turkey. The results of the study exhibited that while there exists two-directional causality between house prices and interest rates and exchange rates, GDP and money supply affect the house prices in one direction.

5.1.2. Participating Banking and Sukuk

Hammoudeh *et al.* (2014) studied the dependency of the Dow Jones global Islamic Equity Market Index to conventional equity indices of Asia, Europe, and United States. The results of the study exhibited that oil prices, the volatility of stock market, the U.S. 10-year Treasury bond interest rate, and the 10-year European Monetary Union government bond index commonly affect the world financial system and Islamic financial market.

Xian *et al.* (2015) investigated the performance of Sukuk and conventional bond in Malaysia by choosing inflation, interest rate, GDP and openness of economy as macroeconomic variables. The results exhibited that there is an important negative relationships among interest rate and inflation and performance of conventional bond

and sukuk whereas, GDP and openness of economy were found to have significantly positive relationship with performance of conventional bonds and sukuk. Wasiuzzaman and Termizi (2010) analyzed the profitability of Islamic banks in Malaysia by using GDP and inflation. Their results exhibited that both inflation and GDP have positive influences on the bank profitability.

Said and Grassa (2013) examined the effects of the macroeconomic factors on sukuk market in different countries. Their results exhibited that the sukuk market is positively influenced by GDP per capita, size of the economy, trade openness, and percentage of Muslim.

Ayub and Masih (2013), investigated impacts of the interest rates and exchange rates on the 40 Islamic banks stocks. The results exhibited that there is a negative impact of the exchange rates, while there is no statistically significant result for the impact of interest rates.

Nahar and Sarker (2016), examined the effects of GDP growth rate, inflation rate, and exchange rate of Islamic banks in 48 Muslim and Non-Muslim countries. The findings of the study exhibited a positive influence of GDP growth rate and inflation rate and negative impact of exchange rate on Islamic banks.

Sensoy *et al.* (2015) analyzed the predictability dynamics of Islamic and conventional equity markets and their results showed that the quality of market, the institutional structures, liquidity and the specific investment behaviors of countries affect the Islamic equity markets.

5.1.2.1. Pension Funds. Wanjiku (2014), by using multivariate regression, investigated the effects of selected macroeconomic variables including inflation rate, interest rate, exchange rate (USD/KES) and GDP growth rate on the performance of the pension fund industry in Kenya. The results of the study exhibited that GDP growth, inflation, currency exchange rate and interest rates affect the returns of pension funds in Kenya.

Kemboi (2014) made a similar study and investigated the effects of money supply, interest rate, inflation on pension funds' net asset values, and her findings exhibited a positive effects of inflation and interest rates and a negative impact of money supply.

Chu (2011) investigated the impacts of inflation, money supply and short-term interest rates on the net asset values of pension funds in Hong Kong. The results of the study exhibited that while the inflation has an impact, the effects of the money supply and interest rates are found insignificant.

Oluoch (2013) studied the main factors that affect the performance of pension funds in Kenya and the influences of fund value, assets, age and the contributions of participants were examined. The results of the study exhibited that the age of investors affect the pension funds' performance the most positively, yet the fund value, assets and contributions of participants also have a weak positive effects on fund performance.

Uyar (2012), investigated the relationship between private pension system and the economic indicators. She examined the relationship between the number of participants, number of certificates and the total investment amount with deposit interest rates, exchange rate, inflation, growth rate, foreign trade rate and Istanbul Stock Exchange index, and her findings exhibited that, there is only one important relationship between the number of deposits and deposit interest rates.

Acikgoz *et al.* (2015) investigated the effects of fund participants, the real fund returns, fund operating expenses and share of fund assets on the growth of pension funds. Except for the fund operating expenses, all the chosen variables are found statistically significant on the growth of pension funds.

The past academic researches on the effects of the independent variables on returns of the dependent variables have different results. The reasons for that may either be the different effects of country specific factors, the chosen sample period of data or the research method used.

In the past literature, the impacts of inflation, gold prices, oil prices, exchange rates, interest rates, political conflicts, elections, political activities, money supply, industrial production, GDP, political and economic news, global financial crisis, S&P 500 index, foreign investor transaction were investigated on the common stocks. Among these factors, inflation, exchange rates, interest rates, oil and gold prices are evaluated as the mostly used parameters with different results obtained as shown in Figure **??**.

The researches about real estate including the REIT and housing price indices also cover a very wide range of variables. Inflation, oil prices, exchange rates, interest rates, home loan interest rates, money supply, GDP, monetary policy, real output growth, contagion, ownership structure, default risk premium, unemployment rate, inhabitants' income, demographic situation, economic growth, number of residential loans, population, real property gain tax, cost of construction, tourist numbers, construction date, level of education, urbanization level, location, financial conditions, income expectations, number of residential loans and number of expatriates were the parameters that their impacts were investigated on the REIT and housing price indices. Among these factors, as shown in Table 5.2, inflation, exchange rates and interest rates are found as the mostly investigated parameters.

The participating banking industry has been developing in the last decade. The past studies that affect the industry cover the parameters including inflation, exchange rates, oil prices, interest rates, GDP, stock market volatility, the US 10 years treasury bonds interest rates, 10 years European Monetary Union government bond index, openness of economy, percentage of Muslims, size of economy, GDP per capita, market quality, institutional characteristics, liquidity and country specific investment behaviors. Among these parameters, inflation, oil prices, exchange and interest rates are evaluated as the common factors that were analyzed in the past as shown in Table 5.3.

Table 5.1. The Past Studies about Stocks.

Independent Variables	**Stocks**	
	Significant	**Insignificant**
Inflation	Simpson and Ramchander (2012), Koroglu (2009), Kaya *et al.* (2013)	Ozbay (2009)
Gold Prices	Kaya *et al.* (2013)	Miyazaki and Hamori (2013), Koroglu (2009)
Oil Prices	Odusami (2009), Reboredo (2010), Louis and Balli (2014), Rafailidis and Katrakilidis (2014), Xu (2015), Koroglu (2009), Kaya *et al.* (2013)	
Exchange Rates	Ajayi and Mougue (1996), Maheen and Ullah (2013), Richards *et al.* (2009), Koroglu (2009), Ayaydin and Dagli (2012), Dogan and Yalcin (2009), Kaya *et al.* (2013)	Ozbay (2009)
Interest Rates	Ozbay (2009), Kaya *et al.* (2013)	Ayaydin and Dagli (2012)

The pension funds are directly and indirectly related to the factors that affect the stocks, bonds, bills, real estate, precious metals etc. in the percentage of its portfolio distribution. That may be a reason for the limited direct studies that investigated the factors that affect the pension fund returns. In the past literature, the impacts of inflation, exchange rates, interest rates, money supply, GDP, fund value, fund assets, age of investors and contribution of participants on pension funds were analyzed. Among these studies, interest rates, inflation and exchange rates are also found as the common parameters with other dependent variables that their affects were investigated. Table 5.1.2.1 shows the past studies about the pension funds.

Table 5.2. Past Studies about REIT and Housing Price Indices.

Independent Variables	**REIT Index**		**Housing Price Index**	
	Significant	**Insignificant**	**Significant**	**Insignificant**
Inflation	Simpson *et al.* (2007), Glascock *et al.* (2002), Ewing and Payne (2005), Hardin *et al.* (2012)	Kirdok (2012), Onder (2010)	Apergis (2003), Li and Chen (2015), Pillaiyan (2015), Brooks and Tsolacos (1999)	Ong (2013), Pashardes and Savva (2009)
Oil Prices			Padilla (2005)	
Exchange Rates	Ngo (2017)	Ngo (2017)	Pashardes and Savva (2009), Badurlar (2008), Padilla (2005)	
Interest Rates	Swanson *et al.* (2002), Allen *et al.* (2002), He *et al.* (2003), Kirdok (2012)		Li and Chen (2015), Brooks and Tsolacos (1999), Galati *et al.* (2011), Badurlar (2008), Padilla (2005)	Ong (2013), Pillaiyan (2015), Pashardes and Savva (2009)
Housing Loan Interest Rates			Apergis (2003), Panagiotizis and Printzis (2015), Galati *et al.* (2011)	

Table 5.3. Past Studies about Participating Banks.

Independent Variables	**Participating Banks**	
	Significant	**Insignificant**
Inflation	Xian *et al.* (2015), Waisuzzaman and Termizi (2010)	
Oil Prices	Hammoudeh *et al.* (2014)	
Exchange Rates	Ayub and Masih (2013), Nahar and Sarker (2013)	
Interest Rates	Xian *et al.* (2015), Nahar and Sarker (2013)	Ayub and Masih (2013)

Table 5.4. Summary of Literature Review.

Independent Variables	**Dependent Variables**				
	Stock Prices	**REIT Index**	**Housing Price Index**	**Participating Banks**	Pension **Funds**
Inflation	√	√	√	√	√
Gold Prices	√				
Oil Prices	√		√	√	
Exchange Rates	√	√	√	√	√
Interest Rates	√	√	√	√	√
Housing Loan Interest Rates			√		
Political Conflicts	√				

Table 5.4. Summary of Literature Review (cont.).

Independent Variables	**Dependent Variables**				
	Stock Prices	**REIT Index**	**Housing Price Index**	**Participating Banks**	Pension **Funds**
Elections	√				
Political Activities	√				
Money Supply	√	√	√		√
Industrial Production	√				
Foreign Investor Transaction	√				
S&P 500 Index	√				
Global Financial Crisis	√				
GDP	√		√	√	√
Foreign Trade Balance	√				
Economic News	√				
Political News	√				
Political Risks	√				
Monetary Policy		√			
Real Output Growth		√			
Contagion in Financial Crisis		√			
Ownership Structure		√			
Default Risk Premium		√			
Unemployment Rate			√		
Inhabitants' Income			√		
Demographic Situation			√		
Economic Growth			√		
Number of Residential Loans			√		
Population			√		
Real Property Gains Tax			√		

Table 5.4. Summary of Literature Review (cont.).

Independent Variables	**Dependent Variables**				
	Stock Prices	**REIT Index**	**Housing Price Index**	**Participating Banks**	Pension **Funds**
Cost of Construction			√		
Household Income			√		
Real Estate Development Investment			√		
Number of Expatriates			√		
Tourist Numbers			√		
Construction date			√		
Level of Education			√		
Location			√		
Urbanization Level			√		
Financial Conditions			√		
Income Expectations			√		
Stock Market Volatility				√	
The US 10 Years Treasury Bond Interest Rates				√	
10 Years European Monetary Union Government Bond Index				√	
Openness of Economy				√	
Percentage of Muslim				√	
GDP per Capita				√	
Size of the Economy				√	
Market Quality				√	
Institutional Characteristics				√	
Liquidity				√	

Table 5.4. Summary of Literature Review (cont.).

Independent Variables	**Dependent Variables**				
	Stock Prices	**REIT Index**	**Housing Price Index**	**Participating Banks**	Pension **Funds**
Country Specific Investment Behavior				√	
Fund Value					√
Fund Assets					√
Age of Investors					√
Contribution of Participants					√

Table 5.5. Past Studies about Pension Funds.

Independent Variables	**Pension Funds**	
	Significant	**Insignificant**
Inflation	Wanjiku (2014), Kemboi (2014), Chu (2011)	
Exchange Rates	Wanjiku (2014)	
Interest Rates	Wanjiku (2014), Kemboi (2014)	Chu (2011)

As a result of the comprehensive literature review, as shown in Table 5.5, since they were commonly used parameters in the past literature for all dependent variables of this study; inflation (CPI), exchange rates (USD/TL) and interest rates (central bank overnight lending interest rates) were selected to investigate. In addition to these three parameters, home loan interest rates due to its tie to the development of real estate industry, oil prices as it has a direct and indirect effects to economies especially for energy dependent countries and gold prices, as far as it is figured out through the research review, it has not been investigated for the real estate, participating bank and pension funds before; were selected as the independent variables of this study.

5.1.3. Establishing the Hypotheses

This research is aiming to bring a new real estate-pension fund financing and investment ecosystem. In that context, after a comprehensive literature review, several hypotheses are constructed. These hypotheses are designed based on the effects of selected independent variables on the returns of dependent variables, the effects of other dependent variables on the average returns of pension funds, and the forecast analysis regarding the model proposed.

5.1.3.1. Hypotheses Between Selected Variables, Dependent Variables. The past literature regarding the effects of independent variables have different outcomes. While some of them have results of significant effects on the returns of the dependent variables, some of them exhibited the opposite results. In that context, while the hypotheses are structured, the nature of the industries, the observed data and the common findings of the extensive literature are combined. The hypotheses of this section are listed as follows:

Table 5.6. Hypotheses between the Selected Variables and Dependent Variables.

H1	Inflation (CPI) affects the returns of BIST 100 index
H2	Inflation (CPI) affects the returns of REIT index
H3	Inflation (CPI) affects the returns of Housing Sales Price index
H4	Inflation (CPI) affects the returns of Housing Rent Price index
H5	Inflation (CPI) affects the Participating Banks Average Share of profits
H6	Inflation (CPI) affects the average returns of Pension Funds
H7	Home loan interest rates affect the returns of Housing Sales and Rent Price index
H8	Home loan interest rates affect the returns of REIT index
H9	Central bank overnight lending interest rates do not affect the returns of BIST 100 index
H10	Central bank overnight lending interest rates affect the Participating Banks Average Share of profits

Table 5.6. Hypotheses between the Selected Variables and Dependent Variables (cont.).

H11	Exchange rates (USD/TL) affect the returns of BIST 100 index
H12	Exchange rates (USD/TL) affect the returns of REIT index
H13	Exchange rates (USD/TL) affect the returns of Housing Sales and Rent Price indices
H14	Exchange rates (USD/TL) affect the returns of Participating Banks Average Share of profits
H15	Exchange rates (USD/TL) affect the average returns of Pension Funds
H16	Gold prices affect the Participating Banks Average Share of profits
H17	Gold prices affect the returns of average returns of Pension Funds
H18	Oil prices affect the returns of BIST 100 index
H19	Oil prices affect the returns of Housing Sales and Rent Price Indices
H20	Oil prices affect the returns of Participating Banks Average Share of profits

H1-H6: Return maximization is important for investors, and this study is aiming to shed lights for investors in order to help them in the process of making decision for which investment tools they will invest in. Inflation is one of the main macroeconomic variable for all economies. Investors, when deciding to their choices for the investment tools, they want to get a protection against inflation. The past studies have different results about the impact of the inflation on the returns. In that context, in this study, inflation is evaluated as a parameter that has a significant impact on the returns of all dependent variables. That assumption forms the hypotheses 1-6.

H7-H8: Housing market is an important component of real estate industry. The home loans build up the 39% of the total consumer loans with a 7% shares of total GDP (TBB, 2017). That is why the home loan interest rates is considered important factor for the returns of housing sales and rent price indices. Due to their tie in real estate industry, it is also considered that the home loan interest rates has a significant impact on REIT returns.

H9-H10: Interest rates are also important economic indicators. The past studies about interest rates have different results. While some of them as Ozbay (2009) and Gungor and Kaygin (2015) exhibited a negative relation between the stock returns and interest rates, others such as Ayaydin and Dagili (2012) found no significant effects of interest rates on stock returns. In this study, H9 hypothesized that the returns of BIST 100 index is not affected from the central bank overnight lending interest rates, and while due to its link to conventional banking, in H10, it is assumed that the central bank overnight interest rates has an impact on participating banking average share of profits (rates of profit share).

H11-H15: The common literature exhibits that the exchange rates has an impact on the returns of the dependent variables of this study. Two exceptions for these results were found by Ozbay (2009) in stocks and Ngo (2017) for partially in REITs. Similar to the majority of the past researches, this study also claim that exchange rates is an important factor that has an impact on the returns of the dependent variables. The hypotheses 11 to 15 were constructed based on this assumption.

H16-H17: Although gold is an important alternative investment tool, its relation to stock market returns was found insignificant by Miyazaki and Hamori (2013), whereas, Gungor and Kaygin (2015) found a negative relation with gold prices and stock prices. On the other hand, throughout the literature review, no study was found that investigated the impact of gold prices on the REIT index returns as well as other dependent variables except for stock markets. The participating banking industry is based on assets such as goldwhich is an important global asset, is believed to affect the Islamic banking. Since interest free pension funds also cover both participating banking shares and gold, H16 and H17 were built on these tie.

H18-H20: Odusami (2009), Reboredo (2010), Louis and Balli (2014), Rafailidis and Katrakilidis (2014) and Xu (2015) found out an effect of oil prices on stock returns. Padilla found the same oil price impact on house prices, and Hammoudeh *et al.* (2014) for participating bank average share of profits, yet there is no study that investigated oil price impact on REIT index returns. In that context, H18-to H20 were constructed

under the claim of the existence of the effect of oil prices on the returns of BIST 100 index, housing sales indices and participating banks share of profits.

While investigating the effects of the macroeconomic variables, it is also important to check whether there is a causality and interaction among the dependent variables themselves. In that aspect, by accepting the average returns of pension funds as the dependent variables, the hypotheses investigating the effects of the returns of BIST 100, REIT, Housing Sales Price, Housing Rent Price Indices and Participating Banking average share of profits on the average returns of pension funds are constructed as follows:

5.1.3.2. Hypotheses among the Dependent Variables. H21-25: By selecting pension fund returns as the dependent variable and accepting the other dependent variables as independent factors, it is assumed that affect the returns of the pension funds are affected from stock exchange, REIT and participating banks shares because current pension funds cover all these investment tools in its different portfolio mix. In addition, it is also hypothesized that the housing sales and rent price indices have impact on the returns of pension funds by assuming that the both industries have a tie with each other.

Table 5.7. Hypotheses among the Dependent Variables

H21	The returns of BIST 100 index affect the average returns of pension funds
H22	The returns of REIT index affect the average returns of pension funds
H23	The returns of Housing Sales Price index affect the average returns of pension funds
H24	The returns of Housing Rent Price index affect the average returns of pension funds
H25	The returns of Participating Banks Average Share of profits affect the average returns of pension funds

5.1.3.3. Hypotheses about the Model. H26-H29: The model proposed in this study is based on the investment scheme that incorporates the real estate investment instruments with the pension funds. For this reason, it is important to investigate and compare the forecasted returns of the real estate investment tools and the average re-

turns of pension funds for 2017. BIST 100 index is also forecasted as an important benchmark tool. In that context, the hypotheses about the model are structured as follows:

Table 5.8. Hypotheses about the Model.

H26	The forecasted average return performance of REIT index is better than the average return performance of Pension Funds
H27	The forecasted average return performance of Housing Sales Price index is better than the average return performance of Pension Funds
H28	The forecasted average return performance of Housing Rent Price index is better than the average return performance of Pension Funds
H29	The forecasted average return performance of REIT index is better than the average return performance of BIST 100 index

The hypotheses were tested with VAR and ARIMA models and the results were discussed in Section 6. The details of the selected methods are discussed below.

5.1.4. Selecting the Research Methods

This research is evaluating the effects of the macroeconomic variables that is observed in a time interval and make a forecast analysis of monthly data of the dependent variables. As a result, time series analysis is selected as the research model. Before explaining the time series and specifically the research method to be used, it is important to mention the major financial theories that discuss the returns of investments.

Modern portfolio theory (MPT), also called as mean-variance analysis, which was introduced by 1990 Nobel laureate Harry Markowitz (1952), is defined as a model that targets to maximize the expected return by creating a portfolio of assets for a given level of risk, defined as variance. MPT assumes that investors prefer the less risky option if they are offered two portfolios with the same expected returns. Hence, an investor may accept the increased risk only if a higher expected return is provided. On the contrary, the higher expected returns means more accepted risk by the investors. Since the investors have different risk perception and aversion characteristics, the way

they evaluate the trade-off will be different (Investopedia, 2017).

Sharpe (1964), Lintner (1965) and Mossin (1966) developed Capital Asset Pricing Model (CAPM) based on the Markowitz's portfolio theory. In order to make decision to include additional assets to a diversified portfolio, the CAPM determines the required rate of return of an asset to be included. Ross (1976) developed the Arbitrage Pricing Theory (APT) which models the expected return of a financial asset as a linear function of several macro-economic parameters. The rate of return obtained from the model is then used for asset pricing. The risky asset's anticipated return and the risk premium of a number of macroeconomic factors are used in APT. If the price diverges, arbitrage should bring it back into line (Wikipedia, 2017).

A time series is defined as the sequence of mathematical data collected in a regular interval in a sequential order. In time series, there is no upper or lower limitation of time that must be included. Time series analysis are good tools to find out the changes of a given asset, security or economic variable over time (Investopedia, 2017).

The theory and practice of asset valuation over time is the main focus area of financial time series analysis. These series analysis are distinguished from other time series analysis by uncertainty. For instance, asset volatility has many definitions and it is not directly observable for stock return series. In financial time series analysis, due to their focus on uncertainty, statistical theory and methods are important (Tsey, 2010).

One of the most important part of this study is focusing on forecast analysis of the time series used. For this reason, it is essential to discuss the financial forecast methods and find the rightest way that will enable this research to find the closest estimated results.

There are many methods that forecasts can be made. These methods can be either qualitative or quantitative. While qualitative models which include market research polling or Delphi method, may be useful in forecasting the short-term projections of

companies, the quantitative models, which are concerned solely with data, try to eliminate the human factor from the analysis. They try to estimate the variables such as sales, GDP, housing prices, which are measured in long terms. The indicator approach is a method which assumes the stability of the relationship certain indicators over time. Econometric modeling is another type of indicator approach which is based on mathematics in which the internal consistency of data sets over time and the significance or strength of the relationship between data sets are tested. In time series methods, the past data is used to forecast future.

There are very common steps in forecast analysis are followed. First, a problem or data point is chosen. In this study, the major question is "what will the returns of the dependent variables be in 2017?" Then, theoretical variables and data set are chosen. Next, in order to simplify the process and save time, the forecaster makes some assumptions. Later, in accordance with the appropriateness to the data set, selected variables and assumptions, the model is chosen. Finally, the data is examined, a prediction made from the analysis and the forecast is compared with real data to adjust the process. In this study, the time series analysis is chosen for forecasting.

Since the forecast is based on the past data only, there is no certainty about the stability of the conditions to be the same in the future. It is also difficult to determine unexpected events or external conditions. Forecasting can be a risky work, because it may limit the range of actions of the forecasters and relying on the forecast results (Investopedia, 2017).

In order to use a time series analysis, it is essential to test its stationary.

5.1.4.1. Stationary Test (Augmented-Dickey Fuller Test). Mean, variance, autocorrelation, etc. are important basic statistical properties. A series is defined as stationary time series when these properties are all constant over time. Most statistical forecasting methods assume that the time series are or become stationary after some mathematical transformations. Estimating stationary series are not difficult. The basic prediction

is that its statistical properties will remain unchanged in the future. Untransforming, which means reversing the mathematical transformations previously used, is made for the stationarized series to obtain predictions for the original series.

Another reason for trying to stationarize a time series is the aim of getting significant sample statistics including means, variances, and correlations with other variables. If the series is stationary, then these future descriptive statistics are useful. For instance, in the case the series is constantly increasing over time, the sample mean and variance will also increase with the size of the sample, and the mean and variance in future periods will not be estimated correctly. The under defined mean and variance of a series will be resulted with bad definition of its correlations with other variables.

Most business and economic time series do not behave stationary. Their non-stationary status may continue even after seasonal adjustment, and they may still exhibit non-stationary behaviors such as trends, cycles and random-walking. If non-stationary time series data is used in financial models, unreliable results and wrong estimations may be obtained. The results obtained by using non-stationary time may indicate a relationship between two variables in fact does not exist. In order to receive consistent, reliable results, it is important to transform the non-stationary data into stationary data.

It may sometimes be possible to stationarize series with a stable long-run trends by de-trending (by fitting a trend line and subtracting it out prior to fitting a model, perhaps in conjunction with logging or deflating.) Such a series is called trend-stationary. However, sometimes de-trending is not enough to convert such series to stationary series, in that case transforming it into a series of period-to-period and/or season-to-season differences becomes essential. Difference stationary series are defined as when the mean, variance, and autocorrelations of the original series are not constant in time, even after detrending. In some cases it is hard to distinguish the trend-stationary from difference-stationary series, then, a unit root test is applied to find out the answer.

Unit root tests are used to test if differencing is required in a time series. There are many unit root tests which are structured on different assumptions and different results. Among these tests, Augmented Dickey-Fuller (ADF) test is one of the most well-known and widely used test. The regression model of the test is shown below:

$$y\prime_t = \phi y_t - 1 + \beta_1 (y\prime_t - 1) + \beta_2 (y\prime_t - 2) + \cdots + \beta_k (y\prime_t - k), \tag{5.1}$$

where y'_t is the first-differenced series, $y'_t = y_t$ is the -1, k is the number of lags to include in the regression (often set to be about 3).

If the original series, y_t needs differencing, then the coefficient ϕ should be approximately zero. If y_t is already stationary, then $\phi < 0$.

David Dickey and Wayne Fuller developed the Dickey-Fuller test in 1979 in order to test the null hypothesis of the existence of a unit root in an autoregressive model. Augmented Dickey-Fuller (ADF) test is used for a larger and more complicated set of time series models. In ADF test, the alternative hypothesis is different depending on which version of the test is used, but is usually stationarity or trend-stationarity. The ADF statistic used in the test is a negative number. The more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence (Nipax, 2017).

5.1.4.2. Autoregressive Models (AR). While the effects of variables are forecasted by a linear combination of predictors at multiple regression models, the autoregression models forecast the variables of interest by using a linear combination of past values of the variable. The term autoregression specifies that it is a regression of the variable against itself.

Thus, an autoregressive model of order p can be written as

$$y_t = c + \phi_1 (y_t - 1) + \phi_2 (y_t - 2) + \cdots + \phi_p (y_t - p) + e_t, \tag{5.2}$$

where c is the a constant, e_t is the white noise.

This is like a multiple regression but with lagged values of y_t as predictors. We refer to this as an AR(p) model.

A wide range of different time series patterns are solved by using flexible autoregressive models.

For an AR(1) model:

When ϕ_1=0, y_t is equivalent to white noise (A time series r_t is called a white noise if r_t is a sequence of independent and identically distributed random variables with finite mean and variance.) When ϕ_1=1 and c=0, y_t is equivalent to a random walk.

(A time series p_t is a random walk if it satisfies $p_t = p_t\text{-}1 + a_t$, where p_0 is a real number denoting the starting value of the process and a_t is a white noise series.

When ϕ_1=1 and c≠0, y_t is equivalent to a random walk with drift When ϕ_1¡0, y_t tends to oscillate between positive and negative values. The autoregressive models are restricted to stationary data, and then some constraints on the values of the parameters are required.

For an AR(1) model: -1¡ϕ_1¡1 When p≥3 the restrictions are much more complicated (Otexts, 2017).

5.1.4.3. Moving Average Models (MA). Instead of using past values of the forecast variable in a regression, past forecast errors in a regression-like model is used at moving average models.

$$y_t = c + e_t + \theta_1 e_t - 1 + \theta_2 e_t - 2 + \cdots + \theta_q e_t - q, \tag{5.3}$$

where e_t is white noise. This is referred as an MA(q) model. The values of e_t is not observed, so it is not really regression in the usual sense.

Each value of y_t can be thought of as a weighted moving average of the past few forecast errors. A moving average model is used for forecasting future values while moving average smoothing is used for estimating the trend-cycle of past values.

Moving Average and Autoregressive models are similar to each other with a main difference. At Ma (q) model, the random white noise "shocks" are seen directly at each current value of it, but at AR (p) model, the white noise "shocks" are only seen indirectly, via regression onto previous terms of the series. Also, while the MA model only ever sees the last q shocks for any particular MA(q) model, the AR(p) model takes all prior shocks into account in a decreasingly weak manner (Otexts, 2017).

5.1.4.4. Auto Regression Moving Average Model (ARMA). Autoregressive model considers its own past behavior as inputs for the model such as momentum and mean-reversion in stock trading. Moving average model is used to characterize "shock" information to a series, such as a surprise earnings announcement or unexpected event. Hence, an ARMA model attempts to capture both of these aspects when modelling financial time series. Volatility is not taken into account in ARMA model. Since The ARMA (p, q) model is a linear combination of two linear models, hence it is also linear: A time series model, xt, is an autoregressive moving average model of order p, q, ARMA (p, q), if:

$$x_t = \alpha_1 x_t - 1 + \alpha_2 x_t - 2 + \ldots + w_t + \beta_1 w_t - 1 + \beta_2 w_t - 2 \ldots + \beta_q w_t - q \qquad (5.4)$$

where w_t is the white noise with, E(wt)=0 and variance $\sigma 2$. (Quantstart, 2017).

5.1.4.5. Auto Regressive Integrated Moving Average Model. Dynamics of a time series is sometimes hard to be explained by classical regression. Adding nonstationary models to the mix leads to the autoregressive integrated moving average (ARIMA)

model (Shumway and Stoffer, 2017). ARIMA model is a form of ARMA model with a number of differences to convert a non-stationary series to a stationary series. ARIMA models are also known as Box-Jenkins model. Makridakis and Hibom (1997) explained the three steps of Box and Jenkins (1976) who popularized the use of ARIMA: Model identification, parameter estimation and diagnostic checking. These three steps are detailed as; forming the series, testing its stationary, differencing if not stationary, identifying the possible model, estimating the parameter values, diagnosing the model, reviewing the model and using the model for forecasting.

Table 5.9. Box-Jenkins Model (Makridakis and Hibon, 1997).

Plotting the series
Stationary test
Differencing if not stationary
Identifying the possible model
Estimating the parameter values
Diagnose the model
Review the model
Use the model to forecast

A time series xt is an autoregressive integrated moving average model of order p, d, q, ARIMA (p, d, q), if ∇dxt is an autoregressive moving average of order p, q, ARMA (p, q).

That is, if the series xt is differenced d times, and it then follows an ARMA (p, q) process, then it is an ARIMA (p, d, q) series.

ARIMA models are used because they can reduce a non-stationary series to a stationary series using a sequence of differencing steps.

5.1.4.6. Vector Autoregression (VAR) Model. Vector autoregression (VAR) models were introduced by Christopher Sims (1980) to model the relations and joint dynamics among a set of macroeconomic parameters (Encyclopedia, 2017).

The vector autoregression (VAR) model is an important multivariate time series analysis method which is very widely used, successful, flexible, and user friendly model. The VAR model is also used for forecasting and policy analysis.

The vector autoregressive model of order 1, denoted as VAR (1), is as follows:

$$x_t, 1 = \alpha_1 + \phi_{11} x_{t-1}, 1 + \phi_{12} x_{t-1}, 2 + \phi_{13} x_{t-1}, 3 + w_t, 1 \tag{5.5}$$

$$x_t, 2 = \alpha_2 + \phi_{21} x_{t-1}, 1 + \phi_{22} x_{t-1}, 2 + \phi_{23} x_{t-1}, 3 + w_t, 2 \tag{5.6}$$

$$x_t, 3 = \alpha_3 + \phi_{31} x_{t-1}, 1 + \phi_{32} x_{t-1}, 2 + \phi_{33} x_{t-1}, 3 + w_t, 3 \tag{5.7}$$

Each variable is a linear function of the lag 1 values for all variables in the set (Wikipedia, 2017).

5.1.4.7. Granger Causality Test. The Granger causality test, first proposed in 1969 and developed by Clive Granger is used the ability of a time series in forecasting another one. Multivariate Granger causality analysis is usually performed by fitting a vector autoregressive model (VAR) to the time series. VAR Granger causality use to examine the causal relationship among the variables (Wikipedia, 2017).

5.1.4.8. Impulse Response Function. The impact on the endogenous variables and the current value of future values when a one-time shock is added to the disturbance term is described by impulse response function. In VAR model, the impulse response functions is also analyzed.

In the past literature, there are many researches that used VAR model. Kim *et al.* (2007) and Kirdok (2012) examined the real estate return behaviors, equity markets

and related macroeconomic variables by using VAR model. Dogan and Yalcin (2007) used VAR model in order to study the effects of exchange rate movements on the stock market in Turkey. Ikizlerli and Ulku (2012) analyzed the influence of political risk on the trades of foreign investors in developing stock markets by using VAR. Ewing and Payne (2005) used VAR model for identifying the reaction of REIT returns to unanticipated changes in selected macroeconomic factors. Another study that VAR is used was made by Hardin *et al.* (2012) who investigated the relationship between REIT dividend yield and expected inflation.

Iacoviello (2002), investigated the key macroeconomic variables that fluctuate the housing prices in major European countries by using VAR model. Sibanda and Mhlanga (2013), used VAR model to investigate the interactions among property returns and selected variables in South Africa. Brooks and Tsolacos (1999) used VAR model to analyze the effect of macroeconomic factors on the UK real estate returns. Xiao (2015) used VAR model to analyze these macroeconomic dynamics that affect the real estate prices in China as Ucal and Gokkent (2009) did the similar study by using VAR model for Turkey.

In the lights of the past studies made, VAR model is selected in order to determine the variables that affect the returns of the dependent variables. Augmented Dickey-Fuller test, Granger Causality test and Impulse Response function were also employed for stationary and causality tests.

For forecast analysis there are several models to be used. Among these, systems dynamics, neural network analysis and agent based modeling are some other options in addition to econometric based model, ARIMA. Ghosh and Chinthalapati (2014) investigated the agent based modelling technique to model and forecast some financial markets including foreign exchange and equities based on time-series properties, and their results exhibited the forecasting capabilities of the model. Although there are several validation approaches, the authors' main concern about the model is that none of these approaches are dominant to test the reliability of the results. Zhang *et al.* (2015) suggested systems dynamics as a new method of analysis for real estate development

as an alternative to econometric methodology. As Ghosh and Chinthalapati (2014) underlined, Radzidcki (2009) had also pointed out the same validation problem in his study made about the system dynamics and its contribution to economic modelling.

An interesting research made about Toledo *et al.* (2008) that integrated the system dynamics and econometric models as a complementary analysis tools to solve complex problems and suggested it for Spanish labor market.

Tse (1997) analyzed the forecasts of real estate prices in Hong Kong with ARIMA model and indicated its use to predict the short term market direction. Vishwakarma, (2013) also used ARIMA models in his study made for the Canadian real estate price index. Stovicek (2007) used ARMA model to forecast the inflation in Slovenia. Berglund (2007) forecasted the housing prices of Stockholm and Sydney by using ARMA model. Hepsen and Vatansever, (2010) forecasted the housing price trends by using ARIMA method. Almarwani (2014), used ARIMA model to examine the time series properties of different properties and compared their characteristics with each other including the UK all housing price index.

It can be said that from extensive literature review, ARIMA model is the most proper method for time series prediction analysis. That is why in this study ARIMA model is selected for the forecast analysis.

6. DATA COLLECTION, THE MODEL, ANALYSIS AND RESULTS

6.1. Data Collection

The data of this study is collected from periodical statistics of the government institutions including Central Bank of the Republic of Turkey (TCMB), Turkish Statistical Institute (TUIK), Istanbul Stock Exchange, Pension Monitoring Center (EGM), Central Securities Depository of Turkey (MKK), Banking Regulation and Supervision Agency (BDDK), as well as many global and prestigious sectoral and institutional associations and reports including Participation Banks Association of Turkey (TKBB), Banks Association of Turkey (TBB), Reidin Real Estate Market Information Center, the US Energy Information Administration, World Bank, OECD, E&Y, JLL, C&W, EPRA and Savills. The period of the data covered is shown in Table 6.1. The VAR analysis was conducted by using the monthly data starting from January 2004 to December 2016. The monthly data of the ARIMA forecast analysis started with the oldest monthly data available for the forecasted variable.

Table 6.1. The Dependent and Independent Variables.

