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EFFICIENCY OF REAL ESTATE MARKET: EVIDENCE FROM ISTANBUL RESIDENTIAL MARKET

M.Sc. THESIS

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FOREWORD

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<u>**APRIL 2017**</u>   **Christabell Fonyuy SUNJO**

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ABBREVIATIONS

AC   **:** Autocorrelation
APC   **:** Partial Autocorrelation
ARG   **:** ARGENTINA
AUS   **:** Austria
CBRT   : Central Bank of Republic of Turkey
DCF   **:** Discounted Cash Flow
EMH   **:** Efficient market hypothesis
FIN   **:** Finland
HK   **:** Hong Kong
ITA   **:** Italy
JPN   **:** Japan
MYS   **:** Malaysia
NZL   **:** New Zealand
PH   **:** Philippines
PT   **:** Portugal
REIDIN : Real Estate Investment Development Information Network
SEC   **:** Securities and Exchange Commission
SOM   **:** Square meter
SG   **:** Singapore
TÜİK   **:** Statistical Institute of Turkey
UK   **:** United Kingdom
US   **:** United State
ULI   **:** Urban Land institute
ZA   **:** South Africa

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EFFICIENCY OF REAL ESTATE MARKET: EVIDENCE FROM ISTANBUL RESIDENTIAL MARKET

ABSTRACT

Efficient market hypothesis means that the future prices of securities are unpredictable with respect to the current available information. The gist of this research is to test market efficiency of real estate using the dynamics of efficient market hypothesis, as put forth by Eugene Fama (1970). In this light, the study is conducted to test the market efficiency of Istanbul real estate markets as to whether the market prices /returns of real estates are random. Thus, the study benefited from a large body of existing literature to adapt an empirical model known as the random walk model. To ascertain/test if the Istanbul residential real estate market prices are random, the study's statistical random walk model enveloped three prominent tests; autocorrelation test, run test and variance ratio test. The study employed a time-series data, thus warranting for unit root testing, on order to regulate stationary. The study found the data unstable and went ahead for the first difference. The study followed the SIC/AIC[1] to select the lag length for the model.

As it is the case with studies investigating market efficiency, results, especially those of emerging markets are always mixed. The results cast doubts in Turkey's real estate market efficiency. The output rejects completely the null hypothesis of weak form market efficiency, suggesting that Istanbul Market is not efficient in its weak form. This shows that investors can make huge returns from real estate because they possess information of past prices that could be used to forecast future prices.

Keywords: *Efficient market hypothesis, Real estate market, Weak form efficiency, and Random walk hypothesis.*

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[1] **Akaike Information Criterion (AIC)**. • **Schwartz Information Criterion (SIC)**-

They capture the quality of the model in suggesting the appropriate lag length to be used. Thus, they inform on model selection but do not taste for any hypothesis.

GAYRIMENKUL PIYASASININ ETKINLIĞI: İSTANBUL KONUT PIYASASI ÖRNEĞI

ÖZET

Etkili piyasa hipotezi, menkul kıymetlerin gelecekteki fiyatlarının bugün eldeki bilgiler ile tahmin edilemeyeceğini varsayar. Bu araştırmanın amacı, Eugene Fama'nın (1970) ortaya koymuş olduğu etkin pazar hipotez dinamikleri kullanarak gayrimenkulün piyasa etkinliğini test etmektir. Bu bilgiler doğrultusunda, yapılan çalışma ile İstanbul gayrimenkul piyasalarının etkinliği piyasa fiyatlarının / getirisinin rastgele olup olmadığı test edilmek üzere incelenmiştir. Bu sayede, çalışma kapsamında, rastgele yürüyüş modeli olarak bilinen ampirik bir modeli uyarlamak için mevcut literatürden yararlanılmıştır. İstanbul konut gayrimenkul piyasası fiyatlarının rastgele olup olmadığını belirlemek / test etmek amacıyla, çalışma içerisinde istatistiksel rastgele yürüyüş modeli için üç belirgin test olan otokorelasyon testi, run testi ve varyans oranı testi kullanılmıştır. Çalışmada bir zaman serisi verisine yer verilmiş ve durağanlığı ayarlamayı düzene sokmak için birim kök testi uygulanmıştır. Çalışma, verileri kararsız bulmuş ve ilk fark için devam etmiştir. Çalışma, model için gecikme süresini seçmek üzere SIC / AIC'yi takip etmiştir.

Piyasa etkinliğini araştıran çalışmalarda olduğu gibi, özellikle gelişmekte olan piyasaların sonuçları daima karışıktır. Sonuçlar, Türkiye'nin emlak piyasası etkinliğinde şüpheler ortaya koymaktadır. Çalışma sonucunda Zayıf tipteki piyasa etkinliği sıfır hipotezini tamamen red ederek İstanbul Piyasası'nın zayıf formda verimli olmadığını önermektedir. Bu durum, yatırımcıların gayrimenkulden büyük kazançlar elde edebildiğini göstermektedir; Bunun nedeni ise gayrimenkuldeki gelecek fiyatları tahmin etmek için kullanılabilecek geçmiş fiyatlarla ilgili bilgi sahibi olmalarından kaynaklanmaktadır.

Anahtar kelimeler: *Etkili piyasa hipotezi, Emlak piyasası, Zayıf form etkinliği ve Rastgele yürüyüş hipotezi.*

1. INTRODUCTION

Originally the term 'efficient market' was developed for the stock market in particular. As time went on, the concept became generalized to other markets like that of the real estate. Efficient market hypothesis has been and is still an important part of finance literature. Since the mid-1970s, there has been a litany of write-ups regarding the real estate sector. Despite this largesse of existing literature, there are still some significant disparities on whether a particular market can be term efficient or inefficient.

Market efficiency as defined by Fama (1970), indicates the total availability of information with respect to asset prices; this means if information reflects prices of securities it cannot be possible to "beat the market". Fama was one of the first scholars who elaborated on the efficient market hypothesis. According to him, there are three forms of market efficiency; strong form efficiency, semi-strong form efficiency and weak form efficiency. All these forms are based on availability of information on Security prices and also, have different level of efficiency with different measures to evaluate it. Weak-form efficient market hypothesis shows that security prices tend to follow a random walk. With this form information is based on historical prices. The current prices reflect the information enclosed in all past prices. No charts and technical analyses can use historical prices to discover undervalued stocks or no abnormal returns can be generated through technical trading. If a market aims to investigate the weak -form of market efficiency, the second level of efficient market can be tested and if the level (semi-strong) is confirmed to be efficient we can go further to test the strong form efficiency. If the weak form does not hold, there is no need to test for other forms of efficiency market hypothesis; we conclude that there is no efficiency in that market. The focus of this research is to detect if the market for real estate is efficient in its weaker form. According to Ananzeh (2014)

markets are efficient but the developed areas are termed more efficient than developing areas because they are characterized by high transaction costs and low liquidity problems. Also, the absence of satisfactory data in a suitable form can make the test for strong and semi-strong type of efficiency to be rare in an emerging market. Consequently the less developed and developing markets seems to be suitable only for weak-form efficiency test. Therefore weak form type of efficient market hypothesis will be carried out in this research using Istanbul residential real estate data as evidence.

1.1. Background of the study

Market efficiency is of interest to public and also of importance to economists. It is one of the most energetic sectors that contribute to the wealth of an economy. The idea of market efficiency is important to investor more because it allows them to make rational decisions (Fama, 1970). If a market is efficient the only way they can get above average profits is by taking advantages of abnormalities when they occur.

According to World Bank statistics (2016), real estates of any country consists a great share of the national economy. For example, real estates constitute nearly 19% of the total Gross domestic product in Turkey's economy. This means that the decline in value of real estate will affect the financial sector, construction and many other sectors in this country. For instance, if there is any decrease in the sales of real estate it can cause prices in this market to drop and if prices drop this will affect the value of every household whether they are actively involved in the business of real estate or not. Efficiency in this market will allow investors to market rational decision they will be no undervalues or overvalued asset in the market. Assuming that the market for real estate is efficient, this will means that the energy cost of building can be totally forecasted and it will be incorporated accordingly into its prices or its earnings.

Real estate market is mostly characterized as a market with high transaction cost, asymmetric information, and low turnover volumes compared to other assets in the financial markets. These characteristics lead to strong evidence of inefficiencies arising from the real estate market, surprising they are claims that this market is generally efficient. Because of the nature of this market and the claims that the

market is also efficient like the stock market, the question of efficiency for this market (real estate) is important. The origins of the test for the efficient markets hypothesis using data from the real estate markets started in the mid-1980s, because of the doubt on whether this particular market is efficient or not, a growing number of empirical studies like Gau (1984) found reason to test market efficiency of this property market, in this investigation he employed forecasting methodology and an empirically test in number of developed markets. Case and Shiller (1989), also saw the need to test for market efficiency using real estate as evidence. They used dynamic multiple indicator to test real estate market efficiency. Not forgetting other studies likes that of Gatzlaff and Trtiroglu (1995) who indicated in their study that this concept of market efficiency is also important not just for the stock markets but for housing markets as well. Among the different few studies addressing the efficient market hypothesis using data from housing market the results are more or less mixed. Thus, difficult to say in general if the housing market is efficient or not. It is under this background that this study wishes to follow the literature on the latest expansion of the theoretical development of Efficient Market Hypothesis; using data from the real estate market. A good number of researchers regard the idea of efficiency for this particular market (real estate) as a paradox because of its characterise (Evans, 1995).

Research like Ergul (1995), pointed that emerging markets are originally characterized as inefficient, but over time, with the right regulatory framework will grow into efficient market. This also constitutes a problem to determining the efficiency of real estate market of emerging markets. Turkey being an emerging market has experienced massive development in housing market. In the early 1960s the construction industry was considered one of the device of economic growth in Turkey before a severe earthquake in 1999 that paused construction for three years. Another interruption was the 2001 financial crisis that disturbed the real estate market of Turkey. Nevertheless, Turkish residential market has a significant growth rate since the most recent economic crises of 2001. Turkish real estate is known as one of the world fastest developing Real Estate markets; this is due to its economic growth and promising demographics in the 2000s (FESSUD 2014). The Housing Development Administration (HAD) established in 1984, witnessed various projects of mass housing and landscaping from the mid-1990s and acquired significant

momentum since 2002. It provide loans for constructions and about 85% of the total amount of loans provided by the HAD have been taken by co-operatives. Co-operatives provides loan to individuals who purchase housing units that the cooperatives have constructed. Housing by HAD in 2003 to 2012 stood at 562000 dwelling units, this accounted nearly 11% of all national statistics of housing during the same period (Turel & Koc, 2014). Since 2005, they have been a great growth in Residential, office and commercial properties of the Turkish property market. The Law on the Transformation of areas in May 2012, under Natural disaster risk was authorized, which lawfully allow public sector participation in urban transformation process with an early estimation of 6.5 million housing units with natural disaster risk FESSUD, (2014).

As foreign investors engage in Turkey's real estate market in recent years. The country has been more stable politically and economically (from 2002 to 2015) as a result the rental yield and selling price for retail and residential properties kept increasing over the last three years. The improvement in investments conditions has also lead to a flourishing investment by foreign companies within all sectors of the real estate market, particularly in retail. This increase indicates better market potential for Turkish real estate industry.

According to Daily Sabah (2016) Istanbul is the largest city in Turkey, with a population of approximately 14.6 million; this part of the country has witness a property boom in local currency terms since the 1990s. Because of the populated nature and the economy boom investors increasingly indicate a great interest in Turkish financial market. Residential, office and commercial assets have boost real estate market in Turkey so much that is known as one of the most promising property markets in Europe. Thus, Turkey offers great entrepreneurs for real estate investor by merging a large construction sector with growing commercial and industrial output. According to the World Bank statistic, Turkey housing market consists of 19% of the total GDP. In all we can say that they have been great economic transformation in Turkey as real estate is concern.

However, a number of empirical studies have found real estate market to be weak form efficient, most of these studies are carried out in developed area. Until now, little have been done in investigating efficiency of real estate in an emerging

economy. This is one of the first studies, testing the weak form of the real estate market in Turkey.

1.2. Purpose of the study

The dynamism of capital market demands the need for efficiency research. Wide literature exists on testing the efficiency of markets e.g. Fama and French (1988), Fama (1991), portray for the developed markets. For the less developed market examples are Chang and Ting (2000), Alam et al (2007), just to name a few. All these research are different in the market types, the time period of the study and the methodology applied for analysing market efficiency. Assuming markets are efficient in their weak -form, participants like investors, mortgage bankers, and so many others would not have to care about passed movement of prices. If this assumption is true, it will be impossible to get additional information from analysing historical prices and as a result investors will not be able to earn excess returns by just studying the market. Nevertheless, if markets are not efficiency that is their weak form, studying historical prices can contain useful and valuable information for investors making them to be able to earn excess return. If investors are to gain this technique as the property market is concern, it is very necessary to ensure that requirements of the efficient market hypothesis are not satisfied in the property market. Recent research's addressing the efficiency of the real estate markets is limited on housing markets for developed countries. Very limited has been done when it comes to evaluating the efficiency of Real estate market of an emerging economy. This research is similar to that of Gu (2002) and Schindler (2010). The similarity is that we both investigate on the weak- form efficiency for residential real estates markets but their studies is in Columbia and Argentina real estate market respectively, while this study is in Istanbul residential market. Another different is that Gu (2002) and Schindler (2010) used different periods to test their result from this study. Thus the focus of this research is first, to review the concept of efficient market hypothesis as was developed in the financial market. Secondly to add to the existing literature on the existence of efficiency in the real estate market, Lastly to carry an empirical investigation on the weak-form of efficient market hypothesis using Istanbul residential real estate market as evidence.

In order to better state the purpose of this study, the critical questions are

- Do historical prices reflect useful information for predicting future prices?
- Is real estate market an efficient market?
- Is Istanbul residential real estate market efficient in its weak-form?

1.3. Methodology of the Study

Generally to test for weak-form efficiency of any markets, we need to look for evidence that if investors used past information they cannot earned excess returns. Thus we can say that the test for weak -form efficiency for any market can follows a random walk model. In a market where prices are randomly distributed, no investors can earn excess profit because the market prices are estimated at their market values. Contrary if not assets and risk might be predictable giving investors room to make excess returns. The method used in this study is the statistical random walk method and it will be based on the availability and nature of data. The statistical test of the random walk requires the test of the following parametric and non-parametric test, autocorrelation tests, run test and the variance ratio test. Data used will be monthly time series. The dependent variable is returns of the real estate Market. The independent variables or explanatory variables are technical analysis of the markets (prices).

1.4. Data and Source

The research area is from one of the most populated cities of Turkey (Istanbul). The study had limited access to data, that is, data was released generally for the Europe side of Istanbul. Again, the data is a monthly time-series data from the period between 01/01/ 2003 to 01/01/2017. The house price index is extracted from Real Estate Investment Development Information Network (REIDIN). The choice of area is because Turkey is an emerging country and fast growing with a huge population of about 79,409, 926 people, also the market has experienced robust economic growth since 2002. The development in Istanbul residential markets offers a valuable opportunity to examine the above stated objectives.

- Hypothesis 1

Null = Istanbul Residential Real Estate market follows a random walk.

Alternative = Istanbul Residential Real Estate market does not follow a random walk.

- Hypothesis 2

Null = Istanbul Residential real estate market is efficient.

Alternative = Istanbul real estate market is not efficient.

The above hypotheses would help the researcher to simple the research questions. Some of the research question will be approached using the qualitative analysis and others using the quantitative analysis. The ultimate goal is to understand the efficient market hypothesis and to prove that Istanbul Residential Real estate market is efficient. If the following test (autocorrelation test, run and variance ratio test) fail to accept the presence of a random walk theory for Istanbul residential real estate market, then we can say that residential prices in this market are predicted indicating that investor can earn excess returns causing the market to be inefficient.

1.5. Draft Plan

This research will be presented in five chapters. Chapter one includes overview, background, and purpose of the research, methodology used in the research and data and source of the study. Chapter two will be a brief history of efficiency market hypothesis, the three forms of EMH. Also important theories and literature of EMH and the efficiency of real estate will be reviewed of the market efficiency hypothesis and of real estate efficiency. Chapter 3 would discuss Turkish real estate, its development in the market, how efficiency market is applied in property market and the strengths, weakness of Turkey's property market. 4th chapter will be explaining the methodology employed in this study plus presenting the out come of the results and its explanations. Conclusion will be seen in chapter 5.

2. LITERATURE REVIEW

The second chapter explores relevant theoretical and empirical literature, which is connected to this study. The first section, gives a general and brief history of the Efficient Market Hypothesis (EMH), a detailed discussion on three forms of EMH is equally offered. The second section seeks to bring clarity to central questions, by considering and following existing literature on market efficiency, that is, if markets are efficient or otherwise. The third section is dedicated to the real estate; looking at the real estate via the efficient market hypothesis. The fourth section makes a critical analysis with respect to the theories and literatures discussed in the previous chapters. The last section (5th) gives a road map as regards the adaptation of the methodologies to be employed.

2.1. A brief history of Efficiency Market hypothesis

Discussions about the concept of efficient markets are an old one and dates as far back as the 18th century with the pioneering thoughts of Regnault (1863), in a book titled "*Calcul des Chances et Philosophie de la Brourse*". In this book, he indicated that there was a correlation between efficient market hypothesis and the random walk hypothesis. The study emphasized that the more you kept a security, the more you could have more returns or loses from the security because of price variations. This is explained by the fact that price changes are directly proportional to the squared root of time.