Variables		**Data Source**	**Period**
Dependent	The Return of REIT Index	Istanbul Stock Exchange	2004-2016
	The Return of BIST 100 Index	Istanbul Stock Exchange	2004-2016
	The Return of Housing Sales Index	Reidin Index	2004-2016
	The Return of Housing Rent Index	Reidin Index	2004-2016
	The Average Return of Pension Funds	Pension Monitoring Center	2004-2016
	The Participating Bank Average Share of profits	Participation Bank Association of Turkey	2004-2016
Independent	Inflation (CPI)	Central Bank Republic of Turkey	2004-2016
	Central Bank Lending Interest Rates	Central Bank Republic of Turkey	2004-2016
	Exchange Rates (USD/TL)	Central Bank Republic of Turkey	2004-2016
	Home Loan Interest Rates	Central Bank Republic of Turkey	2004-2016
	Gold Prices	Central Bank Republic of Turkey	2004-2016
	Oil Prices	US Energy Information Administration	2004-2016

In this study, in addition to the return forecasts of the selected dependent parameters, important forecast analysis were also conducted that cover the pension fund asset size, number of participants, state contribution, size of the home loans, number of home sales to foreigners and mortgaged home sales. Sukuk and ownership structures were also analyzed. In Table 6.2 the list of the additional data used and their sources are shown.

Table 6.2. Additional Data Analyzed.

	Variables	**Data Source**	**Period**
Additional Data	Sukuk Average Coupon Rates	Participation Bank Association of Turkey	2014-2016
	Pension Funds Total Assets	Pension Monitoring Center	2004-2016
	Pension Funds Total Participants	Pension Monitoring Center	2004-2016
	Pension Funds State Contribution	Pension Monitoring Center	2013-2016
	Home Sales	Turkish Statistical Institute	2013-2016
	Home Sales to Foreigners	Turkish Statistical Institute	2013-2016
	Mortgaged Home Sales	Turkish Statistical Institute	2013-2016
	Home Loans	The Banks Association of Turkey	2004-2016
	Ownership Rates of REIT Index	Central Securities Depository of Turkey	2011-2015
	Ownership Rates of BIST 100 Index	Central Securities Depository of Turkey	2011-2015

6.2. Analysis and Results

In this section, the analysis of the stationary and causality test results, as well as the results of the forecast analysis are given. All related tables of the unit root and causality test results are listed in Appendix A, and the forecast results are shown in Appendix B.

Before discussing the VAR and ARIMA analysis results, it is important to interpret the results of the correlation analysis shown in Figure 6.1. The Figure 6.2 to Figure 6.6 show the monthly data of the dependent variables with respect to their correlations.

- The returns of BIST 100 and REIT indices are highly correlated with 79% correlation rate.
- The returns of both REIT and BIST 100 indices are correlated with pension funds average return with 70% and 83% correlation degree respectively.
- Both REIT index return and BIST 100 index returns and pension funds average returns are negatively correlated with USD/TL exchange rates with 44%, 47% and 45% respectively, yet these rates are below 50%.
- Housing sales and rent price indices are 73% correlated to each other.
- Participating banks average share of profit rates are highly correlated with weighted average home loan interest rates and central bank overnight lending interest rates 90% and 94% respectively.
- Weighted average home loan interest rates are correlated with central bank overnight lending interest rates with 91% correlation rate.
- There is a negative correlation among the housing sales price index return and interest rates and participating banking average share of profits, which all of them below 50%.

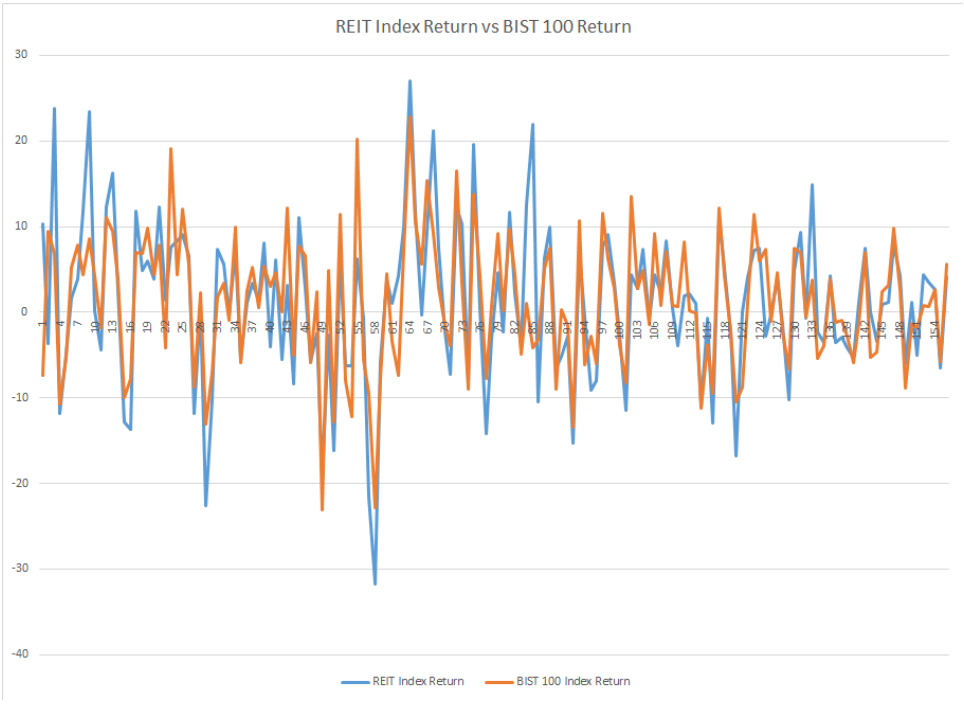


Figure 6.1. Returns of REIT and BIST 100 indices.

Table 6.3. Correlation Matrix among Dependent and Independent Variables.

Correlation Matrix	**REIT Return**	**BIST 100 Return**	**Housing Sales Price Index Return**	**Housing Rent Price Index Return**	**Pension Funds Average Return**	**Participating Banks Monthly Av. Share of profits**	**Gold Price Return**	**USD/TL Exchange Return**	**TUIK CPI**	**Weighted Average Home Loan Interest Rates**	**TCMB Overnight Interest Rates (Lending)**	**Oil Price Return**
REIT Return	1											
BIST 100 Return	0.79	1										
Housing Sales Price Index Return	0.14	0.12	1.00									
Housing Rent Price Index Return	0.16	0.15	0.73	1.00								
Pension Funds Average Return	0.7	0.83	-0.09	0.07	1.00							
Participating Banks Monthly Av. Share of profits	0.07	0.07	-0.43	0.06	0.3	1.00						
Gold Price Return	0.09	0.06	-0.01	-0.01	0.18	0.08	1.00					
USD/TL Exchange Return	-0.44	-0.47	-0.03	-0.13	-0.45	-0.19	-0.23	1.00				
TUIK CPI	-0.06	-0.09	0.08	0	-0.08	0.01	0.05	0.14	1.00			
Weighted Average Home Loan Interest Rates	0.08	0.06	-0.34	0.15	0.33	0.9	0.05	-0.13	0.03	1.00		
TCMB Overnight Interest Rates (Lending)	0.00	0.01	-0.36	0.14	0.25	0.94	0.07	-0.15	0.04	0.91	1.00	
Oil Price Return	0.21	0.18	0.1	0.12	0.02	0.08	0.11	-0.28	0.06	0.00	0.03	1.00

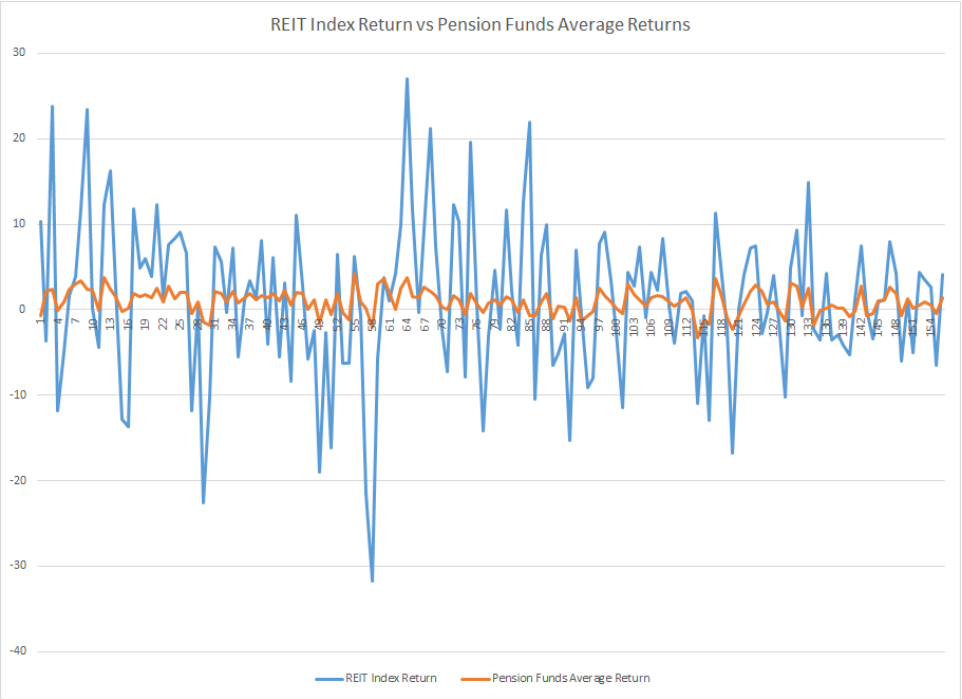


Figure 6.2. REIT Index Return and Pension Funds Average Returns.

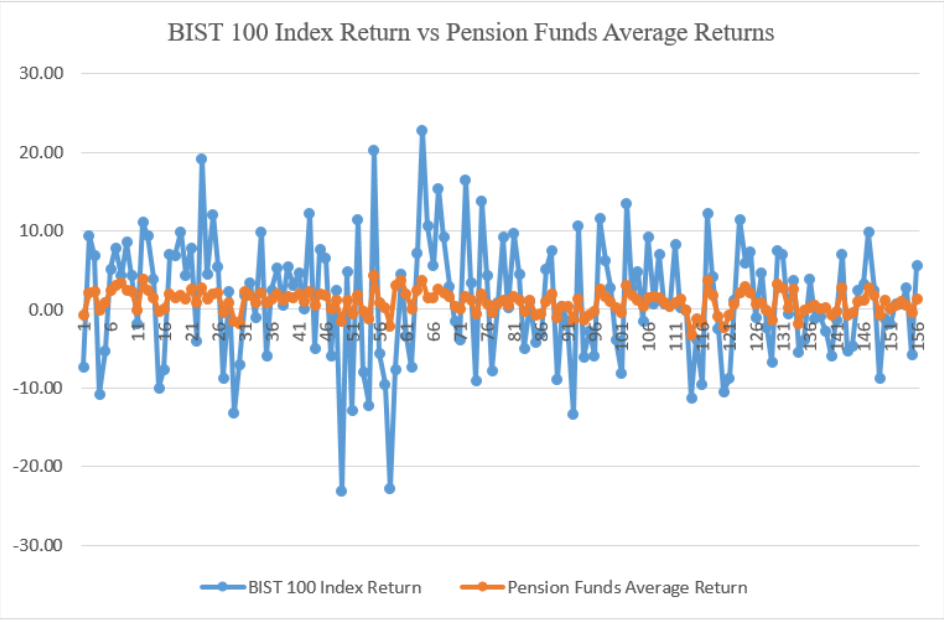


Figure 6.3. BIST 100 Index Return and Pension Funds Average Returns.

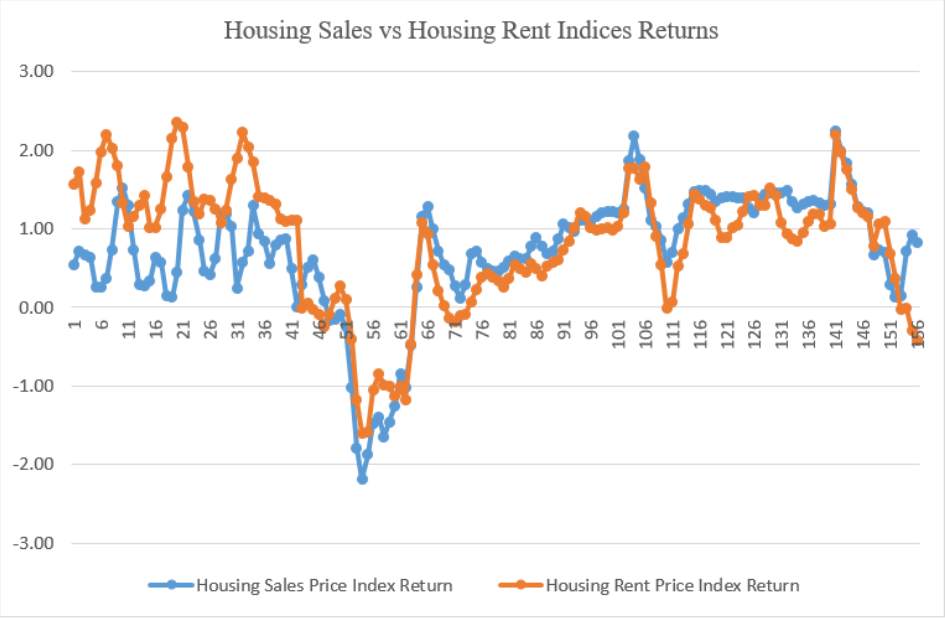


Figure 6.4. Housing Sales and Rent Price Indices Returns.

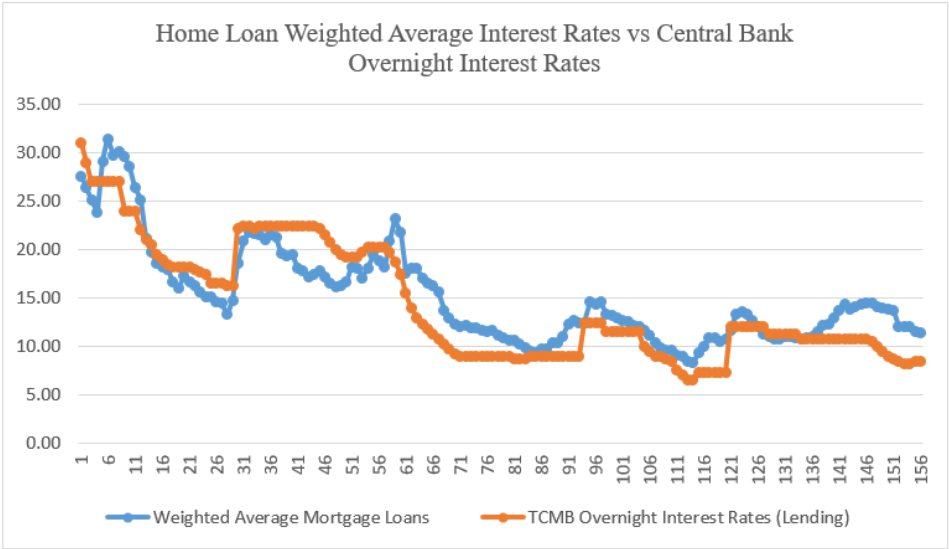


Figure 6.5. Interest Rates Home Loan vs. Central Bank Overnight Lending.

6.2.1. The Stationary Test Results

According to ADF test results, all the dependent and independent variables are found stationary which means VAR model is applicable. All the variables, except for the return of housing sales index, participating bank average share of profit rates and central bank overnight lending interest rates which are stationary after the first

differencing, are found stationary in the original series.

Table 6.4. The Unit Root Test Results.

Variables	**Stationary**
The Return of REIT Index	I (0) - At first series
The Return of BIST 100 Index	I (0) - At first series
The Return of Housing Sales Index	I (1) - At first differencing
The Return of Housing Rent Index	I (0) - At first series
The Average Return of Pension Funds	I (0) - At first series
The Participating Bank Average Share of profits	I (1) - At first differencing
Inflation (CPI)	I (0) - At first series
Central Bank Lending Interest Rates	I (1) - At first differencing
Exchange Rates (USD/TL)	I (0) - At first series
Average Home Loan Interest Rates	I (0) - At first series
Gold Prices	I (0) - At first series
Oil Prices	I (0) - At first series

6.2.2. The Results of VAR Analysis

6.2.2.1. Returns of BIST 100 Index vs. Independent Variables. According to the Granger Causality test results, except for home loan weighted average interest rates, the selected variables do not affect the return of BIST 100 index within 10% confidence interval. When the dynamic impact of the changes in home loan weighted average interest rates is checked, it has a 3 months of positive impact on the returns of BIST 100 index, then this turns out to be a negative impact for 2 months and after the 5th month it again has a positive effect for 3 months, and finally the effects remain insignificant after the 8th month. In the impulse response reaction graph, the horizontal axis refers the reaction period, (in months) and the vertical axis refers to reaction level. The constant line is the reaction of the variable during the time against the dynamic impact occurred due to 1 unit standard deviations and the dotted lines refer to confidence interval for +/- 2 standard error (Kucukaksoy and Ciftci, 2014).

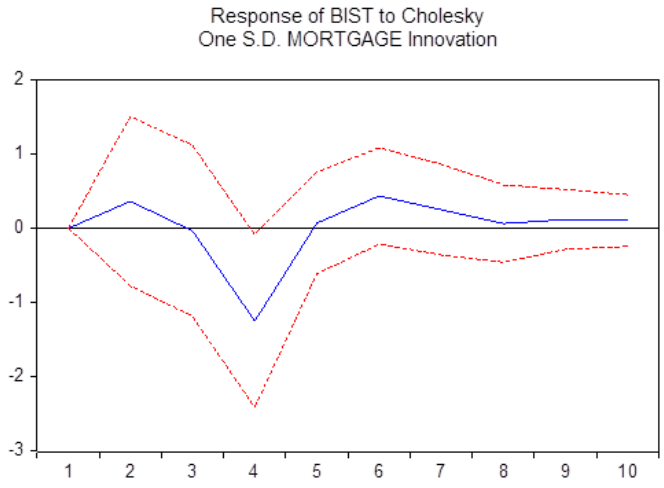


Figure 6.6. Impulse Response Reactions of BIST 100 Index Returns.

6.2.2.2. Returns of REIT Index vs. Independent Variables. Exchange rate and inflation are found the two parameters that affect the return of REIT index, which validated the hypotheses for these variables. The effects of both interest rates, gold and oil prices are found statistically insignificant. As shown in the Figure 6.1, there is a negative relation between the exchange rates and the return of REIT index with 44% correlation ratio. When the impulse response reactions are observed, it can be said that the returns of REIT index give a positive reaction to a shock occurred in the exchange rates for 4 months and then the effects diminish thereafter.

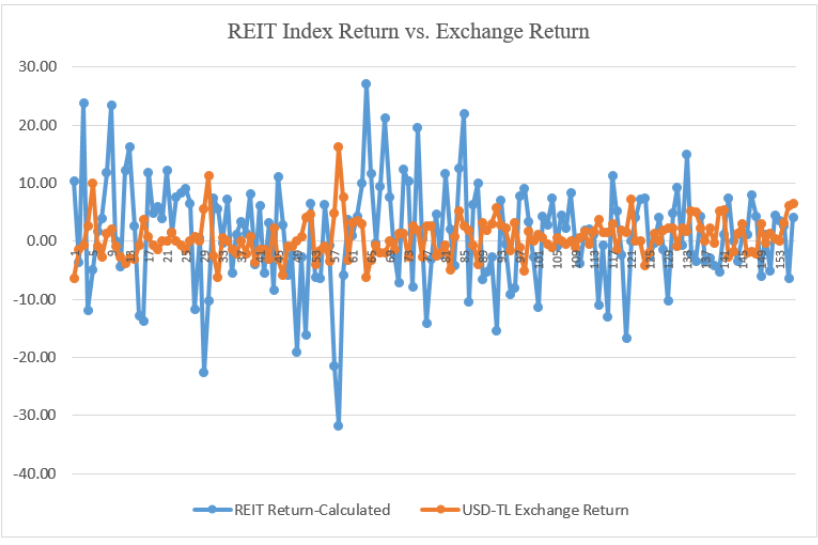


Figure 6.7. REIT Index Return vs. Exchange Return.

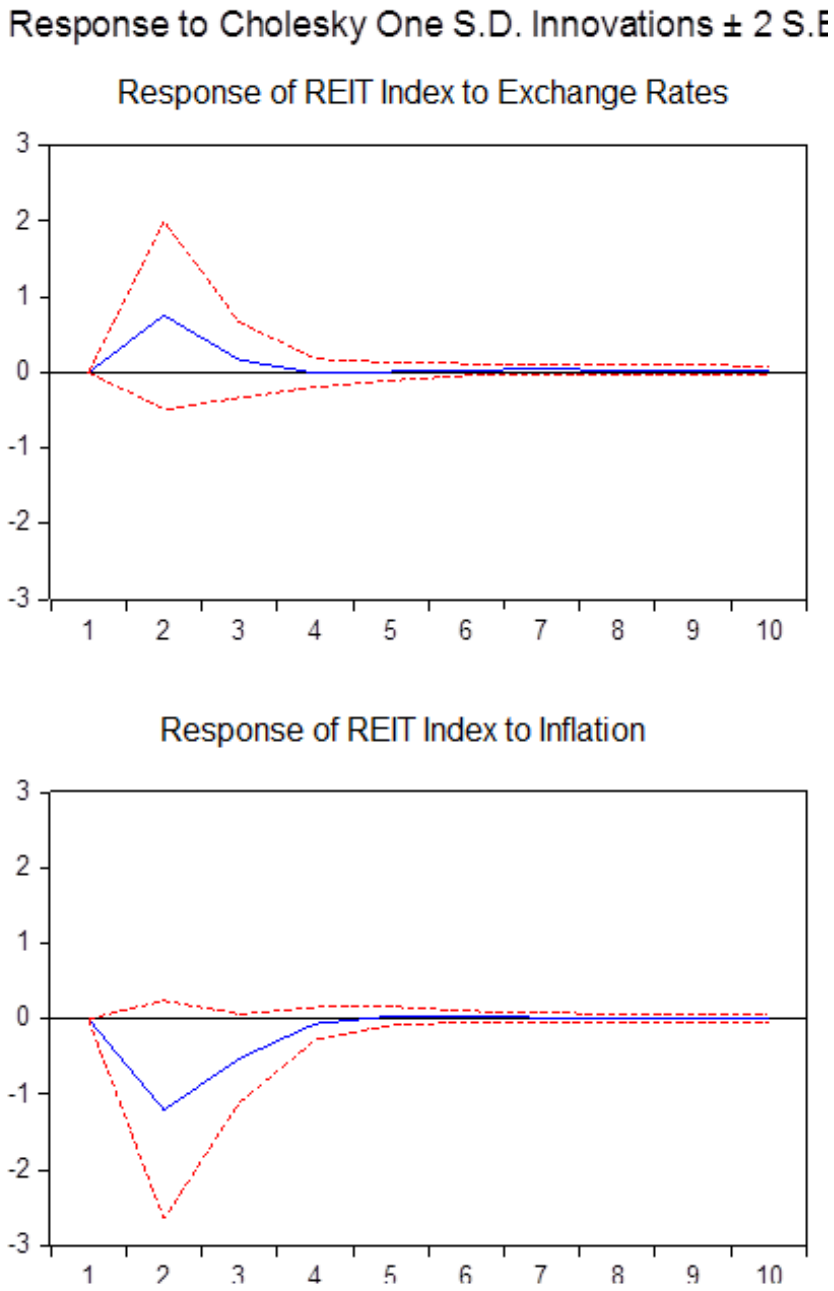


Figure 6.8. Impulse Response Reaction of REIT Index Returns.

The duration of the effect of the shocks in inflation on REIT index returns is the same with the dynamic impact of exchange rates which is 4 months, but the response direction is negative in the inflation case.

6.2.2.3. Returns of Housing Sales and Rent Price Indices Independent Variables. The inflation is found the only factor affecting the return of housing sales index which validated the related hypotheses. The dynamic impact of the inflation on housing sales index response is negative for 7 months and it diminishes at 7th month and becomes insignificant.

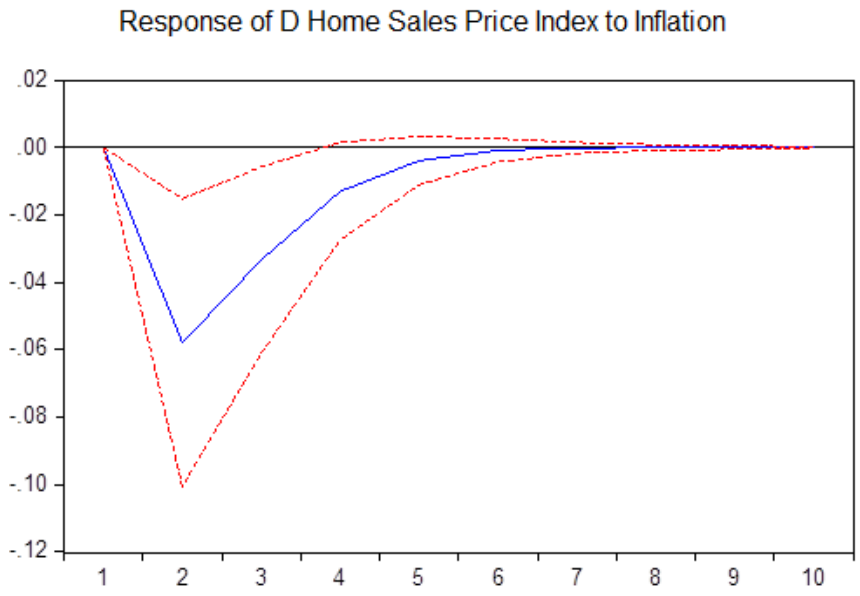


Figure 6.9. Impulse Response Reactions of Home Sales Price Index Returns.

6.2.2.4. Participating Banks Average Share Profits Independent Variables. The results of the analysis exhibited that, three of the selected variables; gold prices, central bank overnight lending interest rates and inflation affect the return of participating banking average share of profit rates, while the effects of oil prices, exchange rates and average home loan interest rates are found insignificant. Gold prices are also evaluated as a factor that affect the participating banks share of profits due to its link because of interest free transactions.

The impulse response reactions of the participating bank share of profits to shocks occurred in the macroeconomic variables that has an effect on the rates were also analyzed. The response of the participating banks average share of profits to shocked changes in gold prices is negative for 5 months, then it turns out to be positive there-

after. The dynamic shocks at central bank overnight lending interest rates also have a positive impact on the response of the participating banks average share of profits for 9 months, for a very small period of time, about a month, it turns out to a negative response, and then it again gives a positive response. The response against inflation is found very interesting. In the first 5 months, it is positive, then one month it becomes negative, later until the 10th month it becomes positive again, and after the 10th month it turns out to negative. That proves the inflation effect on the banking industry.

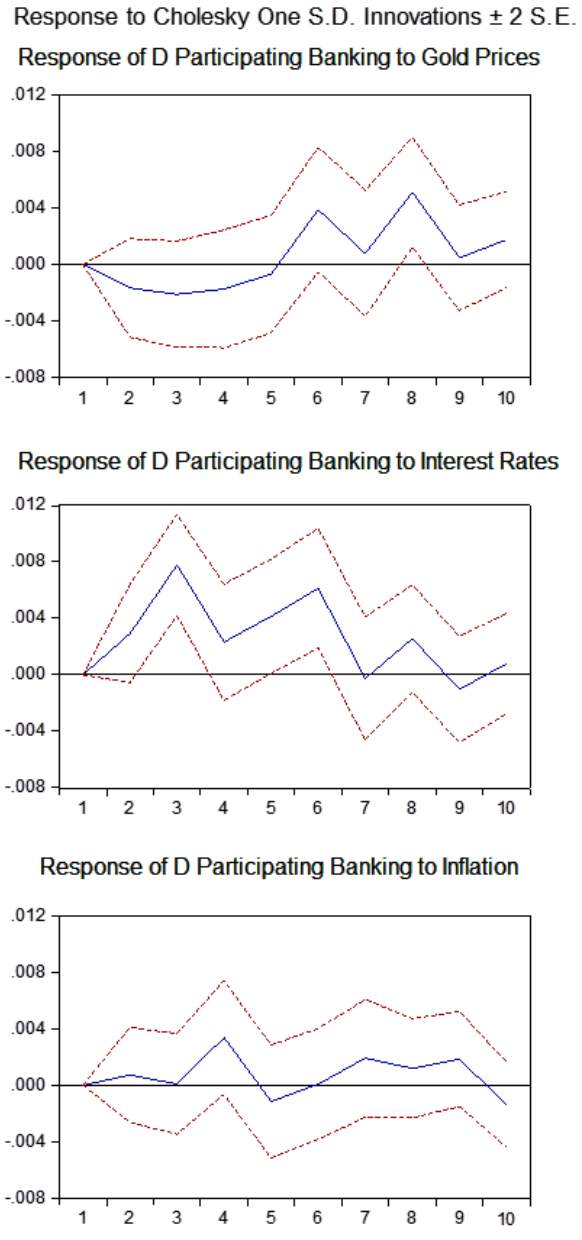


Figure 6.10. Impulse Response Reactions of the Participating Banks Share of profits.

6.2.2.5. Average Returns of Pension Funds vs. Independent Variables. According to the results of the analysis, inflation has an impact on the returns of pension funds. In addition to the inflation, home loan weighted average interest rates is also found a parameter that affects the average return of pension funds. The effects of the rest of the variables are found statistically unimportant. The impulse response reaction of average pension fund returns to shocks in home loan weighted average interest rates is positive alongside the 10 months of time period. On the other hand, oppositely the response of pension fund average returns is negative in the first 4 months after the shock and then it diminishes.

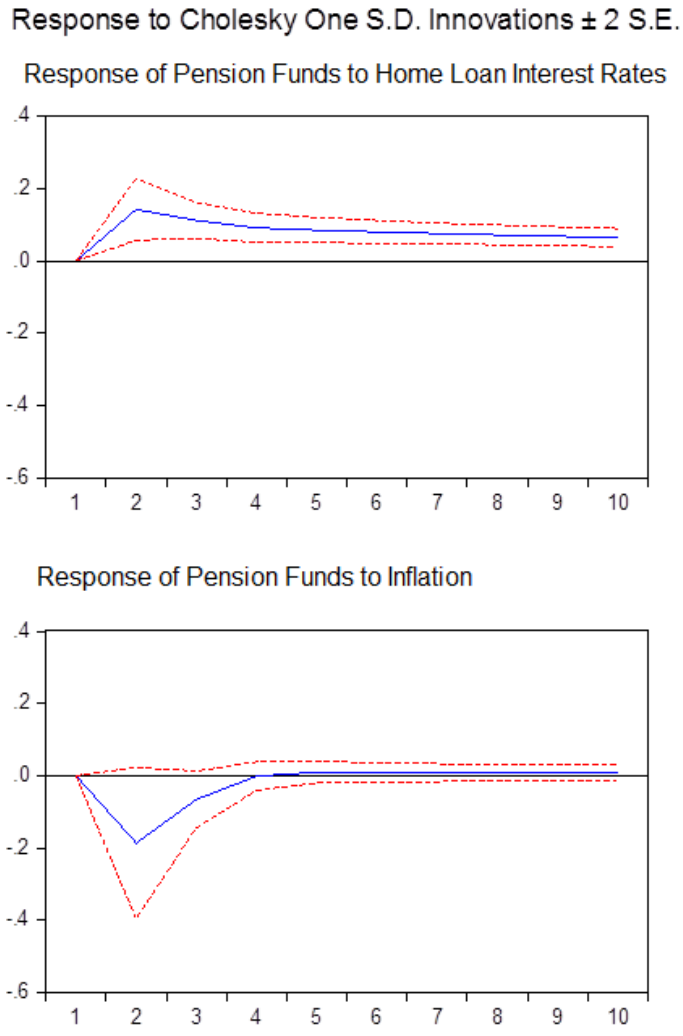


Figure 6.11. Impulse Response Reactions of Pension Funds.

Table 6.5. Summary of the VAR results.

		Independent Variables					
		Inflation (CPI)	Central Bank Overnight Lending Interest Rates	Exchange Rates (USD/TL)	Home Loan Average Interest Rates	Gold Prices	Oil Prices
	The Returns of REIT Index	✓		✓			
Dependent Variables	The Returns of BIST 100 Index				✓		
	The Returns of Housing Sales Index	✓					
	The Returns of Housing Rent Index						
	The Average Returns of Pension Funds	✓			✓		
	The Participating Banks Average Shares of Profits	✓	✓			✓	✓

6.2.2.6. Average Returns of Pension Funds Returns of REIT, BIST 100. Housing Indices and Participating Banking Average Share of Profits. In order to proceed to the next step of analysis, the forecasting step, a vector auto regression analysis among the dependent variables were also employed and the effects of the returns of BIST 100, REIT, housing sales and rent indices and participating banks average share of profits on the average returns of pension funds were analyzed. The results exhibited that except for the participating banks average share of profits, all other variables affect the return of the pension funds.

The results of the impulse response reactions are shown in the Figure 6.13. The response of pension funds average returns against 1 unit shock to the returns of BIST 100 index is positive for 2 months, there after until the 5^{th} months it gives a negative reaction, then from the 5th month to 7^{th} month it again turns out to give a positive reaction. After that the reaction becomes negative and continues the same along the rest of the 10 months period. The impact of REIT index return changes on pension funds response starts negative until the 4^{th} month, then for 2 months of period the response becomes positive and after the 6^{th} month, it continues its negative reaction. The pension fund average returns respond positive to shocks in changes in housing rent

prices alongside the 10 months of period, except for a period in between 2^{nd} and 4^{th} month where the reactions turn out to be negative. The response to shocks in changes in housing sales prices also positive along 10 months. The only exceptions are shown in between 7^{th} and 9^{th} months as a negative response is observed.

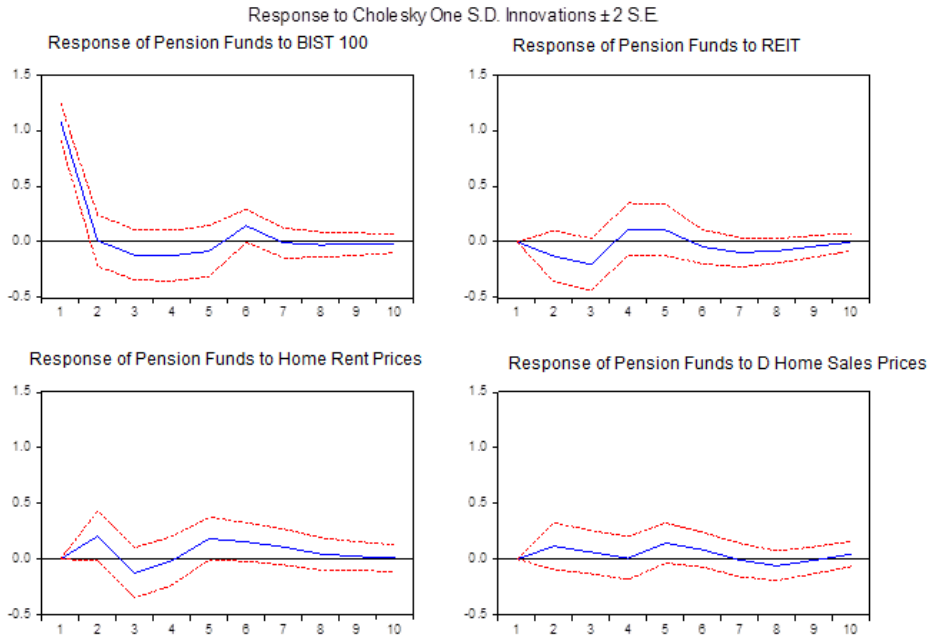


Figure 6.12. Impulse responses reactions of pension funds average returns to the shocks in other dependent variables.

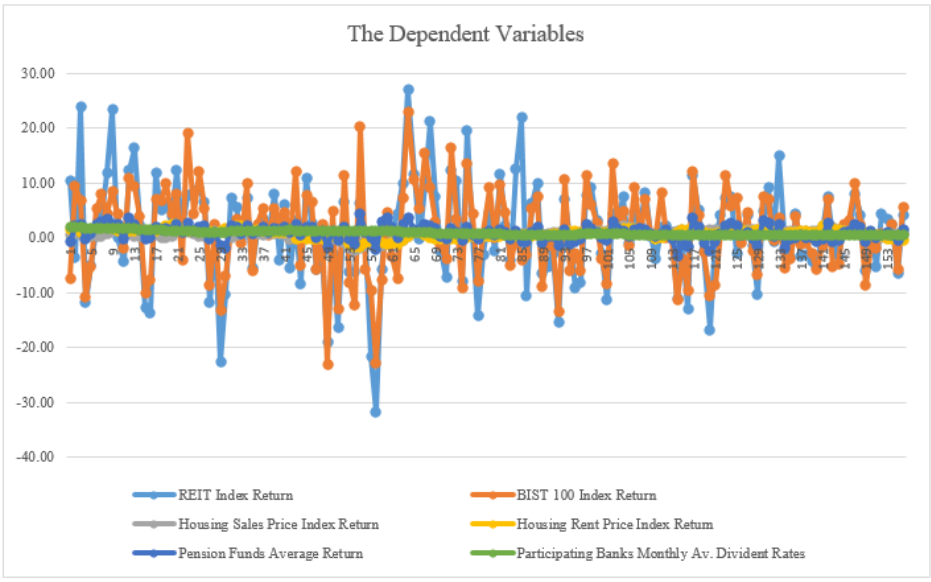


Figure 6.13. The returns of dependent variables for the analysis period (2004-2016).

As a result of these outcomes of VAR analysis made for pension funds and other dependent variables (as accepting them independent variables), forecast analysis of the variables that affect the average return of pension funds is conducted and compared in order to check whether the returns of these parameters are better than the average returns of the pension funds.

6.2.3. Forecast (ARIMA) Results of the Analysis

Forecast analysis is one of the most important part of the analysis in this study. The results are aimed to give us the expected returns of REIT, housing sales, housing rent and BIST 100 indices, as well as the average returns of pension funds for the year 2017 in order to make a forecasted comparative return analysis among different investment tools. By using the monthly return data of the period in between 2004 and 2015, the forecast analysis is made for the year 2016. The results of the analysis is compared with the actual return data of 2016 to check the approximation and direction consistency of the forecasts obtained from the time series with the actual data. A deviation from the real data is expected normally. The important things is to see whether there is a consistent trend between the forecast and actual data. The comparative analysis of the year 2016 exhibited a consistency, and this enabled this research to rely on the forecast analysis of 2017 while establishing the model suggested.

6.2.3.1. Forecasting the Returns of BIST 100 Index. The monthly forecast returns of BIST 100 index is shown in Table 6.6. The general trend of the forecast is similar with the actual data, but the possible reasons for deviations are discussed in the discussion parts. While the average monthly return was forecasted as -0.209, the actual returns was calculated as 0.827 for the year 2016. The deviation in March, May and October is remarkable. The average monthly return for 2017 is estimated as -0.406.

Table 6.6. The Forecast Analysis of BIST 100 Index Returns (ARIMA Results).

Months	2016		2017
	Forecast	Actual	Forecast
January	-1.51	2.45	-2.3
February	0.86	3.18	-0.91
March	-0.88	9.83	1.96
April	-0.58	2.47	1.12
May	0.68	-8.82	0.1
June	1.01	-1.27	-1.21
July	-0.19	-1.84	-0.83
August	-1.19	0.75	1.00
September	-0.78	0.69	-0.77
October	1.52	2.68	-0.55
November	-1.77	-5.78	-1.78
December	0.32	5.6	-0.7
Average	-0.209	0.827	-0.406

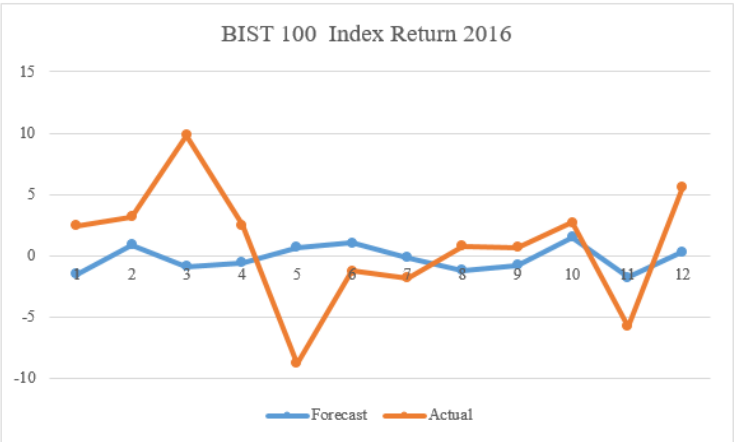


Figure 6.14. BIST 100 Index Return: Forecast vs. Actual for 2016.

6.2.3.2. Forecasting the Returns of REIT Index. The forecast and actual data of the returns of REIT index have similar trends with some breakpoints which are discussed in the next Chapter. The actual monthly average return of 2016 with a return rate of 1.04 exceeded the forecasted returns of 0.366. Forecasted and actual returns almost overlap for February, June, September and October. For the year 2017, the estimated

average monthly return for 2017 is 0.711.

Table 6.7. The Forecast Analysis of REIT Index Returns (ARIMA Results).

	2016		2017
	Forecast	**Actual**	**Forecast**
January	3.01	0.88	2.04
February	0.42	1.12	-1.35
March	3.14	7.98	2.72
April	2.93	4.21	-3.42
May	-2.1	-6.08	1.13
June	0.83	1.11	2.59
July	-2.37	-5.07	3.23
August	0.01	4.42	-1.51
September	3.27	3.49	2.22
October	0.14	2.68	1.64
November	-5.84	-6.45	-1.37
December	0.95	4.18	0.61
Average	0.366	1.040	0.711

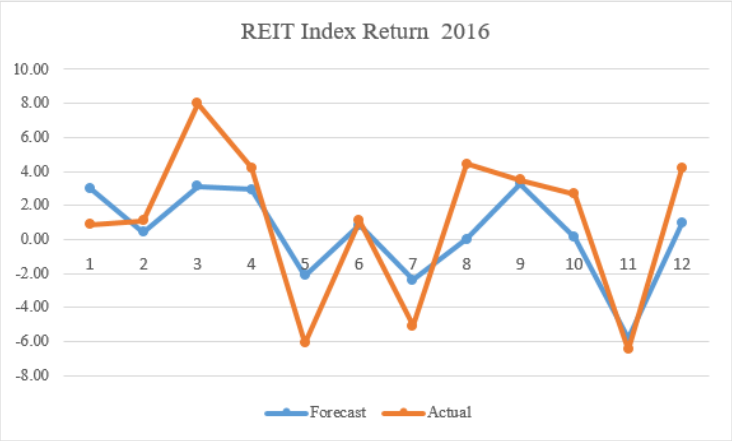


Figure 6.15. REIT Index Return: Forecast vs. Actual for 2016.

6.2.3.3. Forecasting the Returns of Housing Sales and Rent Indices. The forecast and actual data about housing sales and rent price indices are shown in Table 6.7, Table 6.8 and Figure 6.17, Figure 6.18. While both of the indices have a positive forecasted and actual returns in 2016, a negative return for housing rent index with a -0.40 rate

is estimated for 2017.

Table 6.8. The Forecast Analysis of Housing Sales Price Index Returns (ARIMA Results).

	2016		**2017**
	Forecast	**Actual**	**Forecast**
January	1.49	1.29	0.62
February	1.43	1.21	0.52
March	1.48	1.2	0.54
April	1.52	0.67	0.62
May	1.31	0.74	0.68
June	1.44	0.7	0.68
July	1.52	0.29	0.66
August	1.35	0.13	0.64
September	1.4	0.14	0.64
October	1.54	0.72	0.65
November	1.83	0.92	0.67
December	1.8	0.82	0.67
Average	1.509	0.736	0.633

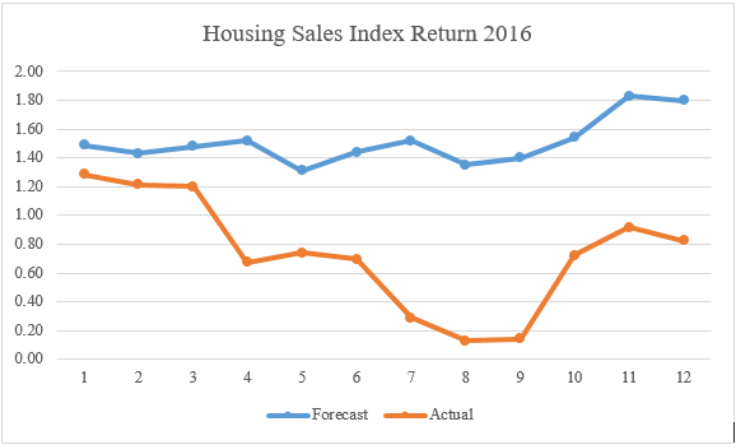


Figure 6.16. Housing Sales Price Index Return: Forecast vs. Actual for 2016.

Table 6.9. The Forecast Analysis of Housing Rent Price Index Returns (ARIMA Results).

	2016		2017
	Forecast	**Actual**	**Forecast**
January	1.46	1.27	-0.48
February	1.41	1.21	-0.45
March	1.43	1.15	-0.4
April	1.46	0.78	-0.38
May	1.32	1.07	-0.37
June	1.45	1.09	-0.38
July	1.53	0.69	-0.39
August	1.31	0.37	-0.39
September	1.18	-0.02	-0.39
October	1.11	-0.02	-0.39
November	1.17	-0.28	-0.39
December	1.15	-0.42	-0.39
Average	1.332	0.574	-0.4

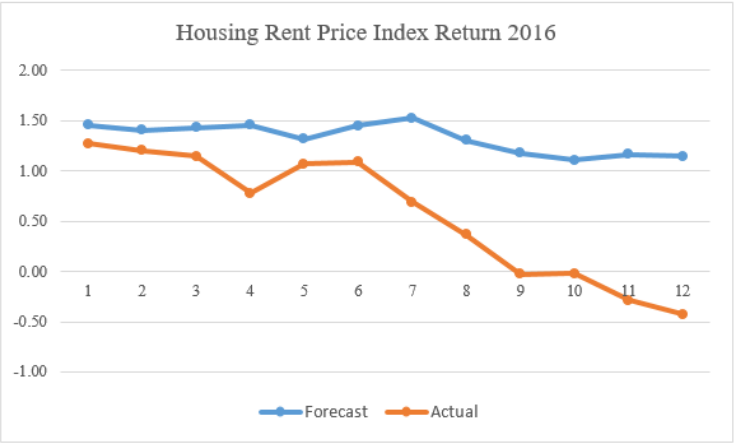


Figure 6.17. Housing Rent Price Index Return: Forecast vs. Actual for 2016.

6.2.3.4. Forecasting the Average Returns of Pension Funds. In 2016, the pension fund average returns performed better than forecasted, but both the forecast and actual returns showed similar trends except for May and November. In 2017, the average monthly return rate was forecasted as 0.42.

Table 6.10. The Forecast Analysis of Pension Funds Average Returns (ARIMA Results).

	2016		2017
	Forecast	**Actual**	**Forecast**
January	0.38	1.00	0.03
February	0.49	1.17	0.26
March	1.14	2.67	0.63
April	0.58	1.85	-0.05
May	0.17	-0.74	0.73
June	0.89	1.24	0.62
July	0.83	0.12	0.41
August	0.41	0.52	0.18
September	1.29	0.96	0.55
October	0.32	0.6	0.18
November	0.33	-0.44	0.85
December	0.18	1.38	0.64
Average	0.584	0.862	0.419

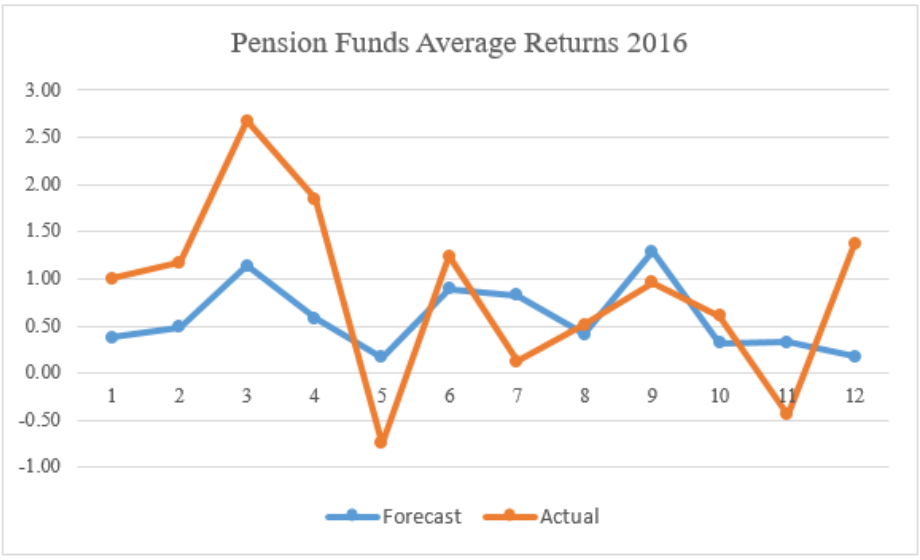


Figure 6.18. Pension Funds Average Return: Forecast vs. Actual for 2016.

6.2.3.5. Summary of Forecast Analysis. The reason that forecast analysis is conducted is to predict the returns of real estate investment instruments including the REIT,

housing sales and rent indices and compare them with the predicted average returns of pension funds and have an insight about the future values of the returns. The higher the returns of the real estate investment instruments than the pension fund returns, the better the model is validated. Forecast of the return of BIST 100 was also made as a benchmark tool and also as a result of VAR analysis that exhibited a causality between the average returns of pension funds. In accordance with the ARIMA forecast results obtained, while the returns of BIST 100 and home rent price indices show a negative return for 2017, the REIT and housing sales price indices had a positive and higher expected returns than the pension funds 2017 average expected returns.

Table 6.11. Summary of 2017 Forecast Analysis (ARIMA Results).

2017 FORECAST					
Months	**BIST 100 Index**	**REIT Index**	**Housing Sales Index**	**Housing Rent Index**	**Pension Funds**
January	-2.3	2.04	0.62	-0.48	0.03
February	-0.91	-1.35	0.52	-0.45	0.26
March	1.96	2.72	0.54	-0.4	0.63
April	1.12	-3.42	0.62	-0.38	-0.05
May	0.1	1.13	0.68	-0.37	0.73
June	-1.21	2.59	0.68	-0.38	0.62
July	-0.83	3.23	0.66	-0.39	0.41
August	1	-1.51	0.64	-0.39	0.18
September	-0.77	2.22	0.64	-0.39	0.55
October	-0.55	1.64	0.65	-0.39	0.18
November	-1.78	-1.37	0.67	-0.39	0.85
December	-0.7	0.61	0.67	-0.39	0.64
Average	-0.406	0.711	0.633	-0.4	0.419

Although these results above proves the hypothesis that claim the returns of real estate investment instruments may provide a better return than the average returns of pension funds, some additional analysis were made in order to strengthen the related hypothesis.

While analyzing the monthly data obtained from 2004 to 2016, a structural break was found in 2008 at global mortgage crisis. The effects of this crisis seem to be lasted until the end of 2009, even longer for some industries. In addition to that observation, the real estate market regulations and sustainable growth of Turkish economy started after the mortgage crisis. For that reason, the average returns of the data in between 2010 and 2016 by excluding the period of mortgage crisis were also analyzed. For both time ranges, the average returns and standard deviations were calculated. Then, Coefficient of Variation (CV) which is a measure used to calculate the total risk per unit of return of an investment was used. The ratio between the standard deviation of an investment by its expected rate of return gives the CV. Coefficient of variation provides a standardized measure of comparing risk and return of different investments. The lowest coefficient of variation provides a better investment option for rational investors as the risk-averse investors aim to reduce their risk per unit of return (Investopedia, 2017).

Table 6.12. Average Returns and Coefficient of Variances.

Years	**BIST 100 Index**	**REIT Index**	**Housing Sales Index**	**Housing Rent Index**	**Pension Funds**	**Participating Banks**
2004-2016 Average Return (AR) (%)	1.22	1.1	0.72	0.83	0.93	0.94
2004-2016 Standard Deviation (SD)	7.75	9.08	0.78	0.81	1.39	0.38
2004-2016 Coefficient of Variation (SD/AR)	6.36	8.25	1.09	0.98	1.5	0.4
2010-2016 Average Return (%)	0.66	0.75	1.1	0.9	0.58	0.63
2010-2016 Standard Deviation	6.29	7.38	0.44	0.52	1.33	0.07
2010-2016 Coefficient of Variation (SD/AR)	9.5	9.83	0.4	0.58	2.28	0.10

Coefficient of Variation =Standard Deviation of the Investment/ Expected Return on the Investment. According to the average return results, the returns of the housing indices are lower than the average pension funds for the whole sample, but higher after the crisis for the period in between 2010-2016. From CV perspective, since

their standard deviation is smaller, the housing sales and rent indices provide better investment option than pension funds for both of the periods studied. Although the return of REIT index is higher than the pension funds in both periods, since the standard deviation of the index is too high due to its volatility to shocks, it seems less attractive than housing indices for the investors do not like risky investments.

Participating banks share of profit rates were also analyzed by CV and the result exhibited that in both periods that include and exclude the mortgage crisis, they perform better than the average returns of pension funds.

Another investment tool that is included in the model is sukuk. The history of sukuk backs to 2010 in Turkey, and there is not enough coupon rate data to make a comprehensive analysis. For this reason, the average sukuk coupon rates issued by private sector in Turkish Lira are calculated for the periods in between 2013-2016. The average return of sukuk coupon rates was obtained as 0.83 which is higher than average returns of pension funds which is 0.60 for the same time period. Although this gives an idea about the performance of sukuk which is better than the average returns of pension funds, it would be better to analyze the return of sukuk for longer periods after the number of observations increase.

Table 6.13. The Results of the Hypotheses.

Number	**Hypotheses**	**Validation**
H1	Inflation (CPI) affects the returns of BIST 100 index	√
H2	Inflation (CPI) affects the returns of REIT index	x
H3	Inflation (CPI) affects the returns of Housing Sales Price index	√
H4	Inflation (CPI) affects the returns of Housing Rent Price index	x
H5	Inflation (CPI) affects the Participating Banks Average Share of profits	√
H6	Inflation (CPI) affects the average returns of Pension Funds	√
H7	Home loan interest rates affect the returns of Housing Sales and Rent Price index	x

Table 6.13. The Results of the Hypotheses (cont.).

Number	**Hypotheses**	**Validation**
H8	Home loan interest rates affect the returns of REIT index	x
H9	Central bank overnight lending interest rates do not affect the returns of BIST 100 index	√
H10	Central bank overnight lending interest rates affect the Participating Banks Average Share of profits	√
H11	Exchange rates (USD/TL) affect the returns of BIST 100 index	x
H12	Exchange rates (USD/TL) affect the returns of REIT index	√
H13	Exchange rates (USD/TL) affect the returns of Housing Sales and Rent Price indices	x
H14	Exchange rates (USD/TL) affect the returns of Participating Banks Average Share of profits	x
H15	Exchange rates (USD/TL) affect the average returns of Pension Funds	x
H16	Gold prices affect the Participating Banks Average Share of profits	√
H17	Gold prices affect the returns of average returns of Pension Funds	x
H18	Oil prices affect the returns of BIST 100 index	x
H19	Oil prices affect the returns of Housing Sales and Rent Price Indices	x
H20	Oil prices affect the returns of Participating Banks Average Share of profits	x
H21	The returns of BIST 100 index affect the average returns of pension funds	√
H22	The returns of REIT index affect the average returns of pension funds	√
H23	The returns of Housing Sales Price index affect the average returns of pension funds	√
H24	The returns of Housing Rent Price index affect the average returns of pension funds	√

Table 6.13. The Results of the Hypotheses (cont.).

Number	**Hypotheses**	**Validation**
H25	The returns of Participating Banks Average Share of profits affect the average returns of pension funds	x
H26	The forecasted average return performance of REIT index is better than the average return performance of Pension Funds	√
H27	The forecasted average return performance of Housing Sales Price index is better than the average return performance of Pension Funds	√
H28	The forecasted average return performance of Housing Rent Price index is better than the average return performance of Pension Funds	x
H29	The forecasted average return performance of REIT index is better than the average return performance of BIST 100 index	√

The summary of the results of the analysis and the validation of the hypotheses are shown in Table 6.2.3.5.

The model developed is a comprehensive ecosystem that covers many investment tools together with many supportive and supplemental parameters. Among these parameters, total home loans and mortgaged home sales are two important variables to forecast. Regarding the pension system, the total number of participants, the size of the fund and the state contribution amount are also important indicators for making an estimate of the size of the model suggested. For these reasons, forecast analysis of these important variables were also conducted.

6.2.3.6. Forecasting the Size of Home Loans. In Turkey, there is an upward trend in the home loans used. Within the last 13 years, by the end of 2016, the total home loan stocks reached to 163.2 billion TL. The home loans build up the 39% of the total consumer loans with a 7% shares of total GDP. The ratio of the problematic home

loans under monitoring is below 1% which means Turkish people pay their home loans regularly. On the other hand, the average home loan used by the home buyers in Turkey is 126.000 TL with a 90 months of maturity period (TBB, 2017).

Table 6.14. The Average Home Loans and Maturity Periods.

Year	Number of Participants	Average Home Loans/Person	Average Maturity Period (Months)
2011	445.000	81.000	89
2012	380.000	90.000	86
2013	648.000	97.000	90
2014	437.000	109.000	91
2015	485.000	114.000	91
2016	490.100	126.000	90

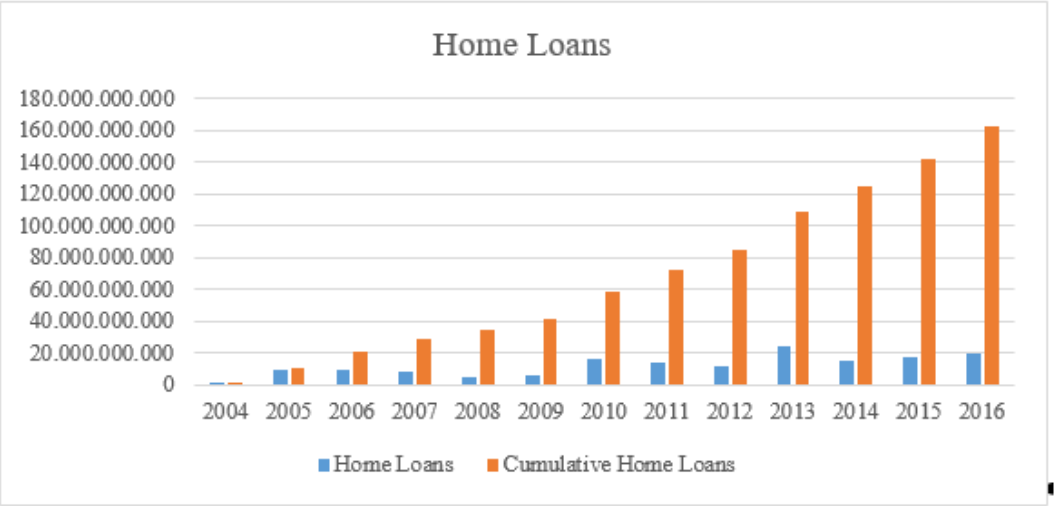


Figure 6.19. The Yearly Cumulative Home Loans (TBB, 2017).

In that context, the total home loans for the year 2016 were forecasted and compared with actual loans used. The trends of both the forecast and actual go consistently except for two break points; one in July and the other in October. The forecasted monthly average home loans is 1.16 billion TL, while the actual is 1.71 billion TL for 2016. In 2017, the total yearly loan size is forecasted to reach to 34.12 billion TL, with a 2.84 billion TL monthly average.

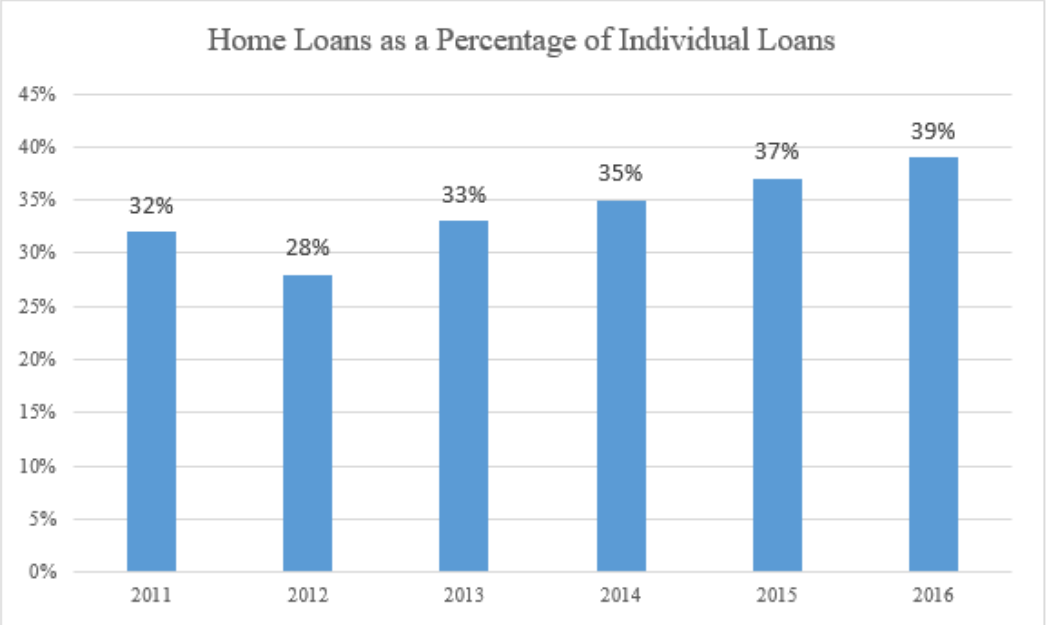


Figure 6.20. The Home Loans as a Percentage of Individual Loans (TBB, 2017).

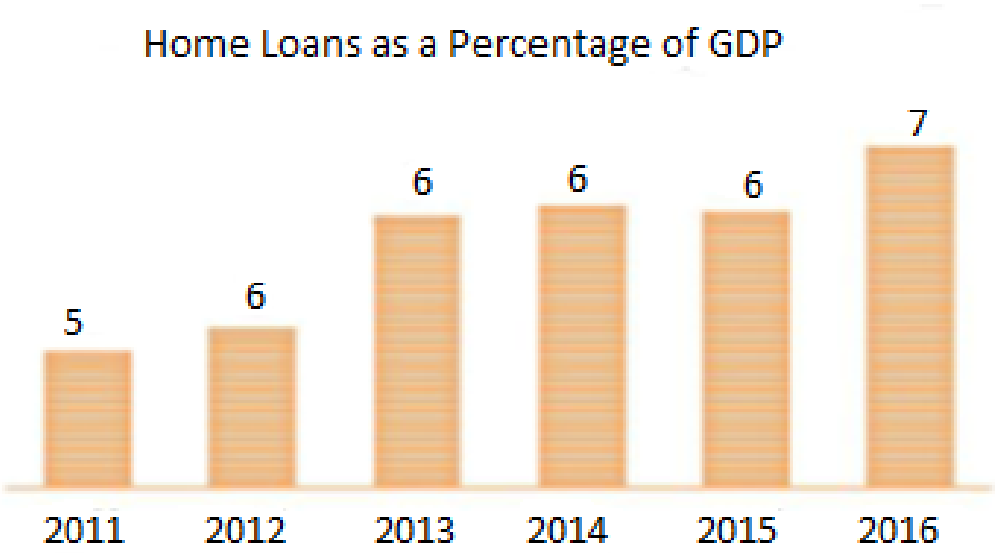


Figure 6.21. The Home Loans as a Percentage of GDP (TBB, 2017).

Table 6.15. The Forecast Analysis of Home Loans (ARIMA Results).

Months	2016		2017
	Forecast	Actual	Forecast
January	342.528.000	572.459.000	1.939.011.861
February	1.288.528.000	908.450.000	3.002.647.355
March	1.532.528.000	1.926.332.000	3.382.617.073
April	997.528.000	1.296.271.000	2.693.950.099
May	1.356.528.000	1.503.003.000	2.881.197.140
June	1.668.528.000	1.754.209.000	3.117.452.817
July	318.528.000	-861.995.000	1.804.018.057
August	1.298.528.000	1.504.211.000	2.861.199.055
September	1.657.528.000	2.323.163.000	3.398.310.647
October	846.528.000	3.015.650.000	2.781.956.724
November	1.069.528.000	3.340.053.000	3.060.502.388
December	1.534.528.000	3.204.575.000	3.199.469.284
Total	13.911.336.000	20.486.381.000	34.122.332.500
Average	1.159.278.000	1.707.198.417	2.843.527.708

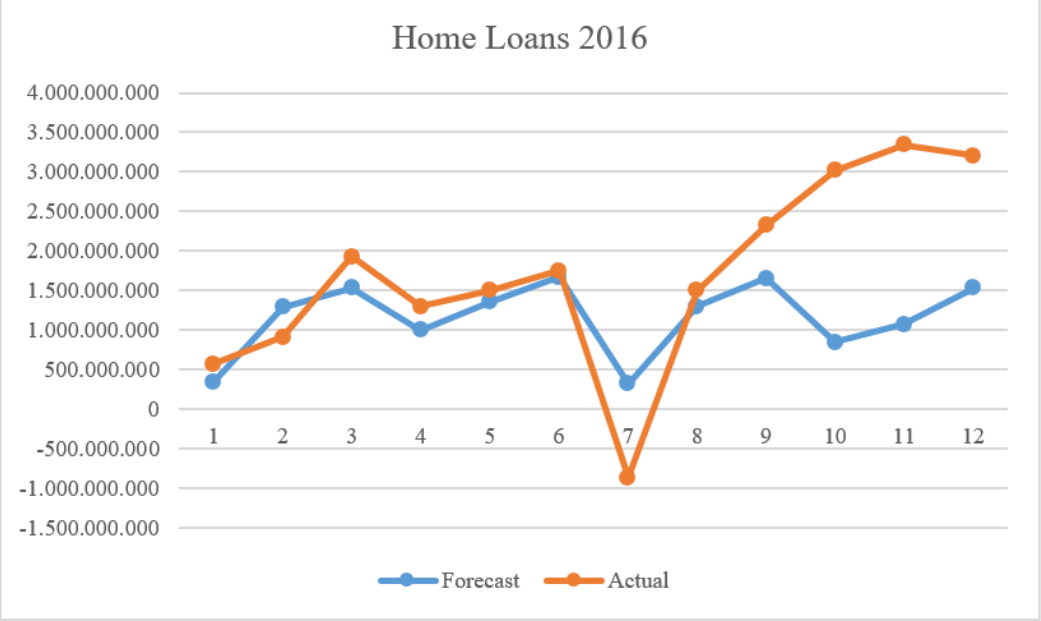


Figure 6.22. Home Loans Forecast vs. Actual for 2016.

6.2.3.7. Forecasting the Number of Mortgaged Housing Sales. Mortgaged home sales is one of the most important factor that affect the model in terms of the total financed units. The forecast of mortgaged home loans for 2016; 436.658 is almost the same with the actual units sold; 449.508.

Table 6.16. The Forecast Analysis of Mortgaged Housing Sales (ARIMA Results).

Months	2016		2017
	Forecast	Actual	Forecast
January	31.021	26.584	37.712
February	32.612	30.455	40.271
March	32.802	38.822	39.663
April	34.524	33.429	37.801
May	36.393	35.423	34.700
June	37.970	36.371	31.672
July	36.701	23.756	28.871
August	38.935	36.458	28.948
September	39.881	42.083	28.424
October	38.716	48.110	28.086
November	38.767	48.941	28.210
December	38.336	49.076	29.042
Total	436.658	449.508	393.400
Average	36.388	37.459	32.783

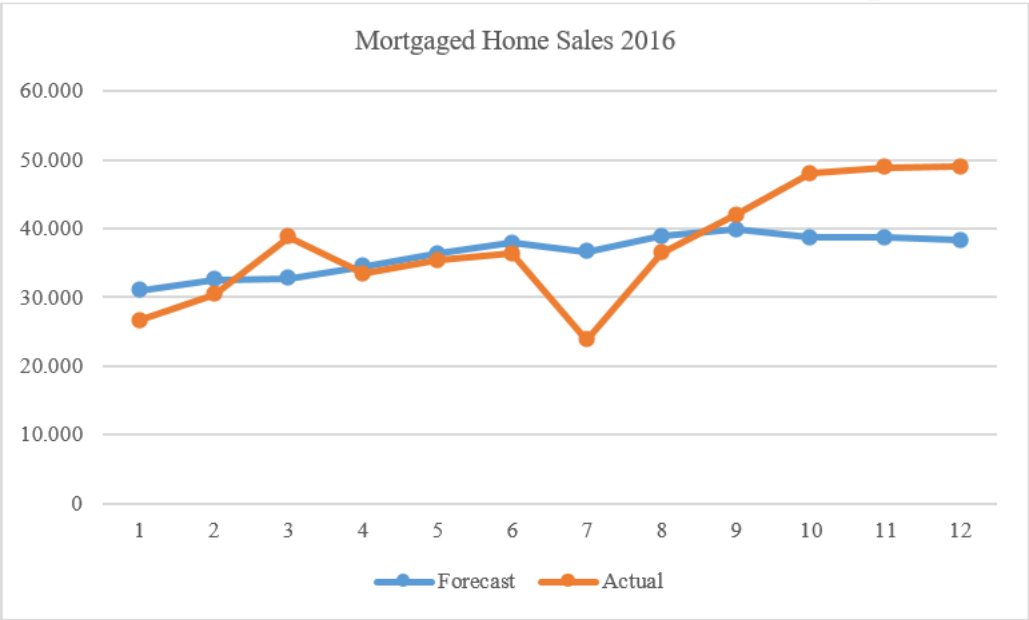


Figure 6.23. Mortgaged Home Sales Forecast vs. Actual for 2016.

In 2017, it is estimated that each month 32.783 units will be sold which will reach up to 393.400 yearly. When the first three months of realizations are compared, the forecast and actual sells overlap for the first two months.

Table 6.17. The Forecast Analysis of Mortgaged Housing Sales-2017 (ARIMA Results).

Months	2017	
	Forecast	**Actual**
January	37.712	35.993
February	40.271	38.676
March	39.663	50.424

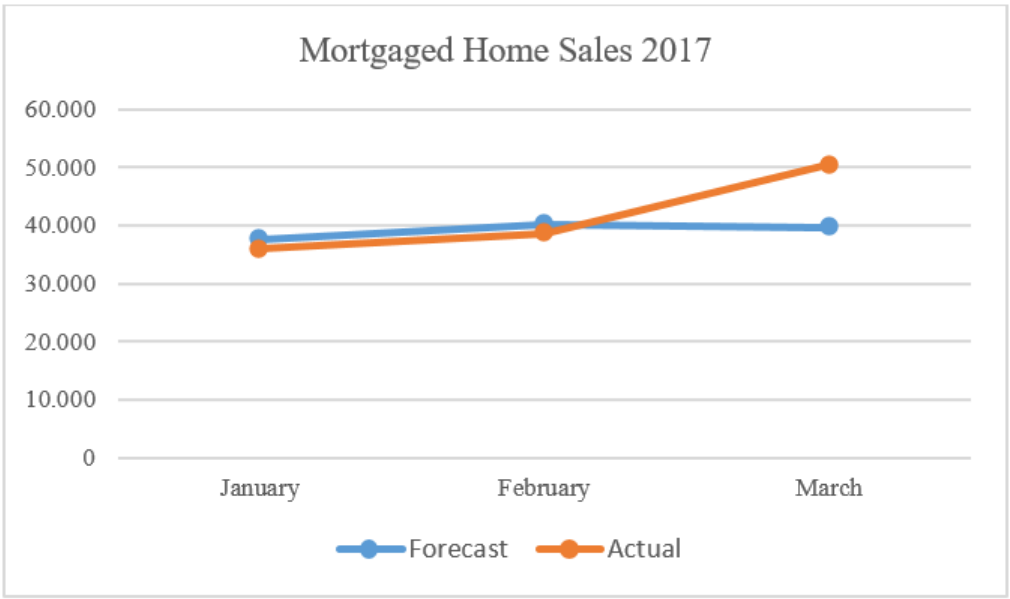


Figure 6.24. Mortgaged Home Sales Forecast vs. Actual for 2017.