History also makes references to the outstanding works of a mathematician, Louis Bachelier in 1900. In his analysis "*Théorie de la speculation*" he applied probability theory. His work had little relevance and was ignored because it was ahead of time, until the 1950s when financial economist introduced the use of probability theory and statistics to model asset prices. Five years later professor Karl Pearson a fellow of the Royal Society in this book Nature (Pearson, 1905) introduced the term random walk. Finally Fama (1965) explained that the awareness that prices adjust to new

information implies that they move in a random walk. In the 1960s and early 1970s the debate focused on the extent to which changes in prices of the security are objective of each other or if market prices respected a random walk theory. Fama (1965) carried out a test to response to this question of randomness in the prices of securities, he acknowledge that prices of securities are in deed random. Fama goes further to attest that the evidence of the EHM is very strong and significant and cannot be ignored. Demonstrating that markets are efficient using evidence from the stock market. H.Roberts dived market efficiency into the semi-strong and weak form; E. Fama expanded this division in 1970. Still in Fama (1970) he did not only explain the two forms of market efficiency he equally added one form to the existing one which he call the strong –form EMH and suggest to carry out market efficiency analysis using asset pricing tests. During this period this concept of efficient market hypothesis was known among the academics but professionals had tittle knowledge on it. After B.Malkiel published a book with tittle "A Random Walk down Wall Street" the concept of EMH was now spread to professionals, this is according to shiller (2003). Some researchers like Black (1986) notices that they was a difference in January stock earnings when compared to the other months .His studies show that, the stock earnings were more higher than in other months and that this could not be clarified only with basic knowledge. Consequently he defined the "noise trader"[2]. Noise traders can exert a lot of effects on prices, at the marketplace.

Today, the concept has taken centre stage in prominent finance literature discussions. The concept has had global acceptance and recognition amongst scholar (Cheung & Coutts, 2001; Smith et al, 2002; Nisar et Hanif, 2012; Maxim et al, 2013). This group of researchers used different markets and different methodologies to investigate market efficiency.

Eakins & Mishkin (2012) described market efficiency as a situation, where the available information reflects the nature of prices. Thus, in such a market,

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[2] Noise traders are investors who make buying and selling decision without making use of fundamental data.

uninformed investors purchase different portfolio, at same market prices will have a fair rate as those obtained by experts.

The most common definition of efficiency is the availability of information to users and how the users handle that information. EMH is the proposition that markets are efficient, meaning prices in the market reflects the true economic value of the security and prices rapidly adjust to any new information. It is not just about the type and basis of information but also the worth and how rapid it is reflected in stocks prices. The more information reflects prices of securities the more efficient the market becomes. The theories of EMH is very controversial and of particular important for the financial economist. Here efficiency of the stock, bond or property market is related to the informational market efficiency and hence the EMH. In another words, efficient market hypothesis implies that there are no excess profits, stable equilibrium conditions. Stocks are being sold at their fair value; any security be it stock, or property cannot be undervalued or over value. We have to note that EMH is not all about information but also any future expectations like earnings or dividend payments.

The hypothesis is based on some preconditions. According to Fama (1970), the prerequisite or requirements of market efficiency are ;

 i. Free transaction cost in trading securities.

 ii. Availability of information to potential and actual investors at the marketplace

 iii. Everyone approves the effects of existing information for the market prices and the future distribution of market prices without complaining

 iv. Investors freely react and quicker to new information causing market prices to adjust accordingly.

In actual, it may be difficult to find a market that justifies completely the above-mentioned situations.

2.1.1. The Three forms of the efficient market hypothesis

Considering the definition of an efficient market as seen above, it is thus, important to proceed to the various forms. According to the American economist, Eugene Fama (1970), there exist three major forms of efficient market; the weak, the semi strong and the strong form. The subsequent paragraphs will be dedicated the explanations regarding forms.

I.   Weak form.

Weak form efficiency implies that there is no way investors can use technical analysis to get abnormal profit. Given that all security market data is incorporated in to security prices, investors cannot use only technical analysis to get abnormal returns. This means we cannot look at past data to predict future price changes of any security. The EMH in its weak form is connected with the Random walk hypothesis (Fama,1970). Future prices cannot be forecasted by analysing previous prices in weak form efficiency. Investors in such a market cannot make an excess return in the long run by using investment strategies based on historical share prices of other historical data. There is no pattern to asset price; technical analysis can't guarantee any abnormal returns to investors. Prices in the weak form market efficiency follow a random walk. There is huge literature in finance dealing with the weak form of efficiency.

The test for weak form test can be classified as:

- Statistical Test for independence of prices, rate of returns. In our explanation of the weak-form EMH, it is indicated that the weak-form EMH stipulates that prices/ rate of return of a particular market are independent from each other. Given this hypothesis that prices are independent from each other the following test are deem necessary to assess the weak form market efficient. Examples of these tests are autocorrelation tests, variance ratio and run test. Alexakis (1992) explained statistical tools like Dynamic regression; Spectral analysis and runs test to be employed to detect patterns in price changes.

- Trading tests: Here, past returns can't suggest future results, implying traders follow a random pattern. Example of a trading test is the filter rules, which demonstrate that after the transaction cost; an investor can't receive any

excess return. The most significant in the field of mechanical trading rules is the work of Alexander (1992).

Studies like that of Nisar and Hanif (2012) employed a set of statistical tests; which are run, autocorrelation, unit root and variance ratio test to investigate the weak – form of efficient market hypothesis for four stock exchange market. Data applied was on a monthly, weekly and daily basis for the period of 14 years (1997-2011).

Clark (2005) in testing for weak form market hypothesis suggests a non –parametric test of market efficiency for an emerging stock market. The study uses two tests; run-test and Autocorrelation function tests (Augmented Dickey -fuller test) to bring in a more perfect conclusion about EMH in emerging financial markets.

Shaker (2013) used autocorrelation (serial correlation) and variance ratio test to investigate the weak –form of efficient market hypothesis for Finnish and Swedish stock markets. Other studies, like the Essay of UK, (2013) test the weak form efficiency, using the Chinese market; explains how the test for weak form efficient market can be attained. This search choose the testing sample of stock price with weekly frequency covering 17 years from 1992 to 2009 including both Shanghai and Shenzhen stock exchanges .The methodology employed to get a comprehensive outcomes consists of serial correlation for efficient test, that is unit root test and run test, which aim to investigate the validity of random walk hypothesis in Chinese capital market.

Ananzeh (2014) emphasise on the use of parametric and non-parametric tests in order to investigate the weak form efficiency .His test was on the Amman stock market returns to examine the randomness of stock price for this market. His study, employed the Jargue –Bera test to indicate evidence for normality on the daily returns of the Amman stock market. The study showed that they are not normally distributed and the run test was used to detect that the daily returns are inefficient at the weak form .In addition Ananzeh used the unit root test to suggest that there is weak form inefficiency in the return series. Still in 2013, Jeboisho in his study to test the weak –form efficient market, used goodness of fit test, run tests and Autocorrelation tests.

Conclusively, the most widely used method, is the model of Clark (2005) ,that is, the run test and autocorrelation test, to detect weak-form efficiency in the situation of stock markets.

II. Semi-strong form

This form of EMH implies that prices in the market reflect or incorporate all public available information e.g. information about a company's earnings, money supply, announcement of dividends, Inflation rates, etc. it is not possible for investors to acquire abnormal profits based on fundamental analysis. In the semi-strong form, the market's reaction to new important information should be instant and unbiased. Investors cannot anticipate before the announcement. Semi –strong form also include all past price that is considered in the weak form beside other information as listed above. To test the semi-strong form, the sample size is very important and the researcher has to measure how quick the stock prices can adjust to the information broadcast

Assuming that the Semi –strong form test, tells if markets reflect all public available information. We are going to state important points necessary for the semi-strong market efficiency as follows;

- Event test: An event test analyses can be used to analyzed both the security before and after the even such as earnings. An investor will not be able to acquire above average return by trading on an event. This is to test market reaction to news (Alexakis.C. 1992)
- Time series analysis and Regression Analysis: A time series predict returns based on historical data. Alexakis (1992) explain semi-strong form testing method is to examine the price responses to announcements though to be relevant to stock returns. Alexakis concluded that some researchers used independent variable, such as money supply announcements to try to see if stock returns react indeed to unanticipated changes of money supply announcement and if any possible trading rules can be extracted from the test performed.

Stefan (2009) explains how we can test the semi-strong form of EMH. First he assess the relationship between price volatility and frequency of news items for each 30

component stocks of the Sand P index to determine which types of stock are more price sensitive. The search goes further to calculate the stocks net returns relative to the market over a six month period prior to that of the study (From 30 July 2008 to 28 January 2009).

III. Strong form efficiency

This implies that all information is absolutely incorporated in the asset price. No participant can earn abnormal returns by using any information be it public or private. No profit can be made because of insider information. Insiders do not know how prices are going to reflect .For example in basic stocks trading, its a game of good or bad news. This depending on the sales report, announced .The good news or bad news regarding of sales report are directly related to stock price. Basically if the sales reports are good or the profit reports are good in theory the share of that company should go up. But if the share prices of a company are bad it indicates that the share prices of that company will go down. For example, take a hypothetical example where the CEO of a company by name Joe sees the latest sales report and he notice that the company is doing great and tells his Friend Toh without announcing to the public, Toh buys the shares before news reach the market about the great sales report of the company. If Joe decide to announce the great sales of the company to the public and the share price goes up. Toh will get rich quick. In a perfect efficient market this situation cannot hold because investors learn information instantaneously. Nobody can earn money by using information such as the sales report (inside information is useless)

In testing for the strong form, the research has to focus around the set of investors and the availability of excess information. Theses investors are categorised as follows;

- Insiders: Those who detain privilege information generally referred to as "insiders". Such individuals like senior category of managers have access to such information. Securities and Exchange commission (SEC) rules completely reject the using of this information to realize abnormal returns.
- Exchange specialist and exchange specialist recalls runs on the orders for a specific equity it has been found however that exchange specialist can achieve above average returns with this specific order information

- Analysis on the equity market demonstrates if an opinion could help an investor attain excess returns

Table 2.1: Summary of the three forms of EMH

Form	Information reflected	Analysis ruled out
Weak	All past price and trading volume information	Technical
Sem-strong	All public information	Fundamental
Strong	All private information	Any

2.1.2 Are stock markets efficient?

Behavioural finance in the last times constantly, challenged EMH with the claim that markets are not efficient. Behaviour finance does not support the idea shareholders are always rational as seen in the efficient market theory. To them, many shareholders may demonstrate irrational behaviour. Many investors react differently to the same peace of information and there is also a means that investors may disagree on the future sharing of returns. Some investors may over react or under react when face with a piece of information on stock prices, this is unpredictable with EMH. Nevertheless, there are some inconsistencies and behaviours that has remained a puzzle to behavioural finance theory (Fama, 1998). Fama (1998) indicates that so many findings by behavioural finance are at variance with each other; behavioural finance indicates or suggests some irregularities (anomalies) that can be rectified by the EMH. Malkiel (2003) points at the irrationality of investors, which makes the possibility of markets being efficient is very impossible. Faced with such situations, investors will look for means to beat the market. According to Malkiel (2003), markets are efficient if and only if there is significant use of vital information.

Fama (1965) and Samuelson (1965) try to predict future price movement explaining the concept of efficient market as a market with rational profit- maximization

characteristic, information here is available to user. Fama (1970, 1991) established efficient market hypothesis, which is now use and accepted by many researcher to test different empirical examples. In any case, article that confirms the hypothesis there are alternatives that invalidates it.

In 1991 Fama revised his work about the weak form hypothesis. He covered more broad areas instead of testing the past returns. The newly revised weak form was conducted as a "test for return predictability" which also included expanding on predicting return with variables like dividend yields and interest rates.

When investigating on the weak form efficiency in developing capital markets or security market, emphasis is place don liquidity and size. The reasons for this emphasis; Firstly, it considers its data to help bring clarity between autocorrelation (serial correlation) and unit root test. Secondly, markets are usually fragmented based on liquidity levels and lastly, liquidity is strongly associated to efficiency. Liquidity means is highly used to estimate stock returns (Banerjee & Ghosh, 2004).

Graham and Hyun-Jung (2003) conducted a variance ratio test of the random walk hypothesis for European emerging stock markets in 2003. The weekly data were from five countries (Graeece, Hungary, Poland, Portugal and Turkey) and used multiple variance ratio tests to examine the hypothesis test for the five medium size stock markets. A number of the markets rejected the hypothesis (Greece, Hungary, Poland and Portugal) this was because the results had autocorrected errors. Turkey, Istanbul sock market accepted the hypothesis of a random walk. Segot and Lucey (2004) carried out another similar study investigate the efficiency of markets in 7 emerging Middle Eastern North African Stock Markets (MENA), from the period 1/1/1998 to 11/16/2004. The sample price indices were from Morocco, Tunisia, Egypt, Lebanon, Jordan, Turkey and Israel. The test for randomness and technical trade analysis were done to come out with a single efficiency index. A multinomial ordered logistic regression was use to test for the impact development, corporate governance and economic liberalization on degree of weak form efficiency. The result indicates heterogeneous levels of efficiency in the Middle Eastern North African Stock markets. The weak form result in the MENA stock was explained by the difference stock market size. The conclusion was that market is efficient.

After thirty more years of research empirical studies addressing financial markets, the EMH appears more debatable today. Authors such as Hassan & Chowdhury (2008), Uddin and Shakila(2008) support the existence of weak form efficient. Others like Islam and kaled(2005), Alam et al, (2007) ,Mobarek et al (2008) reject the existence of weak form efficiency the daily stock exchange market. Mobarek investigation shows that the daily price of stock do not follow a random walk. Raquib & Alom obtained the same result in 2015.

Research on EMH of emerging markets also has mix results. E.g Cheung and Coutts (2001), Abrosimova et al (2002) finds evidence in favour on the weak form of efficient market. But contrary Lee et al (2001), Smith et al (2002), Nisar and Hanif (2012) observed predictability of stock prices (mostly weak form test). However depending on data results can be contradictory. Mxim el (2013) discover a mixes result as they divide data among two time periods, that is the year 2009 to 2010 & the year 2011 to 2012.This was to compare the efficiency of the market before and after the market crash of December 2012. They have the results are interesting after using the runt test .2009 to 2010 demonstrate that returns were not random but surprisingly 2011to 2012 indicate a positive random walk. Gary (2012) test weak form market efficiency of developing market using the Kolmgorov-Smirnov Goodness of Fit test, Autocorrelation test, Run test, Unit root test, variance ration analysis and Granger c causality indicator. He asserts that, in transitional periods, markets could be weakly efficient. Thus, strongly support the market efficiency.

Smith (2011) worked on 15 emerging European markets test four different methods of variance ratio testing and he questions the effect on returns caused by global financial market crisis of 2007-2008. He found that, the degree of efficiency is unstable across markets; the financial crisis exerted minimal effects on efficiency stock market. His final conclusion was that all 15 European markets were not efficient in entire terms, but some are in significantly efficiency.

Sewell (2011) investigates the history of efficient market and half of his studied support market efficiency. Most of the attacks on the efficient market hypothesis were coming from the 1980s and 1990s. According to him EMH strongly true in spirit. Financial economics identify three separate but interconnected types of efficiencies: informational, allocation and operational. Here efficiency is based on

informational efficiency that is, how efficient is the market (real estate market) as far as information is concerned? Grossman and Stiglitz (1980) demonstrate that for a market to be totally efficient there must be no costs linked with obtaining information or carrying out trades. Jensen (1978), Fama(1991) suggest a more practical definition. Fama(1991), suggests that in an efficient market "prices reflect available formation in such a way that the marginal benefits of acting on information (profits to be made) cannot exceed the marginal costs" he goes further to say that the concept of efficient markets is an application of a zero profits theorem that has been well recognized in economics. The number of theories supporting EMH increased after World War II. Time series of 22 stocks was analyzed by M.G.Kendall in 1953 he stated that stock earnings are random. This result was a surprise to some economies at that time. Later on H. Roberts, A. Larson confirmed that markets are in deed efficient (Sewell, 2011).

Niemczak and Smith (2012) implemented the martingale hypothesis in testing 11 Middle Eastern stock markets. Three sample variance ratio test were applied, and also employed the same test to data obtained for the USA role window was use to track the changes in efficiency the overall results was that most market experience continuous period of efficiency and inefficiency.

In 2014 Phan and Zhou investigated the Vietnamese stock market to detect whether or not weak form efficiency holds for the market, three different statistical methods were used to test for market efficiency of stocks (Autocorrelation test, variance ratio test, and runt test). The result obtained strongly rejects the null hypothesis of a random walk for the entire period of the sample as well as for the first two cycles of the market but the third cycles did not reject the null hypothesis. The third cycle of the Vietnamese stock market (February 24th to July 28th 2013) provided evidence supporting random walk hypothesis in the market .The overall conclusion was that the null hypothesis was rejected and hence the Vietnamese stock market is not weak form efficient. All this indicated that markets are inefficient

Islam et al (2015) also investigated if emerging financial markets are efficient using evidence from the Thailand stock market. These authors use the run test and autocorrelation test to arrive at a conclusion. The result shows that autocorrelation exists on the Thailand stock market return presently and particular during the post –

crisis. The run test demonstrate a rejection of the null hypothesis, The conclusion was that Thailand stock market is inefficient supporting behavioural finance that markets are not efficient.