6.2.3.8. Forecasting the Number of Housing Sales Sold to Foreigners. The foreigners are able to own house in Turkey after the reciprocity law issued in 2013. Since then the number of housing units sold to foreigners started increasing. Although there is an increase in the foreigners' buy in 2015, the total units remained in 2016 at the same level of 2014. In the estimate based on the past historical data, the numbers of the unit sales to foreigners do not seem to increase more and tends to stay in the below 20.000 units level, parallel to the numbers of 2016. When the actual data of first three months of 2017 are compared with the estimate, a consistency and almost an overlap in the numbers with a slightly upward increase in March is observed.

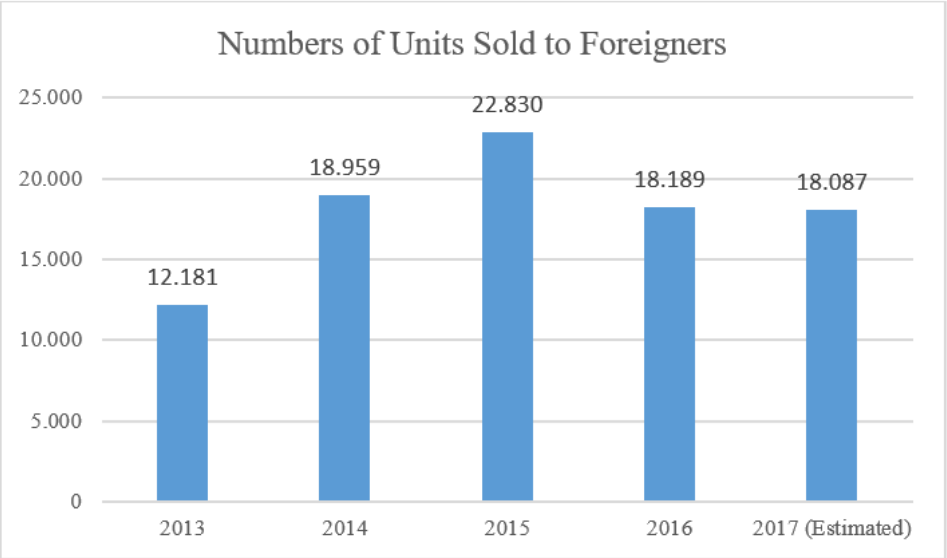


Figure 6.25. Number of Units Sold to Foreigners (TUIK 2016, ARIMA Results).

Table 6.18. The Forecast Analysis of Houses Sold to Foreigners (ARIMA Results).

Months	**2016**		**2017**
	Forecast	**Actual**	**Forecast**
January	1.873	1.462	1.321
February	2.095	1.585	1.371
March	2.112	1.595	1.390
April	2.561	1.581	1.691
May	2.510	1.612	1.644
June	2.470	1.543	1.626
July	2.122	1.044	1.342
August	2.206	1.512	1.386
September	2.128	1.276	1.403
October	2.529	1.566	1.671
November	2.427	1.773	1.629
December	2.427	1.640	1.613
Total	27.460	18.189	18.087
Average	2.288	1.516	1.507

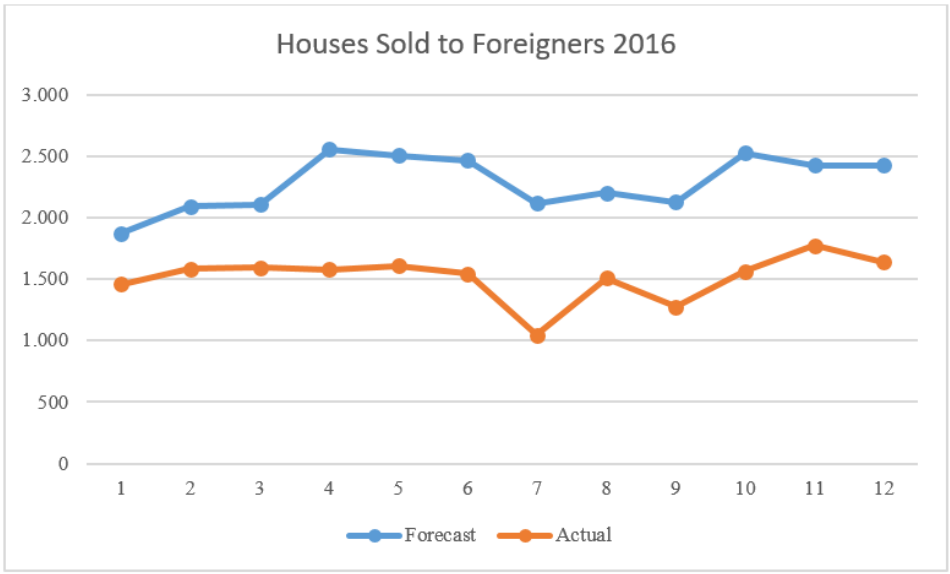


Figure 6.26. Houses Sold to Foreigners Forecast vs. Actual for 2016.

Table 6.19. The Forecast Analysis of Houses Sold to Foreigners-2017 (ARIMA Results).

Months	**2017**	
	Forecast	**Actual**
January	1.321	1.386
February	1.371	1.306
March	1.390	1.578

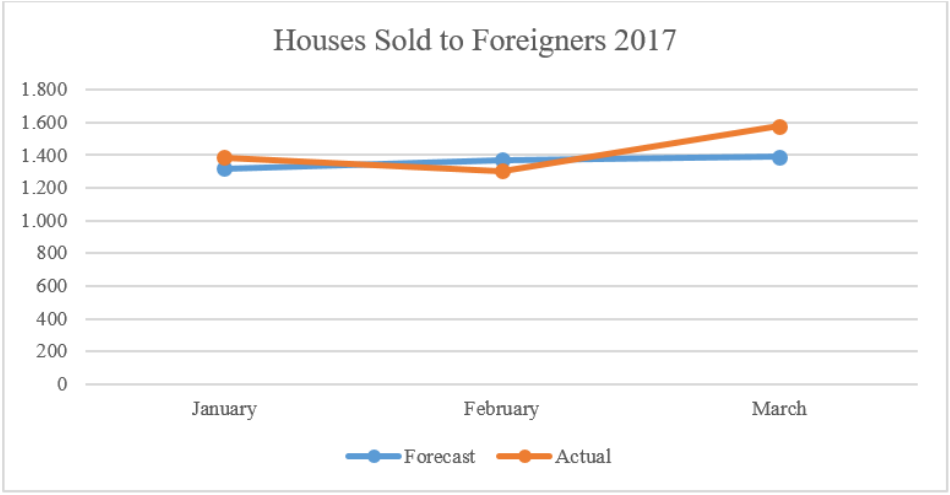


Figure 6.27. Houses Sold to Foreigners Forecast vs. Actual for 2017.

6.2.3.9. Forecasting the Size of Pension Funds. The history of pension funds in Turkey backs to 2003. Although its history is 14 years old, the development of the pension system took a momentum after the 25% state incentives started in 2013. From 2005 to 2015, the fund size grew 66% in average. The yearly paid amount of the participants' growth rate for the same period was 44%. This rapid growth slowed down in 2016 and the total participants' payment amount grew 19% with a 18% decreased growth rate compared to previous year, 2015.

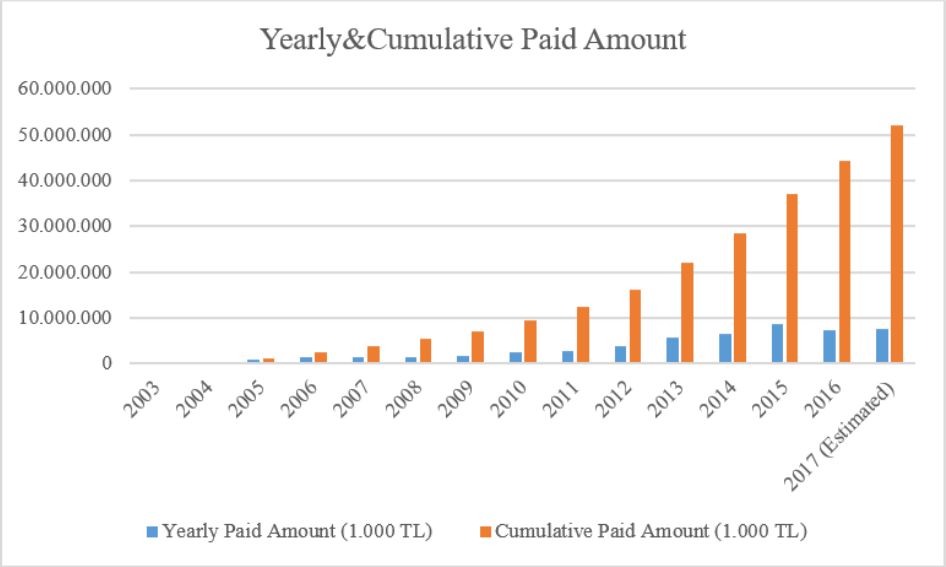


Figure 6.28. Participants' Yearly and Cumulative Paid Amount (EGM, 2016, ARIMA Results).

Although the total estimated deposits of the pension fund participants is 13.84 billion TL, the actual deposit amount was observed as 7.23 billion TL. In 2017, it is estimated that the total paid amount will be 7.72 billion TL. When the actual data of the first 4 months are checked, the estimated amount seem very close to the actual size of the paid amount of participants in that context.

Table 6.20. The Forecast Analysis of Pension Fund Size (ARIMA Results).

Months	2016		2017
	Forecast	Actual	Forecast
January	827.550.145	385.131.843	720.418.295
February	508.550.145	516.315.860	498.001.524
March	853.550.145	504.586.593	575.283.257
April	1.007.550.145	513.690.581	599.034.263
May	1.189.550.145	640.500.490	604.517.875
June	1.297.550.145	568.880.412	670.913.807
July	1.280.099.557	603.196.070	652.388.136
August	1.349.911.246	674.815.508	663.441.675
September	1.387.465.035	650.433.383	689.535.714
October	1.303.710.282	625.725.215	700.651.012
November	1.369.737.959	703.882.632	657.936.004
December	1.464.972.923	845.132.431	686.496.604
Total	13.840.197.872	7.232.291.018	7.718.618.165
Average	1.153.349.823	602.690.918	643.218.180

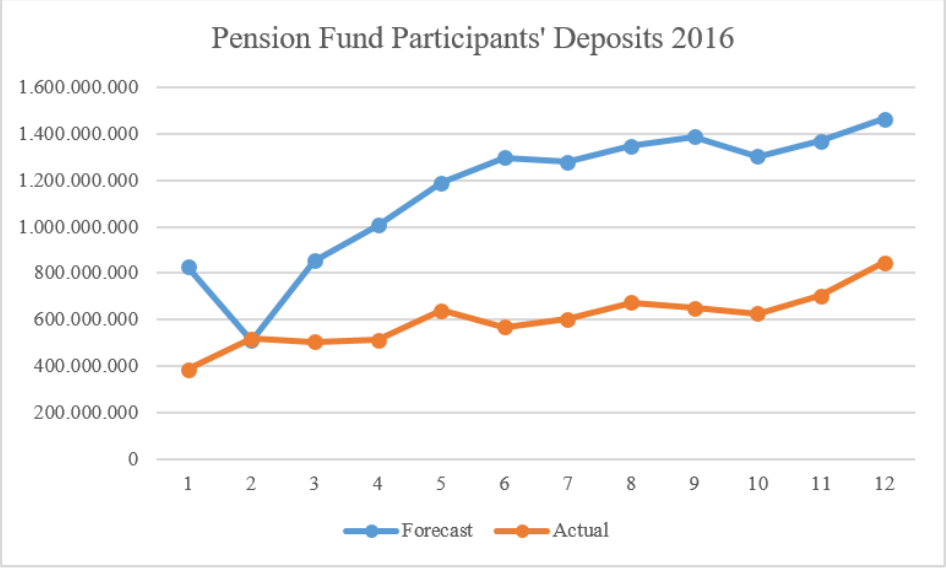


Figure 6.29. The Pension Fund Size Forecast vs. Actual for 2016.

Table 6.21. The Forecast Analysis of Pension Fund Size-2017 (ARIMA Results).

Months	2017	
	Forecast	Actual
January	720.418.295	662.988.188
February	498.001.524	493.407.635
March	575.283.257	578.947.916
April	599.034.263	579.776.079

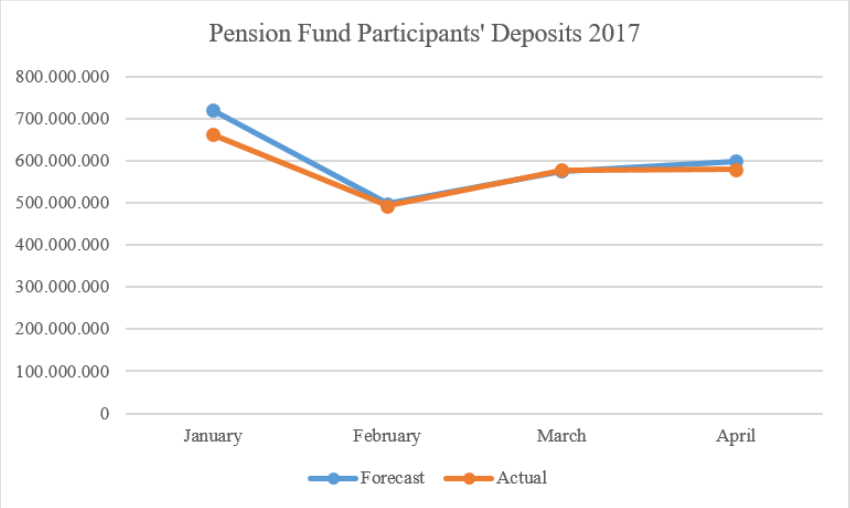


Figure 6.30. The Pension Fund Size Forecast vs. Actual for 2017.

6.2.3.10. Forecasting, Number of Pension Fund Participants. The total participants grew 33% in average in between 2005 and 2015. The yearly average increase was obtained as 11% compared to previous years' numbers. In 2016, this rate decreased 38% and the total numbers of the participants reached to 6.6 million with a 10% increase. It is estimated that the number of newcomers will be 455.354 and the total participants will reach to 7.1 million with 7% increase in 2017.

Table 6.22. The Forecast Analysis of Pension Fund Participants (ARIMA Results).

Months	**2016**		**2017**
	Forecast	**Actual**	**Forecast**
January	103.564	38.469	55.079
February	55.353	60.243	10.235
March	93.281	73.463	47.595
April	94.562	51.340	48.225
May	90.785	58.090	31.994
June	98.230	53.364	44.039
July	103.098	39.729	35.499
August	91.982	34.214	29.543
September	104.439	37.321	38.861
October	111.876	29.490	35.848
November	113.280	52.236	30.697
December	130.246	59.368	47.740
Total	1.190.694	587.327	455.354
Average	99.225	48.944	37.946

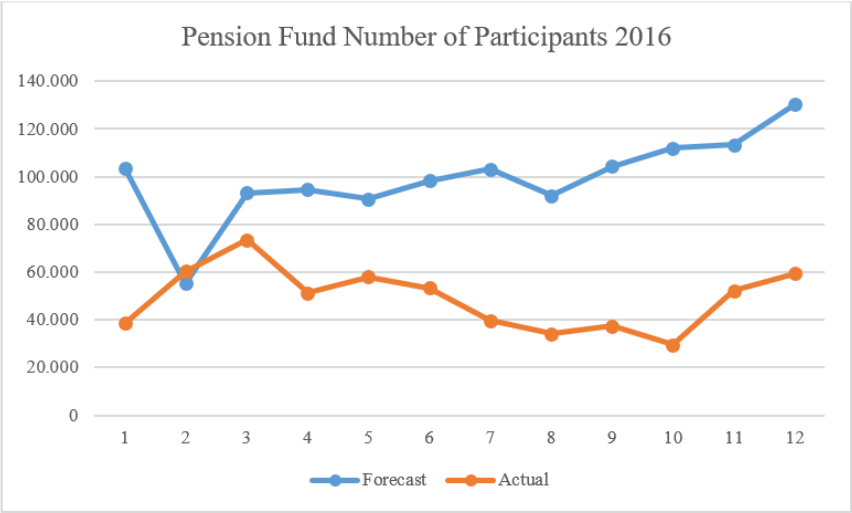


Figure 6.31. The Pension Fund Participants Forecast vs. Actual for 2016.

Table 6.23. The Forecast Analysis of Pension Fund Participants-2017 (ARIMA Results).

Months	**2017**	
	Forecast	**Actual**
January	55.079	92.975
February	10.235	24.467
March	47.595	4.807
April	48.225	12.084

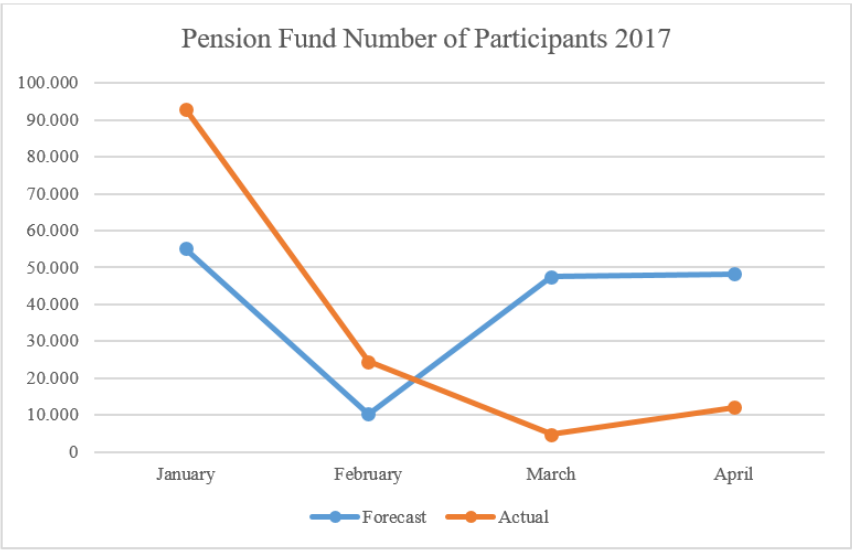


Figure 6.32. The Pension Fund Participants Forecast vs. Actual for 2017.

6.2.3.11. Forecasting the Size of the State Contribution to Pension Funds. The 25% state contribution, started in 2013, is one of the major attraction for the investors to invest in pension funds. By the end of 2016, the total state incentives reached to 7.44 billion TL. The ARIMA results of time series of the state contribution gave a forecast of 1.8 billion TL which is less than the actual deposit, 2.42 billion TL, but the trends of both lines are very consistent. For the year 2017, the estimated state contribution is about 1.85 billion TL, which is below the actual size of 2016, but close to the 2016 forecast.

Table 6.24. The Forecast Analysis of State Contributions to Pension Funds (ARIMA Results).

Months	**2016**		**2017**
	Forecast	**Actual**	**Forecast**
January	130.000.000	224.644.919	-29.358.763
February	45.725.752	-12.694.171	223.000.000
March	300.000.000	313.604.927	220.000.000
April	114.000.000	560.187.519	67.381.067
May	-109.000.000	-155.723.154	246.000.000
June	264.000.000	309.073.637	134.000.000
July	226.000.000	384.069.895	153.000.000
August	-78.851.212	-33.323.029	200.000.000
September	288.000.000	488.087.513	134.000.000
October	38.358.252	-104.182.842	181.000.000
November	191.000.000	7.176.092	168.000.000
December	403.000.000	437.245.805	154.000.000
Total	1.812.232.792	2.418.167.111	1.851.022.304
Average	151.019.399	201.513.926	154.251.859

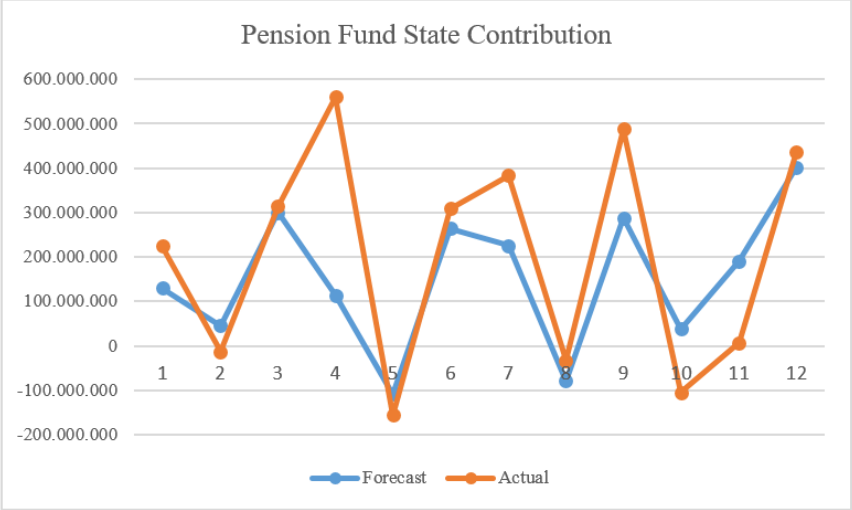


Figure 6.33. The Pension Fund State Contributions Forecast vs. Actual for 2016.

6.3. The Model Proposed

The model of this study is based on integrating the real estate investment instruments with pension funds under the regulatory of newly introduced Turkey Real Estate Fund mechanism. The results of the analysis that exhibit that the returns of the housing sales and REIT indices overperform the average pension funds returns open the door to establish the model. After the model was structured, a set of discussion was made with the experts in real estate industry, finance and capital markets and took its final shape after their contributions. The profile and experience of the experts whom the model discussed with is shown in Table 6.24.

All the experts whom the model discussed with, gave positive feedbacks about the structure of the model and its contribution to the real estate industry, capital markets as well as the future development of pension funds and their impacts to the growth of the economy. The common idea of the experts was the need for new and amended regulations to be issued and strong governance requirement. Such an important model can only be successful by the support of the government and important policy implications on this issue. One important point that was underlined was the sustainability of the model. The model which is capable of financing large scale projects may accomplish

this with sustainable local and international fund flows. This can be achieved with the successes of the projects financed and the returns the investors get by investing in the instruments proposed in the model. The model fund flows and investment area is interrelated to each other. An investor has the option to make profit from different investment tools the model include due to their interconnections. That is why the model is named as an "ecosystem" which is defined as "any system or network of interconnecting and interacting parts, as in a business" (Dictionary, 2017).

Table 6.25. Expert Profile of the Focus Group.

Number	Title	Experience Area	Experience	Education Level
1	Academician	Working as a professor of finance at one of the most prestigious universities in Turkey and ex-chairman of the capital market boards	More than 30 years	PhD
2	Academician	Working as an associate professor of construction management at one of the most prestigious universities in Turkey	More than 15 years	PhD
3	Academician	Working as an assistant professor of finance at one of the most prestigious universities in Turkey and ex-manager at central securities depository	More than 20 years	PhD
4	Academician	Working as an assistant professor of econometrics at one of the most prestigious universities in Turkey	More than 10 years	PhD
5	Chairman	Working as the chairman of one of the largest banks in Turkey	More than 30 years	BA
6	Chairman	Working as the chairman of a real estate sales company	More than 30 years	BA
7	Chairman	Working as the chairman of real estate fund management company, as well as teaching at university as a visiting professor	More than 25 years	PhD
8	Management Consultant	Working as a management consultant, experienced in real estate and finance	More than 25 years	BA
9	Coordinator	Working as a technical coordinator for one of the largest EPC contractors, experienced in infrastructure projects	More than 15 years	MBA
10	Director	Working as an asset director for a real estate development company, experienced in fund management and real estate	More than 15 years	MSc.
11	Director	Working as investment director for an investment company, experienced in finance, real estate and banking industries	More than 15 years	MA

Before explaining the model in details, the reasons why such a model is needed is discussed below:

- The real estate projects lack financing, so alternative financing tools are needed to be developed.
- The investors are seeking alternative long term investment tools, but current individual funds are not attractive enough to bring them in, so an investment ecosystem is needed to be established for sustainability of the fund inflows.
- The current real estate investment instruments are inadequate for long term investments, so there needs to be new attractions for long term involvements.
- Since the pension system is on voluntary basis and it is free to leave the system, the exit rate of the pension fund participants is too high. This makes the future of pension funds questionable. The exit door should be closed for a certain period of time.
- Although there is a 25% state incentives, the monthly contributed amount of the participants to pension funds is very low, it is needed to be increased.
- Although the monthly capital and interest payments are much higher than the monthly payments made to the pension funds, the home buyers are making their payments regularly. These payments may be included in the system by combining the real estate investments and pension system.
- Although the REITs and REIFs are corporate tax exempt, the investors hesitate to invest in Turkish real estate industry, yet these instruments are too small compared to their sizes in the world.
- Although the majority of Turkish people are Muslims, the size of Islamic financing tools are very small compared to the sizes in the world, the share of Turkish Islamic banking is needed to be increased by promoting participating banking industry and other Islamic finance instruments.
- There is an upward trend in interest-free pension fund tools, yet they cover only 5% of the total pension funds. This rate can be increased by investing in interest free real estate investment vehicles.
- The recent government projects, especially the city hospitals are financed by PPP model. The government give long-term payment guarantee to the investor-

contractor of the project, and there needs to be an alternative to this model that enable the government to finance the construction by new financing options and create long term income for new investment projects.

In the lights of the reasons mentioned above and after the suggestions and recommendations of the experts discussed with, the model is structured as follows:

(i) Turkey Real Estate Fund (TREF) will be established as the main investment and financing regulatory mechanism of the real estate investment industry in Turkey.

(ii) TREF may optionally be structured under Turkey Sovereign Wealth Fund (TSWF) which was legally formed in 2016 in order to develop and increase the value of Turkey's strategic assets and consequently provide resource for the primary investments of the country. It is planned to establish sub-funds to manage the investments. The aims of TSWF are contributing to economic growth, supporting the participation financing compliant assets, enlarging the instruments of capital markets, attracting investments (Turkiye Varlik Fonu, 2017).

(iii) The treasury or TSWF may transfer the right of use of pre-determined lands to TREF for public investments.

(iv) TREF may be the main regulator for the new real estate investment projects including infrastructure, healthcare, technology, education facilities, as well as renewable energy and urban transformation projects.

(v) For each specific investment project (city hospitals, energy investments, infrastructure projects, technology and innovation investments etc), as an alternative or a support to PPP model, Turkey Real Estate Fund may either issue sukuk, establish an Islamic REIT and make its first initial public offering (IPO), or establish a REIF or a Venture Capital Investment Fund in order to create financing for construction. Participating banks may also be involved in financing.

(vi) A 4th tier of pension fund (called as the Real Estate Pension System (REPS)) may be established by a new amendment or regulation to current system. In addition to the mandatory social security system, voluntary based pension system and auto enrollment pension system, this 4th tier REPS will aim to attract local and international investors to make their investments to TREF or its sub-funds. Local

and international pension funds, insurance companies, banks, other mutual funds and financial institutions will be able to invest in TREF.

(vii) All these issued new capital market instruments created for investment projects may be the main investment tools of newly introduced REPS.

(viii) By establishing TREF, it is also aimed to create a new home financing system for the individual home buyers.

(ix) In that context, it is suggested to transfer minimum 50% (up to 100%) of the total state contributed amount in the voluntary pension system to TREF. The state incentives reached to 7.44 billion TL by the end of 2016 (EGM, 2016).

(x) The participants may also be free to transfer their savings from other pension funds to this new 4th tier REPS.

(xi) The transfer of lands, at least 50% of state contribution and the transfer of the savings of the participants may create an initial resource for future investment and financing options of TREF.

(xii) For those who want to buy house but need financing may apply to TREF or to financial institutions through TREF for home loans.

(xii) The capital of the loan may be re-paid in equal installments in accordance with the maturity period.

(xiv) The determined monthly financing cost may be deposited to Real Estate Based Pension Fund.

(xv) It is recommended to deposit the monthly installment of the financing cost to the pension company of the financial institution provided the home loan.

(xvi) These financial institutions can either be banks, local or international pension funds, insurance companies, other mutual funds or the Turkey Real Estate Fund itself.

(xvii) The re-payment of the financing cost, together with its total returns made within the maturity period of financing may be paid to the financial institution at once at the end of the maturity period. All the accumulated amounts will be invested in the Real Estate Based Pension Funds that covers only real estate capital market instruments, shares of participating banks and sukuk which also include the issued instruments by TREF for financing large public investments.

(xviii) For this reason, many sub-funds with the combination of different shares of real estate investment trusts, shares of infrastructure REITs, real estate investment funds, lease certificates, real estate certificates may be established.

(xix) Newly established Islamic REITs and REIFs, venture capital investment funds, venture capital private equity investment trusts, issued sukuks for public investments and private ones may also be included in these sub-fund mixes.

(xx) These sub-funds may have the option of consisting completely interest free investment instruments (for example in the current regulation of REIFs, it is allowed for a REIF to make its 20% investments to bonds, bills, repo, reverse repo etc. which do not fit with the Islamic law, that is why Islamic REIFs are also recommended).

(xxi) As an alternative to current home loan interest rates, a new interest free home loan financing system is also introduced in the model. This system is constructed on the Rental Income Based Financing method and is named as RIBF Method.

(xxii) As recommended above, the home buyer may not pay any financing fee during the maturity period of financing. An incremental financing cost may be determined based on the valuation of the rent of the home itself together with the average prices of the neighborhood at the date of purchasing. The valuation of the rent may be reviewed by capital market board licensed experts every year by taking into consideration the home rent index. Each month, the home buyer may deposit the determined and yearly adjusted rent amount to real estate based pension fund. The yearly adjusted total rent amount and its total returns accumulated during the maturity period may be the financing cost of the project.

(xxiii) Although it may not be sustainable to continue the state incentives, in order to attract people to use their home loans through TREF and the new real estate based pension system, it is recommended that at least 15% state contribution to be applied to this new real estate pension system (REPS).

(xxiv) If the participants, who exited from either the voluntary based or auto-enrollment systems within the last three years, want to re-enter the system, it is recommended to give them the right to receive the state incentives in the condition that they deposit the minimum total contribution amount of the total duration passed since they left the system.

6.4. Sample Fund Size Estimation for the Model

In order to make a forecast analysis of the model, some assumptions were made including the results of the analysis. As discussed in the previous Chapters, Turkey Real Estate Fund needs long term investors to finance large real estate investment projects. For this reason, it is recommended to transfer the total state incentives accumulated in the pension system (excluding the auto-enrollment) to Turkey Real Estate Fund or to its sub-pension fund established after the newly introduced Real Estate Pension System. According to the Pension Monitoring Center Report, 2015, 33.2% of the people investing in funds are flexible to invest in different instruments. HSBC Future of Retirement Turkey Report (2015) states that 81% and 79% of the people who are both retired and working perceive the real estate investments as creating an income for their retirement ages respectively. In the lights of the facts reported, in addition to the state incentives, it is also assumed that at least 10% of current pension fund participants may transfer their savings to TREF.

This suggested ratio is also consistent with the Preqin Real Estate Report, 2017 stating that pension funds real estate average allocations are 7.3% and 8.8% in the US and in the world respectively.

Table 6.26. Turkey Real Estate Fund Size (Assumption for 2017).

Turkey Real Estate Fund Asset Size (2017 Suggestion)	**Total (TL)**
%100 of the 25% State Incentives (TL)	9.289.189.486
%10 of the Participant's Deposits (TL)	5.417.209.962
Total (TL)	14.706.399.448

In that context, by the end of 2017, in accordance with the 2017 forecasts, as shown in Table 6.25, the fund may have about 14.7 billion TL asset size to start financing different real estate investment projects, as well as providing home loans to home buyers.

In the report prepared by Insurance Association of Turkey in 2012, the projected size of the pension funds in 2023 is estimated as 124 billion TL with normal growth scenario (15% growth/year) and 408 billion TL with accelerated growth scenario (28% growth/year). If this projection turns out to be a reality, this growth projection may make pension funds one of the major investors of Turkey Real Estate Fund.

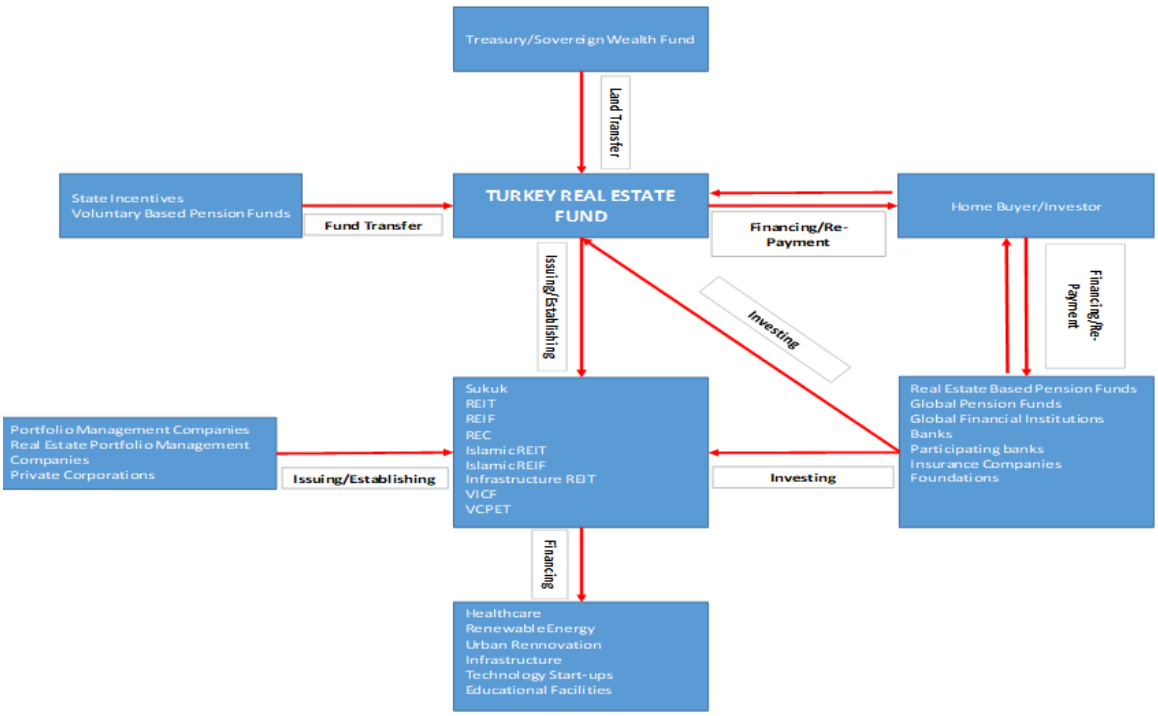


Figure 6.34. Real Estate-Pension Fund Investment Ecosystem Model.

Table 6.27. The Summary of Forecast Analysis.

Item	Parameters	2016	End of 2016	2017 (Estimated)	End of 2017 (Estimated)
1	Total Size of the Participant's Deposits in Pension Funds (TL)	7.232.291.018	44.351.386.577	7.718.618.165	52.070.004.742
2	Total State Incentives (TL)	2.418.167.111	7.438.167.182	1.851.022.304	9.289.189.486
3	Average Return of the Pension Funds (TL)	779.824.038	1.619.784.997	482.309.880	2.102.094.877
4	Total Size of the Pension Funds (TL)	10.430.282.167	53.409.338.756	10.051.950.348	63.461.289.104
5	Total Number of Participants in Pension Funds	587.327	6.625.759	455.354	7.081.113
6	The Percentage of Interest Free Pension Funds (%)	4.95	5.21	5.31	
7	Total Home Loans (TL)	20.486.381.000	163.734.509.000	34.122.332.500	197.856.841.500
8	Total Mortgaged Home Sales (Unit)	449.508	1.733.697	393.400	2.127.097
9	Total Home Sales to Foreigners (Units)	18.189	72.159	18.087	90.246

Table 6.26 shows the summary of forecast analysis. According to the analysis, total size of the pension funds excluding the auto-enrollment is estimated as 63.5 billion TL. It is projected that 10% of the participants may transfer their savings to REPS and all the state contribution may be transferred to TREF. If 20% of the TREF (2.94 billion TL) is assigned for home loans, the TREF may finance 8.6% of the total estimated home loans for 2017 (34.12 billion TL).

6.5. Interest Free Home Financing

In literature, the housing financing systems are categorized under 4 main models: direct financing, saving system depending on a contract, bank deposits financing, mortgage banking model (Hepsen, 2010). All these financing models are used by different investors and home purchasers. In this study, an interest-free financing system is recommended for home ownership. In order to achieve this, the regulatory mechanism of Turkey Real Estate Fund plays a vital role. The people who hesitate to pay interest for religious or any other reasons should have different options to purchase their houses. The steps of the interest-free financing system described in this research, which is named as Rental Income Based Financing (RIBF) Model is described below:

- The home buyer will finance her house from TREF and will pay back the capital in monthly equal installments during the maturity period.
- She will not pay any financing fee to TREF or the financial institution during the maturity period of financing.
- An incremental financing cost will be determined based on the valuation of the rent of the home itself together with the average prices of the neighborhood at the date of purchasing.
- The valuation of the rents will be reviewed by capital market board licensed experts every year by taking into consideration the home rent index.
- Each month, the home buyer will deposit the determined and yearly adjusted rent amount to Real Estate Pension Fund. The total rent amount and its total returns accumulated during the maturity period will be the financing cost of the project.

- As an alternative, if the people are unable to pay the financing cost for any reason during the loan period, the system will again work for them, in that case they will pay the total financing cost as the total calculated rent amount plus the average return of the Real Estate Pension Fund for the loan maturity period.
- It should also be noted that this system may allow the people to involve in the system without down payment depending on the total value of the house.
- There may be a range for that: a) The units with a value below 300.000 TL, down payment is not required, b) The units with a value between 300.000 TL - 500.000 TL - At least 5% down payment is required, c) The units with a value between 500.000 TL - 1.000.000 TL - At least 10% down payment is required, d) The units with a value more than 1.000.000 TL, at least 15% down payment is required.

Two examples are made to give an idea about how the model will work:

Example 1: Let's consider a unit with a value of 500.000 TL. The buyer is going to make 5% down payment and will need to finance 475.000 TL, assuming he can only pay the capital and no interest fee he is capable of paying. The monthly rent of his unit is 1.500 TL at the time of purchasing.

First, the last five years (2012-2016) of yearly average of housing rent price index monthly returns are used in order to calculate 5 years of incremental rental income.

Then, the last five years average pension funds monthly returns (in the future, the average returns of the real estate pension funds will be used) were used in order to calculate the additional increase of the rents (considering if the monthly rents were deposited to pension funds accounts). Then, each year both the incremental rent with its additional return adds up and the total financing cost of the unit is calculated.

For 475.000 TL, 60 months, the total financing cost is calculated as 121.482 TL, which is relatively less than (which is good for home buyers) but close to current financing costs of the banks with current interest rates (a benchmark is obtained from

a public bank, and the total financing cost is calculated as 150.359 TL for the same 60 months period) but reasonable to open a discussion with financial institutions, especially with the participating banks and other Islamic funds worldwide.

Example 2: In this case, let's increase the value of the unit to 1.100.000 TL and maturity period to 120 months. Down payment becomes 15% and the financing requirement is now 935.000 TL. By using the last 10 years of yearly average of housing rent price index monthly returns and the average pension funds monthly returns, the total financing cost is calculated as 538.879 TL, which is also reasonable compared to current financing costs of the public bank with current interest rates (A benchmark from a bank for 10 years period was obtained as 627.472 TL financing cost).

6.6. Ownership Effect

Ownership effect is another important parameter that may affect the returns. In this study, the ratios of foreign, local, institutional and individual investors of BIST 100 and REIT indices were obtained from Central Securities Depository covering a period of 2011-2015.

Foreign investors' ownership rate of BIST 100 index is 66.74%, and this rate is 41.42% at REIT index. This situation is the same for the ownerships of institutional investors' rate. The BIST 100 index and REIT index have 82.43% and 65.05% institutional investors' ownership rates respectively. Although both indices are highly correlated and integrated, this difference is needed to be evaluated.

The local individual investors' ownership rate for REIT index is quite high with 34.48%, which may be evaluated as the appetite of Turkish citizens to real estate industry. This rate is just 17.36% for BIST 100 index which is the half of REIT index.

Table 6.28. Example 1 for Financing with RIBF Method.

The Value of the Unit (TL)	500000
Down Payment(TL)	0.05
Down Payment (TL)	25000
Loan Amount (TL)	475000
Maturity (Months)	60
Monhly Payment (TL)	7917
Monthly Rate	1500

Years	**Yearly Rent (TL)**	**Monthly Rent Increase Rate (%)**	**Monthly Rental Increase (TL)**	**Months**	**Yearly Rent Increase (TL)**	**Monthy Returns of Pension Fund (%)**	**Monthly Return of Pension Funds (TL)**	**Yearly Return of Pension Funds (TL)**	**Monthly Rent (TL)**
2012	18000	1.29	232	12	2786	1.31	36.5	438.02	1500
2013	21224	0.86	183	12	2190	-0.05	-1.1	-13.14	1769
2014	23402	1.21	283	12	3398	1.12	38.06	456.68	1950
2015	27256	1.3	354	12	4252	0.18	7.65	91.84	2271
2016	31600	0.57	180	12	2161	0.86	18.59	223.06	2633
Total	121482								

Table 6.29. Example 2 for Financing with RIBF Method.

The Value of the Unit (TL)	1.100.000
Down Payment (TL)	15%
Down Payment (TL)	165.000
Loan Amount (TL)	935.000
Maturity (Months)	120
Monhly Payment (TL)	7.792
Monthly Rate	3600

Years	**Yearly Rent (TL)**	**Monthly Rent Increase Rate (%)**	**Monthly Rental Increase (TL)**	**Months**	**Yearly Rent Increase (TL)**	**Monthy Returns of Pension Fund (%)**	**Monthly Return of Pension Funds (TL)**	**Yearly Return of Pension Funds (TL)**	**Monthly Rent (TL)**
2007	43.200	0,56	242	12	2.903	1.42	41.22	494.68	3.600
2008	46.598	-0,77	-359	12	-4.306	0.79	-34.01	-408.17	3.883
2009	41.884	0,01	4	12	50	1.65	0.83	9.95	3.490
2010	41.944	0,32	134	12	1.611	0.74	11.92	143.03	3.495
2011	43.698	0,76	332	12	3.985	-0.08	-3.19	-38.26	3.641
2012	47.645	1,29	615	12	7.375	1.31	96.62	1159.42	3.970
2013	56.180	0,86	483	12	5.798	-0.05	-2.9	-34.79	4.682
2014	61.943	1,21	750	12	8.994	1.12	100.73	1208.8	5.162
2015	72.145	1,30	938	12	11.255	0.18	20.26	243.1	6.012
2016	83.643	0,57	477	12	5.721	0.86	49.2	590.43	6.970
Total	538.879								

Table 6.30. The Ownership Rates of BIST 100 and REIT Indices (MKK, 2016).

	Years	Foreign Investors (%)	Local Investors (%)	Institutional Investors (%)	Individual Investors (%)	Foreign Institutional Investors (%)	Foreign Individual Investors (%)	Local Institutional Investors (%)	Local Individual Investors (%)
REIT Index	**2011**	43.6	56.4	59.97	40.03	43.09	0.51	16.88	39.52
	2012	37.62	62.38	61.64	38.36	37.07	0.55	24.57	37.81
	2013	39.16	60.84	64.5	35.5	38.55	0.61	25.95	34.89
	2014	43.21	56.79	70.46	29.54	42.85	0.36	27.6	29.19
	2015	43.52	56.48	68.67	31.33	43.18	0.34	25.49	30.98
	Average	41.42	58.58	65.05	34.95	40.95	0.47	24.1	34.48
	Years	**Foreign Investors (%)**	**Local Investors (%)**	**Institutional Investors (%)**	**Individual Investors (%)**	**Foreign Institutional Investors (%)**	**Foreign Individual Investors (%)**	**Local Institutional Investors (%)**	**Local Individual Investors (%)**
BIST 100 Index	**2011**	64.4	35.6	79.49	20.51	64.15	0.25	15.34	20.26
	2012	66.54	33.46	81.44	18.56	66.35	0.19	15.09	18.37
	2013	67.73	32.27	83.49	16.51	67.52	0.2	15.97	16.31
	2014	67.78	32.22	83.75	16.25	67.61	0.17	16.14	16.08
	2015	67.25	32.75	84	16	67.03	0.22	16.97	15.78
	Average	66.74	33.26	82.43	17.57	66.53	0.21	15.9	17.36

7. DISCUSSIONS

In the section 6, VAR and ARIMA results were analyzed and initial discussions made for individual findings of the analysis made. In this section, a more detailed discussion from the perspective of their effects to the model developed is made.

7.1. Discussion on VAR Results

7.1.1. Returns of BIST 100 Index vs. Independent Variables

According to the Granger Causality test results, except for home loan weighted average interest rates, the selected variables do not affect the return of BIST 100 index within 10% confidence interval. Although this finding seem questionable at first look, the similar results in the literature support these findings. The ineffectiveness of inflation and exchange rate on BIST 100 returns is consistent with the findings of the research made by Ozbay (2009), as well as the results for gold prices match with the studies of Koroglu (2009) and Miyazaki and Hamori (2009). Parallel to the outcomes of this study, Ayaydin and Dagli (2012) also found that the effect of interest rates is statistically insignificant. From both exchange rate and inflation perspective, it is important to investigate how the returns of individual firms in BIST 100 index are affected from any changes occur in inflation and exchange rates, and how their profitability and balance sheets are dependent to foreign currencies. It is also important to evaluate the effects of company specific microeconomic and macroeconomic factors together. The results obtained for the ineffectiveness of gold prices over BIST 100 returns may be interpreted that the investors of gold is different than the investors of stock markets, and the up and downs in the gold prices have no impact on the stock markets in Turkey.

Although in the past literature, oil prices affect the returns of stock prices, no evidence was found about the impacts of the oil prices according to the results of this study. In order to investigate this ineffectiveness further, it is important to check the

weights of the oil based or oil related companies in the BIST 100 index and how the oil prices affect the returns of these companies.

In the hypotheses, it was thought that the central bank overnight lending interest rates affect the returns of BIST 100 index, but surprisingly the results exhibited that the home loan weighted average interest rates affect the returns of BIST 100 index. This result is important in terms of the integration of real estate industry and stock exchange in Turkey.

7.1.2. Returns of REIT Index vs. Independent Variables

Exchange rate and inflation are found the two parameters that affect the return of REIT index, which validated the hypotheses for these variables. The results for inflation is consistent with the findings of Simpson *et al.* (2007), Hardin *et al.* (2012) Glascock *et al.* (2002), Ewing and Payne (2005), Kirdök (2012), and opposite with Onder's (2010) results. Ngo (2017) claimed that she published the first study that investigated the effects of exchange rates on REIT returns. Her analysis had exhibited opposite results for different types of REITs. The results of the analysis of this research, as exhibited the existence of the influence of exchange rates on REIT index is important to contribute another study investigating the effects of exchange rates in Turkey, in that sense.

The effects of both interest rates, gold and oil prices are found statistically insignificant. It is surprising that the interest rates, especially the home loan interest rates, in contrast to the findings of Allen *et al.* (2002), Swanson *et al.* (2002), He *et al.* (2003), Kirdök (2012) don't affect the return of REIT index which is needed to be investigated further. The investigation of the impacts of gold and oil prices on REIT index returns did not exist in the literature as far as the past literature reviewed. In that context, although the results exhibited an insignificant effect, analyzing the impacts of these two parameters on the returns of REIT index was important. The results exhibited that the REIT industry is independent from the oil and gold industries in Turkey. For further analysis on the impacts of the oil prices, it is important to evaluate

the rates of foreign individual and institutional investors from oil rich countries who invest in REIT index and their buy/sell transactions in accordance with the oil price fluctuations.

There was found a negative relation between the exchange rates and the return of REIT index with 44% correlation ratio. Although this ratio does not seem very high, the result of VAR analysis that exhibited the existence of effect of the exchange rates on the returns of REIT index is important to evaluate. The sharp decrease of REIT return in the Figure 6.2. corresponds to the mortgage crisis in September, October and November 2008 with a 21.48% and 31.73%, 5.80% loss respectively. On the other hand, TL devaluated against USD in these months are 4.84%, 16.22%, 7.50% respectively. The REIT index return was recovered with a steep increase of 27% and 11.67% in April and May 2009. In the same months TL gained value against USD but could not recover all the devaluation.

7.1.3. Returns of Housing Sales and Rent Price Indices vs. Independent Variables)

The inflation is found the only factor affecting the return of housing sales index which validated the related hypotheses. This result is consistent with the findings of Apergis (2003), Li and Chen (2015), Pillaiyan (2015), Brooks and Tsolacos (1999) and opposite with the results of Ong (2013) and Pashardes and Savva (2009). There is no variables that affect the return of housing rent index among the selected variables which is needed to be studied further. Ong (2013), Pillaiyan (2015), Pashardes and Savva (2009) had found that the interest rates do not affect the returns of housing price indices. The results of this study is also consistent with their findings. It is important to furtherly study the rate of the used home loans at low and high interest rates environments and the price increase and decreases in that periods. In addition to macroeconomic variables, it is important to evaluate the real estate specific factors for deeply analyzing the returns of housing prices indices.

7.1.4. Participating Banks Average Share of Profits vs. Independent Variables

The results of the analysis exhibited that, three of the selected variables; gold prices, central bank lending interest rate and inflation affect the return of participating banking average share of profit rates, while the effects of oil prices, exchange rates and home loan interest rates are found insignificant. The effects of the central bank lending interest rates and inflation are not surprising as they were similar to Xian *et al.* (2015), Nahar and Sarker (2013) found for interest rates, and Xian *et al.* (2015), Waisuzzaman and Termizi (2010) exhibited for inflation, and both of the results validated the hypotheses.

Gold prices are also evaluated as a factor that affect the participating banks share of profits due to its link because of interest free transactions. This tie is also validated in the findings of the VAR results. It is assumed that the oil prices has an effect on Turkish economy, its link to participating banking industry was also considered effective and the hypotheses was structured as the oil prices have an impact on the share of profit rates. The results of the study exhibited a different result than the findings of Hammoudeh *et al.* (2014) who had found an influence of oil prices.

Ayub and Masih (2013), Nahar and Sarker (2013) had exhibited the existence of the effect of the exchange rates on the share of profits of participating banks. One another different result than the hypotheses claim was obtained for the insignificancy of the impact of exchange rates on the share of profit rates which may also need to be furtherly investigated.

7.1.5. Average Returns of Pension Funds vs. Independent Variables

Wanjiku (2014), Kemboi (2014), Chu (2011) had found that inflation has an impact on the returns of pension funds. The results for inflation is consistent with their findings. In addition to the inflation, home loan weighted average interest rates is also found a parameter that affects the average return of pension funds. The effects of

the rest of the variables are found statistically unimportant. The results of the interest rates effect is similar with what Chu (2011) found and the finding for exchange rates was the opposite of the results of Wanjiku (2014). The results about the interest rates is as accepted in the hypotheses, but the existence of the effect of home loan weighted average interest rates is an interesting finding that might be evaluated a connection between the real estate industry and pension funds.

7.1.6. Average Returns of Pension Funds vs Returns of REIT, BIST 100, Housing Indices and Participating Banking Average Share of Profits

In order to proceed to the next step of analysis, the forecasting step, a vector auto regression analysis among the dependent variables were also employed and the effects of the returns of BIST 100, REIT, housing sales and rent indices and participating banks average share of profits on the average returns of pension funds were analyzed. The results exhibited that except for the participating banks average share of profits, all other variables affect the return of the pension funds. In fact, the effect of the participating banks average share of profits on the average returns of the pension funds were expected, but it seems like the interest free pension fund level, which is about 5% of the total fund size is not very effective when evaluating the pension fund returns.

7.2. Discussions on ARIMA Results

7.2.1. Forecast Results of the Returns of BIST 100 Index

Although the general trend of the forecast is similar with the actual data, there are 4 major break points that deviate the forecast returns for the year 2016. The first one is the growth rate announcement at the end of March 2016, which exceeded the expected rate, had a positive effect on capital markets. Second, in May, there was a political crisis after the Prime Minister Ahmet Davutoglu's resignation. This political situation affected the stock market negatively. The third one was the coup attempt. Although its effect surprisingly did not create a big shock, it still deviated the forecast. The last one, in November, was the consequences of the election of Donald Trump as

the President of the US which shocked the global economy, as well as the Turkish stock markets.

While the Brexit (exiting from the European Union) decision of the UK in June affected the returns negatively, the economic incentives announced by the government in December had a positive impact on stock returns. It should also be noted that after sharp drops, there may also be sharp increases in stock markets due to the opportunity of purchasing the shares from an undervalued prices Although the average return of 2016 is higher than the forecasted, the high volatility in 2016 seem to have affected the forecast of 2017 negatively.

7.2.2. Forecast Results of the Returns of REIT Index

The forecast and actual data of the returns of REIT index show similar behaviors as BIST 100 index. The growth rate, resignation of the prime minister, decision of the people of UK to leave the European Union, the coup attempt, results of the elections in the US and economic decisions of the government affected the returns of REIT index and deviated the 2016 forecast. In 2016, the inflation and exchange rates increased and this rise affected the return of REIT index, consistent with the findings of the VAR analysis that proves the impacts of the inflation and exchange rates. The average return of REIT index increase in December may be due to the positive effect of the upward adjustment of the profit targets of Emlak Konut REIC which is the largest company that dominates the REIT index. The actual return data which exceeded the forecasted return of 2016 may have resulted with a positive shift for 2017 forecast.

7.2.3. Forecast Results of the Returns of Housing Sales and Rent Indices

The forecast and actual data about housing sales index seem not being affected from major political and global economic storms. This is a good sign for sustainability of the housing sector, yet there is a negative trend after July 2016, the coup attempt. GYODER, the Association of Real Estate and Real Estate Investment Companies, and Emlak Konut REIC started a campaign for increasing the housing sales and decreased

the interest rates and the pulled down pre-payment rate from 25% to 20% in August. This campaign seemed to have brought an upward momentum to the sales and housing sales price index.

The housing rent index seem to be affected more negatively after coup attempt compared to the sales index. That may not be the only reason to explain this decrease. The decrease rate is increasing in the last two months of 2016, and this decrease may have affected the forecast results of 2017 with a negative average return expectation. In that context, the vacancy rates of the existing houses, the unemployment rates, the income per capita, as well as other macroeconomic and demographic variables which were not studied in this research should be examined to find out the reason behind that expected decrease.

7.2.4. Forecast Results of the Average Returns of Pension Funds

In 2016, the pension fund average returns performed better than forecasted, but they showed similar trends except for May and November; probable negative effects of the resignation of the prime minister and the Trump's victory. There is also a minor effect of the coup attempt.

7.2.5. Results of the Coefficient of Variance

The results of the CV comparison support the outcomes of the ARIMA forecast results. The coefficient of variance of housing sales and rent indices is smaller than the pension funds, which gives the idea of investing in housing is less risky than investing in pension funds. Although the CV of REIT index is higher than the CV of pension funds due to high volatility, this may not be interpreted as not investing in REIT index because CV refers to the risk level of the investment tool and for those who want a risky investment may prefer REIT index as it has higher return for the year 2017 according to the ARIMA forecast analysis results. One of the limitation for this study is the lack of returns of real estate investment funds (REIF), infrastructure REIT and real estate certificates. All the three instruments are very new in the Turkish real estate

capital markets and the more REIFs are established, the more infrastructure REITs are founded and made their initial public offerings (IPO), and the more sukuk issued, the more return data will be available for further studies to strengthen the validation of the model.

7.2.6. Forecast Results of the Size of Home Loans

The total home loans for the year 2016 were forecasted and compared with actual loans used. The trends of both the forecast and actual go consistently except for two break points: The coup attempt in July and the campaign of GYODER and Emlak Konut REIC started in August and continued thereafter. The decrease in July may have deviated the forecast downward, while the new housing campaign may have shifted the direction upwards especially after September. In the lights of the results, the total home loans for 2017 is forecasted as 34.1 billion TL with a monthly average of 2.84 billion TL.

7.2.7. Forecast Results of the Number of Mortgaged Housing Sales

Mortgaged home sales is one of the most important factor that affect the model in terms of the total financed units. The forecast of mortgaged home loans for 2016 is almost the same with the actual data. The minor deviation observed may be caused due to the same reasons mentioned for home loans; the negative effects of coup attempt and positive outcomes of the real estate campaign thereafter.

In 2017, it is estimated that each month 32.783 units will be sold which will reach up to 393.400 yearly. When the first three months of realizations are compared, the forecast and actual number of sales overlap for the first two months. In March, there is a remarkable increase may be due to new regulations that announced covering a decrease in title deed fees, cancelling the stamp duty tax in housing sales contracts, and a decrease in VAT tax.

7.2.8. Forecast Results of the Number of Housing Sales Sold to Foreigners

Although there is an increase in the foreigners' buy in 2015, the negative political and global political situations and terrorist attacks may have decreased the appetite of the foreigners, and as a result the total units remained in 2016, at the same level of 2014. In the forecast based on the past historical data, the number of the unit sales to foreigners seem not to increase more and may stay in the below 20.000 units level. When the actual units sold to foreigners in the first three months of 2017 were analyzed and compared with the estimates, a consistency and almost an overlap in the numbers is observed with a slightly upward increase in March. There is a possibility for exceeding the forecast because of the new law that bring VAT exempt to foreigners and the right of citizenship for those who purchase a house for at least 1 million USD value.

7.2.9. Forecast Results of the Size of Pension Funds

The history of pension funds in Turkey backs to 2003. Although its history is 14 years old, the development of the pension system gained a momentum after the 25% state incentives started in 2013. From 2005 to 2015, the fund size grew 66% in average. The yearly paid amount of the participants' growth rate for the same period was 44%. This rapid growth slowed down in 2016 and the total participants' payment amount grew 19% with an 18% decreased growth rate compared to previous year, 2015. This decrease seems to be the main reason for the deviation of the 2016 forecast, but both of the forecast and actual trends show similar behaviors.

7.2.10. Forecast Results of the Number of Pension Fund Participants

The total participants grew 33% in average in between 2005 and 2015. The yearly average increase was obtained as 11% compared to previous years' numbers. In 2016, this rate decreased 38% and the total numbers of the participants reached to 6.6 million with a 10% increase. It is estimated that the number of pension fund participants will reach to 7.1 million participants with 7% increase in 2017. In 2017, the number of

total participants started decreasing. This may be a result of the auto-enrollment. The newcomers of the system may have chosen to enroll in the auto enrollment instead of enrolling to the voluntary based system. For the first 4 months of 2017, there are 2.45 million people enrolled in the auto-enrollment system and 293.3 million TL was deposited by the participants (PMC, 2017). Although the system is very new and continue adding 25% state incentives, the exited number of participants in March is significant. According to Pension Monitoring Center, the exit rate of the participants of the auto enrollment system reached to 60% by the end of March 2017. In that context, the suggested 4th tier real estate based pension system (REPS) may be a good solution to keep the people in the system if implemented.

7.2.11. Forecast Results of the Size of the State Contribution to Pension Funds

The 25% state contribution, started in 2013, is one of the major attraction for the investors to invest in pension funds. By the end of 2016, the total state incentives reached to 7.44 billion TL. The ARIMA results of time series of the forecasted state contribution is 1.8 billion TL, which is less than the actual deposited amount, 2.42 billion TL, but the trends of both lines are very consistent. For the year 2017, the estimated state contribution is about 1.85 billion TL, which is below the actual size of 2016, but close to the 2016 forecast. Although a consistency among the trends is observed, the reason for the deviation from actual size may be the limited data covering 43 months (June 2013-December 2016) only. The more data is collected, the more accurate of the forecast results will be in the time series analysis.

7.3. Discussions about the Model

The model proposed in this study is based on the establishment of Turkey Real Estate Fund (TREF), which is suggested as a regulatory and a funding and investment mechanism of real estate industry in Turkey. TREF is aimed to work as a fund of funds that covers the real estate investment tools.

A fund of funds (FOF) is defined as a strategy of investment where a different types of funds are invested in one umbrella fund. Rather than investing directly in common stocks, bonds and other types of investment tools, a portfolio that contains different assets are invested in by the fund of funds. Fund of funds covers different assets under different funds into one umbrella fund to achieve a wide diversification. Although the investors may reduce their risks and has the possibility of making better returns, they may have to pay more for fund management fees that is already paid to the managements of sub-funds. There are different kinds of FOFs including mutual fund, hedge fund, a private equity or an investment trust.

Ang *et al.* (2008) listed the reasons for investing in fund of funds as allowing investors to obtain exposure to hedge fund investments that are otherwise closed to individual investors, accepting lower investments than those required by hedge funds, providing investors access to a diversified portfolio of hedge funds and providing good access to information and professional portfolio management that would otherwise be hard, or costly to obtain. An FOF may either invest in portfolios containing assets and funds managed by one investment company or invest in external funds controlled by other managers from other companies. Investors in private equity funds of funds may include public and corporate pension plans, endowments/foundations, insurance companies/banks.

Real estate funds of funds which offer investors to reach a diversified portfolio of fund investments via a single commitment, cover a small but important part of the private real estate fund universe. Although the first fund of funds was established in 1978 in the US (Weidig *et al.* 2005), the first real estate funds of funds were founded in the late 1990s. Public pension funds covers the largest share with 34% of all fund of funds investors, this is followed by foundations with 25% and endowment plans with 14%. With private sector pension plans investment size of 10%, the total of pension funds cover almost the half of the real estate fund of funds investors (Preqin Report, 2012). Although an extensive researches about different types of funds in finance literature exist, there are not many studies that focused on fund of funds. While some of the studies focused on the risks and returns of the FoFs, some others studied the

parameters that affect the returns and their performance drivers.

Weidig *et al.* (2005) studied the risk profile of the private equity funds of funds. Their results exhibited that funds of funds have higher returns than individual funds. In their research, Lynch and Mosto (2003) confirmed the past studies that claim a convex relation between past returns and fund flows of mutual funds and their model predicted that only after bad return performance the investment strategy changes. Gresch and Wyss (2011) studied the risk and return characteristics of different fund categories by using real fund of funds (FoF) data and a detailed dataset of 1,641 private equity funds raised from 1979 to 2010. According to the results of their study, FoFs exhibit better risk-return profile, higher risk-return ratio, lower average loss and less probability loss than aggregate direct fund investments. Hilli *et al.* (2010) applied the strategic optimization technique to an asset liability management problem coming from pension insurance industry. The results of their study exhibited that the optimized fund of funds beat the best individual investment strategy by a wide margin. Brown *et al.* (2003), study the management fees of fund of funds and claim that the lower returns of the FoFs compared to individual funds because of the fee arrangement and suggest a new fee arrangement for a better incentives at a lower cost to investors in these funds.

In that context, it is suggested that, in order to finance large projects, as an alternative or complementary to using PPP model, TREF can issue sukuk, establish Islamic REITs, Islamic REIFs, Infrastructure REITs, Venture Capital Investment Funds and other capital market instruments The investors of these instruments can be either local pension funds or international financial institutions and global funds. If Turkey Real Estate Fund provides a good feasibility analysis and a long term cash flow of the projects with acceptable profit margins, it may have the opportunity to either get direct loans from institutions or use the aforementioned investment tools to provide indirect financing.

In order to discuss the suggested model and how it may be implemented, some special cases of Islamic Funds including Islamic REITs and sukuk that may fit to the model as investment tools are reviewed.

7.3.1. Cases in Islamic REITs

There are very good examples for Islamic REITs that fit the model as Islamic investment tools. Among these, Al-'Aqar Healthcare REIT, established in Malaysia in June 2006 and was listed in the Main Board of Bursa Malaysia in August 2006 is a good example for hospital project financing in Turkey. Al-'Aqar Healthcare REIT was originally established to own and invest in Shariah compliant properties which comprise 6 hospitals. Since its establishment, the number of properties increased from 6 to 22 properties in Malaysia. They also developed one healthcare project in Australia (Al Aqar, 2017).

Ripain and Ahmad (2016) analyzed the performance of Al-'Aqar Healthcare REIT in between 2006 and 2015. They used trend analysis focusing on dividend distribution per unit and net asset value (NAV) of the company. Their results exhibited that Al-'Aqar Healthcare REITs has the capability to attract investors. The dividend distribution per unit and net asset value have an upward trend because it is backed by various quality assets.

The second Islamic REIT, Al-Hadaharah Boustead REIT, with initial investment in palm oil plantation was established in February 2007. The third Islamic REIT and world's first Islamic industrial/office REIT, Axis REIT, was initially launched as conventional REIT in August 2005 but subsequently restructured to be Shariah-compliant in December 2008. Both of these REITs were also Malaysian based. In May 2013, KLCC Real Estate Investment Trust (KLCC REIT) was established as the world's first Shariah-compliant stapled REIT and currently Malaysia's largest REIT. Stapled REITs are defined as investment tools which contains two or more separate entities 'stapled together' to trade using a single new financial instrument. Al-Salam Real Estate Investment Trust is another Sharaih compliant REIT listed on in the Bursa Stock Exchange in Malaysia in September 2015.

The first Islamic REIT in Kuwait, which is not listed in stock market was established in 2007 when Al Mahrab Tower REIT was founded. The first Islamic REIT in

Bahrain was authorized in June 2009 and Inovest REIT, which is also not listed, was established in order to develop income generating properties in the Gulf Cooperation Countries (GCC).

Sabana REIT, the Singapore based and the world's largest Islamic REIT was established in 2010 and listed in the Singapore Exchange Securities Trading Limited in order to make investments industrial real estates including high-tech industrial, chemical warehouse and logistics, warehouse and logistics, and general-industrial projects. UAE launched the first Islamic REIT in 2010 when Dubai Islamic Bank partnered with Eiffel Management of France to found the Emirates REIT incorporated in the Dubai International Financial Centre (DIFC) (Islamicbanker, 2017).

Rozman *et al.* (2015) investigated the risk-adjusted performance analysis between Islamic REITs (Is-REITs) in a mixed asset portfolio in between November 2008 and December 2014. They compared Is-REITs in a mixed asset portfolio consists of shares and bonds and their results exhibited that Is-REITs outperform both shares market and bonds market.

Table 7.1. Islamic REIT Performance (Rozman *et al.* 2015)

	Shares	**IREITs**	**Bonds**	**Cash**
Average Annual Return	16.18%	26.02%	3.46%	0.45%
Average Risk	10.48%	14.30%	3.23%	1.46%
Risk/Return Ratio	0.65	0.55	0.94	3.24
Sharpe Ratio	1.5	1.79	0.93	
Rank	2	1	3	

Mohamad (2016) analyzed the performance of Shariah real estate investment trusts with conventional ones and her results provided evidence indicating that the two performances of two structures are significantly different, and performance of Islamic REITs were found better compared to conventional REITs.

From the global cases, it can be concluded that Islamic REITs can invest in many different investment areas including healthcare, retail, manufacturing, technological, and industrial and warehouse and logistics project in the condition to comply the Islamic law principles. These investment areas support the idea of providing financing through Islamic REITs for large government projects including city hospitals, technological investments, and energy and infrastructure projects.

7.3.2. Cases in Sukuk

The sukuk market, although slowed down in 2015 is still one of the pioneer markets of Islamic finance. As discussed in Chapter 3, the total global sukuk issuance reached to 767.1 billion USD as of 2015. Khazanah Nasional Berhad, the Malaysian sovereign wealth fund, is one of the major active players in the Islamic capital market in terms of sukuk issuances and equity investments. In Dubai, UAE, the Emirate's sovereign wealth fund and the Investment Corporation of Dubai, are also issuing sukuk for Shari'ah-compliant investments. There are many diversified areas that sukuk is used for financing. Among these areas, three interesting cases which may be suggested as complementary financing tools to the model were selected.

In order to support life-saving health and immunization programs in the poorest countries of the world, the International Finance Facility for Immunization ("IFFIm") issued a truly landmark transaction in Islamic finance - a $500 million "Vaccine Sukuk" in December 2014. The issue was one of the largest debut Sukuk issued by an international entity, as well as the first fully "socially responsible" Sukuk issuance in the international capital markets. In September 2015, IFFIm returned to the Sukuk market with a second "Vaccine Sukuk" issuance for $200 million.

Another socially responsible Sukuk, called as Sustainable and Responsible Investment (SRI) Sukuk is an interesting case to be mentioned. Before discussing SRI, the Social impact bonds (SIBs), which are relatively new concept to the world are explained. SIBs are contractual commitments in the public sector to help improve social outcomes, which will eventually result in public sector savings. In a typical SIB, in-

vestors pay for the project at the beginning, and then are paid based on the outcomes accomplished by the project. In this context, instead of focusing on inputs or outputs, the social outcomes are important. The outcomes are predefined and measurable. The first ever SIB was issued in September 2010 by the UK government in order to finance a prisoner rehabilitation program. The US, specifically New York City, launched a similar prisoner rehabilitation program in 2012. Canada, Belgium, the Netherlands, Germany and Australia also issued SIBs.

The Securities Commission Malaysia (SC) launched its Sustainable and Responsible Investment (SRI) Sukuk Framework in August 2014 in order to enable the financing of socially responsible investments. The rising trend of green bonds and social impact bonds globally to finance a wide range of sustainable activities such as those addressing the needs of the country like infrastructure and small businesses are the main reasons behind the SC to set up this SRI Sukuk framework within an Islamic fixed income investment concept. Renewable energy or reduced greenhouse emissions, projects improving the quality of life for society, educational projects falling under the community and economic development category are the main projects that SRI Sukuk is interested in. The MYR 1 billion Khazanah Ihsan Sukuk Program is the first program approved by the SC Malaysia under its SRI Framework. Khazanah has issued a MYR 100 million tranche in May 2015 for a tenor of 7 years. The inaugural issuance proceeds termed as the "First Sukuk Ihsan" is used to finance schools under a private school program identified for 2015. The Ihsan Sukuk is considered another milestone in product innovation in the Islamic capital market from Malaysia.