Habibour et al (2016), investigated the weak form of market efficiency of Dkaka stock. He used the runs test, serial correlation test and variance ratio test method to conduct the test. Habibour concluded that markets do not respond to new information immediately and public availability of information is slowly absorbed .The run test proved that share price do not follow a random walk. This indicated inefficiency of markets.

A good number of modern study in the stock market support the hypothesis of a random walk for example Nisar and Hanif (2012) and Niemczak & G. Smith (2012) suggest after their empirical investigations that markets are efficient but some other factors like price cycles and the nature of the goods in the market can affect the market efficiency not necessarily information, but study like that Fama (1991) and Sewell,2011) saw information as the major factor responsible for market efficiency.

Contemporary studies that support the random walk theory for example, include: Nisar and Hanif (2012), Niemezak and Smith (2012). They go ahead to state that other factors (price fluctuations, type of good) could distort market efficiency and not necessary information. This is in sharp contrast to the conclusions of Fama (1991) Sewell (2011).

2.1.3 Theories relevant to efficient market hypothesis

 Information efficiency in markets can be explained in two groups that is theoretical and empirical aspect. The first part known as theoretical part shows the model in which markets can be consider information efficient. When looking at literature we see that must study considered the real estate markets less efficient compare to financial markets. According to Fama there are theoretical works explaining this concept of efficient market hypothesis. His works were not only empirical but there were some theories. He also reviewed some historical studies and tested the hypothesis by using models such as fair game model, Sub martingale model expected return model and random walk model which are now considered as theories in an efficient markert.

- **The Fair Game Model**

This theory state that a stochastic process X_t with the condition on information set Y_t is a fair game if its realises the following conditions:

$$\varepsilon \qquad (X_{t+1}lY_t) \qquad =0$$
(1)

In situation of stock market Fama (1970) derives a model of EMH from the Fair Game Property for estimated returns and expressed it in the following ways

$$x_{j,t+1} \qquad =p_{j,t+1} \qquad — \qquad \varepsilon \qquad (p_{j,t}+1Y_t \qquad),$$
(2)

With

$$\varepsilon \qquad (x_{j,t+1}lY_t \qquad) \qquad = \qquad \varepsilon[\qquad p_{j,t+1} \qquad — \qquad (p_{j,t+1}lY_t \qquad)]$$
(3)

Where $X_{j,t+1}$ is the surplus market value of security j at period t+1, $p_{j,t+1}$ is the real price of security j at period t+1, and $\varepsilon(p_{j,t+1}lY_t$), is the anticipated price of security j that was estimated at period t , based on the information set Y_t.

$$W_{j,t+1} \qquad = \qquad r_{j,t+1} \qquad — \qquad \varepsilon \qquad (r_{j,t+1}lY_t \qquad)$$
(4)

With

$$\varepsilon \qquad (r_{j,t+1}lY_t \qquad) \qquad = \qquad \varepsilon[\qquad r_{j,t+1} \qquad — \qquad (r_{j,t+1}lY_t \qquad)]$$
(5)

Where $W_{j,t+1}$ is unanticipated return for a security j at period t+1, rj,t+1 is the real return for a security j at the period t+1,and $\varepsilon(P_{j,t+1}lY_t$) is the equilibrium predicted return at the period t+1(estimated at period t) based on the information set Y_t.

This model indicates that the additional market value of security j at time t+1($P_{j,t+1}$) is the variance between real price and estimated price ,based on the information set Y_t .Also the unanticipated additional return for a security j at period t+1($W_{j,t+1}W$) is measured by the variances between the real and estimated return in that time this is based on the existing information at period t,Y_t .

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According to the equations above the additional or surplus market value and additional return is zero. Meaning equations (3) and (5) implies that the surplus market value structures $\{X_{j,t+1}\}$ and $\{W_{j,t+1}\}$ respectively are fair games with respect to the information structure $\{Y_t\}$

- **The Sub martingale**

This model is similar with the Fair Game Model but has some small modification in estimated return. Here the estimated return is measured to be positive and not zero as indicated in the Fair Game Model. The positive value indicates that prices in the market are predicted to increase over time. This model can be statistically written as:

$$E \qquad (\qquad \frac{ri-1}{Yt}) \geq Pj,t$$

(6)

$$E \qquad (\qquad \frac{ri-1}{Yt}) = \frac{E(\frac{ri-1}{Yt})}{Pj,t} \geq 0$$

(7)

The sub martingale Model shows that the expected return structure $\{r_{j,t}+1\}$ follows a sub martingale (where knowledge of past event never helps in the prediction of the future event) based on the information structure Y_t. The empirical conclusion of this model is that no transaction rule cantered only on information set Y_t can have larger estimated return than an approach of always purchasing and holding the security for future.

- **The Random Walk theory**

Most of the literature has focused on the random walk hypothesis (RWH), The random walk theory is a theory that indicates or explained that future prices changes are not predictable. That is to say a positive change in the price of a stock on a specific day does not necessary indicate a further positive change or negative change in the following stocks. Therefore prices changes cannot be predicted using history prices or past information. Price modifications have the same distribution and are independent of one other. Jules Regnault in this book titled "Calcul des Chances et Philosophie de la Bourse",1863 was the first to talk on the Random walk theory . Malkiel (1973) in this book titled " A Random walk Down Wall Street" suggest that

stock prices are random making it difficult for investor to steadily beat the market, In 2003 Malkiel also support the random walk model by explaining that price of stocks reflect the available information in the market, meaning that today's price variation would reflects today news and tomorrow's price disparity would reflect tomorrow news. These leads to the conclusion that price are independent of each other and also since news cannot be forecasted prices changes are random.

Fama (1965) denotes that randomness and prices modifications are reliable with the concept of market efficiency. Thus the random walk theory is related to the weak form of efficiency market. The random walk theory is mathematically presented as follows

$$X_{t+1} \qquad = \qquad X_t \qquad + \qquad e_{t+1}$$
(8)

Where X_{t+1} are price of share at period t+1; X_t: price of share at period t

e_{t+1} is random error with zero mean and limited variance

Where, X_t is the gap of the dependent variable, $\propto$ is an idea tern and coefficient of X_{t-1} is equals unity

$\propto$ is included in the model when the mean of the dependent variable is not zero. When the mean is zero it implies that $\propto$ will be excluded from the model. A random walk without drift represents a purely random process that takes a random step away from its last observed value. The Random walk does seem to precisely describe the experimental data for daily and weekly data for the test of market efficiency. Fama and French (1988) admitted that serial correlation do not exist for quarterly and yearly data. The correlation is weak for such data. RWM does not support such long horizon.

Given the considerable amount of empirical studies above, which test the efficient market hypothesis for the financial markets and theories supporting the concept of EMH in the stock exchange markets we can say that large studies focus on the efficiency of stock market. The result of the studies indicates that some markets are efficient. It is interested to know that little have been done when it comes to

investigating efficient market hypothesis in the real estate market particularly using data from an emerging markets.

2.1.4 What is real estate market?

We need to know what real estate market is all about before discussing on the efficiency of this market. Result may dependent upon the definition when reviewing empirical studies.

In economics real estate market can be term as a market where supply and demand for land and building meet and are being traded. They are three major types of real estate property according to Kimmons,(n,d), namely land, Residential and commercial real estate.

According to Real estate market (n.d) the two principal types of real estate are residential and commercial real estate. Where residential real estate (housing market) is the sales and rental of land or house to individuals and families for daily living, and commercial real estate is the sale and lease of property for business reasons.

The result of market efficiency will be different base on whether data collection was on residential or commercial real estate market. Differences in the type, space and time of the property have an effect on judging the efficiency of the market. An empirical study of real estate market commonly focuses on one of the submarkets. Nevertheless some studies can carry investigation on multi submarkets.

2.2 Theoretical argument of information efficiency of the real estate market

Theories related to information efficient of the property market/ arguments explaining their characteristics and why the market (real estate) should be information efficient or not.

- Heterogeneous products. Each real estate has a set of drivers influencing its performance. Uniqueness or non-homogeneity is the concept that no two pieces of property are precisely the same or in the same location, physical structure and financing. The characteristics of each property no matter how small or big differ from those of every other. Information in the real estate

market can be incomplete and complex because of its nature that is location, physical structure and financial differences from other markets

- High transaction cost: In acquiring real estate investments, you are typically subjected to higher costs than many other types of investments. The cost involve are land transfer; legal free and deed registration fee just to name a few. This proves that buying a house cost much more than most transaction. Because of the so many transactions cost that occur relatively infrequent in this market, information cannot reflect fast in this market and prices cannot change immediately as required by efficient market.

- Regulations and strong role of policy: roles governing the functioning of the real estate require special procedures and this regulation differs from countries to countries and from regions to and regions. Price control and security laws affect the market prices and the way changes can influence the markets, in some countries government are totally landowners, landlords or developers. This disparity in laws and government involvement is an indicate that real estate markets operates differently between countries and this may have implications in terms of availability of information as well as informational efficiency of the markets.

- Production lags: The supply of real estate does not respond quickly to changes in the market, this is because of its long financing period. A real estate project takes many months or years to develop to be able to make the product available in the market. The sizes of the project determine the time it will be completed. All these factors slow-movement of information, particularly the prices (Maier and Herath, 2010).

- Other information asymmetries: Individuals are normally more interested in using the property than in the transaction itself (value of the property), Consequently this makes them less informed than the other party in the transaction. Purchasing or seeking for the service of a professional mediator does not automatically resolve the problem of information asymmetry, the agent always product their own economic interests. As a result one can say that prices will rather reflect the interests of the well-informed party involved in the transaction than those who are less informed.

All these difference of property market form the other financial markets like the stock market bring doubt on the strength of the EMH in the real estate market. Others researchers strongly suggest there is needs to distinguish between types of real estate, the countries and regions when evaluating efficiency in this markets. Due to the above difference the results of a particular property cannot be transferred to another property.

2.3 Empirical evidence on efficiency for real estate market

In this section we observed literature in both efficiency and inefficiency of real estate market. The First part of this review will present earliest studies results on real estate efficiency and the second part will constitute currents reviews on information efficiency of real estate markets.

It is important for real estate investors, mortgage bankers, homeowners to understand this concept of efficiency as the housing markets is concern. They also need to know the implications of market inefficiency. There is a good number of studies demonstrating efficiency or inefficient of the market for stock when compare to the real estate market. Be it stock or property market the hypothesis of market efficiency is generally not rejected (Fama, 1970).

Hamilton & Schwab (1985) were one of the earliest researches to test efficiency in the real estate market. Their test was base on the degree to which household in the market reacts to changes in the market. The researches use a cross sectional model to explained the weak –form efficiency in the housing market. Data used was form 49 metropolitan areas of the USA Their findings shows that household systematically make mistakes to include past increase information into their expected future home prices this made them to conclude that housing markets are inefficient.

Linneman (1986) carried out an investigation on the existence of efficient market hypothesis in real estate markets. Linneman's findings was on the individual housing market of Philadelphia from the period of 1975 to 1978, his evaluation of the house value was base on individual assessment of their house value. He also used hedonic

price method for his study. He implements this methodology to the yearly residential appraisal for the Philadelphia standard Metropolitan statistical area (MSA) [3] . Linneman(1986) concluded that excess returns are not enough to cover the high transaction cost associated with transacting residential real estate ,hence the market can be measured as semi-strong form efficiency.

Few years later another Case and Shiller (1989) carried out a test on efficiency or inefficiency of the housing market. Using data form U.S they choose single-family houses of four societies in USA. They also applied statistical methodology of the RWH in investigating single –family residential prices. This study shows advancement in its evaluation of the market when compared to that of analysis of Gau (1984,1985) who tested the weak form efficiency of residential markets using Canada as evidence and reported that Canadian income generating residential markets are efficient. Case and Shiller results did not confirm the presence of weak form efficiency for housing markets this was contrary to the study of Gau (1984,1985) and Linneman (1986). By applying exchange tactics to further proof the absence of the weak form efficiency for US single-family homes Case and Shiller (1989) highlight uncertainties as proof of whether or not housing markets are efficient. In 1996 Kuo use econometrical and statistical methods to supports the result of Case and Shiller (1989). Kuo(1996) confirm that the market for real estate does not follow a random walk and indicated that efficient market estimates are sensitive to different approximation techniques.

Gau (1984) assess the weak form efficiency using data for Vancouver residential and commercial market from the period of 1971 to 1980. He construct monthly price and return series for the property and then test series for weak form efficiency. Gau finding indicated that there are some statistically significant relationships among the monthly series, not forgetting that the relationships are not sufficient enough to generate perfect price forecasts. Gau paper is among the minority which found any evidence of market efficient .Gau(1985) reused his data of 1984 and conducted an

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[3] MSA is know as geographical region that is highly populated and a sound economic background.

empirical test of the semi-strong form of efficiency still of Vancouver real estate market .He tested the speed at which a number of publicly available informational factors were exploited into real estate value. The results indicated that they is no significant indication of abnormal returns related to changes in public informational variables, thus his findings acknowledge that property markets are in deed efficient (Gau,1985.p.26)

In 1990 Case & Shiller take steps further to test the strong form of efficiency by investigating the predictability of excess returns in the housing market. Discovers that housing prices appear to demonstrate serial independence. They results shows that when home values increase in a particular year, it is possible to go up the next year. The authors create a quality-adjusted rent to price ratio, which they test for extrapolative capability in predicting future housing price movements. In all their result appear to corroborate with the earlier studies there did before.

Another study, which is partially similar to that of Case And Shiller (1990), is that of Guntermann and Norrbin (1991) included an estimate of expected appreciation into the tests of market efficiency since the previous study has been using forecasting approach. Data obtained for the research was from January 1970 to September 1981, of single–family residence in Lubbock and Texas using a dynamic multiple indicator, his evidence support inefficiency ex- post and efficient extant because there was serial correlation of the values in the last three sectors for up to six quarters. From the researchers findings there concluded that inefficiency using pass data do not reject the possibility that real estate markets are efficient now.

The test of market efficiency conducted by Evans and Rayburn (1991) assesse the outcomes of school integration decisions may have into in single –family housing prices. The research used monthly mean prices for dwelling unit in Memphis and Tennessee for the period of 15 years. The martingale model was use to detect efficiency in this market. There was an interfered by four decision associated to school integration with diverse characteristics. This study provides evidence of efficiency.

Darrat and Glascock (1993) used monthly data and the vector autoregressive model to re-examines the market efficiency for real estate market. The researchers based their test on real estate returns and a number of significant financial and economic

indicators. The empirical evidence suggest that the real estate market is efficient with respect to existing information on the company production, that is the risk factor, the term structure of interest and monetary base. The study also indicates that market participants rapidly and fully exploit the movements in these variables. Another studies in 1995 by Gatzlaff and Titiroğlu provide evidence that the real estate market segments that is (housing, commercial and land markets) undergoes diverse levels of efficiency. Income property (commercial) markets are reported to efficient more than the housing market.

Another study that support the inefficiency of the housing market carried out in the same year was by Ito and Hirono (1993), they investigate the price, rent and excess returns of Tokyo condominium housing units. Data was collected from sale and rent housing prices. Hedonic regression was used to separately show the effects of several factors on housing price and rents. According to this estimate price increase 85-90% during the year 1981 to 1992 while rents increased about 65% of housing. The result shows that low rents are compensating for by the large expected capital gains and large expected capital gains are not unpredictable with the historical trend. This is reflected in the pricing of housing excess returns calculated by two different methods show significant fluctuation during the same period. Housing investment yields higher returns on average than investment in financial instruments there still exists unpredictability of excess returns from one year to another. This study rejects the weak form efficient market hypothesis. The conclusion was considered uncertain because of the short sample used.

Evan (1995) used statistical methods argues that property market is less efficient than the stock market. He formulated questions on whether property market is efficient and how it operates if it happens to be efficient? After his research he indicated that real estates are heterogeneous in nature. He also noted that they are limited or unavailability of information in this market. Evan's conclusion was that the real estate market is not efficient at all. He goes further to explain the possibility for investors to earn abnormal return in the real estate marketplace more than the stock market.

Authors like Fu and Ng (2001) used statistical method to determine the efficiency of real estate market of Hong Kong. They use Campbell-Shiller log liner present value

equation detect how price react to information. They found that price variation in real estate markets brings a high serial autocorrelation in excess returns. Another discovery was that the excess earnings decrease the return instability and the correlation with excess returns in stock markets. Their analysis pinpoint a collective price modification that retrieves lost information in real estate returns because of inefficiency. They conclude that the Hong Kong real estate market is inefficiency.

More recent research on the predictability of house prices has been carried out by Kleiman et al (2002), The study perform test of the random walk theory for international commercial real estate markets using for the following geographical regions that is Europe, Asia and North America. Two different techniques were employed (the unit root test and the Cochrane variance ratio test) to test the hypothesis. The study also explores a non-parametric run test to detect weak form efficiency in international commercial real estate share prices of the markets. Based on their findings they made a conclusion that international real estate can get benefits from diversification for both short run but for long run. The result from the runs test strongly affirms that international commercial real estate markets are weak form efficient. Another study in the same year was by Gu (2002), he examines spatial markets, his data was from the first quarter of 1975 to the first quarter of 1999 and for all fifty states(that is Columbia) and U.S. Accordingly to Gu changes in all conditions indicate variance ratios of less than one ,showing mean decline. The results from heteroscedasticty-robust variance ratio tests vary across the states when running test statistics for more lags making the statistics test less significant. His research supports the rejection of weak –form market efficiency.