Pakistan Mobile Communication Limited (PMCL) issued sukuk of worth USD 65.8 as Pakistan's first airtime based sukuk in 2014. Unlike its other structured alternatives this airtime Sukuk was backed by underlying ownership in airtime (represented by prepaid cards), and the performance was directly linked with the sale of airtime in the local market. The proceeds were utilized to finance PMCL's on-going capital expenditure with specific focus on its rural network expansion and upgradation in line with the development mandate of the Guarant Co. Ltd., an international development finance institution which has the mandate to support development of infrastructure

projects as well as promote capital markets development in lower and lower-middle income countries. The Sukuk was offered with floating rate ranging over the period of up to 5 years inclusive of 2 years grace period on principal portion.

By issuing sukuk, companies or governments can provide financing for their real estate investment projects. From the global sukuk cases, in addition to common financial applications, it can be concluded that different types of sukuk can provide financing for social responsibility projects, educational facilities, infrastructure projects, renewable energy projects, as well as technology start-ups.

These cases are good examples for developing alternative financing tools under the Turkey Real Estate Fund mechanism.

7.4. Summary of Discussions and Recommendations

The model developed in this study is integrating the real estate capital market instruments with pension funds in order to finance investment projects and create a new investment area for investors. The model is designed as an ecosystem that circulate the investment tools among the developers and investors with a possibility of attracting international investors to be involved in the system.

According to the results of the VAR analysis made, inflation is found the only but an important common variable that affect the returns of REIT index, housing sales index, average returns of pension funds and participating banks average share of profits. Protection against inflation is a significant factor for investors when deciding in which tools they will invest in. In that context, pension funds, real estate investments and bank deposits are some of the options for investors to choose. Both pension funds as stated in the Ludens Pension Report (2016), and the real estate investment tools, as Erol and Tirtiroglu exhibited for REITs (2008), Brueggeman *et al.* (1992) exhibited for real estate funds and Ucal and Gokkent (2009) found out for home ownerships in their researches; provide hedge against inflation. These findings support the theoretical structure of the model which is introducing Turkey Real Estate Fund based on

integrating the real estate investment tools with pension fund.

According to the results of ARIMA forecasts, the returns of REIT and the housing sales indices are found greater than the average pension fund returns. That means, the pension funds may consider investing in real estate investment instruments.

On the other hand, Markowitz (1952), in the Model Portfolio Theory assumes that investors prefer the less risky option if they are offered two portfolios with the same expected returns. In order to take into consideration the risk factors, the coefficient of variations were calculated in this study. The CV's, both including and excluding the data of mortgage crisis period in 2008, were calculated, and in this case the returns of housing sales and rent indices became more attractive compared with the average returns of pension funds. That makes the housing investments a strong long term investment areas where the pension funds can invest in.

As an investment instrument in the capital markets, REITs are listed in the stock markets (the share of stocks among the total investment tools of pension funds invest in is 12.11% as of December 2016, SPK Monthly Report, 2017), and are one of the investment tools of pension funds. That is the same with sukuk and participating bank shares where they are also listed in the investment tools, especially in the mixes of interest free pension funds. Then, what makes the suggestion in this research different than the current situation is that, increasing the real estate investment tools in these mixes by enhancing the current tools, bringing new instruments by combining the home ownership investment perspective of the citizens, creating new and additional tools for financing large investment projects, and including these tools in the pension fund options provided may increase the size of the pension funds and create a source of financing in an investment ecosystem. Currently, the real estate investment funds (REIFs) are being evaluated by the pension funds to invest in. The main problem with this situation is that, there is no past return data of the REIFs to give the pension funds that they are better investment tools compared to the current investment areas of the pension funds are; stocks, treasury bills and government bonds, reverse repo, money market instruments, foreign securities and corporate bonds. That is why the results

of this study about the returns of the REIT and housing sales price indices which are greater than the average returns of pension funds are important in that aspect.

Another point that the pension funds are hesitating to invest in real estate investment funds because of the current voluntary system that allows the fund participants to leave the system at any time. In the model introduced, since the accumulated savings in the Real Estate Based Pension System are used to finance large investment projects and to provide home loans, the exit from the system is needed to be closed for certain period. In fact, the people who may finance their home loans from Turkey Real Estate Fund and regularly pay the financing cost to the pension fund are considered as not exiting the system.

According to the Bank Association of Turkey, 2017, the total size of the home loans in Turkey reached to 163.8 billion TL by the end of 2016, and according to the forecast results, it is estimated to be 197.9 billion TL by the end of 2017. As a starting point, TREF may allocate 20% of its assets to finance home loans which is 2.9 billion TL. The projected home loan amount for 2017 is 34.1 billion TL. That means 8.6% of the total home loans for 2017 may be financed through TREF with its own resources. In fact, this financing mechanism can be sustainable if TREF is capable of attracting local and international pension funds, as well as insurance firms, foundations, banks and other financial institutions, because the more investors invest in TREF, the more the size of the fund will grow. In that context, TREF needs to generate long term regular incomes, and here the main part of the model which is focusing on large real estate project financing starts working.

One of the main idea when creating the model was bringing a solution to project financing problem. Especially the large public projects including the city hospitals, roads, tunnels, bridges are being financed either by Public Private Partnership (PPP) model or some other alternatives such as BOT and BOOT. Although these models are bringing a partial solution to finance the projects, the government is providing long term payment guarantees (in city hospital projects up to 28 years) to the contractor of the project. The contractor, then, is providing financing from different financial

institutions including local and international banks. Instead of direct financing through banks, TREF may be the main source of financing which issue different capital market instruments for different project investments.

In addition, the current established REIFs and issued RECs as well as newly introduced Islamic REITs may also be considered important investment tools for pension funds. The new and alternative tools suggested in project financing in the model are shown in Table 7.2.

Table 7.2. Recommended Financing and Investment Tools for Different Types of Projects.

Project Type	**Recommended Financing/ Investment Tools**
Infrastructure Projects	Sukuk, Infrastructure REIT
Energy Projects	Islamic REIT, Sukuk
Healthcare Projects	Islamic REIT, Sukuk
Urban Renovation	Islamic REIT, Islamic REIF
Educational Facilities	Sukuk, Venture Capital Investment Funds
Technology Start-Ups	Sukuk, Venture Capital Investment Funds
Social Responsibility Projects-Mosques, Parks, Cultural Centers	Sukuk
Industrial Projects	Islamic REIT, Sukuk

The city hospitals in Turkey, which are very popular investment tools regulating under PPP model may be financed by Islamic REITs, and both local and international investors, especially the financial institutions which are currently funding these hospitals would be interested in purchasing the shares of these newly established Islamic REITs.

Energy and infrastructure projects are also other investment areas that Islamic REIT, as well as infrastructure REITs may invest in, due to their nature of complying to Shariah principles. Combining the PPP models with infrastructure REITs as Erol and Ozuturk (2011) also suggested in their study may also be another option for project financing. According to the report published by Deloitte in 2010, both brownfield and greenfield infrastructure projects are recommended to be financed by REITs. This may bring a liquidity, incremental stability, capital market access and taxation advantages. In the US, there are many types of REITs established for different purposes, including apartment REITs, correctional facility REITs, data center REITs, diversified REITs, farmland REITs, government and defense REITs, healthcare and senior housing REITs, hotel REITs, industrial REITs, infrastructure REITs, life science REITs, mall REITs, manufactured housing REITs, mortgage REITs, office REITs, residential single-family and property REITs, retail REITs, self-storage REITs, student housing REITs, timberland REITs (Investsnips, 2017). Some of these types of REITs may also be established in Turkey by issuing additional regulations and amendments.

Sukuk is another investment instrument that is capable of providing financing for large projects. The cases mentioned above which are even focusing social responsibility projects including schools or vaccine developments are good examples for future investment areas to be financed by sukuk in Turkey including universities, technology start-ups, mosques, recreation areas, cultural and social facilities in addition to large renewable energy and infrastructure projects.

Another investment tool that is promising for start-ups are private equity/venture capital investment funds (VCIFs) and venture capital private equity investment trusts (VCPET).

Private equity is defined as investing in companies in need of financing with a potential growth. While venture capital commonly invests in the start-up or early stage of the life cycle of a business, the private equity focuses on financial involvement in more developed stages and aim to create value in the enterprise by improving its operational, production or sales performance and thereafter exiting the investment

through a sale of the enterprise, in an expectation of profit. Private equity/venture capital investment funds may give investors an opportunity to realize good returns upon sale of the investee company. In Turkey, private equity/venture capital investment funds are regulated by the Communiqué on Principles of Venture Capital Investment Funds published in January 2014. Private equity/venture capital investment fund is an asset with no legal entity, established by portfolio management companies and venture capital portfolio management companies which have an operating license received from SPK in order to manage the portfolios with at least 80 percent of fund net assets to be composed of one or more venture capital investments. As of June 2016, only one private equity/venture capital investment fund has been founded in Turkey. The VCIFs are free to be established as interest free funds.

Venture capital and private equity investment trust is defined as a form of co-operative investment structure. The entrepreneurs establish their companies and investors provide long term financing to these firms through capital market instruments. VCPETs' shares can be sold either to public or solely to qualified investors.

VCPETs may purchase stocks and borrowing instruments issued by the entrepreneur firm, issue borrowing tools, be part of the management of the entrepreneur firm, and consider investing in other venture capital investment trusts. VCPETs are corporate tax exempt, which makes attracts the investors to invest in VCPETs.

There are currently 13 VCPETs, 8 of which are traded under Istanbul Stock Exchange, 3 are sold to only qualified investors and remaining 2 have not been sold to public yet. The regulation allows to establish VCPETs that are compliant with interest-free finance principles (Participating Finance Country Report, Undersecretariat Treasury, 2016).

The idea of venture capital investments can also be combined with crowdfunding which is the use of small quantities of capital from many participants to finance a new business establishment and angel investment scheme which may attract investors who are interested in entrepreneurs to finance more start-up technology projects. This fund-

ing mechanism may also help the implementation process of industrial 4.0 revolution in Turkey.

The proposed sukuk issuances for new investment project financing, the IPO's of the shares of newly established Islamic and Infrastructure REITs, the current issued sukuk, and REIT shares, as well as REIFs and RESs shares, venture capital investment funds, venture capital private equity investment trusts, current participating banks shares which are involved in funding projects are recommended to be a mix of new pension fund alternative investment tools which is named as Real Estate Based Pension Fund.

8. CONCLUSION

This study introduces Turkey Real Estate Fund (TREF) as the regulatory and funding mechanism of newly developed real estate-pension fund investment ecosystem. In this respect, a model is developed that covers the current and proposed real estate investment tools and combined them with the suggested 4th tier pension system called Real Estate Pension System (REPS) based on investing in real estate investment instruments.

Data used in this study covered the periods between 2004 and 2016, and were collected from Central Bank of the Republic of Turkey (TCMB), Turkish Statistical Institute (TUIK), Istanbul Stock Exchange, Pension Monitoring Center (EGM), Central Securities Depository of Turkey (MKK), Banking Regulation and Supervision Agency (BDDK), as well as many global and prestigious sectoral and institutional associations and reports.

Findings of the study reveal that real estate investment instruments are good long-term investment tools to be considered by pension funds. The integration of the pension system and the real estate industry can bring momentum for co-development of both sectors. Introducing alternative financing instruments is an important milestone for the sustainability of the public and private investments. The limited financing vehicles for large real estate investments can be enhanced by implementing the proposed model in this study.

Home ownership is a commonly accepted and an important tool for future investments for many decades. The pension funds are recently adopted in Turkey as an alternative to home ownership investments by making savings with smaller amounts. Although the size of the pension funds are increasing after the new regulations that implemented the 25% state incentives, the home loans are also increasing with a very minor tracking rate less than 1%. This picture brought the idea of connecting two investment tools under a regulatory mechanism and growing them together.

One another aspect of this study is promoting the interest free investment options for the people who have religious concerns. This was resulted with the idea of development of interest-free financing model that is based on rental income based financing method (RIBF) suggested. Instead of paying monthly interest to banks, it is suggested to make yearly valuation of the rent amounts of the units to be purchased in accordance with the housing rental index and expert reports.

The total incremental income and its additional returns if it was invested in the real estate based pension funds introduced in this study builds up the total financing cost of the unit and is paid either monthly or at the end of the maturity period. The option of paying the financing fee or the determined rent amount to the real estate based pension funds option is open if one is considering to receive the state incentives.

The VAR analysis results exhibited that inflation is an important parameter that affect the returns of investment tools. In that context, an investment model that combines two investment instruments; real estate and pension funds may provide hedge against inflation.

Based on the research findings, the following recommendations are presented in order to run and enhance the model proposed:

- Turkey Real Estate Fund (TREF) is suggested to be established as a regulatory and financing mechanism. It may also considered to be structured under Turkey Sovereign Wealth Fund (TSWF). The Treasury of Turkey or TSWF may transfer the rights of use of the lands allocated for the public investments including the city hospitals, renewable energy lands, universities, etc. The state contribution accumulated in different pension funds is recommended to be transferred to the management of TREF.
- In order to integrate the real estate investment instruments and pension funds, the 4th tier pension system, called Real Estate Pension System (REPS) is suggested to be adopted by making amendments to the current regulation. It is important to announce it as a new system to distinguish the new model from the existing

mechanism. If this new tier is explained well enough, it may be a good solution for decreasing the high-exit rate from the auto enrollment system. One important point that is needed to be taken into consideration for the new regulation is closing the exit for REPS participants. Although the people who use the financing through the suggested model automatically are engaged to stay in the system until the end of their loans, there is also a need for a regulation that prevents the participants leaving the system by law.

- The Current real estate investment trust (REIT) regulation is recommended to be amended. Mandatory dividend payments for REITs is strongly suggested to attract more long-term investors. The minimum capital requirements for establishing a REIT is recommended to be re-considered to promote new but small types of project or industry specific areas. In that context, new types of REITs, including the hospital REITs, data center REITs, industrial REITs, energy REITs, etc. are suggested to be established for diversification of the sector. Making amendments to regulations that promote Islamic REITs are strongly recommended, especially for the projects that match the Shariah-compliant requirements such as healthcare, farmland, education, technology, energy and infrastructure investments.
- Amendments to regulations of real estate investment funds (REIF) is also recommended. In the current REIF regulation, investing in projects which are under construction is not allowed. That makes the investors to hesitate to be a shareholder of a REIF as they are willing to make returns over the price increase during the construction phase. In that aspect, it is recommended to enable REIFs to invest in projects under construction. Another amendment or regulation that may be considered about REIFs is designing Islamic REIFs to attract investors who seek interest-free and Sahriah-compliant investments.
- Rental Income Based Financing (RIBF) method is proposed as interest-free financing option for home purchasers. In order to establish a reliable valuation, a comprehensive and detailed track record of the residential market which include a strong sales and rent index mechanism is needed for each and every cities, counties and streets of Turkey. This method may open a door for urban transformation project financing.

- According to the Innovation in Islamic Liquidity Management report prepared by Thomson Reuters in 2017, the estimated size of the Islamic banking will grow from 1.8 trillion USD to 3.5 trillion USD by 2021 by 75% increase. If Turkey is able to get an important share from the pie, this growth may open a big room for financing the real estate investments by using Islamic funds. In that context, new Islamic financing instruments, as well as Islamic insurance (tekaful) is recommended to be commonly used and integrated in the model proposed.
- Sukuk, named as Islamic bond or lease certificate, is an important financing tool that is commonly used in many countries, and, with its total issuance reached to 767 billion USD, is shining as one of the main financing vehicles that is capable of large public investments. According to the IFFM report, 2015, the average maturity of Turkish sovereign sukuk is 6.83 years for cross-border issuances. That tenor is enough to finance long term real estate investments. In that context, creating a strong sukuk market in Turkey is highly recommended. For many years, Turkish citizens hesitated to deposit their money to Islamic banks, later named as participating banks due to their common applications with conventional banking systems including the almost equalities of share of profits with current market interest rates. It is suggested that Turkish government should start a long-term campaign to explain the asset based Islamic finance to the citizens. The growing size of the industry will also attract global investors to invest in the assets of Turkey.
- If the participants of pension funds, who exited from either the voluntary based or auto-enrollment systems within the last three years, want to re-enter the system, it is recommended to give them the right to receive the state incentives in the condition that they deposit the minimum total contribution amount of the total duration passed since they left the system.

This study has focused on developing a model that connects the real estate industry and pension system in Turkey based on the past data of REIT, housing rental and sales indices, as well as the data of participating banking, since there is no past data about the returns of real estate investment funds, infrastructure REITs and real estate certificates. This is one of the main limitation of the study. In the future, as

the return data become available in those areas, they may also be included in further studies.

Yield data about commercial real estate including the shopping malls and offices were not enough to include them in the analysis made. In the future, the commercial real estate market may also be analyzed in terms of returns in order to find out its effects on the model proposed.

Another suggestion for further studies is breaking down the research period into two in order to investigate the structural break effects. Before and after the 2008 mortgage crisis periods may be evaluated and their results may be compared. The results may also be compared with the same research made in a developed and emerging countries.

In this study, six important factors were selected as a result of an extensive literature studies. These factors may be extended with other important macroeconomic variables including GDP growth rate, GDP per capita, money supply, unemployment rates, industrial production, and the results may be comparatively evaluated. The effects of socioeconomic factors such as population, expenditure preferences, age distribution, income levels, and demographic conditions on the future of real estate and pension system would also be another research area to be recommended for future studies.

The ownership effect on stock returns are also another research area for the returns of both REIT and stock exchange indices. Both company specific and index based ownership effect may be very helpful for future return related studies.

The selected forecast method, ARIMA, is one of the most popular and reliable econometric method used in financial time series analysis. This method does not include the volatility effects. For further studies, ARCH (autoregressive conditional heteroscedasticity and GARCH (generalized autoregressive conditional heteroscedasticity) methods may also be selected to take into consideration the volatility effects.

There are also different forecast methods such as, system dynamics, agent based modelling and artificial neural network. Although these methods are not as common methods as econometric based approaches that are used in financial time series, they may also be selected for future forecast analysis especially for real estate related parameters.

The latest regulation about auto enrollment to the pension system cover the people under the age of 45. When taking into consideration the population, the income level and monthly contribution to pension funds, the people elder than 45 years old are suggested to be an important focused age group of the new tier, Real Estate Pension System, because 30% of the pension fund investors are elder than 45 according to the EGM report, 2016. Future research may include the spending and saving habits of the people and their effect to future retirement plans from real estate and pension linkage perspective.

In accordance with the growth rate of the pension fund size, the total home loans and the total projected financing need of large investment projects, simulations of the total size of newly developed Turkey Real Estate Fund, the size of newly introduced Real Estate Pension Funds, and the total size of the projects financed by newly suggested Rental Income Based Financing Model are recommended as a further study. The total size of the Turkey Real Estate Fund and its contribution to the GDP of Turkey may also be evaluated.

This study did not include the size and the enrollment data of the auto-enrollment pension system which is effective by January 2017. A further research may be conducted after the effects of the auto-enrollments to the size of the pension funds is observed for 2017.

Another further study is suggested to be conducted on the governance of the model proposed. In that context, the relations among the TREF and financial institutions, as well as the portfolio management and insurance firms may be studied in details.

REFERENCES

A Case for Islamic Sharia Compliant Real Estate Investment Trust's (Islamic REIT's) in Kenya, https://www. islamicbanker. com/ articles /a - case - for - islamic - sharia - compliant - real - estate - investment - trust - s-2, accessed at June 2017.

Acikgoz E., H. Uygurturk, T. Korkmaz, "Analysis of Factors Affecting Growth of Pension Mutual Funds in Turkey", *International Journal of Economics and Financial*, Vol. 5, No. 2, pp. 427-433, 2015.

Admidins D., J. Zvanitajs, "Factors Affecting the Dwelling Space Market Prices in Latvia", *Intellectual Economics*, Vol. 5, No. 12, pp. 513-525, 2011.

Ajayi R.A., M. Mougue, "On the Dynamic Relation Between Stock Prices and Exchange Rates", *The Journal of Financial Research*, Vol. 19, No 2, pp. 193-207, 1996.

Akgiray V., S. Peksevim, E. Sener, "Pension Funds and Financial Stability: Lessons from Chile and Turkey", *Journal of Finance & Banking Studies*, Vol. 5, No 2, pp 1-20, 2016.

Akkaya G., N. Kutay, M. Tukenmez, "Real Estate Investment Trusts And Fundamentals of Real Estate Investments: A Case of Turkey" *Yönetim ve Ekonomi*, Vol. 12, 12005.

Aktas H., S. Oncu, "The Stock Market Reaction to Extreme Events: The Evidence from Turkey", *International Research Journal of Finance and Economics*, Vol. 6, pp. 78-85, 2006.

Al Aqar Healthcare REIT, http://www.alaqar.com.index.php/overview, accessed at June 2017.

Allen M.J., T.M. Madura, Springer, "REIT Characteristics and the Sensitivity of REIT Returns", *Journal of Real Estate Finance and Economics*, Vol. 21, No. 2, pp. 141-152, 2000.

Almarwani H.A, *An Approach to Modeling and Forecasting Real Estate Residential Property Market*, Ph.D. Thesis Brunel University, 2014.

Alrifai T., "Islamic Finance and the New Financial System, An Ethical Approach to Preventing Future Financial Crisis", *John Wiley and Sons Singapore Pte. Ltd.*, 2015.

Ambachtsheer K., R. Capelle, T. Scheibelhut, "Improving Pension Fund Performance", *Financial Analysts Journal*, Vol. 54, No. 6, pp. 15-21, 1998.

An Introductory Study on Time Series Modeling and Forecasting, 2016 https:// gejza . nipax . cz/ - media / stochasticke - procesy: 1302. 6613. pdf, accessed at March 2017.

An Introductory Study on Time Series Modeling and Forecasting, https:// gejza. nipax. cz/- media / stochasticke - procesy : 1302. 6613. pdf, accessed at May 2017.

Andonov A., P. Kok, N. Eicholtz, "Value Added From Money Managers in Private Markets", *An Examination of Pension Fund Investments in Real Estate*, Maastricht University, 2012.

Ang A., M. Rhodes-Kropf, R. Zhao, "Do Funds-of-Funds Deserve Their Fees-on-Fees", *NBER Working*, Vol. 13944, pp. 1-50, 2008.

Apergis N., "Housing Prices and Macroeconomic Factors: Prospects within the European Monetary Union", *International Real Estate Review*, Vol. 6 No. 1, pp. 63-74, 2003.

Arbitrage Price Theory, http://www. wikipedia . com, accessed at April 2017.

Attah-Botchwey E., "Best Practice Pension Systems in Developing Nations", *International Journal of Humanities and Social Science*, Vol. 4, No. 9, pp. 236-248, 2014.

Autoregressive Moving Average ARMA (p, q) Models for Time Series Analysis - Part 3, 2016, https://www.quantstart.com / articles / Autoregressive - Moving - Average - ARMA - p - q - Models - for - Time - Series - Analysis - Part - 3, accessed at March 2017.

Autoregressive Moving Average ARMA(p, q) Models for Time Series Analysis - Part 3, https://www. quantstart . com / articles, accessed at May 2017.

Autoregressive Models, https://www. otexts . org / fpp / 8 / 3, accessed at May 2017.

Ayaydin H., H. Dagli, "Gelisen Piyasalarda Hisse Senedi Getirisini Etkileyen Makroeko nomik Degiskenler Üzerine Bir Inceleme: Panel Veri Analizi", *Atatürk Üniversitesi Iktisadi ve Idari Bilimler Dergisi*, Vol. 26, No. 3-4, pp. 45-65, 2012.

Aydinoglu C., *Turkish REITs: An Overview of the Industry and its Performance, Massachusetts Institute of Technology Real Estate Development*, M.S., Department of Architecture, 2004.

Aysoy D., *Kurumsal Yatirimci Olarak Türkiye'de Emeklilik Fonlari ve Fon Performanslarinin Analizi*, T.C. Baskent Üniversitesi Sosyal Bilimler Enstitüsü Isletme Anabilim Dali Muhasebe ve Finansman Yüksek Lisans Programi, Yüksek Lisans Tezi, 2011.

Ayub A., M. Masih, "Interest Rate, Exchange Rate", *Stock Prices of Islamic Banks: A Panel Data Analysis*, Vol. 1, pp. 58871, 2013.

Badurlar I.O., "Investigation of Relationship Between House Prices and Macroeco-

nomic Variables in Turkey", *Anadolu University Jounal of Social Sciences*, Vol. 8, No. 1, pp. 223-238, 2008.

Bardhan A., R. Edelstein, D. Tsang, "Global Financial Integration and Real Estate Security Returns", *Real Estate Economics*, Vol. 36, No. 2, pp. 285-311, 2008.

Berglund C., *Determinants and Forecasting of House Prices*, Term Thesis, Uppsala University, Department of Economics, 2007.

Bikker J.A., O.W. Steenbeek, F. Torracchi, "The Impact of Scale, Complexity and Service Quality on the Administrative Costs of Pension Funds: A Cross-Country Comparison", *The Journal of Risk and Insurance*, Vol. 79, No. 2, pp. 477-514, 2012.

Brown S.J., W.N. Goetzmann, B. Liang, "Fees on Fees in Funds of Funds", *NBER Working*, Vol. 1, pp. 9463, 2003.

Brooks C., S. Tsolacos, "The Impact of Economic and Financial Factors on UK Property Performance", *Journal of Property Research*, Vol. 16, No. 2, pp. 139-152, 1999.

Brueggeman W.B., A.H. Chen, T.G. Thibodeau, "Some Additional Evidence on the Performance of Commingled Real Estate Investment Funds: 1972-1991", *The Journal of Real Estate Research*, Vol. 7, No. 4, pp. 433-448, 1992.

Brueggeman W. B., J.D. Fisher, "Real Estate Finance and Investments", 14^{th} Edition, *McGraw-Hill*, 2011.

Case B., Y. Yang, Y. Yildirim, "Dynamic Correlations Among Asset Classes: REIT and Stock Returns", *J Real Estate Finan Econ*, Vol. 44, pp. 298-318, 2012.

Central Bank Republic of Turkey, http://www. tcmb . gov . tr / accessed at May 2017.

Chan S. H., W.K. Leung, K. Wang, "Institutional Investment in REITs: Evidence and Implications", *Journal of Real Estate Research*, Vol. 16, N. 3, pp. 357-374, 1998.

Chang G., C. Chen, "Evidence of Contagion in Global REITs Investment", *International Review of Economics and Finance*, Vol. 31, pp. 148-158, 2014.

Chu P. K., "Relationship Between Macroeconomic Variables and Net Asset Values (NAV) of Equity Funds: Cointegration Evidence and Vector Error Correction Model of the Hong Kong Mandatory Provident Funds (MPFs)", *Journal of International Financial Markets, Institutions & Money*, Vol 21, No. 5, pp. 792-810, 2011.

Chun G.H., J. Sa-aadu, J.D. Shilling, "The Role of Real Estate in an International Investor's Portfolio Revisited", *Journal of Real Estate Finance and Economics*, Vol. 29, No. 3, pp. 295-320, 2004.

Chung R., S. Fung, S.K. Hung, "Institutional Investors and Firm Efficiency of Real Estate Investment Trusts", *J Real Estate Finan Econ*, Vol. 45, pp. 171-211, 2012.

Ciller B., *Turkish Residential Real Estate Analysis, Massachusetts Institute of Technology Real Estate Development*, M.S. Thesis, Department of Urban Studies and Development, 2007.

Cobankaya F.T., *Determination of Level of Awareness in Turkey of Participation Banks: A Research in the Region West Mediterranean, Suleyman Demirel Universitesi*, Sosyal Bilimler Enstitüsü Isletme Anabilim Dali Yüksek Lisans Tezi, 2014.

Communique on Real Estate Investment Funds, "Published in the Official Gazette", *Capital Markets Board of Turkey*, 2014.

Communique on Real Estate Certificates, http://www. spk . gov . tr / apps / Mevzuat / Printer Friendly . aspx?nid =171282 & submenuheader = null, accessed at June

2017.

Deloitte Report, "REITs and Infrastructure Projects", *The Next Investment Frontier*, 2010.

Dictionary Web Site, 2016, http:// www. dictionary. com/ browse/ ecosystem, accessed at April 2017.

Dogan N., Y. Yalcin, "The Effects of the Exchange Rate Movements on the Istanbul Stock Exchange", *Applied Financial Economics Letters*, Vol. 3, No.1, pp. 39-46, 2007.

Dogan N., Y. Yalcin, "The Effects of the Exchange Rate Movements on the Istanbul Stock Exchange", *Applied Financial Economics Letters*, Vol. 3, No.1, pp. 39-46, 2007.

Ekincioglu O., *GMYO Endeksinin Enflasyona Karsi Performansinin Fama-Schwert Modeli ile Incelenmesi*, ITÜ FBE Yüksek Lisans Tezi, 2003.

"Emeklilik Yatirim Fonlari Performans Raporu", *Ludens Ileri Finansal Hizmetler ve Danismanlik Ltd. Sti.*, 2016.

Ennis R.M., P. Burik, "Pension Fund Real Estate Investment under a Simple Equilibrium Pricing Model", *Financial Analysts Journal*, Vol. 47, No. 3, pp. 20-30, 1991.

Ennis R.M., P. Burik, "The Influence of Non-Risk Factors on Real Estate Holdings of Pension Funds", *Financial Analysts Journal*, Vol. 47, No. 6, pp. 44-55, 1991.

EN /icerik /51 /about - us, http://www. turkiyevarlikfonu . com . tr/ accessed at June 2017.

Erol T., D.D. Ozuturk, "An Alternative Model of Infrastructure Financing Based on Capital Markets: Infrastructure REITs (InfraREITs) in Turkey", *Journal of Eco-*

nomic Cooperation and Development, Vol. 32, No. 3, pp. 65-88, 2011.

Erol I., D. Tirtiroglu, "The inflation-Hedging Properties of Turkish REITs", *Applied Economics*, Vol. 40, pp. 2671-2696, 1990.

Ewing B.T., J.E. Payne, "The Response of Real Estate Investment Trust Returns to Macroeconomic Shocks", *Journal of Business Research*, Vol. 58, pp. 293- 300, 2005.

Fama E.F., G.W. Schwert, "Asset Returns and Inflation", *Journal of Financial Economics*, Vol. 5, pp. 115-146, 1977.

Feng L., W. Lu, W. Hu, "Macroeconomic Factors and Housing Market Cycle: An Empirical Analysis Using National and City Level Data in China", *Conference on Web Based Business Management*, Vol. 1, No. 2, pp. 1088-1092, 2010.

Fernandez V., "Stock Market Turmoil: Worldwide Effects of Middle East Conflicts", *Emerging Markets Finance and Trade*, Vol. 43, No. 3, pp. 58-102, 2007.

Fredrick O.S., R. Muasya, K.T. Kipyego, "Effect of Foreign Exchange Rates on Price per Share", *Journal of Business Administration and Education*, Vol. 6, No. 2, pp. 34-56, 2002.

French N., "Decision Theory and Real Estate Investment: An Analysis of the Decision-Making Processes of Real Estate Investment Fund Managers", *Managerial and Decision Economics*, Vol. 22, No. 7, pp. 399-410, 2001.

Galati G., F. Teppa, R. Alessie, "Macro and Micro Drivers of House Price Dynamics: An Application to Dutch Data", *DNB Working*, Vol. 1, No. 288, 2011.

Ghosh P., V.L.R. Chinthalapati, "Financial Time Series Forecasting using Agent Based Models in Equity and FX Markets", *6th Computer Science and Electronic Engineering Conference*, University of Essex, VOl. 1, pp. 97-102, 2014.

Glascock J.L., C. Lu, R.W. So, "REITs Returns and Inflation: Perverse or Reverse Casuality Effects", *Journal of Real Estate Finance and Economics*, Vol. 24, No. 3, pp. 301-317, 2002.

Global Pension Funds, "Best Practices in the Pension Funds Investment Process", *PwC Report*, 2016.

Global REIT Survey 2016, "European Public Real Estate Association (EPRA) Reporting", 2016.

Glossary on Islamic Financing, http://www. sbp. org. pk/ IB/ Gloss. asp, accessed at May 2017.

Gresch N, R. Wyss, "Private Equity Funds of Funds vs. Funds: A Performance Comparison", *The Journal of Private Equity*, Vol. 14, No. 2, pp. 43-58, 2011.

Grum B., D.K. Govekar, "Influence of Macroeconomic Factors on Prices of Real Estate in Various Cultural Environments: Case of Slovenia, Greece, France, Poland and Norway", *3rd Global Conference on Business Economics*, Vol. 39, pp. 597-604, 2016.

Gundogdu A. E., "Menkul Kiymet Yatirim Fonlari ve Bireysel Emeklilik Yatirim Fonlarinin Kiyaslamali Getiri Analizi", Marmara Üniversitesi, Bakacilik ve Sigortacilik Enstitüsü Sermaye Piyasasi ve Borsa Anabilim Dali Yüksek Lisans Tezi, 2010.

Gungor B., C.Y. Kaygin, "Dinamik Panel Veri Analizi ile Hisse Senedi Fiyatini Etkileyen Faktörlerin Belirlenmesi", *KAÜ IIBF Dergisi*, Vol. 6, No. 9, pp. 149-168, 2015.

Hammoudeh S., W. Mensi, J.C. Reboredo, D.C. Nguyen, "Dynamic Dependence of the Global Islamic Equity Index with Global Conventional Equity Market Indices and Risk Factors", *Pacific-Basin Finance Journal*, Vol. 30, pp. 189-206, 2014.

Han J., Y. Liang, "The Historical Performance of Real Estate Investment Trusts", *The Journal of Real Estate Research*, Vol.10, No.3, pp.235-262, 1995.

Hardin III W. G., X. Jiang, Z. Wu, "REIT Stock Prices with Inflation Hedging and Illusion", *J Real Estate Finan Econ*, Vol.45, pp. 262-287 2012.

Hayta Ö. "Gayrimenkul Yatirim Ortakliklari ve Gayrimenkul Yatirim Ortakliklari Performans Degerlendirmesi: IMKB'de Bir Uygulama", Çukurova Üniversitesi, Sosyal Bilimler Enstitüsü, Isletme Anabilim Dali Yüksek Lisans Tezi 2009.

He L.T., J. R Webb, F.C.N. Myer, "Interest Rate Sensitivities of REIT Returns", *International Real Estate Review*, Vol. 6 No. 1, pp. 1 - 21, 2003.

Hepsen A., "Calendar Anomalies and Turkish REITs", *International Journal of Economics and Finance*, Vol. 4, No.3, pp. 230-236, 2012.

Hepsen A., "Gayrimenkul Piyasalari ve Finansmani", *Literatür Yayinlari*, 2010.

Hepsen A., M. Vatansever, "Forecasting Future Trends in Dubai Housing Market by Using Box-Jenkins Autoregressive Integrated Moving Average", *International Journal of Housing Markets and Analysis*, Vol. 4, No. 3, pp. 210-223, 2010.

Hilli P., M. Koivu, T. Pennanen, "Optimal Construction of a Fund of Funds", Strategic Ass *et al. location for Central Banks and Sovereign Wealth Managers Proceedings*, 2008.

Howell P.L., "A Re-Examination of Pension Fund Investment Policies", *The Journal of Finance*, Vol. 13, No. 2, pp. 261-274, 1958.

Hung J.C., S.L. Jiang, C.L. Chiu, "Jump Risk of Presidential Election: Evidence from Taiwan Stock and Foreign Exchange Markets", *Applied Economics*, Vol. 39, No. 17, pp. 2231-2240, 2007.

Hussain M., A. Shahmoradi, R. Turk, "An Overview of Islamic Finance", *IMF Working*

Paper, 2015.

Hussin M.Y.M., F. Muhammed, S.A. Awang, A.A.S. Mohammad, "Development of Sukuk Ijarah in Malaysia", *Journal of Islamic Economics, Banking and Finance*, Vol. 92, No. 2, pp. 91-102, 2012.

Iacoviello M., House Prices and Business Cycles in Europe: a VAR Analysis, Working Papers in Economics, Boston College, Vol.1, pp. 540 2002.