Rahmann (2004) analyze if housing markets of the US, UK and Canada is inefficiency as was the case in the past twenty years. Sample period was from 1983 to 2004; Serial correlation and momentum method were use to analyzed the result. His test shows that the markets are inefficiency in the logic of traditional financial theory. In his observation he fines significant and demanding serial correlation. Rahamann (2004) concluded that housing markets in the three counties are weak-form inefficient and that the different between counties might imply diverse degrees of inefficiency This analysis indicated that inefficiencies has economically important on an aggregate level and post holding period retunes indicate that the inefficiencies

are caused by market frictions not speculation. Policymakers can moderate the conflict.

But Oak and Andrew (2003), provide empirical evidence supporting the weak from market efficiency in hotel real estates markets. The research employed autocorrelation and cross correlations analysis to bring out the result. They finding was that they is little evidence that past hotel prices can forecast future hotel prices in the same city as well as cities around. The null hypothesis of random walk was accepted. The research support weak-form of efficiency market hypothesis in pricing of hotel real estate.

Larsen and Weum (2007) question efficiency of the housing market using data from its capital (Oso). They used time persistence test on a repeated sales model of a house price index and house earning. The data cover the period 1991 to 2002. They investigate how the historical price return can be used to forecast future returns. They concluded that house price data and housing returns contain predictable elements so the null hypothesis of martingale processes was rejected and indication that real estate market is inefficiency supporting Case and Shiller (1984). Also Clayton (1998) test the extend to which condominium apartment prices in Vancouver from the period 1982 to 1994, data was from Canadian quarterly house prices, monthly rents and annual property tax payments for seven different types of housing units in cities across Canada. Clayton concluded that future excess returns of housing are partially anticipated base on currently available information, his empirical result prove strong evidence against market efficiency.

Maier and Herath (2009) used meta- analysis method to elaborate on whether real estate markets are efficient or not . The study look at three aspect the availability of information, price volatility –cycles –bubbles and price dispersion and found that there where mixed result because a good number of researches support the concept of inefficiency in the real estate market and others accept the presence of efficiency in the real estate market.

Schindler et al (2009) test efficiency for 14 national public real estate markets. The research used the single variance ratio test of Lo and Mackinlay (1988) and the multiple variance tests to detect if the real estate is weak form efficient. They explore weekly data of real estate returns form the period January 1990 to December 2006.

The results shows that investors are expected to earn excess returns by using past information in most of this markets. Conclusively weekly-securitized real estate prices reject the random walk hypothesis. Meaning the market is inefficient.

Schindler (2010) demonstrate similar results as Gu (2002). Schindler research was on quarterly transaction-based nationwide indices from 1974 to 2009. The study carry empirical analyses on U.K housing prices using the random walk theory. The test show that price disparity generating process of UK housing market changes significantly from the theoretical model of the random walk hypothesis. The evidence rejects the weak form efficient market hypothesis for the U.K housing Market. The null hypothesis of random walk was rejected based on the use of parametric and non-parametric test to detect whether or not the inefficiency can be used by investors to earn excess returns .He apply technical trading strategies and the result shows that investors might likely generate excess returns from the U.K housing market by using past information, using both autocorrelation and moving average based strategies.

Schindler (2010) investigated on the efficient market hypothesis of monthly return of twelve (Argentina, Austria, Finland, Hong Kong, Italy, Malaysia, New Zealand, the Philippines Portugal Singapore and South Africa) emerging real estate stock markets and four developed market (AUS, JPN, UK, and US) for the period 1992 to 2009 using monthly data. To test for weak form, random walk model was effectuated, the study implore a parametric tests established on autocorrelation and variance ratios and also non-parametric test that is run test for market efficiency in accordance with the RWM. Contrary to the result form the developed real estate market by Schindler et al (2009) the result did not reject the weak-form of efficient market hypothesis for the following emerging real estate markets, Asia Pacific, Argentinian and the South African markets. From a statistical view point prices reflects at least publicly available information and that information flow in these markets through the asset pricing process is working well. Equally technical analysis suggests that investors might be able to generate excess return by using transaction tactics compared to a buy and hold policy but the difference between conditional and unconditioned mean results are weakly significant by majority. It is doubtful if excess return can be achieved effectively or if transaction cost, and other issues influence or significantly reduces excess returns. Therefore the research conclusion was that for a piratical

viewpoint there is no final response to the questions of market efficiency in emerging securitized real estate market.

Devaney et al (2011) investigated the efficiency of the UK commercial property market and the contact between prices, construction and newly supply. Annual frequency data was collated form London over the period 1920 to 2008. They examine if prices are in accord with present values, secondly they apply a structural vector autoregressive model to examine if inventors react correctly to price indicators. The analysis of the London office multiplier series and the corresponding rent series denotes that price are not informational efficient over the period of study. For inventors reaction they found that the rational multiplier and mispricing have an effect. Investors might react positively to mispricing because they want to exploit extra profit opportunities of simple because they have the wrong observation on the long run value of their investments. The authors suggest further analysis on this. The final conclusion was that the rejection of the hypothesis of an informational efficient market does not allow the rejection at one percent level but at five percent level.

Yakie (2016) in his paper use statistical method to investigate the efficiency of residential real estate market for China. His result indicates that housing prices cannot adjust to new information immediately, using autocorrelation and Fisher – type unit toot test based on Augmented Dickey –fuller test he concluded that the market do not observe the weak –form efficiency.

2.3.1 Analysis /Discussion

After discussing the Efficient Market hypothesis in section 2, the question whether markets are efficient is examine. The Evidence that is portrayed in literature is mixed. Some studies generally support that market are indeed efficient while others do not support the existence of market efficiency. The summary from literature can be seen in the table below

Table 2.2: Studies on the efficient of housing markets

Authors	Years	Type of housing	Scale (Local national or international	Geography (US, Europe or Asia)	Developed or Emerging	Type of test (weak ,semi-strong or strong form)	Market Efficiency
Gau	1984	Residential (commercial generating)	Local	Canada-Vancouver	Developed	Weak-form	Efficient
Hamilton & Schwab	1985	Residential	National	USA	Developed	Weak-form	Inefficient
Linneman	1986	Residential	Local	USA-Philadelphia	Developed	All three forms	Efficient
Case and Shiller	1989	Residential	Local	USA	Developed	Weak-form	Inefficient
Evans and Rayburn	1991	Residential	Local	USA	Developed	All three forms	Efficient
Guntermann and Norrbin	1991	Residential	Local	USA (Lubbock &Texas)	Developed	Weak-form	Inefficient (ex-post) Efficient (Ex ante)
Hosios and Pesando	1991	Residential	Local	Canada-Toronto	Developed	Weak-form	Inefficient
Ito and Hirono	1993	Residential	Local	Asia – JPN(Tokyo)	Developed /Emerging	Weak form	Inefficient
Gu	2002	Residential	National	Columbia USA	Developed	Weak-form	Inefficient

Rahmann	2004	Residential	National	USA UK Canada	Developed	Weak -form	Inefficient
Rosenthal	2006	Residential	National	Europe -UK	Developed	Weak form	Efficient
Larsen and Weum	2007	Residential	Local	Europe-Oso	Developed	Weak -form	Inefficient
Schindler	2010	Residential	National	USA	Developed	Weak-form	Inefficient
Schindler	2010	Securitized Real Estate	National	ARG, AUS, FIN,HK,IA,MYS, NZL, PH,POR,SG ZA,and,JPN, UK, US)	Emerging and Developed	Weak form	Efficient and Inefficient

Residential, commercial and land classification are the types of real estate we see in the literature review of efficiency of real estate market .The table above shows that more researchers did they studies on residential housing and commercial real property number few base their test on the efficiency of the land market, most studies is surrounded residential housing.

Majority of the studies assessing the real estate efficiency defines their studies based on different segment of the real estate (residential or commercial). Literature examination on efficiency or inefficiency in table 2.2 above borrows from the idea of Fama (1970) to be able to investigate any form of EMH be it weak, semi-strong or strong form. We can see that more than half of the studies is done in the developed area little have been done to investigate efficient or inefficiency in the emerging real estate market not to talk of the developing markets.

Still in table 2.2 the result summarised are mixed so we cannot say or generalise if the real estate market is efficient or not. Since properties differs from one another with respect to their geographical location.

2.3.2 Relevance of the Study

In all, previous studies look at. if information is reflected in prices, volatility cycles bubbles, excess return. The studies examined so far have mixed and inconsistent result as to whether the real estate market is efficient, thus the need for further research on market efficiency. We can also see that more research is done in the developed world. However this study differs from pervious literature in that it seeks to gain more understanding of the efficient market hypothesis, using real estate data for an emerging economy(Turkey) and for the period of 2003 to 2015. To the best of our inquiry/knowledge, no study exist on detecting if prices of Istanbul real estate market follows a random walk for Istanbul property market. This research will add further evidence on efficiency of real estate for Istanbul housing market. In summary, the above research on efficiency of housing market show that they is no united conclusion on efficiency for this market. Thus, the need for further research is essential for better understanding of the efficient market hypothesis for housing market.

2.4 Research methodology

Based on pervious studies various methods have been applied to test market efficiency like the statistical method of random variable model, the hedonic price model, the vector autoregressive model and Meta analysis method. Most studies use the (Random Walk Model) RWM to do empirical findings on efficiency of the market. This research employs the random walk model using the following tests, which are necessary to attest the presence of randomness (autocorrelation test, the run test and the variance ratio test). Randomness, suggest there is difficulty to ascertain the future returns, thus making the making markets efficient. The methodology adopted in this research is in the spirit of that suggested by Schindler (2010) allowing the joint test for all observation intervals. In line with past studies and since this study is focused on emerging market, it is essential to apply the autocorrelation test of random walk to considers serial correlation and run root test to minimize possible errors.

3. TURKEY'S REAL ESTATE

This third chapter paints a unique picture of Turkish real estate market. The chapter equally gives relevant information regarding the demanders and suppliers, in the real estate market. The chapter again takes a critical look at the development of mortgage market, the challenges as well as the damaging consequences of the recent financial deregulations (2008 financial meltdown or crisis). In attempting to give a balance to this study, and on this section, the study incorporated SWOT (Strength, Weaknesses, Opportunity & Threats) analysis to clarify the level or position of Turkish Real estate market.

3.1 Overview of Turkish Economy Outlook vis-à-vis and the development of Turkey's Real estate

As per the report from World Bank in 2016, the strength of Turkish economy (largeness) is evaluated at the 17th position globally and in her continent (Europe), evaluated at the 6th position with a huge population of close to 80 million and a current GDP of approximately, 730 USD billion. The economy demonstrated a solid performance after the financial crisis of 2001 and after that, growth was promising. The par of real estate is 19.5% of her GDP, thus, offers huge unexploited business or investment potentials. The unprecedented (rapid) growth of her population, has triggered a continuous request or demand for landed properties. Such a demand is even on the rise, as houses reflect things of first importance (World Bank, 2016).
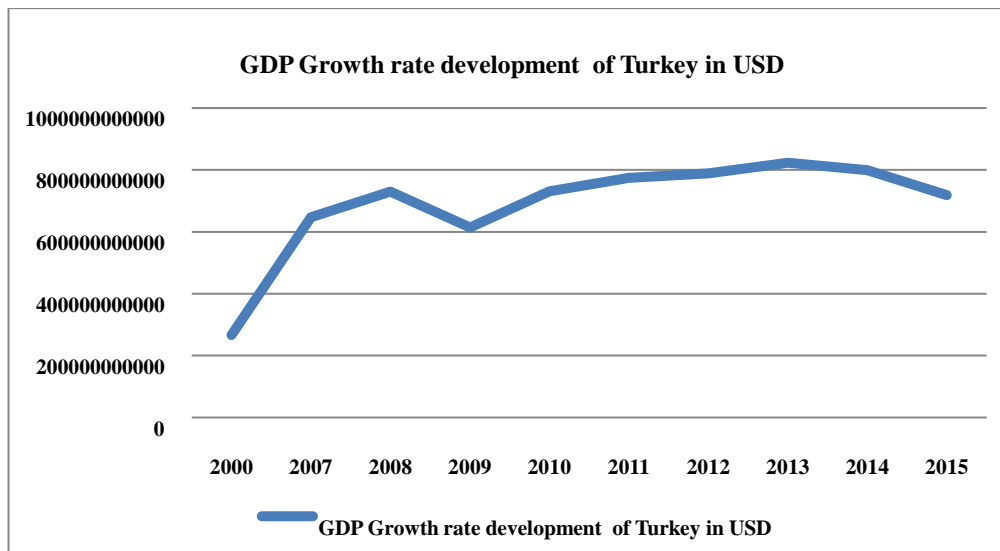
Figure 3.1 GDP Growth rate development, 2000 - 2015
Source: World Bank Database(2015)

According to figure 3.1, Turkey has witnessed a huge economic transformation over the past decades. The study of Ciller (2007), disclosed the advantageous position of Turkey's real estate, thanks to her geographical location, population growth, growing GDP per capita, extensive urban development (renewal) and the existence of power for the construction sector. The study (Ciller, 2007), was very enriching as regards exposing Turkey's potentials. In year 2000, the GDP share of the real estate sector, went up by 2.3% and in 2012, it witnessed an increase of 3.8%. As regards construction, real estate and the sales of new houses, their share to total GDP increased by 16.7% from 2000 to 2005. Between 2006 and 2009, the highest increase was recorded. The definition of World Bank for surface areas is 783,560 sq.km (World Bank Data, 2016).

According to Ciller (2007), Turkey as a developing country has experienced massive development in housing and commercial market after the financial banking crises in 2000- 2001. In the early 1960s the construction industry was considered one of the device of economic growth in Turkey due to massive increase in population, natural disasters and also movement from rural to urban area. A severe earthquake in 1999 paused construction for three years in Turkey. 2001 financial crisis was another interruptive factor that slow down the development of real estate market in this country. Nevertheless, Turkish residential and commercial market has a significant growth rate since the most recent economic crises of 2001.

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Turkish industry has been one of the world fastest developing Real Estate markets, because of its economic growth and promising demographics in the 2000s FESSUD, (2014). The Housing Development Administration (HAD) establish in 1984 undergone various projects of mass housing and landscaping from the mid-1990s and acquired significant momentum since 2002. It provide loans for constructions and about 85% of the total amount of loans provided by the HAD have been taken by co-operatives. Co-operatives provides loan to individuals who purchase housing units that the cooperatives have constructed. Housing by HAD in 2003 to 2012 stood at 562000 dwelling units, this accounted nearly 11 % of all national starts of housing during the same period[4]. Since 2001, they have been a great growth in Residential, office and commercial properties of the Turkish real estate sector. Turkey's geographical location, population growth and demographic advantage, the increase in income per capital wide urban renewal and development, large capacity and power in the construction sector etc are the drivers of the Turkish real estate sector. The real estate sectors share in the GDP increased by 2.3 % in 2000 and by 3.8 % in 2012.The average share of construction new home sales rental and commercial activity in the GDP increase by 16.7 % between 2000 and 2005,The sharpest increase was observed in-between 2006 and 2009 with 20.5 %.

By 2002, the Turkish Property Market, was opened to foreigners (foreign investors), though they were legislated to purchase properties in particular areas. Furthermore, the existence of "reciprocity clause" hampered full acquisition of properties by foreigners. The clause stipulated, that the right to purchase a house in Turkey by a foreigner was given only to those countries that allowed Turkish citizens oversea to equally purchase buildings in a foreign land. In this line, such rights were granted to Britain, Germany, the Netherlands, to name a few. By 2005, area limitation was uplifted, but the reciprocity act maintained, until 2012, the reciprocity act was in force. In August 2012, the Turkish government to give foreign investors the wide margin to purchase properties in Turkey stamped out, the reciprocity act. Summarily,

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[4] http://www.gyoder.org.tr/img/mc-content/20131023104456_2835roadshow2012_gyoder.pdf

in 2012, nationals of 183 countries were thus, permitted to purchase properties in Turkey (Gyoder report, 2015). The size of land foreigners could purchase was increased from 2.5 hectares to 33 hectares. According to Investment Support Promotion Agency of Turkey (ISPAT), because of the relaxation of these restrictions, Foreign Direct Investment (FDI) inflow went up to $ 12.5 b, in the year 2012. With this increase in FDI, construction and real estate received close $ 1.6 b. in 2015, the figures went up; FDI stood at $16.5 b, while construction and real estate went up to approximately $ 4 b.

By 2012, there was significant progress in the construction and real estate sector; construction licenses stood at 225000 while occupancy permits were at 1777000. The total number of houses sold stood at 290000. The introduction of real estate investment funds in the beginning of 2014 remains instrumental, as one of the striking developments in the real estate sector of Turkey. Market players did not establish the funds for a prolonged period of time due to several requests. The revision of the capital market Board's regulation to date has established several funds that are ready to invest in real estate. It is anticipated that this new investment instrument will invite more foreign investors to the market. As at now, there is huge progress in the development and setting of new targets; as seen in the urban expansion and mega projects like Marmaraay, Kanal Istanbul, and the third Istanbul airport. The government has put every effort to energize the real estate sector.