Icellioglu C.S., *Real Estate Investments in the Economic and Financial Perspective: Econometric Analysis of Istanbul Housing Market (2008-2011)*, Istanbul Üniversitesi Sosyal Bilimler Enstitüsü Doktora Tezi, 2012.

Ikizlerli D., N. Ulku, "Political Risk and Foreigners Trading: Evidence from an Emerging Stock Market", *Emerging Markets Finance and Trade*, Vol. 48, No. 3, pp. 106-121, 2012.

Impavido G., "On the Governance of Public Pension Fund Management, The Works Bank Policy Research Working Paper 2878", *Financial Sector Operations and Policy Department*, Vol. 1, pp. 1-36, 2002.

Inderst G., "Pension Fund Investment in Infrastructure", *OECD Working Papers on Insurance and Private Pensions*, No. 32, pp. 1-45, 2009.

"International Islamic Financial Market (IIFM)", *Sukuk Report* 4^{th} *Edition*, 2015.

"International Islamic Financial", *Market Sukuk Report* 5^{th} *Edition*, 2016

"Individual Pension System Progress Report", *Pension Monitoring Center*, 2015.

Ionescu O.C., "The Evolution and Sustainability of Pension Systems the Role of the Private Pensions in Regard to Adequate and Sustainable Pensions", *Journal of Knowledge Management, Economics and Information Technology*, Vol. 1, pp. 159-181, 2013.

"Islamic Financial Services Industry (IFSI) Stability Report", *Islamic Financial Services Board*, 2016.

Islamic Finance, http://www. worldbank . org, accessed at May 2017.

Islamic Development Bank, http://www. isdb. org /, accessed at May 2017.

Istanbul Stock Exchange, http://www. borsaistanbul.com /veriler /verileralt /aylik - konsolide - veriler, accessed at May 2017.

"JLL Turkey Commercial Real Estate", *Market Overview 2016 Year End Report*, 2017

"Katilim Emeklilik", *Monthly Pension Funds Reports*, Makrofon (2014-2016)

Kaya B., *Katilim Bankalarinda Bireysel Emeklilik Sistemi ve Isleyisi*, Yüksek Lisans Tezi, Gazi Üniversitesi, Egitim Bilimleri Enstitüsü, Isletme Anabilim Dali 2013.

Kaya V., I. Çömlekçi, O. Kara, "Hisse Senedi Getirilerini Etkileyen Makroekonomik Degiskenler 2002-2012 Türkiye Örnegi", Dumlupinar Üniversitesi Sosyal Bilimler Dergisi, Vol. 35, pp. 167-176. 2013.

Kemboi L.J., *Effect of Macroeconomic Variables on the Net Asset Values of Equity: Empirical Evidence from Pension Funds in Kenya*, M.S. Thesis, KCA University, 2014.

Kiyilar M, A. Hepsen, "Performance Appraisal of Real Estate Investment Trusts (REITs): A Practice in Istanbul Stock Exchange", *Yönetim*, Vol. 65, pp. 11-23, 2010.

Kim J.W. *et al.* "REITs' Dynamics Under Structural Change with Unknown Break Points", *Journal of Housing Economics*, 16, pp. 37-58, 2007.

Kirdok F.E., *Dynamic Relationship Between Macroeconomic Variables and Returns on Turkish Real Estate Investment Trusts*, M.S. Thesis, Graduate School of Economics

and Socia Sciences of Ihsan Dogramaci Bilkent University, 2012.

Korkmaz T., H. Uygurturk, "Using Regression Analysis in Turkish Pension Funds' Performance Measurements", *ZKÜ Sosyal Bilimler Dergisi*, Vol. 3, No. 5, pp. 37-52, 2007.

Korkmaz T., H. Uygurturk, E. I. Cevik, "The Analysis of Affecting Factors of Individual Pension Funds' Trading Volume", *TISK Akademi*, Vol.1, pp. 65-80, 2010.

Köroglu Y., *Hisse Senedi Getirilerini Etkileyen Makroekonomik Degiskenlerin Analizi ve bir Uygulama*, Yüksek Lisans Tezi, Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü, 2009.

Kucukaksoy I., I. Cifci, "The Effect of Terms of Trade on Balance of Trade: Application of HarbergerLaursen-Metzler Hypothesis for Turkey", *Optimum Journal of Economics and Management Sciences*, 2014, Vol. 1, No. 2, pp. 103-129, 2014.

Kuhle J.L., "Portfolio Diversification and Return Benefits - Common Stock v.s. Real Estate Investment Trusts", *The Journal of Real Estate Research*, Vol. 2, No.2, pp. 1-9, 1987.

Li J., X. Chen, "Analysis of China's Real Estate Prices and Macroeconomy Based on Evolutionary Co-spectral Method", *Journal of Industrial Engineering and Management*, Vol. 8, No. 2, pp. 598-614, 2015.

List of REITs Listed on US Exchanges, http:// investsnips . com / complete - list - of - reits - listed - on - u - s - exchanges /, accessed at June 2017.

Liu C.S., M.S. Chang, X. Wu, C.M. Chui, "Hedges or Safe Havens-Revisit the Role of Gold and USD Against Stock: a Multivariate Extended Skew-t Copula Approach", *Quantitative Finance*, Vol. 1, pp. 1-27, 2016.

Liu H.C., J. Mei, "The Predictability of Returns on Equity REITs and Their Co-

movement with Other Assets", *Journal of Real Estate Finance and Economics*, Vol. 1, No. 5, pp. 401-418, 1992.

Louis R. J., F. Balli, "Oil Price and Stock Market Synchronization in Gulf Cooperation Council Countries", *Emerging Markets Finance and Trade*, Vol. 50, No. 1, pp. 22-51, 2014.

Lynch A. W., A.K. Musto, "How Investors Interpret Past Fund Returns", *The Journal of Finance*, Vol. 58, No.5, pp. 2033-2058, 2003.

Maheen J., N. Ullah, "Impact of Foreign Exchange Rate on Stock Prices", *Journal of Business and Management*, Vol. 7, No. 3, pp. 45-51, 2013.

Mandaci P. Etal, "Co-Movements of REIT Indices with Structural Changes Before and During the Subprime Mortgage Crisis: Evidence from Euro-Med Markets", *International Journal of Strategic Property Management*, Vol. 18, No. 1, pp. 1-10, 2014.

Manjoo F. A., "The UK Legal Reforms on Pension and the Opportunity for Islamic Pension Funds", *Journal of Islamic Accounting and Business Research*, Vol. 3, No. 1, pp. 39 - 56, 2012.

Makridakis S., M. Hibon, "ARMA Models and the Box-Jenkins Methodology", *Journal of Forecasting*, Vol. 16, pp. 147-163, 1997.

Marcato G., D. Brounen, "The Liquidity of International Real Estate Securities", *EPRA Research*, pp. 1-27, 2015.

Markowitz H., "Portfolio Selection", *The Journal of Finance*, Vol. 7, No. 1, pp. 77-91, 1952.

Mattesini F., L. Becchetti, "The stock market and the Fed", *Applied Financial Economics*, Vol. 19, No. 2, pp. 99-110, 2009.

Mitchell O. S., G. S. Fields, "Designing Pension Systems for Developing Countries", *Pension Research Council*, Wharton School, University of Pennsylvania, Vol. 1, pp. 1-38, 1996.

Miyazakia T., S. Hamorib, "Testing for Causality Between the Gold Return and Stock Market Performance: Evidence for 'Gold Investment in case of Emergency", *Applied Financial Economics*, 23, pp. 27-40, 2013.

Modern Portfolio Theory, http://www. investopedia. com/ terms / m / modernportfolio theory. asp, accessed at May 2017.

Mohamad S., J. Othman, R. Roslin, O. M. Lehner, "The Use of Islamic Hedging Instruments as Nonspeculative Risk Management Tools", *Venture Capital*, Vol. 16, No. 3, pp. 207-226, 2014.

Moran B.I., "Islamic Law Meets ERISA: How America's Private Pension System Unintentionally Discriminates Against Muslims and What To Do About It", *University of California*, Davis, Vol. 46, pp. 209-263, 2012.

Murphy P. L., A. R. Musalem, "Pension Funds and National Saving", *WPS3410*, Vol. 1, pp. 1-46, 2004.

Myer F. C. N., J. R. Webb, "Return Properties of Equity REITs, Common Stocks, and Commercial Real Estate: A Comparison", *Journal of Real Estate Research*, Vol. 8, pp. 87-106, 1993.

Nahar S., N. Sarker, "Are Macroeconomic Factors Substantially Influential For Islamic Bank Financing? Cross-Country Evidence", *Journal of Business and Management*, Vol. 18, No. 6, pp. 20-27, 2013.

Newell G., A. Osmadi, "The Development and Preliminary Performance Analysis of Islamic REITs in Malaysia", *Journal of Property Research*, Vol. 26, No. 4, pp. 329-347, 2009.

Ngo T., "Exchange rate exposure of REITs", *The Quarterly Review of Economics and Finance*, Vol. 64, pp. 249-258, 2017.

Odusami B.O., "Crude Oil Shocks and Stock Market Returns", *Applied Financial Economics*, Vol. 19, pp. 291-303, 2009.

Oluoch M.A., *The Determinants of Performance of Pension Funds in Kenya*, M.S. Thesis in Business Administration, University of Nairobi, 2013.

Onder Z., "High Inflation and Returns on Residential Real Estate: Evidence from Turkey", *Applied Economics*, Vol.32, pp. 917-931, 2010.

Onder Z., C. S. Mugan, "How Do Political and Economic News Affect Emerging Markets? Evidence from Argentina and Turkey", *Emerging Markets Finance and Trade*, Vol.42, No.4, pp. 50-77, 2006.

Ong T.S., "Factors Affecting the Price of Housing in Malaysia", *Journal of Emerging Issues in Economics*, Vol. 1, No. 5, pp. 414-429, 2013.

Ong T. S., B. H. Teh, C. H. Soh, & Y. L. Yan, "Malaysian Real estate Investment Trusts: A Performance and Comparative Analysis", *International Journal of Economics and Finance*, Vol. 4, pp. 73-84, 2012.

Ozbay E., *The Relationship between Stock Returns and Macroeconomic Factors: Evidence for Turkey*, M.S. Thesis, University of Exeter, 2009.

Ozkan T., C. O. Demirkale, "Private Pension Fund Performance and Comparison with Basic Investment Instruments in Turkey", *International Conference on Eurasian Economies*, Vol. 1, pp. 514-521, 2015.

Padilla M.A., *The Effects of Oil Prices and Other Economic Indicators on Housing Prices in Calgary*, MIT Master of Science Thesis in Real Estate Development, 2005.

Panagiotidis T., P. Printzis, "On the Macroeconomic Determinants of the Housing Market in Greece: A VECM approach", *Hellenic Observatory Papers on Greece and Southeast Europe*, Vol. 1, No.88, pp. 12-18, 2015.

Park D., G.B. Estrada, "Emerging Asia's Public Pension Systems: Challenges and Reform Efforts", *IMF Conference on Designing Fiscally Sustainable and Equitable Pension Systems in Asia in the Post-crisis World*, Vol. 1, pp. 1-38, 2012.

Pashardes P., C.S. Savva, "Factors Affecting House Prices in Cyprus: 1988-2008", *Cyprus Economic Policy Review*, Vol. 3, No. 1, pp. 3-25, 2009.

Pension Monitoring Center, http://www. egm. org. tr, accessed at June 2017.

Peiser R.B., D. Hamilton, "Professional Real Estate Development", *The ULI Guide to the Business*, Third Edition, Urban Land Institute, 2012.

Pillaiyan S., "Macroeconomic Drivers of House Prices in Malaysia", *Canadian Social Science*, Vol. 11, No. 9, pp. 119-130, 2015.

Radzidcki M.J., "System Dynamics and Its Contribution to Economics and Economic Modeling", *Encyclopedia of Complexity and Systems Science*, Vol. 1, pp. 8990-9000, 2009.

Rafailidis P., C. Katrakilidis, "The Relationship Between Oil Prices and Stock Prices: a Nonlinear Asymmetric Cointegration Approach", *Applied Financial Economics*, Vol. 24, No. 12, pp. 793-800, 2014.

Real Estate Investment Funds Brief Guide, http://www. cmb. gov. tr, accessed at May 2017.

"Real Estate Investment Trusts Applications in Turkey", *E&Y*, 2015.

Reboredo J.C., "Nonlinear Effects of Oil Shocks on Stock Returns: a Markov-Switching Approach", *Applied Economics*, Vol. 42, pp. 3735-3744, 2010.

Redman A.L., H. Manakyan, "A Multivariate Analysis of REIT Performance by Financial and Real Asset Porfolio Characteristics", *Journal of Real Estate Finance and Economics*, Vol. 10, pp. 169-175, 1995.

"Republic of Turkey Prime Ministry Undersecretariat of Treasury", *Participation (Islamic) Finance Country Report*, 2016.

REIT, http://www. investopedia. com/ terms / r/ reit. asp, accessed at May 2017.

Richards N. D., J. Simpson, J. Evans, "The Interaction between Exchange Rates and Stock Prices: An Australian Context", *International Journal of Economics and Finance*, Vol.1, No. 1, pp. 3-22, 2009.

Ro S., Ziobrowski A.J., "Does Focus Really Matter Specialized vs. Diversified REITs", *J Real Estate Finance Economics*, Vol. 42, pp. 68-83, 2011.

Rosentraub M.S., T. Shroitman, "Public Employee Pension Funds and Social Investments: Recent Performance and a Policy Option for Changing Investment Strategies", *Journal of Urban Affairs*, Vol. 26, No. 3, pp. 325-337, 2004.

Ruzgar B., "Examining the Structure of Funds by Mixture Experiments Method in Private Pension Funds", *Süleyman Demirel Üniversitesi Iktisadi ve Idari Bilimler Fakültesi*, Vol. 13, No. 1, pp. 111-131, 2008.

Said A., R. Grassa, "The Determinants of Sukuk Market Development: Does Macroeconomic Factors Influence the Construction of Certain Structure of Sukuk", *Journal of Applied Finance & Banking*, Vol. 3, No. 5, pp. 251-267, 2013.

Saripudin K.J., S. Mohamad, N.F.M. Nazif, L.H. Abdullah, N.N. Abdul Rahman, "Case Study on Sukuk Musharakah Issued in Malaysia", *Middle-East Journal of Scientific Research*, Vol. 12, No. 2, pp. 168-175, 2012.

Schnare A.B., R.J. Struyk, "Segmentation in Urban Housing Markets", *Journal of*

Urban Economics, Vol. 3, No. 2, pp. 146-166, 1976.

Sensoy A., G. Aras, E. Hacihasanoglu, "Predictability Dynamics of Islamic and Conventional Equity Markets", *North American Journal of Economics and Finance*, Vol. 31, pp. 222-248, 2015.

Shehu A.A., "A Study on Financial Risk Analysis in Pension Funds Investment: an Implication of Exchange Rate Exposure", *Proceedings of the 8th International Conference on Innovation & Management*, Vol. 1, pp. 1301-1308, 2011.

Shumway R. H., D. S. Stoffer, "Time Series Analysis and Applications Using the R Statistical Package", *Free Dog Publishing*, 2017.

Sibanda M., R. Mhlanga, "The Interaction between Property Returns and the Macroeconomy: Evidence from South Africa", *International Journal of Business and Social Research (IJBSR)*, Vol. 3, No. 4, pp. 146-152, 2013.

Simpson M. W., S .Ramchander, J.R. Webb, "The Asymmetric Response of Equity REIT Returns to Inflation", *J Real Estate Finan Econ*, Vol. 34, pp. 513-529, 2007.

Simpson M.W., S. Ramchander, "Asymmetric and Cross-sectional Effects of Inflation on Stock Returns under Varying Monetary Conditions", *Applied Financial Economics*, Vol. 22, pp. 285-298, 2012.

Sonmez H., "Determination of the Criteria Preferred in Entering Private Pension System by Analytical Hierarchy Process", *Anadolu University Journal of Social Sciences*, Vol. 12, No. 13, pp. 83-92, 2012.

State Bank of Pakistan Web Site, 2016, http:// www. sbp .org. pk/ IB/ Gloss. asp, accessed at March 2017.

Stationary and Differencing, 2016, Web Site https: // people . duke . edu/ rnau/

411diff . htm, accessed at March 2017.

Stovicek K., "Forecasting with ARMA Models: The case of Slovenian Inflation", *Banka Slovenije, Prikazi in analize XIV/1*, Vol.1, pp. 23-55, 2007.

Sumer L., B. Ozorhon, "A Comparative Return Analysis of Real Estate Investment Trust (REIT)", *Index and Major Indexes in Istanbul Stock Exchange (Advances in Civil Engineering Conference*, Bogazici University September 2016.

Stationary and Differencing, https:// people . duke . edu/ rnau /411 diff .htm, accessed at May 2017.

Swanson Z., J. Theis, K. M. Casey, "REIT Risk Premium Sensitivity and Interest Rates", *Journal of Real Estate Finance and Economics*, Vol. 24, No. 3, pp. 319-330, 2002.

Time Series, http://www. investopedia. com/ terms / t / timeseries.asp, accessed at May 2017.

Thomson Reuters Sukuk Perceptions & Forecast Study, 2017, https://ceif. iba. edu. pk/ pdf/ ThomsonReuters -Sukuk Perceptions Forecast Study 2017. pdf accessed at June 2017.

Thomson Reuters Innovation in Islamic Liquidity Management Report, https://ceif. iba. edu. pk / pdf/ ThomsonReuters - Innovationin Islamic Liquidity Management 2017.pdf, accessed at June 2017.

Tse R.Y.C., "An Application of the ARIMA Model to Real-Estate Prices in Hong Kong", *Journal of Property Finance*, Vol. 8, No. 2, pp. 152-163, 1997.

Tsey R.S., "Analysis of Financial Time Series, Third Edition", *A John Wiley & Sons Inc. Publication*, 2010.

Toledo P.A., A.C. Marquez, F. Nunez, C. Usabiaga, "Introducing VAR and SVAR

Predictions in System Dynamics Models", *Int. J. of Simulation and Process Modelling*, Vol. 4, No. 1, pp. 7-17, 2008.

Ucal M.S., G. Gokkent, "Macroeconomic Factors Affecting Real Estate Markets in Turkey: A VAR Analysis Approach", *Briefing Notes in Economics*, Vol. 1, No. 80, pp. 2-13, 2009.

Ural M., T. Adakale, "Risk Management and Value at Risk Analysis in the Individual Pension Funds", *Ege Akademik Bakis*, Vol. 9, No. 4, pp. 1463-1483, 2009.

US Energy Information Administration, https://www. eia. gov/, accessed at June 2017.

Uyar H.I., "The Investigation of Relationship between Private Pension System and the Economic Indicators", *Mali Çözüm Dergisi*, Mart-Nisan, pp. 71-93, 2012.

Vector Autoregression, 2016, http://www. encyclopedia. com/ social - sciences / applied - and - social - sciences - magazines / vector - autoregression, accessed at April 2017.

Vector - autoregression, https://en. wikipedia. org / wiki / accessed at April 2017.

Vector Autoregression, http://www. encyclopedia. com/ social - sciences / applied - and - social - sciences - magazines / vector - autoregression, accessed at May 2017.

Vishwakarma, V.K., "Forecasting Real Estate Business: Empirical Evidence From The Canadian Market", *Global Journal of Business Research*, Vol. 7, No .3, pp. 1-14, 2013.

Wang K., J. Erickson, G. Gau, S.H. Chan, "Market Microstructure and Real Estate Returns", *Real Estate Economics*, Vol. 23, No. 1, pp. 85-100, 1995.

Wang Y.H., C.T. Lin, "Empirical Analysis of Political Uncertainty on TAIEX Stock Market", *Applied Economics Letters*, Vol. 15, No. 7, pp. 545-550, 2008.

Wanjiku E., *The Effect of Macroeconomic Variables on Portfolio Returns of the Pension Industry in Kenya*, M.S. Thesis, School of Business, University of Nairobi, 2014.

Wasiuzzaman S., H.A.A. Tarmizi, "Profitability of Islamic Banks in Malaysia: An Empirical Analysis", *Journal of Islamic Economics*, Vol. 6, No. 4, pp. 53-68, 2010.

What is the Difference between REIT and Real Estate Fund, http://www. investopedia. com, accessed at May 2017.

What is Sukuk, http:// thatswhy . isdb . org / irj / go / km / docs / documents / ID BDevelopments / Internet / thatswhy / en / sukuk / what - is - sukuk .html, accessed at May 2017.

Weidig T., A. Kemmerer, B. Born, "The Risk Profile of Private Equity Funds of Funds", *Journal of Alternative Investments*, Vol. 7, No. 4, pp. 33-41, 2005.

Weimer A.M., H. Hoyt, G.F. Bloom, "Real Estate", Sixth Edition, *The Ronald Press Company*, New York, 1972.

Wiedemer J.P., "Real Estate Finance, Third Edition, Reston Publishing Company", *Inc. A Prentice-Hall Company*, Reston, Virginia, 1980.

Wiley J. A., L. V. Zumpano, "Institutional Investment and the Turn-of-the-Month Effect: Evidence from REITs", *J Real Estate Finan Econ 39*, Vol. 1, pp. 180-201, 2008.

Worldbank Islamic Finance Report, 2016, http://www.worldbank.org, accessed at June 2017.

Xian L.J., W.K. Chun, W.S. Yee, Y.J. Wen, "Comparison Between Performance of Sukuk and Conventional Bond in Malaysia", Faculty of Business and Finance, Research Project, University Tunku Abdul Rahman, 2015.

Xiao P., "An Empirical Analysis of Factors Influencing China's Real Estate Prices-Based on the VAR Model", *Lingnan Journal of Banking, Finance and Economics*, Vol. 5, pp. 17-28, 2015.

Xu B., "Oil Prices and UK Industry-Level Stock Returns", *Applied Economics*, Vol. 47, No. 25, pp. 2608-2627, 2015.

Yildirim B., *The Capital Structure of Turkish Real Estate Investment Trusts*, M.S. Thesis, Middle East Technical University 2008.

Yildirim H. H., *Calculation of Risk-Return on Real Estate Investments*, Yüksek Lisans Tezi, Marmara Üniversitesi Sosyal Bilimler Enstitüsü, 2012.

Zhang X., D. Geltner, D. Neufville, "System Dynamics Modeling of Chinese Urban Housing Markets for Pedagogical and Policy Analysis Purposes", *MIT Engineering Systems Division & Center for Real Estate Working Paper Series*, Vol. 2, pp. 1-37, 2015.

Zheyu L., *Macroeconomic Factors Effect on Housing Price Index in China, Universiti Technologi Malaysia*, M.S. Thesis, 2015.

APPENDIX A: VAR ANALYSIS RESULTS

A.1. Unit Root (Augmented Dickey Fuller) Tests Results

A.1.1. Pension Funds

Table A.1. Pension funds return series is stationary at I(0) level.

Null Hypothesis: Pension Funds has a unit root				
Exogenous: Constant				
Lag Length: 9 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.132.427	0.0012
Test critical values:	1% level		-3.475.500	
	5% level		-2.881.260	
	10% level		-2.577.365	

A.1.2. BIST 100 Index

Table A.2. BIST 100 index return series is stationary at I(0) level

Null Hypothesis: BIST 100 Index has a unit root				
Exogenous: Constant				
Lag Length: 9 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.494.680	0.0003
Test critical values:	1% level		-3.475.500	
	5% level		-2.881.260	
	10% level		-2.577.365	

A.1.3. REIT Index

Table A.3. REIT index return series is stationary at I(0) level.

Null Hypothesis: REIT Index has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.071.331	0.0000
Test critical values:	1% level		-3.472.813	
	5% level		-2.880.088	
	10% level		-2.576.739	

A.1.4. Participating Banking

Table A.4. Participating banking share of profits series is stationary at I(1) level after first differencing.

Null Hypothesis: Participating Banking has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 10 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.139.219	0.5193
Test critical values:	1% level		-4.022.586	
	5% level		-3.441.111	
	10% level		-3.145.082	
Null Hypothesis: D(Participating Banking) has a unit root				
Exogenous: None				
Lag Length: 10 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.359.913	0.0009
Test critical values:	1% level		-2.581.120	
	5% level		-1.943.058	
	10% level		-1.615.241	

A.1.5. Housing Sales Price Index

Table A.5. Housing sales price index return series is stationary at I(1) level after first differencing.

Null Hypothesis: Housing Sales has a unit root				
Exogenous: Constant				
Lag Length: 4 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.441.687	0.1322
Test critical values:	1% level		-3.473.967	
	5% level		-2.880.591	
	10% level		-2.577.008	
Null Hypothesis: D(Housing Sales) has a unit root				
Exogenous: None				
Lag Length: 3 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.350.863	0.0000
Test critical values:	1% level		-2.580.366	
	5% level		-1.942.952	
	10% level		-1.615.307	

A.1.6. Housing Rent Price Index

Table A.6. Housing rent price index return series is stationary at I(0) level.

Null Hypothesis: Housing Rent has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.299.624	0.0166
Test critical values:	1% level		-3.473.096	
	5% level		-2.880.211	
	10% level		-2.576.805	

A.1.7. Gold Prices

Table A.7. Gold prices return series is stationary at I(0) level.

Null Hypothesis: Gold prices has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.381.481	0.0000
Test critical values:	1% level		-3.472.813	
	5% level		-2.880.088	
	10% level		-2.576.739	

A.1.8. Exchange Rates (USD/TL)

Table A.8. Exchange rates return series is stationary at I(0) level.

Null Hypothesis: Exchange Rates has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.417.042	0.0000
Test critical values:	1% level		-3.473.382	
	5% level		-2.880.336	
	10% level		-2.576.871	

A.1.9. Inflation (CPI)

Table A.9. Inflation series is stationary at I (0) level.

Null Hypothesis: Inflation has a unit root				
Exogenous: Constant				
Lag Length: 13 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.618.017	0.0002
Test critical values:	1% level		-3.476.805	
	5% level		-2.881.830	
	10% level		-2.577.668	

A.1.10. Central Bank Overnight Lending Interest Rates

Table A.10. Central bank overnight lending interest rates series is stationary at I(1) level after first differencing.

Null Hypothesis: CB interest rates has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 2 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.056.946	0.5651
Test critical values:	1% level		-4.019.151	
	5% level		-3.439.461	
	10% level		-3.144.113	
Null Hypothesis: D(CB interest rates) has a unit root				
Exogenous: None				
Lag Length: 0 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.008.680	0.0000
Test critical values:	1% level		-2.580.065	
	5% level		-1.942.910	
	10% level		-1.615.334	

A.1.11. Home Loan Interest Rates

Table A.11. Home loan interest rates is stationary at I (0) level.

Null Hypothesis: Home loan interest rates has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 4 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.169.409	0.0063
Test critical values:	1% level		-4.019.975	
	5% level		-3.439.857	
	10% level		-3.144.346	

A.1.12. Oil Prices

Table A.12. Oil prices return series is stationary at I (0) level.

Null Hypothesis: Oil prices has a unit root				
Exogenous: Constant				
Lag Length: 2 (Automatic - based on AIC, maxlag=13)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.466.418	0.0000
Test critical values:	1% level		-3.473.382	
	5% level		-2.880.336	
	10% level		-2.576.871	

A.2. Granger Causality Tests Results

A.2.1. Pension Funds

Table A.13. Home loan interest rates and inflation affect the returns of pension funds within 10% confidence level.

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 04/27/17 Time: 00:21			
Sample: 2004M01 2016M12			
Included observations: 154			
Dependent variable: Pension Funds			
Excluded	Chi-sq	df	Prob.
Gold Prices	0.138832	1	0.7094
D CB Interest Rates	0.017146	1	0.8958
Home Loan Interest Rates	20.36659	1	0.0000
Exchange Rates	2.428026	1	0.1192
Inflation	3.175811	1	0.0747
Oil Prices	0.001802	1	0.9661
All	27.30472	6	0.0001

A.2.2. BIST 100 Index

Table A.14. Home loan interest rates affect the returns of BIST 100 index within 10% confidence level.

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 04/27/17 Time: 00:27			
Sample: 2004M01 2016M12			
Included observations: 154			
Dependent variable: BIST 100 Index			
Excluded	Chi-sq	df	Prob.
Gold Prices	5.185167	4	0.2688
D CB Interest Rates	2.116320	4	0.7144
Home Loan Interest Rates	8.592146	4	0.0721
Exchange Rates	5.247462	4	0.2628
Inflation	7.524661	4	0.1106
Oil Prices	3.189237	4	0.5267
All	27.47266	24	0.2829

A.2.3. REIT Index

Table A.15. Exchange rates and inlation affect the returns of REIT index within 10% confidence level.

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 04/27/17 Time: 00:29			
Sample: 2004M01 2016M12			
Included observations: 154			
Dependent variable: REIT Index			
Excluded	Chi-sq	df	Prob.
Gold Prices	0.221917	1	0.6376
D CB Interest Rates	0.017778	1	0.8939
Home Loan Interest Rates	2.570390	1	0.1089
Exchange Rates	2.763920	1	0.0964
Inflation	2.889570	1	0.0892
Oil Prices	0.140338	1	0.7079
All	7.378381	6	0.2873

A.2.4. Participating Banking

Table A.16. Gold prices, central bank overnight lending interest rates and inflation affect the participating banking share of profits within 10% confidence level.

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 04/27/17 Time: 00:33			
Sample: 2004M01 2016M12			
Included observations: 154			
Dependent variable: DParticipating Banking			
Excluded	Chi-sq	df	Prob.
Gold Prices	12.89214	6	0.0448
D CB Interest Rates	28.20160	6	0.0001
Home Loan Interest Rates	10.01955	6	0.1238
Exchange Rates	1.672444	6	0.9472
Inflation	11.34866	6	0.0782
Oil Prices	10.46267	6	0.1065
All	119.6805	36	0.0000

A.2.5. Housing Sales Price Index

Table A.17. Inflation affects the returns of housing sales price index within 10% confidence level.

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 05/01/17 Time: 23:53			
Sample: 2004M01 2016M12			
Included observations: 154			
Dependent variable: DHousing Sales			
Excluded	Chi-sq	df	Prob.
Gold prices	0.276263	1	0.5992
D CB Interest Rates	1.326694	1	0.2494
Exchange Rates	0.049664	1	0.8236
Inflation	6.766940	1	0.0093
Home Loan Interest Rates	0.069775	1	0.7917
Oil Prices	1.212865	1	0.2708
All	12.05953	6	0.0607

A.2.6. Housing Rent Price Index

Table A.18. There is no variable that affect the returns of housing rent price index at 10% confidence level.

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 05/01/17 Time: 23:59			
Sample: 2004M01 2016M12			
Included observations: 154			
Dependent variable: Housing Rent			
Excluded	Chi-sq	df	Prob.
Gold prices	1.641862	4	0.8012
D CB Interest rates	1.143695	4	0.8873
Exchange rates	4.496588	4	0.3430
Inflation	2.941934	4	0.5676
Home loan interest rates	7.436156	4	0.1146
Oil prices	3.779767	4	0.4366
All	18.00521	24	0.8028

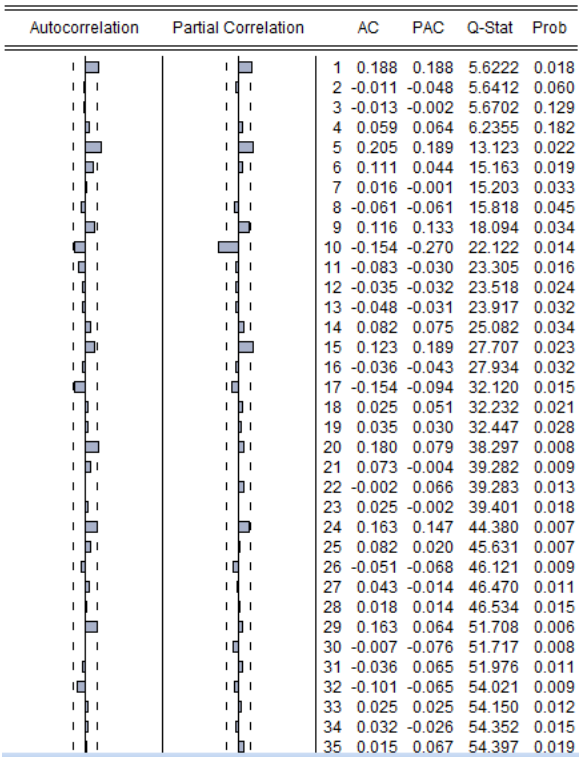
A.2.7. Pension Funds vs. Other Dependent Variables

Table A.19. The returns of BIST 100, REIT, housing sales and rent price indices affect the returns of pension funds at 10% confidence level.

Dependent variable: Pension funds			
Excluded	Chi-sq	df	Prob.
BIST 100	8.023637	4	0.0907
DParticipating Banks	6.398869	4	0.1713
REIT	8.772264	4	0.0671
Housing Rent	7.912381	4	0.0948
DHousing Sales	9.038341	4	0.0601
All	43.54936	20	0.0017

APPENDIX B: ARIMA ANALYSIS RESULTS

B.1. Pension Funds



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.188	0.188	5.6222	0.018
		2	-0.011	-0.048	5.6412	0.060
		3	-0.013	-0.002	5.6702	0.129
		4	0.059	0.064	6.2355	0.182
		5	0.205	0.189	13.123	0.022
		6	0.111	0.044	15.163	0.019
		7	0.016	-0.001	15.203	0.033
		8	-0.061	-0.061	15.818	0.045
		9	0.116	0.133	18.094	0.034
		10	-0.154	-0.270	22.122	0.014
		11	-0.083	-0.030	23.305	0.016
		12	-0.035	-0.032	23.518	0.024
		13	-0.048	-0.031	23.917	0.032
		14	0.082	0.075	25.082	0.034
		15	0.123	0.189	27.707	0.023
		16	-0.036	-0.043	27.934	0.032
		17	-0.154	-0.094	32.120	0.015
		18	0.025	0.051	32.232	0.021
		19	0.035	0.030	32.447	0.028
		20	0.180	0.079	38.297	0.008
		21	0.073	-0.004	39.282	0.009
		22	-0.002	0.066	39.283	0.013
		23	0.025	-0.002	39.401	0.018
		24	0.163	0.147	44.380	0.007
		25	0.082	0.020	45.631	0.007
		26	-0.051	-0.068	46.121	0.009
		27	0.043	-0.014	46.470	0.011
		28	0.018	0.014	46.534	0.015
		29	0.163	0.064	51.708	0.006
		30	-0.007	-0.076	51.717	0.008
		31	-0.036	0.065	51.976	0.011
		32	-0.101	-0.065	54.021	0.009
		33	0.025	0.025	54.150	0.012
		34	0.032	-0.026	54.352	0.015
		35	0.015	0.067	54.397	0.019

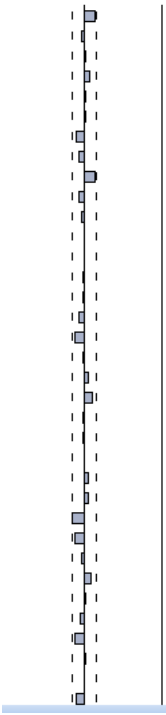
Figure B.1. Pension Funds.

Table B.1. Pension Funds.