According to Deloitte report (2014) Turkish Real Estate industry offers many opportunities to local and international participant. During 2002, FDI inflow in Turkey was weak but increase as investors began to see reason to invest in this area. In 2007 FDI reach a record level of $ 22.0464 b and 13% of the amount was real investment as seen in figure 2 below.
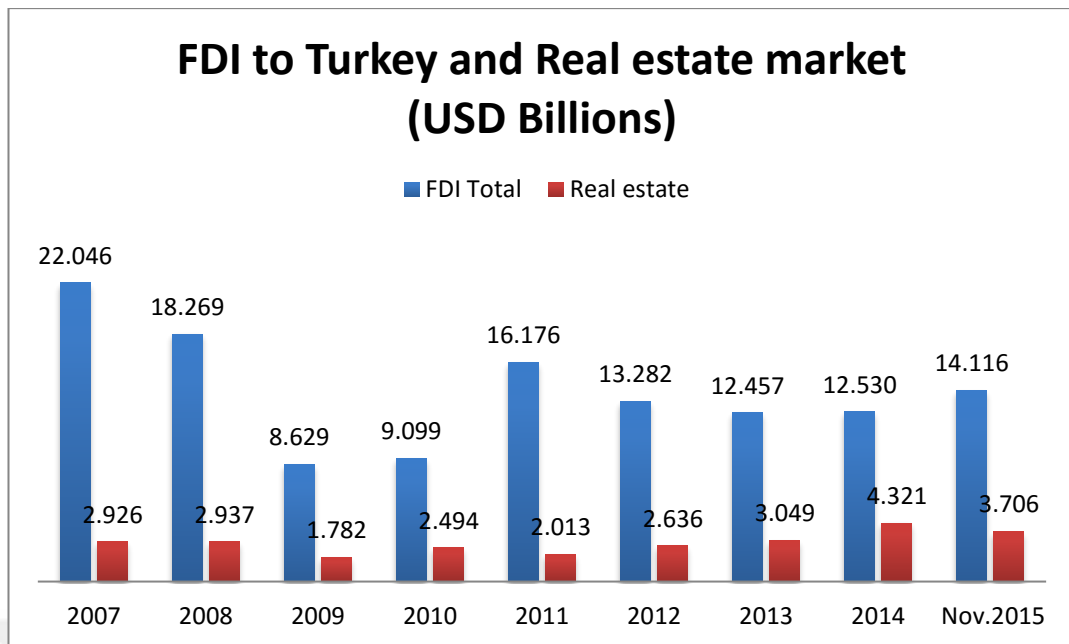
Figure 3.2: FDI to Turkey and Real estate market from 2007 –November 2015

Source: Central Bank of Republic of Turkey (2016)

As shown on figure 2 above, the drop of $ 1155 in FDI, in 2009, when compared to the damaging effects of the financial crisis explain the drop in 2008 figures. In 2011, FDI began to increase. Paradoxically, real estate investment registered a decrease evaluated at $ 2.013b as compared to $ 2.494b in 2010. Turkey recovered from the financial crisis and continued to attract foreign direct investment in 2012. In 2012, FDI rose to 13.282 when compared to 8.629 b in 2009. Real estate also went up to $2.636 b, when compared with 2009 figures, which was $1.782 b.

As a result, the removal of the reciprocity law, witnessed a dramatic increase in the real estate sector; foreign ownership of building stood up to 7%, equivalent to $2.636b, in 2012. Between 2012 and 2014 for example, the real estate sales to foreigners increased by 10%.

3.3 Supply and demand in the real estate market

With respect to market demands, the Turkish Real Estate sector (market) can be regrouped as;

- Residential / Housing Real Estate Market
- Office Real Estate

- Retail Real estate
- Logistic real estate

3.3.1 Residential / Housing Real Estate Market outlook

Housing and Residential real estate are property purchased for individual use mostly housing for families. Residential real estate sector is pivotal in Turkish real estate industry and most housing in Turkey is provided by private developers, public or quasi public (cooperative), private organization. The increase in population and other factors like natural disaster, industrialization, migration from rural areas to urban areas and the renewal of existing houses are the principal determinants that affect the housing requirement in Turkey. After the crisis in 2001, the number of residential building construction demonstrated a massive increase. In 2000 there was 13.6 million houses in Turkey and 38 percent was constructed without a license, according to construction permit housing has increased much between 2002 to 2006 in terms of residential units and total area. Average per m^2 value of their certified houses reached 318USD in 2006 in 2002 it stood at 164 USD, reflecting together the appreciation of the construction inputs and real estate prices. There has been rural exodus (movements from royal areas to cities). This has registered a 5% decline from 2005 to 2012. This increase is translates acute shortage of houses, thereby demanding for more houses. For example, 77% of the constructed buildings were residential houses in 2005. Istanbul, Ankara are estimated to be one of the most populated cities in 2023. Closely following these two major cities, are Izmir, Bursa, Antalya, Sanliurfa, Adana, Gaziantep, Konya and Kocaeli. In 2013, housing development administration of Turkey constructed approximately 620.000houses in 800 different towns around turkey. By the last quarter of 2008, the total housing stock in Turkey amounted to about 16.8 million apartment units.

According to Turkish Statistical Institute report (2016), the aggregate number of apartment unit sold in Turkey in the second quarter of 2011 increased by 18%, when compared to 2010 of same period.

According to the Ministry in charge of Environment and Urbanization, there are up to 19 million residences in Turkey as of 2016. Despite this huge availability of residential houses, there is still a latent need for more houses. Furthermore, its anticipated that approximately 7 million residential units nationwide will be

destroyed and reconstructed over the next 2 decades. This puts the average demand figures for houses per year at 600,000-650000 units. The figure below clarifies these deficiencies;

Table 3.1: Residential market supply (2014 to September 2016)

Construction permits, January- September 2016				Ratio of change (Previous year)	
Year Indicators	2016	2015	2014	2016	2015
Number of building	94015	89577	110984	5.0%	-19.3%
Floor area (M^2)	143514251	135263868	175969522	6.1%	-23.1%
Value (TL)	1278146876 22	1144319132 92	1397452613 52	11.7 %	-18.1%
Number of dwelling unit	692136	640130	825590	8.1%	-22.5%

Source: TURKISH STATISTICAL INSTITUTE (2016)

In figure 3, we compare the first 9 months with the previous years; it is noticed that the aggregate figures for buildings, number of dwelling, value and floor area went up by %5, %8.1, %11.7 and %6.1 respectively. Furthermore, with respect to the nature of the investor, private sector had the highest sector share of 121.1Million Metres Squares and closely followed with 19.7 million Squares for the public sector. Construction cooperatives registered 2.7 metre squares. The number of housing units stood at a total of 6 92.136 dwelling as of September 2016, 637936is from the private sector 43,868 by public sector and 103331 the dwelling units is by construction cooperatives. Istanbul has the highest share floor area with 27.5 million m2, followed by Ankara with 12.6 million m2 and Izmir with 36 918 units. Hakkari, Şimak and MuŞ are province with the lowest dwelling units.

Table 3.2: Occupancy permits, January September 2016

Year Indicators		2016	2015	2014	Ratio of change (previous year) 2016	2015
Number of building		76185	78374	96381	-2.8%	-18,7%
		1009685	10123441	11361399		
Floor area (M2)		28	1	6	-0.3%	-10,9%
		8977092	84413834	88489882		
Value (TL)		488	436	236	-89.4%	-4,6%
Number of dwelling unit		504814	521889	574621	-3.3%	-9,2%
Source: TURKISH STATISTICAL INSTITUTE(2016)						

Number of building given occupancy permits decreased by 2.8% as of September 2016 when compare with the previous year, number floor area of building, value of buildings and number of dwelling units drop by 0.3% and 3.3% respectively. The total amount of floor area realized as 101.0 m^2 and 57.7 million m^2 of it completed as residential building 24.5 million m^2 of it realized as non-residential building and 18.7 million m2 of it realized as common used area. Concerning the type of investor, private sector had the highest share with 87.6 million m^2 follow by the public sector with 10.9 million m^2 and construction cooperatives with 2.4 million m^2 respectively, not forgetting the number of dwelling units where 504814 dwellings, 462,628 of it was by private sector 30832 by public sector and 11342 by construction. Istanbul with the highest shares of 113291 units, the second is Ankara with 38857 units and third is Izmir with 32296 units. Ardahan, Hakkari and Şimak are provinces with the lowest dwelling units.
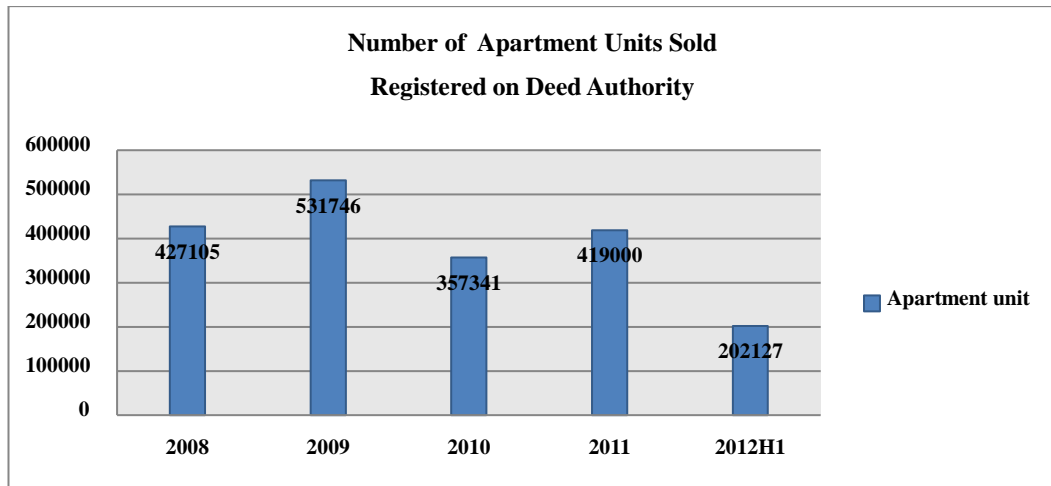
Figure 3.3: Housing Sector ;Effective Demand Comperatively Higher Annaual House Sales

Source : Turksat(2013)

At the beginning of 2009 number apartment sold increase when compare to 2008 by 1064641 housing unit. Further more we see that there is a decrease in the number of housing unit sold in 2010 when compare with the previous years and after 2010 the housing sales start increasing.

With respect to the housing price indicator in Turkey the residential prices have amplified at 93 percent during the last five years and the Istanbul residential market stood out with the highest increased. The figure below demonstrates the increase in the house sales in the past three years .All the figures are in billion TL
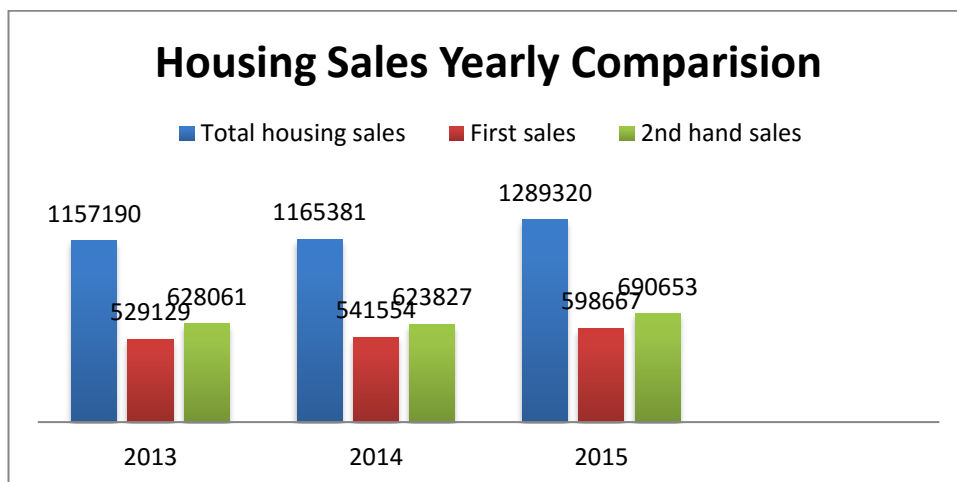
Figure 3.4: 2013 -2015 First and second hand housing sales comparison

Source: GYODER ((2015)

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In figure 3.4 above we notice an increase in total housing sales for the last three years in both first sales and second hand sales. The Mortgage sales of 2013, 2014 and 2015 stand at 460,122, 389,689 and 434,388 respectively. The housing prices went up significantly, in real terms, while real estate construction cost did not change very much, in this period. Also, mortgage sales for Istanbul as compared to the rest of the country declined over these years. This fall indicates growth in qualified number of housing projects in other counties of Turkey (Collier, 2016).

Updated data, as at the first half of 2015, indicate a direct link between interest rate and housing loans in Turkey. Interest rates on housing loans have improved, through out 2015, to about 1.1% per month. Nevertheless, the housing loans interest rates started increasing in the last quarter of 2013, and there are indications the upward trend would continue. As pointed out by the report of GYODER, in 2016, where there is a constant growth in the mortgage market.

Housing loan in Turkey indicates that there is direct relationship between the interest rates and the volume of housing loans. There is and increased in housing loan as shown by figure 7 above. As of 2015 throughout was a housing loan balance of 132.6 billion USD in Turkey; this balance represents 9.5% of total loans.
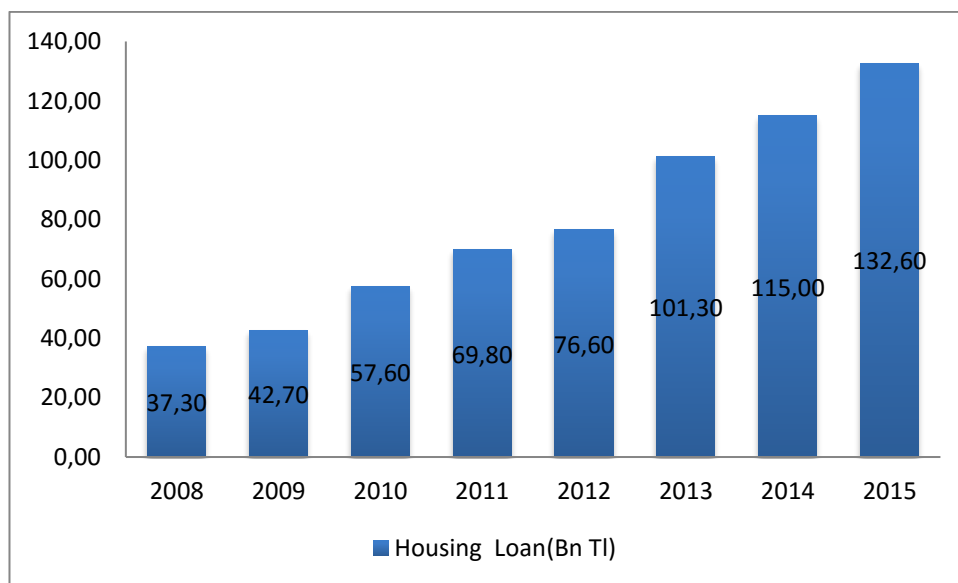
Figure 3.5: Housing Credits

Source: GYODER, March 2016

Housing loan in Turkey indicates that there is direct relationship between the interest rates and the volume of housing loans. There is and increased in housing loan as shown by figure 7 above. As of 2015 throughout was a housing loan balance of 132.6 billion USD in Turkey; this balance represents 9.5% of total loans.

3.3.2 Office Market

Office real estate is a property that is business focused, that is a property that is sold, leased or used to achieve a set business objective. The growing demand for offices is strongly correlated with the increasing presence of multinational companies, establishing their regional managements as well as operations. In assessing the office market in international standards, one of the categories used is Central Business District (CBD) and outside Central Business District. We also have A[5] type and B[6] type offices as another classification, CBD defines the areas where A and B type building of international standards are concentrated. The main office markets in Turkey are Istanbul, Izmir and Ankara with 2.88 million, 400000 and 85000 squares meters associated to type "A" office space respectively. Class A office are anticipated to hit 6.5 million square meter by the end of 2017 with the completion of projects like the Istanbul Finance Centre in Asian side. The most developed and more similar to international standards is Istanbul market. The office market has been developing since 2002 as investments from abroad and large national industries grow in Turkey. There has been an increase in office stock in the year 2002 to 2008 with a compound Annual growth rate of 10.7 percent. In both short and midterm, office in Istanbul will offer higher yields and challenges than many saturated markets. Increasing demand for Istanbul office market both from local and international investor. In 2012 office construction licenses across Turkey, saw a dramatic increase of %27. Istanbul is the focus for office market; we will thus, look at the demand and supply of Istanbul office instead of Turkey.

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[5] Class A properties means the highest quality building in the market and area .There are mostly new buildings within 15 years and with top services .They professionally well managed

[6] B class is older than class A properties, have lower income tenants and might or might not be professionally managed.

The high demand for office has lead to the demand for better accommodation and upgrades existing establishment and has also help keep rental rates stable, as more high quality office space has come online. For Jones Lang LaSalle- a firm established for global real estate, after topping at about 40 euro per sq meter in 2008 when supply was tight major rent levels for office have stabilized at around 35 euro per sq meter services.
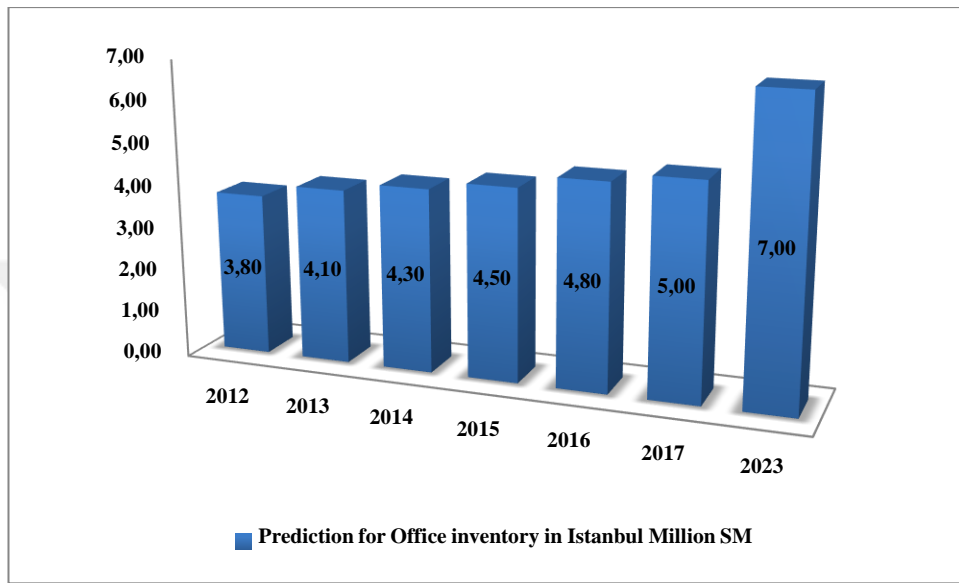
Figure 3.6: Demand: Office Market ;Istanbul Needs New Office Investment

Source: GYODER (2016)

Supply

According to Collier (2016), regarding the office stick of class "A" buildings in Istanbul, has increased by 3.2%, when compared with the level of the third quarter of 2015. The supply table below makes clarity between the existing stock and average vacancy rates.

Table 3.7: Supply of existing stock and average vacancy rates

	Class	Total Office Area (sqm)	Average Vacancy Rate (%)	Average Rent (USD)
Asia	A	791,527	22.50	22.01
	B	275,221	11.56	14.42
Europe	A	1,723,298	26.48	31.70
	B	474,636	16.51	18.51
Istanbul	A	2,514,825	25.23	25.24
	B	749,857	14.69	15.78
Source: Colliers International (2016)				

In the first quarter of 2016 average vacancy rate of Istanbul stood at 25.23 percent and 14.49 percent for class A and B respectively compare to 21.19 percent and 16.01 percent of the first quarter of 2015. Average rent in first quarter of 2016 was 25.24 USD and 15.78 USD for Class A and B respectively in Istanbul.

3.3.3 Retail Market

Retail real estates are properties used fully to market and sell consumer goods and services. There involve shopping centres. There's been significant growth in the retail market for the past years. In terms of revenue the percentage of organized retailers in retail market has went from %28 to %38 for 2002 and 2008.The share of modern retail within retail market differs by years based on economic growth, increase in personnel income urbanization and changes in lifestyles. According to the fundamental notion regarding economic and social development in Turkey the increase in modern retail market share will continue to increase until 2023. As a choice for commercial property investors, high yielding shopping centre remains the best option. The aggregate space (leasable), in 2012, reached 8.2 million square metres across Turkey. This was explained by the increase in the domestic demands for shopping centres. By the end of 2014, there were 319 shopping centers in Turkey with a leasable area of close to 9.218.82 Squares metres. Ankara and Istanbul represented up to 55% of the total shopping centres, Izmir with 4% , Bursa and

Kocaeli with seventy shopping centres of the entire shopping centres in the republic of turkey.

In 2015 during the last quarter household final consumption expenditure expand by 4.7 percent at constant price. In the same year the overall private demand was more strong compare to other figures of the previous years, According to the Turkish council of shopping centers shopping centers sales per leasable area has reached to 644 TL sqm amplified by 9.7 percent by the first quarter of 2016, with respect to the previous year's same quarter.

Shopping center supply reached to 10.5 million sqm with the opening of 1 shopping center, increasing the total number to 356 in Turkey with the release of 2015 population statistic. There is a strong demand from global investors to shopping center market. 33 percent of the average of the total shopping centers inventory belongs to global investors.

Supply

Colliers international Turkey reports (2016) indicates a continues and strong growth in the shopping centre sector across the turkey. According to the report, by the end of 2016, 36 more shopping centres would be opened.

Table 3.4: Cities According to Gross Leasable Area (sqm/100 person)

Cities	Population	Current stock No of Shopping Centers	%	Total Leasable Area (sqm)	%	GLA (m2/1,000 Per person)
Bolu	291095	4	1,16	88268	0,85	303
Istanbul	14657434	117	34,01	4093753	39,26	279
Ankara	5527057	33	95,9	1430442	13,72	271
Kocaeli	178005	11	3,2	319049	3,0	179

City	Population	Number	%	Leasable area	%	
	5				6	
			2,9		1,4	
Muğla	908877	10	1	151921	6	167
			0,5		0,3	
Karabük	236978	2	8	39448	8	166
			0,8		0,4	
Kırıkkale	270271	3	7	44039	2	163
	193183		2,0		2,6	
Gaziantep	6	7	3	279393	8	145
	228845		3,7		3,1	
Antalya	6	13	8	327912	5	143
	134105		2,0		1,1	
Kayseri	6	7	3	191590	84	143
Turkey Toatal	787410 53	344	100	10426174	100	

Source: Colliers international (2016)

As of first quarter of 2016 there were 344 shopping centers the whole Turkey. Total leasable area of at 10,426,171 sqm same period, considering this figure they is estimate of 11,811,986 sqm by the end of 2016. Bolu city an important midpoint between the capital of Turkey Ankara and the largest city of Turkey Istanbul has the highest leasable area per head with a rate of 303 sqm per 100 inhabitants. According to the previous year it reflects an increase of 58percent. Istanbul and Ankara followed with 279 and 271 sqm per 100 people respectively (Colliers international Turkey report, 2016)

3.3.4 Logistic market

JLL report (2015), explains that Turkey is one of the emerging logistics markets in Europe, Middle East and Africa, with strong demand, pipeline and planned supply, According to logistics Association Turkey (LODER) the logistics industry size is estimated to reach 108 to 140 billion USD in 2017. The main logistics market is located in Turkey's Marmara region, that is Istanbul and Kocaeli province .

Hadımköy and Esenyurt are on Europe side, Tuza on the Asian side of Istanbul and Gebze, Çayırova and Dilovasi in Kocaeli are the main logistic sub markets of the Marmara region. Political insecurity caused a sluggish logistics market and slowdown on industry investments especially in the second half of 2015. The logistic market directly depends on trading volume, which is mainly driven by economic and political conditions. Economic and political issues continue to shape the logistics market and industry investments during the first half of 2016. While warehouse leasing and sale transaction volume remained at a small level, the market witnessed transactions that were mostly made from demand in 2015. The drop in transaction capacity was also directly behind the decision of most of the logistic companies to use vacant area in their existing warehouses to encounter additional needs. Recently occupier demand has been concentrated on two warehouse types including 500-to 3000 sqm city – center distribution warehouses and 30,000 to 50,000sqm warehouses for merging trend in core logistics locations.

The logistics performance index which is broadcasted twice-yearly by the world bank and measure the efficiency of trade supply chains, reports that Turkey's ranking has dropped from position 30 with a score of 3.50 in 2014 to position 34 with a score of 3.42 in 2016. In the first quarter of 2016, 316,200 sqm of logistics leasing transactions were realized at consideration decrease (16 percent) compare to the same period in 2015. The most active industries in terms of leasing transaction were logistic companies with 50 percent, retail with 15 and cosmetics companies with a 6 percent Gross leasable area share.Logistics supply ; major development projects in 2010 are:

- Ekol Logistics (Cargo transport and warehouse management company) completed the development of 101,100sqm warehouse in Gebze,

- Logipark: Logiturc is known as the most active investor presently in the logistic market, they have accomplished 120000sqm logipark project in Tuzla. The project faces demand from end users such as retailers, pharmaceutical and other manufacturing companies.

- Tekz European Logistics Centre: Tekfen freshly completed the development of its owner occupied warehouse with an estimated 17,500sqm space in Minarshian.

Principal infrastructure projects such as 3rd bridge, 3rd Airport and port City project will have an impact on Turkey's logistics market. With the fast increase of E-commerce, investment in logistic will be needed in the international standards especially in the specified regions.
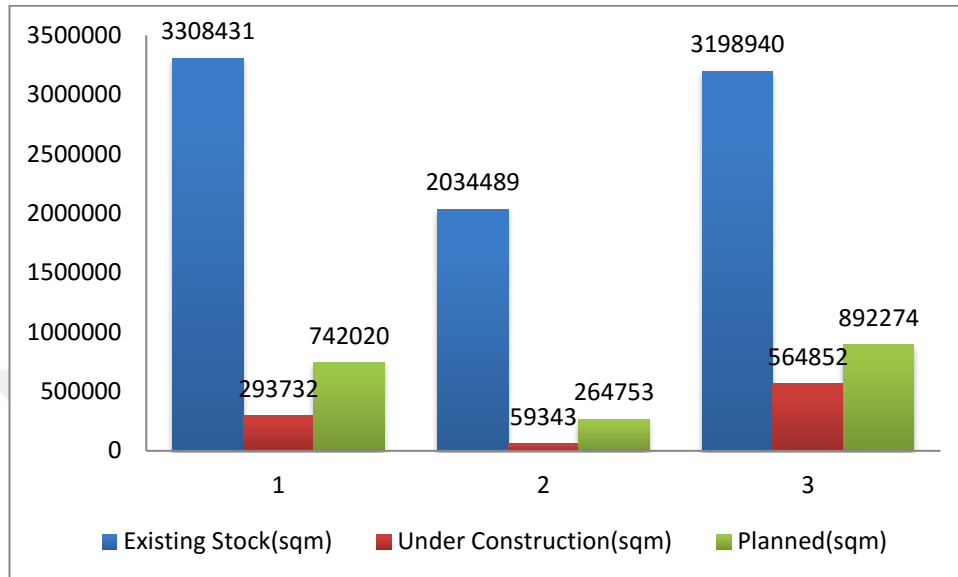
Figure 3.7 Market Snapshot of Istanbul and Surrounding Area

Source: JLL (2016)

Istanbul Europe area denoted as 1, Istanbul Asia area as 2 and Kocaeli area as 3. Istanbul has the highest exiting stock (3,308,431 sqm) Second by Kocaeli (3,198,940 sqm) and lastly the Asia part of Istanbul with 2,034,488 sqm. More project have been planned in Kocaeli area .

3.2 Real estate Mortgage market development

Real estate mortgage[7] has indicated a powerful growth pattern for the past years in the history of Turkey. Before the 2000s, a well-diversified mortgage market did not exist. The prevailing economic conditions like high and persistent inflation did not give room for such a development. The incompetence of banks to play technical role weakened such developments. After the crisis of 2000, measures were put in place to

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[7] Mortgage is a loan in which property is use as collateral

avoid such damaging effects, and hence attract foreign investors-FDI. Thus, improvements with the regulatory changes paved the way for a sound legal background. This translated increase in investor confidence and new housing units sprung up. The financial sector was thus adjusted to handle all mortgage products, by decreasing mortgage interest rates.

According to European Mortgage Federation's Hypostat report (2013) mortgage interest rate dropped severely from 40 percent to 50 percent in the years 2000 and 2003 to the 9 percent to 15 percent band after 2010. The annual rate of interest for new residential loans in Turkey dropped from 48.3 percent to 12.4 percent in 2002 and 2012 respectively.

The figure below shows the number of mortgage sales in the year 2009 to 2015.
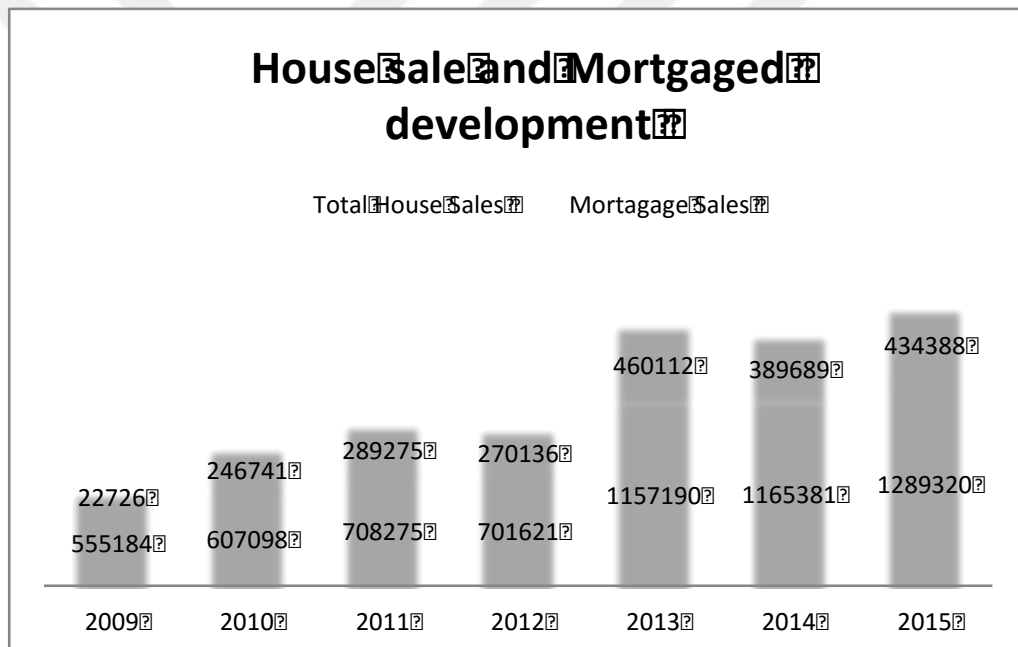
Figure 3.8: House sale and mortgaged development from 2009 – 2015

Source: Turkish Statistical Institute (2016)

In 4th quarter of 2009, 555,184 houses were sold in Turkey resulting to a 17.47 percent rate of increase compared to the previous period. Mortgage sales stood at 22,726 houses, the number of total and mortgage sale keep increasing until 2012 where total sale of houses decreases. In the 2012, 270136 houses were sold in Turkey resulting to -19.19 percent decrease compared to the previous year. Commercial loans for construction and real estate exceeded 89 billion TL in total with an increase of 40 percent from 2011 to 2013. In 2012 construction sector increase by 50 percent

when compare to the year 2011 reaching 59 billion TL, while real estate sector loan grew by 27 percent reaching 30 billion TL in the same year. But sales of mortgage of the same year dropped.

Nevertheless, varaitions over the past years in the ratio of mortgage sales in Istanbul vis-à-vis the rest of the country (Turkey) has been on a constant rise over the years. This regression suggests or translates an increment in the number of qualified technicians handling housing projects in other cities (counties) of Turkey.

3.3 The impacts of economic crisis to the Turkey real estate

Turkey has experienced several financial instabilities arising from the banking sector in, 194-1995 and 2000- 2001 and the global financial crisis in 2008. These crises have drastically changed the political, social and economic outlook of Turkey (CosKun, 2010).
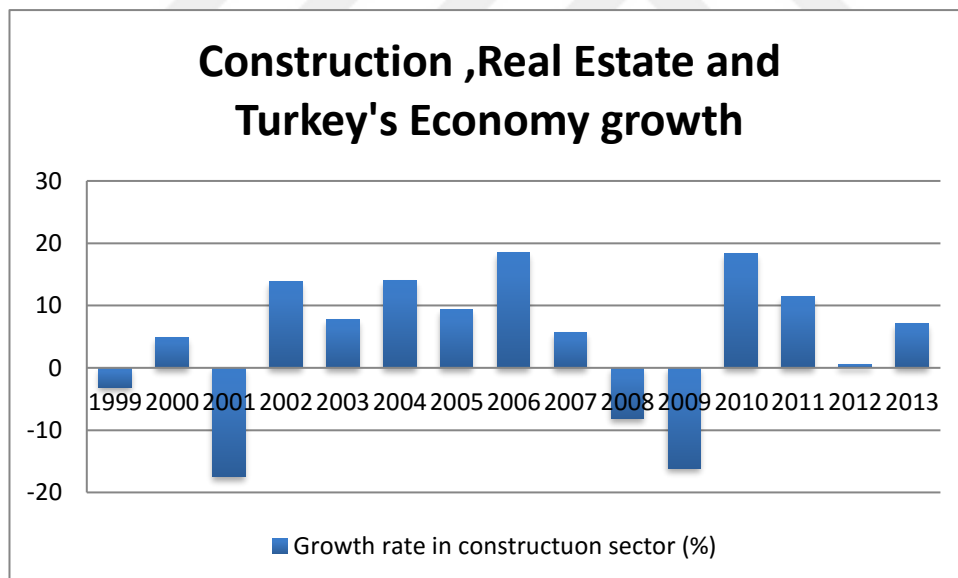
Figure 3.9: Development of real estate in Turkey from 1999-2013

Source: Turkish Statistical Institute (2014)

It is clearly seen that the 1999 and 2001 financial crises in Turkey and the global financial crisis in 2008 -2009 directly caused a negative growth rate in the sector. The growth of the sector has decline to -3.1 percent in 1999, -17.4 percent in 2001 and to -16.1in 2009. Consequently the data has shown the instability of the

construction industry during the years of economic crises. The figure above displays the growth rate of the construction industry combining with the variation in the real GDP growth rate during the period of 1999 to 2013.