Dependent Variable: Pension Funds				
Method: Least Squares				
Date: 05/04/17 Time: 00:35				
Sample (adjusted): 2005M04 2016M12				
Included observations: 141 after adjustments				
Convergence achieved after 9 iterations				
MA Backcast: 2004M11 2005M03				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(5)	1.130.644	0.080468	1.405.091	0
AR(10)	-0.4898	0.117275	-4.176.515	0.0001
AR(15)	0.315686	0.077487	4.074.035	0.0001
MA(5)	-0.95163	0.023865	-3.987.597	0
R-squared	0.173564	Mean dependent var		0.853333
Adjusted R-squared	0.155467	S.D. dependent var		1.367.424
S.E. of regression	1.256.642	Akaike info criterion		3.322.722
Sum squared resid	2.163.434	Schwarz criterion		3.406.374
Log likelihood	-2.302.519	Hannan-Quinn criter.		3.356.715
Durbin-Watson stat	1.715.943			
Inverted AR Roots	.99	.86-.25i	.86+.25i	.50+.74i
	.50-.74i	.31+.94i	.31-.94i	.03+.89i
	.03-.89i	-.55-.71i	-.55+.71i	-.80-.58i
	-.80+.58i	-.84-.30i	-.84+.30i	
Inverted MA Roots	.99	.31+.94i	.31-.94i	-.80-.58i
	-.80+.58i			

B.2. REIT Index

Date: 05/04/17 Time: 00:58
Sample: 2004M01 2016M12
Included observations: 156



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.146	0.146	3.3731	0.066
		2	-0.034	-0.056	3.5562	0.169
		3	0.011	0.025	3.5755	0.311
		4	0.068	0.063	4.3362	0.362
		5	0.016	-0.002	4.3796	0.496
		6	0.017	0.022	4.4295	0.619
		7	-0.111	-0.121	6.4632	0.487
		8	-0.078	-0.048	7.4856	0.485
		9	0.144	0.159	10.987	0.277
		10	-0.082	-0.144	12.120	0.277
		11	-0.036	0.032	12.338	0.339
		12	0.005	0.005	12.341	0.419
		13	-0.008	-0.029	12.351	0.499
		14	-0.018	-0.001	12.407	0.574
		15	-0.016	-0.043	12.452	0.645
		16	-0.081	-0.043	13.619	0.627
		17	-0.126	-0.111	16.434	0.493
		18	-0.009	-0.019	16.448	0.561
		19	0.043	0.089	16.776	0.605
		20	0.099	0.081	18.546	0.552
		21	-0.013	-0.035	18.579	0.612
		22	-0.017	0.002	18.632	0.668
		23	0.001	-0.018	18.632	0.722
		24	0.049	0.012	19.088	0.747
		25	0.050	0.038	19.551	0.770
		26	-0.171	-0.178	25.109	0.513
		27	-0.135	-0.076	28.609	0.380
		28	-0.034	-0.030	28.836	0.421
		29	0.082	0.070	30.146	0.407
		30	0.024	0.064	30.261	0.452
		31	-0.053	-0.070	30.814	0.476
		32	-0.124	-0.110	33.851	0.378
		33	0.020	0.004	33.933	0.422
		34	-0.008	-0.096	33.947	0.470
		35	-0.101	-0.030	36.020	0.421

Figure B.2. REIT Index.

Table B.2. REIT Index.

Dependent Variable: REIT Index				
Method: Least Squares				
Date: 05/04/17 Time: 00:58				
Sample (adjusted): 2006M03 2016M12				
Included observations: 130 after adjustments				
Convergence achieved after 30 iterations				
MA Backcast: 2004M01 2006M02				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(9)	0.159147	0.068263	2.331.376	0.0213
AR(26)	-0.45794	0.069146	-6.622.803	0
MA(26)	0.907652	0.024566	3.694.733	0
R-squared	0.365168	Mean dependent var		0.350308
Adjusted R-squared	0.35517	S.D. dependent var		8.795.016
S.E. of regression	7.062.512	Akaike info criterion		6.770.285
Sum squared resid	6.334.642	Schwarz criterion		6.836.459
Log likelihood	-4.370.685	Hannan-Quinn criter.		6.797.174
Durbin-Watson stat	1.527.328			
Inverted AR Roots	.97-.11i	.97+.11i	.90-.34i	.90+.34i
	.80+.56i	.80-.56i	.65+.72i	.65-.72i
	.45+.85i	.45-.85i	.23-.95i	.23+.95i
	.01+.97i	.01-.97i	-.23+.94i	-.23-.94i
	-.46+.86i	-.46-.86i	-.64-.73i	-.64+.73i
	-.80+.54i	-.80-.54i	-.92-.35i	-.92+.35i
	-.96-.12i	-.96+.12i		
Inverted MA Roots	.99-.12i	.99+.12i	.93-.35i	.93+.35i
	.82+.57i	.82-.57i	.66+.75i	.66-.75i
	.46+.88i	.46-.88i	.24+.97i	.24-.97i
	.00-1.00i	.00+1.00i	-.24-.97i	-.24+.97i
	-.46+.88i	-.46-.88i	-.66-.75i	-.66+.75i
	-.82-.57i	-.82+.57i	-.93-.35i	-.93+.35i
	-.99-.12i	-.99+.12i		

B.3. General

Date: 05/04/17 Time: 01:03
Sample: 2004M01 2016M12
Included observations: 156

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.036	0.036	0.2099	0.647
		2	0.009	0.007	0.2217	0.895
		3	-0.011	-0.012	0.2416	0.971
		4	0.005	0.006	0.2454	0.993
		5	0.100	0.100	1.8726	0.866
		6	-0.069	-0.077	2.6514	0.851
		7	-0.009	-0.005	2.6663	0.914
		8	-0.121	-0.118	5.0932	0.748
		9	0.141	0.154	8.4357	0.491
		10	-0.201	-0.238	15.278	0.122
		11	0.005	0.058	15.283	0.170
		12	0.055	0.043	15.802	0.200
		13	-0.095	-0.083	17.348	0.184
		14	-0.034	-0.081	17.554	0.228
		15	0.016	0.109	17.598	0.284
		16	-0.070	-0.156	18.466	0.297
		17	-0.142	-0.110	22.023	0.184
		18	-0.001	-0.028	22.023	0.231
		19	-0.113	-0.044	24.308	0.185
		20	0.108	0.048	26.426	0.152
		21	0.013	0.000	26.455	0.190
		22	-0.023	0.032	26.551	0.229
		23	-0.025	-0.071	26.671	0.270
		24	0.051	0.020	27.163	0.297
		25	0.013	0.004	27.194	0.346
		26	-0.086	-0.103	28.602	0.329
		27	0.087	0.024	30.054	0.312
		28	-0.119	-0.061	32.774	0.244
		29	0.134	0.088	36.254	0.166
		30	0.048	0.040	36.707	0.186
		31	-0.006	0.006	36.715	0.221
		32	-0.026	-0.071	36.845	0.255
		33	0.004	0.011	36.848	0.295
		34	0.018	-0.045	36.912	0.336
		35	-0.061	-0.046	37.679	0.348

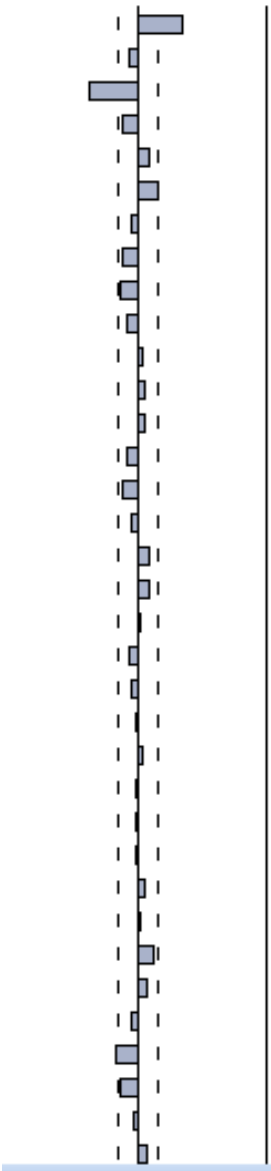
Figure B.3. BIST 100 Index.

Table B.3. BIST 100 Index.

Dependent Variable: BIST 100				
Method: Least Squares				
Date: 05/04/17 Time: 01:04				
Sample (adjusted): 2004M11 2016M12				
Included observations: 146 after adjustments				
Convergence achieved after 8 iterations				
MA Backcast: 2004M01 2004M10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(10)	0.774542	0.052315	1.480.542	0
MA(10)	-0.92522	0.01972	-4.691.857	0
R-squared	0.105068	Mean dependent var		1.148.151
Adjusted R-squared	0.098854	S.D. dependent var		7.802.967
S.E. of regression	7.407.257	Akaike info criterion		6.856.401
Sum squared resid	7.900.914	Schwarz criterion		6.897.273
Log likelihood	-4.985.173	Hannan-Quinn criter.		6.873.008
Durbin-Watson stat	1.935.238			
Inverted AR Roots	.97	.79+.57i	.79-.57i	.30-.93i
	.30+.93i	-.30-.93i	-.30+.93i	-.79-.57i
	-.79+.57i	-.97		
Inverted MA Roots	.99	.80-.58i	.80+.58i	.31-.94i
	.31+.94i	-.31-.94i	-.31+.94i	-.80-.58i
	-.80+.58i	-.99		

B.4. Housing Sales Price Index

Date: 05/04/17 Time: 01:10
Sample: 2004M01 2016M12
Included observations: 155



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.364	0.364	20.990	0.000
		2	-0.079	-0.245	21.991	0.000
		3	-0.392	-0.327	46.556	0.000
		4	-0.120	0.190	48.865	0.000
		5	0.098	0.027	50.426	0.000
		6	0.161	-0.057	54.649	0.000
		7	-0.056	-0.110	55.174	0.000
		8	-0.117	0.039	57.457	0.000
		9	-0.144	-0.093	60.929	0.000
		10	-0.097	-0.159	62.507	0.000
		11	0.039	0.117	62.762	0.000
		12	0.063	-0.039	63.428	0.000
		13	0.054	-0.038	63.934	0.000
		14	-0.094	-0.105	65.443	0.000
		15	-0.126	-0.022	68.194	0.000
		16	-0.064	-0.002	68.908	0.000
		17	0.095	-0.002	70.510	0.000
		18	0.094	-0.018	72.073	0.000
		19	0.015	-0.043	72.111	0.000
		20	-0.071	0.012	73.014	0.000
		21	-0.062	-0.033	73.702	0.000
		22	-0.019	-0.059	73.769	0.000
		23	0.034	0.013	73.981	0.000
		24	-0.016	-0.092	74.027	0.000
		25	-0.015	0.001	74.071	0.000
		26	-0.011	0.008	74.094	0.000
		27	0.042	0.035	74.422	0.000
		28	0.016	-0.058	74.472	0.000
		29	0.115	0.159	77.022	0.000
		30	0.067	0.000	77.894	0.000
		31	-0.055	-0.191	78.495	0.000
		32	-0.175	-0.029	84.580	0.000
		33	-0.145	-0.016	88.758	0.000
		34	-0.030	-0.097	88.941	0.000
		35	0.070	-0.055	89.948	0.000

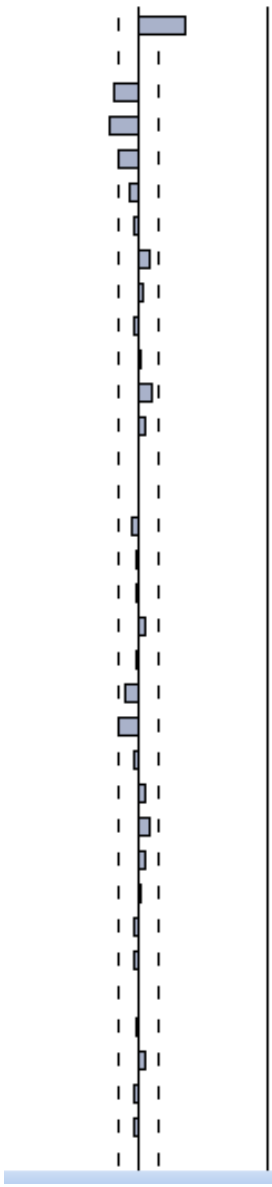
Figure B.4. Housing Sales Price Index .

Table B.4. Housing Sales Price Index.

Dependent Variable: DHousing Sales				
Method: Least Squares				
Date: 05/04/17 Time: 01:12				
Sample (adjusted): 2004M06 2016M12				
Included observations: 151 after adjustments				
Convergence achieved after 24 iterations				
MA Backcast: 2004M05				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	1.389.288	0.074371	1.868.048	0
AR(2)	-0.6393	0.089744	-7.123.573	0
AR(4)	0.193302	0.049248	3.925.070	0.0001
MA(1)	-0.99039	0.01624	-6.098.606	0
R-squared	0.276014	Mean dependent var		0.003642
Adjusted R-squared	0.261239	S.D. dependent var		0.288184
S.E. of regression	0.247698	Akaike info criterion		0.072916
Sum squared resid	9.019.047	Schwarz criterion		0.152844
Log likelihood	-1.505.165	Hannan-Quinn criter.		0.105387
Durbin-Watson stat	2.013.288			
Inverted AR Roots	.94	.42+.60i	.42-.60i	-.38
Inverted MA Roots	.99			

B.5. Housing Rent Price Index

Date: 05/04/17 Time: 01:22
Sample: 2004M01 2016M12
Included observations: 155



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.372	0.372	21.866	0.000
		2	0.005	-0.155	21.869	0.000
		3	-0.200	-0.172	28.294	0.000
		4	-0.234	-0.109	37.108	0.000
		5	-0.172	-0.073	41.911	0.000
		6	-0.081	-0.049	42.986	0.000
		7	-0.033	-0.065	43.161	0.000
		8	0.094	0.078	44.637	0.000
		9	0.037	-0.091	44.860	0.000
		10	-0.044	-0.081	45.191	0.000
		11	0.008	0.068	45.202	0.000
		12	0.114	0.113	47.405	0.000
		13	0.063	-0.045	48.095	0.000
		14	0.000	-0.021	48.095	0.000
		15	-0.002	0.067	48.096	0.000
		16	-0.052	-0.054	48.567	0.000
		17	-0.018	0.037	48.624	0.000
		18	-0.009	0.023	48.637	0.000
		19	0.056	0.075	49.206	0.000
		20	-0.015	-0.122	49.249	0.000
		21	-0.105	-0.086	51.245	0.000
		22	-0.170	-0.071	56.558	0.000
		23	-0.027	0.061	56.695	0.000
		24	0.054	-0.017	57.231	0.000
		25	0.085	-0.010	58.589	0.000
		26	0.059	-0.007	59.253	0.000
		27	0.021	-0.045	59.335	0.000
		28	-0.039	-0.024	59.625	0.000
		29	-0.032	0.036	59.824	0.001
		30	0.001	0.047	59.824	0.001
		31	-0.013	-0.091	59.856	0.001
		32	0.041	0.057	60.193	0.002
		33	-0.029	-0.039	60.360	0.003
		34	-0.048	-0.002	60.832	0.003
		35	0.003	0.043	60.834	0.004

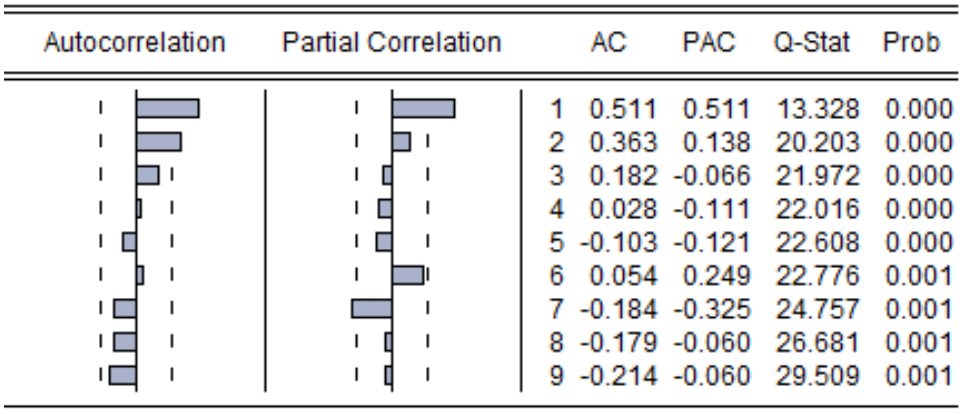
Figure B.5. Housing Rent Price Index.

Table B.5. Housing Rent Price Index.

Dependent Variable: DHousing Rent				
Method: Least Squares				
Date: 05/04/17 Time: 01:27				
Sample (adjusted): 2004M05 2016M12				
Included observations: 152 after adjustments				
Convergence achieved after 3 iterations				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(3)	-0.20241	0.072199	-2.803.481	0.0057
AR(1)	0.398338	0.073083	5.450.529	0
R-squared	0.198331	Mean dependent var		-0.01086
Adjusted R-squared	0.192986	S.D. dependent var		0.285432
S.E. of regression	0.256415	Akaike info criterion		0.12903
Sum squared resid	9.862.284	Schwarz criterion		0.168818
Log likelihood	-7.806.290	Hannan-Quinn criter.		0.145193
Durbin-Watson stat	1.977.455			
Inverted AR Roots	.44+.48i	.44-.48i	-.48	

B.6. Mortgaged Home Sales

Date: 05/04/17 Time: 22:22
Sample: 2013M01 2016M12
Included observations: 48



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.511	0.511	13.328	0.000
		2	0.363	0.138	20.203	0.000
		3	0.182	-0.066	21.972	0.000
		4	0.028	-0.111	22.016	0.000
		5	-0.103	-0.121	22.608	0.000
		6	0.054	0.249	22.776	0.001
		7	-0.184	-0.325	24.757	0.001
		8	-0.179	-0.060	26.681	0.001
		9	-0.214	-0.060	29.509	0.001

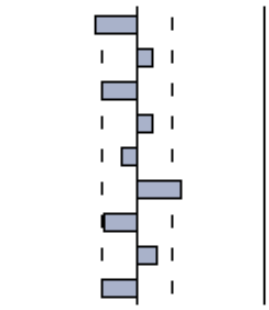
Figure B.6. Mortgaged Home Sales.

Table B.6. Mortgaged Home Sales.

Dependent Variable: MORTGAGED SALES				
Method: Least Squares				
Date: 05/04/17 Time: 22:26				
Sample (adjusted): 2013M08 2016M12				
Included observations: 41 after adjustments				
Convergence achieved after 47 iterations				
MA Backcast: 2013M07				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	35571.63	6.486.357	5.484.068	0
AR(1)	0.91441	0.059762	1.530.092	0
AR(7)	-0.2321	0.057986	-4.002.763	0.0003
MA(1)	-0.93328	0.121368	-7.689.660	0
R-squared	0.363641	Mean dependent var		35177.05
Adjusted R-squared	0.312044	S.D. dependent var		7.041.695
S.E. of regression	5.840.601	Akaike info criterion		2.027.552
Sum squared resid	1.26E+09	Schwarz criterion		2.044.270
Log likelihood	-4.116.482	Hannan-Quinn criter.		2.033.640
F-statistic	7.047.749	Durbin-Watson stat		1.307.246
Prob(F-statistic)	0.000728			
Inverted AR Roots	.94-.27i	.94+.27i	.29+.73i	.29-.73i
	-.41+.61i	-.41-.61i	-.72	
Inverted MA Roots	.93			

B.7. Home Sales to Foreigners

Date: 05/04/17 Time: 22:34
Sample: 2013M01 2016M12
Included observations: 47



		AC	PAC	Q-Stat	Prob
1		-0.347	-0.347	6.0117	0.014
2		0.118	-0.003	6.7205	0.035
3		-0.293	-0.288	11.217	0.011
4		0.127	-0.078	12.080	0.017
5		-0.130	-0.131	13.007	0.023
6		0.365	0.263	20.473	0.002
7		-0.274	-0.086	24.795	0.001
8		0.169	0.049	26.474	0.001
9		-0.284	-0.124	31.363	0.000

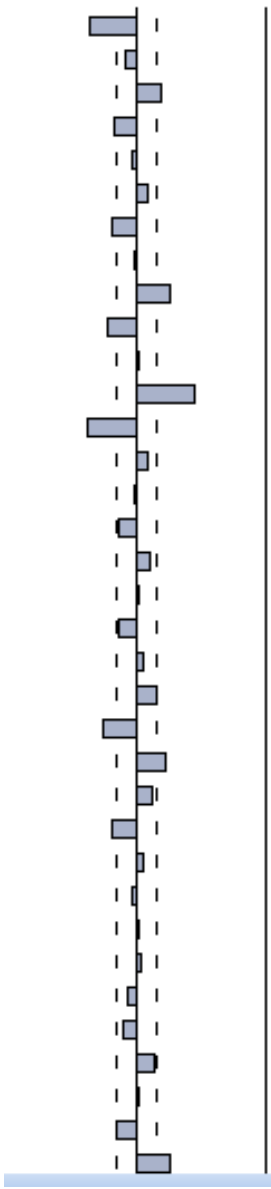
Figure B.7. Home Sales to Foreigners .

Table B.7. Home Sales to Foreigners

Dependent Variable: DHome Sales to Foreigners				
Method: Least Squares				
Date: 05/04/17 Time: 22:30				
Sample (adjusted): 2013M05 2016M12				
Included observations: 44 after adjustments				
Convergence achieved after 13 iterations				
MA Backcast: 2013M02 2013M04				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(3)	-0.94369	0.090001	-1.048.533	0
MA(1)	-0.31164	0.110159	-2.828.972	0.0072
MA(3)	0.798063	0.082331	9.693.392	0
R-squared	0.350982	Mean dependent var		1.575.000
Adjusted R-squared	0.319323	S.D. dependent var		2.671.532
S.E. of regression	2.204.098	Akaike info criterion		1.369.460
Sum squared resid	1991800	Schwarz criterion		1.381.625
Log likelihood	-2.982.812	Hannan-Quinn criter.		1.373.971
Durbin-Watson stat	2.149.297			
Inverted AR Roots	.49+.85i	.49-.85i	-.98	
Inverted MA Roots	.57-.79i	.57+.79i	-.83	

B.8. Pension Funds Number of Participants

Date: 05/04/17 Time: 22:42
Sample: 2004M01 2016M12
Included observations: 155



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.377	-0.377	22.407	0.000
		2	-0.090	-0.270	23.689	0.000
		3	0.189	0.056	29.407	0.000
		4	-0.175	-0.112	34.354	0.000
		5	-0.046	-0.149	34.701	0.000
		6	0.098	-0.047	36.282	0.000
		7	-0.201	-0.223	42.926	0.000
		8	-0.010	-0.234	42.942	0.000
		9	0.276	0.120	55.675	0.000
		10	-0.244	-0.098	65.655	0.000
		11	0.014	-0.150	65.689	0.000
		12	0.472	0.435	103.56	0.000
		13	-0.394	0.022	130.13	0.000
		14	0.090	0.020	131.52	0.000
		15	-0.011	-0.125	131.54	0.000
		16	-0.154	-0.041	135.69	0.000
		17	0.111	0.024	137.88	0.000
		18	0.010	-0.016	137.89	0.000
		19	-0.142	0.053	141.52	0.000
		20	0.063	-0.102	142.23	0.000
		21	0.158	-0.067	146.79	0.000
		22	-0.269	-0.159	160.00	0.000
		23	0.223	0.022	169.14	0.000
		24	0.118	0.056	171.72	0.000
		25	-0.199	0.139	179.14	0.000
		26	0.063	-0.063	179.90	0.000
		27	-0.031	0.049	180.07	0.000
		28	0.019	0.184	180.14	0.000
		29	0.033	0.017	180.36	0.000
		30	-0.080	-0.070	181.61	0.000
		31	-0.102	-0.098	183.67	0.000
		32	0.142	0.048	187.66	0.000
		33	0.009	-0.053	187.68	0.000
		34	-0.159	-0.059	192.78	0.000
		35	0.266	0.085	207.08	0.000

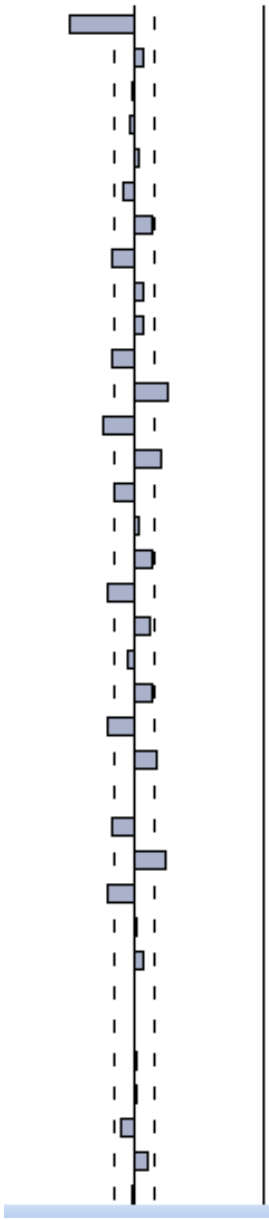
Figure B.8. Pension Funds Number of Participants .

Table B.8. Pension Funds Number of Participants.

Dependent Variable: Pension Funds Number of Participants				
Method: Least Squares				
Date: 05/04/17 Time: 22:47				
Sample (adjusted): 2005M02 2016M12				
Included observations: 143 after adjustments				
Convergence achieved after 16 iterations MA Backcast: 2004M01 2005M01				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(7)	-0.21598	0.075215	-2.871.517	0.0047
AR(12)	0.469393	0.079036	5.939.002	0
MA(1)	-0.52642	0.058728	-8.963.790	0
MA(13)	-0.43352	0.065058	-6.663.509	0
R-squared	0.501335	Mean dependent var		1.297.343
Adjusted R-squared	0.490573	S.D. dependent var		16484.79
S.E. of regression	11765.88	Akaike info criterion		2.161.137
Sum squared resid	1.92E+10	Schwarz criterion		2.169.425
Log likelihood	-1.541.213	Hannan-Quinn criter.		2.164.505
Durbin-Watson stat	1.935.662			
Inverted AR Roots	.91	.84+.47i	.84-.47i	.44+.81i
	.44-.81i	.03-.94i	.03+.94i	-.50-.81i
	-.50+.81i	-.79-.47i	-.79+.47i	-.96
Inverted MA Roots	.99	.88+.43i	.88-.43i	.58-.76i
	.58+.76i	.15-.92i	.15+.92i	-.30-.87i
	-.30+.87i	-.67+.62i	-.67-.62i	-.88+.22i
	-.88-.22i			

B.9. Pension Funds Total Assets

Sample: 2004M01 2016M12
Included observations: 155



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.521	-0.521	42.866	0.000
		2	0.075	-0.269	43.758	0.000
		3	-0.010	-0.149	43.775	0.000
		4	-0.037	-0.143	43.996	0.000
		5	0.035	-0.080	44.191	0.000
		6	-0.084	-0.163	45.349	0.000
		7	0.144	0.020	48.745	0.000
		8	-0.179	-0.144	54.020	0.000
		9	0.069	-0.149	54.807	0.000
		10	0.069	-0.004	55.613	0.000
		11	-0.179	-0.208	61.031	0.000
		12	0.269	0.088	73.365	0.000
		13	-0.250	-0.111	84.036	0.000
		14	0.219	0.078	92.294	0.000
		15	-0.169	-0.042	97.277	0.000
		16	0.033	-0.097	97.465	0.000
		17	0.137	0.119	100.76	0.000
		18	-0.226	-0.093	109.83	0.000
		19	0.128	-0.117	112.76	0.000
		20	-0.064	-0.055	113.50	0.000
		21	0.146	0.099	117.36	0.000
		22	-0.222	-0.168	126.40	0.000
		23	0.181	0.060	132.42	0.000
		24	0.007	0.017	132.43	0.000
		25	-0.174	-0.048	138.09	0.000
		26	0.250	0.092	149.91	0.000
		27	-0.206	-0.048	157.99	0.000
		28	0.013	-0.129	158.02	0.000
		29	0.068	-0.052	158.90	0.000
		30	0.001	0.052	158.90	0.000
		31	0.006	-0.008	158.91	0.000
		32	0.022	0.228	159.01	0.000
		33	0.010	-0.001	159.03	0.000
		34	-0.100	0.053	161.03	0.000
		35	0.110	0.076	163.47	0.000
		36	-0.021	0.083	163.56	0.000

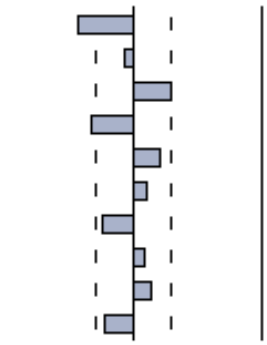
Figure B.9. Pension Funds Total Assets.

Table B.9. Pension Funds Total Assets.

Dependent Variable: DPension Funds Total Assets				
Method: Least Squares				
Date: 05/04/17 Time: 22:54				
Sample (adjusted): 2004M02 2016M12				
Included observations: 155 after adjustments				
Convergence achieved after 15 iterations				
MA Backcast: 2003M01 2004M01				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4183962	1451159	2.883.186	0.0045
MA(1)	-0.79177	0.048934	-1.618.029	0
MA(12)	0.30368	0.091314	3.325.689	0.0011
MA(13)	-0.32581	0.09356	-3.482.387	0.0007
R-squared	0.422394	Mean dependent var		4503328
Adjusted R-squared	0.410918	S.D. dependent var		1.19E+08
S.E. of regression	91576194	Akaike info criterion		3.952.871
Sum squared resid	1.27E+18	Schwarz criterion		3.960.725
Log likelihood	-3.059.475	Hannan-Quinn criter.		3.956.061
F-statistic	3.680.798	Durbin-Watson stat		1.903.813
Prob(F-statistic)	0			
Inverted MA Roots	.92	.87-.30i	.87+.30i	.63+.67i
	.63-.67i	.22-.89i	.22+.89i	-.25+.88i
	-.25-.88i	-.65-.65i	-.65+.65i	-.89+.24i
	-.89-.24i			

B.10. Pension Funds State Contribution

Date: 05/04/17 Time: 23:03
Sample: 2013M06 2016M12
Included observations: 43



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.451	-0.451	9.3811	0.002
		2	-0.069	-0.342	9.6057	0.008
		3	0.300	0.148	13.968	0.003
		4	-0.339	-0.179	19.665	0.001
		5	0.218	0.077	22.085	0.001
		6	0.105	0.180	22.667	0.001
		7	-0.262	-0.013	26.362	0.000
		8	0.091	-0.159	26.824	0.001
		9	0.151	0.142	28.122	0.001
		10	-0.239	-0.059	31.482	0.000

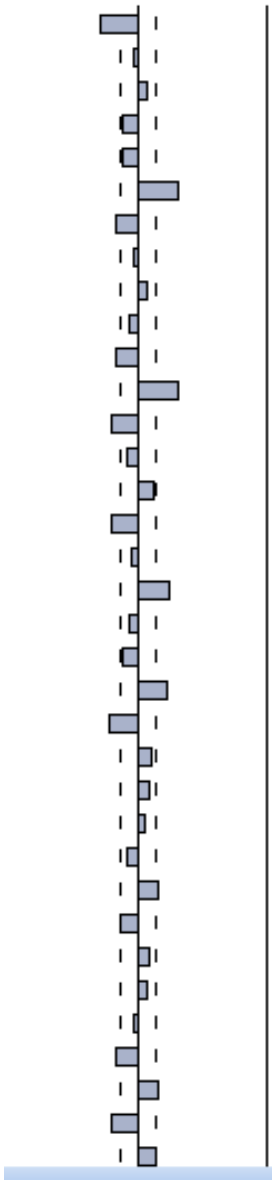
Figure B.10. Pension Funds State Contribution.

Table B.10. Pension Funds State Contribution.

Dependent Variable: Pension Funds State Contr.				
Method: Least Squares				
Date: 05/04/17 Time: 23:04				
Sample (adjusted): 2013M08 2016M12				
Included observations: 41 after adjustments				
Convergence achieved after 14 iterations				
MA Backcast: 2013M07				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.66E+08	11870439	1.395.874	0
AR(1)	-1.155.356	0.219463	-5.264.469	0
AR(2)	-0.61861	0.135966	-4.549.746	0.0001
MA(1)	0.610953	0.245713	2.486.444	0.0175
R-squared	0.379671	Mean dependent var		1.70E+08
Adjusted R-squared	0.329374	S.D. dependent var		1.60E+08
S.E. of regression	1.31E+08	Akaike info criterion		4.031.793
Sum squared resid	6.39E+17	Schwarz criterion		4.048.511
Log likelihood	-8.225.175	Hannan-Quinn criter.		4.037.881
F-statistic	7.548.593	Durbin-Watson stat		1.984.244
Prob(F-statistic)	0.000462			
Inverted AR Roots	-.58+.53i	-.58-.53i		
Inverted MA Roots	-.61			

B.11. Mortgage Loans

Date: 05/04/17 Time: 23:10
Sample: 2003M01 2016M12
Included observations: 167



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.312	-0.312	16.558	0.000
		2	-0.027	-0.138	16.684	0.000
		3	0.078	0.028	17.724	0.001
		4	-0.138	-0.119	21.034	0.000
		5	-0.116	-0.219	23.387	0.000
		6	0.333	0.240	42.788	0.000
		7	-0.178	-0.004	48.359	0.000
		8	-0.036	-0.090	48.585	0.000
		9	0.066	-0.038	49.361	0.000
		10	-0.077	-0.002	50.415	0.000
		11	-0.176	-0.199	55.994	0.000
		12	0.321	0.118	74.760	0.000
		13	-0.205	-0.063	82.458	0.000
		14	-0.092	-0.179	84.003	0.000
		15	0.123	-0.046	86.799	0.000
		16	-0.213	-0.201	95.308	0.000
		17	-0.053	-0.140	95.839	0.000
		18	0.248	-0.015	107.49	0.000
		19	-0.068	0.068	108.37	0.000
		20	-0.122	-0.166	111.22	0.000
		21	0.238	0.080	122.20	0.000
		22	-0.231	-0.106	132.58	0.000
		23	0.100	0.111	134.53	0.000
		24	0.083	-0.109	135.88	0.000
		25	0.043	0.131	136.25	0.000
		26	-0.095	-0.000	138.06	0.000
		27	0.156	-0.027	142.95	0.000
		28	-0.144	0.016	147.18	0.000
		29	0.086	0.081	148.68	0.000
		30	0.074	0.029	149.81	0.000
		31	-0.044	-0.085	150.21	0.000
		32	-0.182	-0.111	157.09	0.000
		33	0.170	-0.091	163.20	0.000
		34	-0.209	-0.042	172.48	0.000
		35	0.144	0.039	176.89	0.000

Figure B.11. Mortgage Loans.

Table B.11. Mortgage Loans.

Dependent Variable: DMortgage Loans				
Method: Least Squares				
Date: 05/04/17 Time: 23:13				
Sample (adjusted): 2003M08 2016M12				
Included observations: 161 after adjustments				
Convergence achieved after 25 iterations				
MA Backcast: 2001M11 2003M07				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(6)	0.965949	0.04522	2.136.109	0
MA(1)	-0.22565	0.048025	-4.698.484	0
MA(6)	-0.72582	0.042481	-1.708.570	0
MA(16)	-0.15789	0.040306	-3.917.342	0.0001
MA(21)	0.167544	0.038207	4.385.149	0
R-squared	0.352089	Mean dependent var		19798789
Adjusted R-squared	0.335476	S.D. dependent var		5.72E+08
S.E. of regression	4.66E+08	Akaike info criterion		4.278.893
Sum squared resid	3.39E+19	Schwarz criterion		4.288.463
Log likelihood	-3.439.509	Hannan-Quinn criter.		4.282.779
Durbin-Watson stat	2.073.289			
Inverted AR Roots	.99	.50+.86i	.50-.86i	-.50+.86i
	-.50-.86i	-.99		
Inverted MA Roots	.98	.91	.83-.36i	.83+.36i
	.64-.67i	.64+.67i	.50-.85i	.50+.85i
	.25-.83i	.25+.83i	-.05+.89i	-.05-.89i
	-.39-.89i	-.39+.89i	-.55+.74i	-.55-.74i
	-.69-.49i	-.69+.49i	-.86-.25i	-.86+.25i
	-.98			