The share represented by the market value of the entire real estate sector increased from 8.3 % to 9.8 % in 1998 and 2013 respectively. By the end of 2013, the construction sector to GDP ratio stood at 5.8 %, the real estate renting and other business activities to GDP ratio was 4 %. When we look at the figure above we notice that the real estate sector has been significantly affected by the financial crises in the years 1999,2001 and 2009. During the year 2006, 2010 and 2011, the real estate sector grew significantly at 16.6 %, 13.9 % and 10.7 % respectively.

Loans were very carefully inspected because of the financial crisis in 2001, also as a result of the liquidity crisis the cost of borrowing abroad become expensive for the financial institution in Turkey. During this period Interest rate were increased and this affects the amount of borrowing double.

Several foreign investors withdraw back to heir domestic markets in order to create new opportunities in their own countries.

The other effect was the slight increase in investment yields for commercial standing assets because of the increase in financing cost. That is Banks offers more difficult and expensive financing terms, which permit only investor with high equity ratio means to be active thus in turn shall increase yields for commercial asset.

After the crisis, especially in the period 2003 to 2007 the Turkish economy showed an amazing period of economic growth due to several reasons, such as EU full membership candidacy, improving liquidity resulting from increases in direct and portfolio investments. After 2001, interest rate and inflation rate drop and they was increase in liquidity, this led to the escalation of investments in real estate and construction activities. According to TurkStat (Turkish Statistical Institution) the construction sub-sector has made an influence to the gross national product at rate 3.5% to 5.3% throughout its activity between the period 2004 to 2006.

3.4 How efficient market theory applies to the property market

The marketplace is a platform, where individual and corporate bodies inter-act at a low transaction cost, by exchanging securities (financial) through prices that demonstrate the forces of demand and supply. As discussed above, the property market is an interface of supply and demand for real estate. Efficient market hypotheses also known as the efficient market theory is the proposition that markets are efficient, meaning prices in the market reflects the true economic value of the security and prices rapidly adjust to any new information. In this type of market future price of a security is unpredictable .The real estate market by numerous empirical studies has uncovered real estate to be weak form efficient.

According to Man and Chau (n,d) it remains a fact to assume that there is no property cycle; these men go to underline the fact that there is no predictability of property prices. If otherwise (if prices are predicable), it would thus, be inconsistent with the general conclusions of an efficient market hypothesis (EMH).

We follow the literature of Sayce et al (2006), for an efficient market theory, a key number of words to be emphasized:

- Efficiency of Information; this is further differentiated as
    1. Strong Form Efficiency- when all relevant details regarding prices of investments are publicized
    2. Semi-Strong- when all publicly available information, regarding prices are released, but there is still the existence of insider information
    3. Weak form Efficiency- this shows that information related to past price movements is compressed into market prices, such as abnormal returns, which can't be gained by identifying price trends.
- Good Analysis; assuming that those operating the markets are good analysts and are able to understand and apply proper evaluation and appraisal mythologies
- Ability to deal on price anomalies: where price irregularities exist there is the ability in the market to commence buy /sell transactions rapidly and cheaply to remove the price irregularity.
- Taxation free: There is an assumption that there are no taxes in the market place that could give rise to pricing differences. (This is unrealistic)

Inefficient in the market will imply the price or the value a security will not be equal to its worth. Assets in the market would be under or over prices if this is the case. Thus gives the potential for investments to or underperform the returns that otherwise might be expected.

Turning back to the property market the content of the above four elements require for value or price to equal work now how does the property investment market stand? Consideration is given to each of these opinions separately the below

- Information in the property market: The proper market unlike the stock market has no central market place. Full information about and facts relating to transactions are only open to those involved in the deal and to those who through their network of contacts can gain access to this information.
  The publicly available information on property sales are permitting transactions is accessible to subscribers through property intelligence's. This intelligence provides information that has been published in the trade press via press release and so on. Nevertheless this information is a good starting point for evaluators. It is not exposed to verification, thus in practice the level of information held by parities and potential parties to transaction may be significantly different

- Good analysis in property market .The discounted cash flow (DCF) analysis methodologies used another capital markets to analyse expected future cash flows and returns are not general use in unification with evaluation in the UK. This is the case in precise, outside the major property markets. Properties professional principally have little experience of anticipating methods, as these generally do not form part of their professional or academic training. The future cash flows on which their DCF analysis is established may not always be healthy.

- Ability to deal on price anomalies in the property market; Properties is complicated and expensive to manage unlike equities and bonds trading. They is high transfer cost and the inability to buy/sell property quickly, this leads to what a number of academics call stick pricing.

- Taxes are ignored: efficient market hypothesis ignore taxes issues. For Investor in bonds and equities markets tax consequences of investing in an asset can be calculated in a relatively open manner and are usually similar for

all listed companies. When investing the direct property, the tax position can vary from property to property

The above aspects of market efficiency are difficult to achieve or attain when it comes to the property market than when it concerns other markets like the bond markets.

The major assumptions of EMH revolve around; perfect information, rationality of economic agents, non-existence of risks, just to name a few.

Perfect information means that the economic agents have same, or relevant information which when used in the market place, the best products gets higher products. Perfect competition translates the concept of free entry and exit. Also, these denotations could simplify a complex reality, as to say the EMH says the market is always correct. Market developers and investors, in their technical analysis could misrepresent the truth likewise; other factors could as well distort the market negatively

The contribution of real estate to most economies is usually positive. In the real estate market, booms are always seen during periods of severe speculation, which involves the expansion of banking credits. This usually leaves devastating effects for the economy in general, and the real estate in particular (Sterman, 2000).

Arvanitidis (2015) argues that, the marketplace that does not show association between price variations in the current and past periods is regarded as a weak efficient market. The study (Arvanitidis, 2015), follows a the existing literature to conclude that the weak efficiency of the market has been successfully tested for the stock markets, but when faced with the real estate market, there two generally accepted approaches to investigate information efficiency.

The forecasting approach, which states that, the proof for the support of efficient market rests in its responsiveness to predict future prices.

The other approach places emphasis on the presence of detectable rule and strategies for trading properties. In this case the ability to outperform the market, once transaction costs are taken in to account is seen as a proof, which distorts efficiency in the market, but number of studies are fewer and less conclusive when compared to

the financial market. Arvanitidis (2015) found property market to be 'allocative efficacy' or 'productive efficiency'.

Allocative efficiency measures the results of the method on the grounds of "value standards", standards that are regulated by public policy to represent other considerations like social needs. Efficiency here reflects, adequate supply, at acceptable prices. The second measure of productive efficiency emphasis is on profitability from the producer's standpoint.

3.5 Strengths, Weaknesses, opportunities and Threats of Turkey's real estate market

Strengths
- Solid construction firm with a worthy reputation worldwide
- Strong banking system
- Salient (powerful) investment positions

Opportunities

- Predictable increase in quality of housing in obedience with the earthquake guidelines
- Growing demand for residence and plaza buildings
- Housing supply is less than housing demand indicating growth potential
  - Reconstruction and modernizations of slum houses on a constant basis

Weaknesses

- Lots of old houses that are unlicensed and disqualifies acquisition of credit (Mortgage)
- Land area remains not only inaccessible, but extremely sold at high prices like in Istanbul

Threats

- Fear of a possible earthquake, especially in the Marmara zone, which harbors important industries
- The real sector, naturally has her instability that remains threat

To sum-up, the extent to which the real estate finds itself in the analysis of efficient market hypothesis still remains a debate. No matter what direction the debate follows, the fact remains conspicuous that the efficient market hypothesis of Eugene Fama (1970) remains the foundation for economic considerations, regarding financial markets as well as property market. As it is the case, so many of the assumptions sustained by EMH might seem purely theoretical with no practical realizations for contemporary 21st century markets, but the ideas remain ideal for economic modelling, likewise, the thoughts assist a behavioural financial analyst.

4 METHODOLOGY TO TEST WEAK FORM EFFICIENCY OF REAL ESTATE MARKET IN ISTANBUL (EUROPE PART)

This part is to test and bring out empirical evidence on efficiency of residential real estate returns in Istanbul market. Base on pervious studies as seen in chapter 2, the random walk model which allows the collection of large amount of data will be use to determine the result. Below is the type of data and the methodology used in this study

4.1 Description of Data and sources

This study uses monthly sales price index of Istanbul residential (Europe side) real estate market from the period 01/01/ 2003 to 01/01/2017. The monthly price indictor is collected form Real Estate Investment Development Information Network (REIDIN)[8] database. Data is a time series data and contain 169 periods; many period are necessary for our time series analysis. Based on the availability of data, the study covers residential sales price index city wide of Istanbul (Europe part). As a support to better analyse our results, a statistical package was used; Eviews statistical software was used to run the main purpose of the test which is, if Istanbul residential real estate returns follows a random walk or not. Randomness is central in this analysis because, if results follow a particular pattern, it sends a message that the markets are not efficient, because investors would be able to used to historical prices to forecast future prices. If otherwise, economic agents can't forecast the market, thus, proofing market efficiency.

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[8] REIDIN is an important real estate information company focusing on emerging markets.

The monthly price index of Istanbul residential property is used to generate the monthly returns for this market as seen below.

R_t $= \log(P_t)$ $-$ $\log(P_{t-1})$ $=$ $\log(P_t/P_{t-1})$ (1)

Where P_t and P_{t-1} stands for housing prices at time t and t-1.

Rt, is returns

As demonstrated in equation (1), the profits or returns are measured by taking the log (natural) of the present prices, minus the previous prices. Prices here denote housing prices.

4.2 Empirical Methodology

According to the empirical understanding put forth by early researchers for an efficient market, the methodology adopted by Fama (1970) seems very much appealing and plausible. As earlier discussed, most studies, focusing on the efficiency of markets mostly test for stock markets. Few studies however, have attempted to test the real estate market using the dynamics put forth for testing stock market. The majority of such studies largely focus on the developed economies, our study is significant and her novelty rests in the fact that it is bringing to the lamplight, the situation or position of an emerging market-Turkey.

Randomness, translates efficiency, and to test for this efficiency in the residential real estate sector in Istanbul (the European side), we are going to follow the existing literature to adapt the random walk model, as her empirical methodology. Contemporary studies that support the random walk theory for example, include: Nisar and Hanif (2012), Niemezak and Smith (2012). They go ahead to state that other factors (price fluctuations, type of good) could distort market efficiency and not necessary information. This is in sharp contrast to the conclusions of Fama (1991) Sewell (2011).

To detect or test randomness (Random Walk), of residential real estate market prices, there is a statistical process or steps as prescribed by Niemezak and Smith (2012). In our situation, both parametric and non-parametric methods / technique are employed

to test randomness of a time series analysis. The study uses a time series data and as a common assumption, the data has to be stationary. Stationarity here, means the mean, the variance are all are constant over time. If otherwise, the results will be bias. Thus, in situation of non-stationarity, we proceed to calculating the first differencing (time-to-time periods). All this effectuated under a unit root testing. After this preliminary examination, the data is ready and set for analysis; the first step of the random walk package is to investigate or test for autocorrelation (serial correlation) coefficient test, the second is run testing and the last stage is variance ratio testing. The first stage, which tests for autocorrelation, captures the randomness of returns in the housing market, the second stage tracks and explains the concept of independence of returns. The last stage, which is variance ratio testing, investigates if returns are predictable or random.

4.2.1 Autocorrelation tests (Serial Correlation)

The first step is to test the random walk model of housing index. As noted above, autocorrelation measures the independence of price changes and it is a test to investigate the null hypothesis of a random walk (Fama, 1970). To test for market efficiency there is need for a time series rates of return. That is to say the relationship between the residential return at present moment (period) and its value in the past period is thus:

$$P_K = \frac{\sum_{t=1}^{N-k}(r_t - \bar{r})(r_{t+k} - \bar{r})}{\sum_{t=1}^{N}(r_t - \bar{r})^2}$$

(2)

P_K indicates serial correlation coefficient of housing returns of lag k;

N -number of periods or observation

r_t – returns for period t

r_{t-k} -housing returns for period t-k

$\bar{r}$ -the sample mean of housing returns and k is the lag of the period.

Autocorrelation (serial correlation) test is preoccupied to ascertain if the serial correlation coefficients are significantly different from naught (zero). We thus, reject the hypothesis if housing prices, that is prices changes are serially correlated, where P_K is different from naught (zero). The Ljung-Box portmanteau statistic (Q) becomes relevant for joint hypothesis testing, when all the autocorrelations are zero.

$$Q_{LB} \qquad = \qquad N \qquad (N+2) \qquad \sum_{j=1}^{k} \frac{p_j^2}{N-j}$$
(3)

P_j - j^{th} autocorrelation

N - observation number

In the null hypothesis of zero autocorrelation at the first k autocorrelations (p1 =p2= p3=p4…= pk = 0. The Q –statistics is measured as chi-squared with levels of freedom equivalent to the number of autocorrelations (k)

4.2.2 Run testing

This is a test for independence, in our case, focus is on if price variations are independent within time or nor. As a non-parametric test, it suggests that if a series exhibits randomness, the expected as well as the observed number of runs should be close. We can thus regard "run testing' as a progression of repeated variations of prices, with the same sign. In this light, we thus categorise runs in three ways; increasing run (upward), decreasing run (downward) and constant run (flattened). This fits in the explanations of either prices are going up, reverse or are fixed and do not change. The null hypothesis of independence in our case-housing price variations, the anticipated (expected) number of runs (M) could be estimated as thus;

$$M \qquad\qquad = \qquad \frac{N(N+1) - \sum_{i=1}^{3} n_i^2}{N}$$
(4)

N – sum of observations (price changes)

n_i - of price changes in each class ($N = \sum_{i=1}^{3} n_i^2$).

For large sum of observations where N> 30. The sampling distribution of m is nearly normal and the standard error of m(σ_m) is denoted as seen in equation (5)

$$\sigma_m) \qquad = \qquad \{ \qquad \frac{\sum_{l=1}^{3} n_i^2 \ [\sum_{l=1}^{3} n_i^2 + N(N+1)] - 2N \ \sum_i^3 n_i^3 - N^3}{N^2 \ (N-1)} \}^{\frac{1}{2}}$$

(5)

The Z-statistics (standard normal) is used to test if the real number of runs is consistent with the hypothesis of independence;

$$Z \qquad = \qquad (R \qquad \pm \qquad 0.5 \qquad - \qquad m) \qquad / \qquad \sigma_m$$

(6)

R – real (actual) number of runs,

m - expected number of runs

0.5 is the continuity adjustment

Where the sign of the continuity change is -ve (-0.5) if $R \geq m$, or +ve, when R is too small or too large. In cases where R remains too small or large, it implies there is proof of dependence within the housing returns. Such a test is referred to as a two-tailed test. If on the other hand, the expected number of runs stands to be different from the observed, it therefore suggest the market reactions regarding information asymmetry could lead to instances of abnormal or excess returns (Nisar & Hanif, 2012).

4.2.3 Variance test

There are some studies, which use unit root testing for market efficiency. Following Schinder (2010), such studies that employ unit root testing and serial correlation always suffer from biased results, emanating or coming from non-harmonized (non-synchronized) and irregular trading. To rectify these irregularities, the variance ratio test stands ideal as proposed by Lo and MacKinlay (1988). The first hypothesis (null) assumes linearity Lo and MacKinlay (1988) in the sample interval. That is to say, if a series follows a random walk process, her variance of its q difference will definitely be q times the variance of the first difference

$$\text{Var} \qquad (p_t - \qquad p_{t-q}) = \qquad q\text{Var} \qquad (p_t \qquad - \qquad p_{t-1})$$

(7)

We term q as any positive integer, The variance ratio (VR(q)) is given by :

VR (q) $= \dfrac{\frac{1}{q}\mathrm{Var}(p_t - p_{t-q})}{\mathrm{Var}(p_t - p_{t-1})} = \dfrac{\sigma^2(q)}{\sigma^2(1)}$

(8)

Assuming a series of n_{q+1} price observations ($P_0, P_2, P_3, P_4, \ldots\ldots, P_{nq}$) measured at similar interval is observed . If the random walk is respected, the variance of the qth difference will agree to q times the variance of first differences. The formals for $\sigma^2(q)$ and $\sigma^2(1)$ are given by

$\sigma^2(q)$ $= \dfrac{\sum_{l=q}^{nq}(p_t - p_{t-q} - q\hat{\mu})^2}{h}$

(9)

Where h $=$ q(nq+1-q)(1- $\dfrac{q}{nq}$)

(10)

While $\hat{\mu}$ $= \dfrac{1}{nq}\sum_{t=1}^{nq}(p_t - p_{t-1}) = \dfrac{1}{nq}(p_t - p_0)$

(11)

$\sigma^2(1)$ $= \dfrac{\sum_{l=q}^{nq}(p_t - p_{t-1} - \hat{\mu})^2}{(nq-1)}$

(12)

For null hypothesis testing, there is the assumption of homoscedastic and heteroscedacity. Lo and MacKinlay (1988) developed

Z(q) and Z^* (q) .The standard z- test statistic is below

Z(q) $= \dfrac{VR(q)-1}{\sqrt{\theta}(q)}$ $\sim$ N(0,1)

(13)

And

Z^* (q) $= \dfrac{VR(q)-1)}{\sqrt{\theta^*}(q)}$ a $\sim$ N(0,1)

(14)

θ(q) Stands for the asymptotic variance of the variance ratio under the assumption of homoscedasticitym and θ^* (q) stands for asymptotic variance of the variance ratio in the assumption of heteroscedasticity

$$\theta \qquad (q) \qquad = \qquad \frac{2(2\,p-1)(q-1)}{3q\,(nq)}$$

(15)

$$\theta^* \qquad (q) \qquad = \qquad \sum_{j=1}^{q=1}\{\frac{2(q-j)}{q}\}^2 \qquad \qquad \delta \qquad (j)$$

(16)

δ (j) Stands for heteroscedasticity developed as follows

$$\delta \qquad (j) \qquad = \qquad \frac{\sum_{j+1}^{nq}(p_t-p_{t-q}-\hat{\mu})^2\,(p_{t-1}-p_{t-j-1}-\hat{\mu})^2}{\{\sum_{t=1}^{nq}(p_t-p_{t-1}-\hat{\mu})^2\}^2}$$

(17)

4.3. Result and Discussion

The results are reported in the light of existing literature and with respect to the output results from the E-views software. They are organized in the following manner; descriptive statistics, unit root testing, autocorrelation, run testing and the variance ratio testing

4.3.1 Descriptive statistics

Here, we are investigating if the data is normally distributed or not. The descriptive statistics of the monthly price/returns of Istanbul residential real estate prices is in its locally currency (Turkish lira)

Table 4.1: Descriptive Statistics of monthly market return

	RETURN_RT_
Mean	0.003572
Median	0.003763
Maximum	0.009954
Minimum	-0.010508
Std. Dev.	0.003902
Skewness	-1.690020
Kurtosis	6.517046
Jarque-Bera	166.5600
Probability	0.000000
Sum	0.600053
Sum Sq. Dev.	0.002543
Observations	168

From table 4.1 we can see that the statistic has a two-tail distribution with two degree of freedom. That is skewness coefficient and kurtosis. The Skewness and kurtosis are greater than zero. Following Jargue and Bera (1980) test when the probability of the distribution is equal to zero, the null hypothesis is being rejected. The probability of the monthly return data is equal to zero therefore the descriptive statistics for the monthly return is not normally distributed.

4.3.2 Results of Unit root testing

The study uses a time series data and as a common assumption, the data has to be stationary. Stationarity here means the mean, the variance are all are constant over time. If this is not done, the results will be bias. Thus, in situation of non-stationarity, we proceed to calculating the first differencing (time-to-time periods) In this study, the data was detected not be stationarity through unit root testing as reported on table 4.2, we then proceeded to differencing and as seen in table 4.3.

After, differencing and making the time series data stable, which is, stationary with a constant variance and mean, we then proceeded to employ our empirical steps for the

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random walk model. The random walk theory is ideal for this study because it captures the core of this study as it detects the weak form efficiency in the three different ways; namely, autocorrelation, the run test, and the variance ratio test. We are going to proceed to state our hypothesis accordingly and conclude in line with existing empirical literature.

H_0:p>0 Has a unite root test

H_1= p = 0 Has no unit root test

Table 4.2: Unit root test (level test)

| Augmented Dickey-Fuller test statistic (ADF)	P- value of ADF	Coefficient	P-value of lag
Intercept	0.1708	-0.056213	0.0223
Trend	0.3278	-0.0666309	0.0134
Non	0.1553	-0.024207	0.1695

P value is not equal to zero in Table 4.2, meaning we accept the first hypothesis (null hypothesis) of a unit root testing. If there is unit root test it denotes, the time series data is not stationary. We have to do the 1st difference to make sure the series is stationary. The table below represent the 1st difference. Significant at 1% level

Table 4.3: The Unit root test (1st level difference)

| Augmented Dickey-Fuller test statistic (ADF)	P- value of ADF	Coefficient	P-value of lag
Intercept	0.0000	-1.034380	0.0000
Trend	0.0000	-1.034292	0.0000
Non	0.0000	-1.034357	0.0000

In table 4.3 the p value = 0 we reject the null hypothesis of a unit root test hence the data is stationary in the 1st difference. We can now process in our test for random walk using the autocorrelation, run test and the variance ratio test. Significant at p less than 1%

Note:The return is not stationary in the "Level", but it is stationary in the first difference.
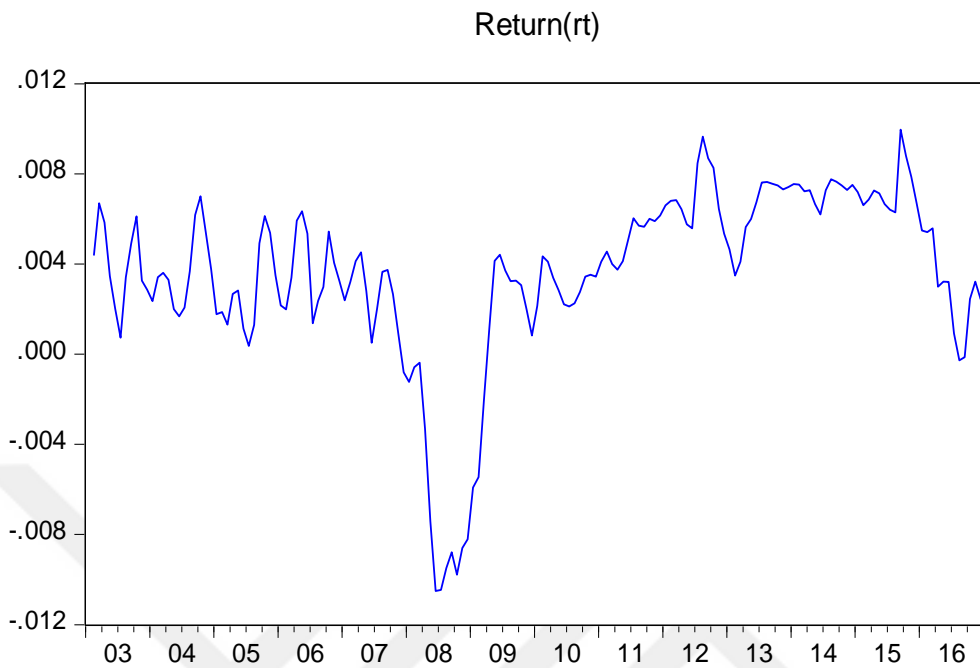
Return(rt)

Figure 4.1: Graph of return

The graph explained the non-stationary situation of the series .We can see that from 2003 to 2007 they is a constant mean and in 2008 the series is away from the mean this could be as a result of the financial crises and from 2008 to 2016 the mean is not constant over time.

RE_DIFF
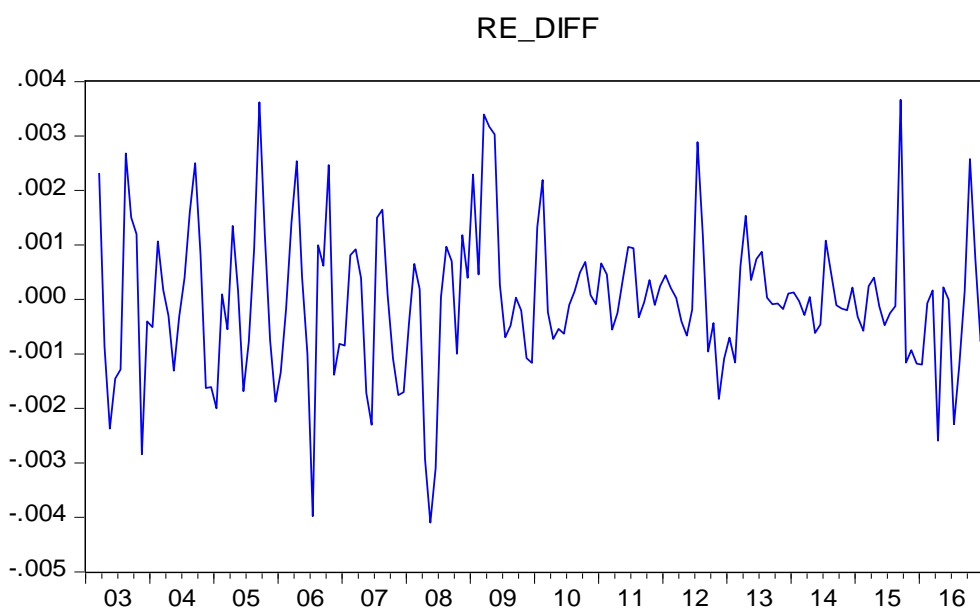
Figure 4.2: Graph of return 1st difference

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4.3.3 Autocorrelation test result

If they is no serial correlation in the residuals, the autocorrelation (AC) and partial autocorrelations (APC) at all lags should be nearly zero and all Q-statistics should be insignificant with large p-values.

The autocorrelation results for 12 lags of the dependent variable are presented below.

H0:p >0 , Is a random walk

H1:p=0 , No random walk

Table 4.4: Autocorrelation of Monthly returns

Date: 03/11/17   Time: 20:03

Sample: 2003M01 2017M01

Included observations: 167

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|**		.|**		1	0.350	0.350	20.782	0.000
*|.		**|.		2	-0.095	-0.247	22.318	0.000
***|.		**|.		3	-0.367	-0.290	45.473	0.000
*|.		.|*		4	-0.109	0.151	47.548	0.000
.|*		.|*		5	0.148	0.094	51.354	0.000
.|**		.|.		6	0.246	0.048	61.977	0.000
.|.		*|.		7	0.032	-0.075	62.161	0.000
*|.		.|.		8	-0.139	-0.028	65.610	0.000
**|.		*|.		9	-0.241	-0.116	75.953	0.000
**|.		*|.		10	-0.210	-0.186	83.883	0.000
.|.		.|*		11	0.037	0.099	84.132	0.000
.|*		.|.		12	0.153	0.010	88.421	0.000

In table 4.5 the result shows that there is autocorrelation in the time series since all p-values = 0 we accept presence of autocorrelation in the time series and reject the random walk hypothesis. If the random walk hypothesis is rejected it means prices are predictable and hence Istanbul residential real estate is not weak form efficient. To be more specific, autocorrelation coefficients are significantly not equal to zero

with a positive sign for 1st, $5^{th}, 6^{th}, 7^{th}, 11^{th}$, and 12th lag. We need to know that the positive sign indicates prices can be predictable within short time; hence the hypothesis of weak-form efficiency is rejected. Negative sign is at the 2nd, 3rd, 4th ,8th ,9th, and 10th lag. The negative autocorrelation shows mean reversion in returns implying that prices and returns finally move back ward towards the mean or average. A high significant positive autocorrelation is seen at all the levels first level with Q-Statistics. The entire 12-lag variable shows a positive autocorrelations meaning, the probability values are zero for all lags showing the existence of serial correlation in the series. The results of the Q-stat show that the autocorrelation coefficients of all 12 lags are jointly significant.

Note the autocorrelation test has indicated the presence of significant coefficients since the probabilities are zeros for all level (very significant). The null hypothesis is rejected at > 1% significant level.

4.3.4 Result of the run test

Here we want to know if prices are independent of each other. The run test is considered more suitable than serial correlation (autocorrelation) test because all observed series do not need to respect the normality distribution.

H0: sequence is a random walk. This means that there are equal number of runs between observed (actual) runs and the forecasted (expected) runs

H1: Sequence is not a random walk. This means that there are no equal number of runs between observed (actual) runs and the forecasted (expected) runs

Table 4.5: Run test

. run test re_diff		
N(re_diff <= -.0000535160070285)	=	84
N(re_diff > -.0000535160070285)	=	83
obs = 167		
N(runs) = 65		
z = -3.03		
Prob>z = 0		

The result does not accept the first hypothesis. The rejection of the null hypothesis of random walk is explained by the P-values; since p= 0. If the null hypothesis of random walk is rejected it means that the market is not weak form efficient. The run test is significant at 1%

4.3.5 Results of Variance Ratio Testing

This test is to know whether returns of real estate can be predictable, if they are predictable it means investors can make excess profit by studying passed prices of residential real estate market, the efficient market hypothesis will be rejected in this situation. The study applies the original data and the first differenced data. The test has two results that is the Joint test, which indicates the null hypothesis, for all periods, and the individual test, which shows the variance ratio test, applied to individual periods. Next the study repeats the previous analysis but allows for heteroskedasticy in the data.

Table 4.6: Application of the 1st difference return data

$H_{0:}$ p = 0 Return is a random walk

H_1 p$\neq$ 0 Return is not a random walk

Date: 03/11/17   Time: 20:15

Sample: 2003M01 2017M01

Included observations: 166 (after adjustments)

Standard error estimates assume no heteroskedasticity

Compute variances assuming zero mean

Use biased variance estimates

User-specified lags: 2 4 8 16

Joint Tests	Value	df	Probability
Max |z| (at period 4)*	4.004712	166	0.0002
Wald (Chi-Square)	20.63641	4	0.0004

Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.845055	0.077615	-1.996322	0.0459
4	0.418498	0.145204	-4.004712	0.0001

|				
8	0.208795	0.229588	-3.446187	0.0006
16	0.096617	0.341639	-2.644264	0.0082

*Probability approximation using studentized maximum modulus with

   parameter value 4 and infinite degrees of freedom

Test Details (Mean = 0)

Period	Variance	Var. Ratio	Obs.
1	2.3E-06	--	166
2	1.9E-06	0.84506	165
4	9.6E-07	0.41850	163
8	4.8E-07	0.20880	159
16	2.2E-07	0.09662	151

In table 4.6, the variance ratio test does not accept the null hypothesis. It rejects the hypothesis of random walk and this is identified from its probability value. The P-value is not equal to naught (zero). Relating the results to our research inquiry; if the first hypothesis (null) is rejected, it has serious implications for our study. It therefore, denotes that the real estate market of Istanbul is not efficient in its weak form.
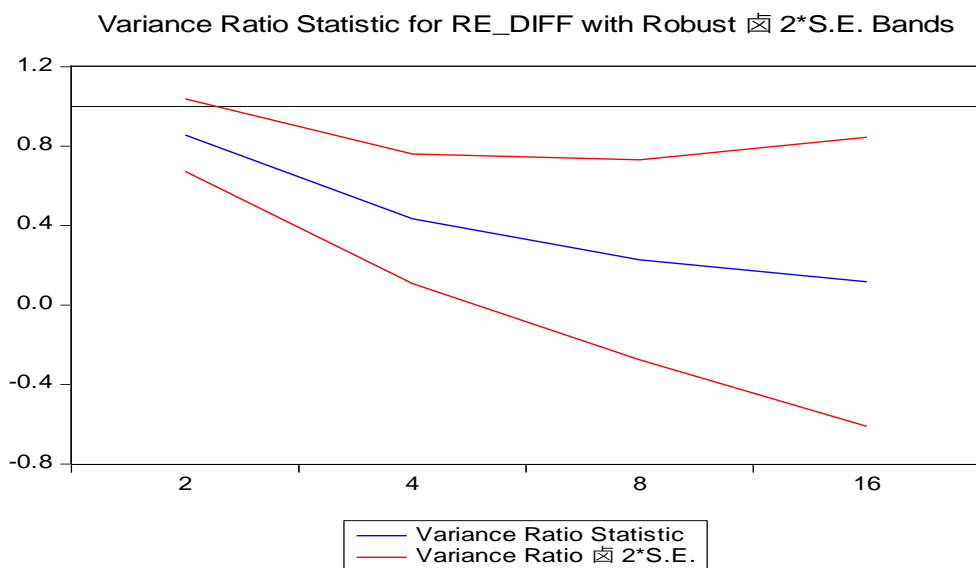
Figure 4.3: Graph of the Variance ratio test

Table 4.7. Robust Checks

The data used to perform rubustness is the return data that has the first level differnce. Robustness is to the ability to ascertain if the main results were not merely driven by underlying assumptions, which at times, gives biased results. Thus, we used this to understand if the altered assumptions could have significant variation with the results.

H_0: p=0 RE_DIFF is a martingale[9]

H_1: p≠ 0 RE_DIFF is not a martingale

Date: 03/11/17   Time: 20:15

Sample: 2003M01 2017M01

Included observations: 166 (after adjustments)

Heteroskedasticity robust standard error estimates

User-specified lags: 2 4 8 16

Joint Tests	Value	df	Probability
Max |z| (at period 4)*	3.467495	166	0.0021

| Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.855408	0.091460	-1.580931	0.1139
4	0.434637	0.163047	-3.467495	0.0005
8	0.227954	0.251784	-3.066306	0.0022
16	0.117433	0.363758	-2.426246	0.0153

*Probability approximation using studentized maximum modulus with

parameter value 4 and infinite degrees of freedom

---

[9] A series follows a martingale when knowledge of past event never helps in the prediction of the future events.

Test Details (Mean = -1.07405171087e-05)

Period	Variance	Var. Ratio	Obs.
1	2.3E-06	--	166
2	2.0E-06	0.85541	165
4	1.0E-06	0.43464	163
8	5.3E-07	0.22795	159
16	2.7E-07	0.11743	151

Variance Ratio Statistic for RE_DIFF with Robust 図 2*S.E. Bands
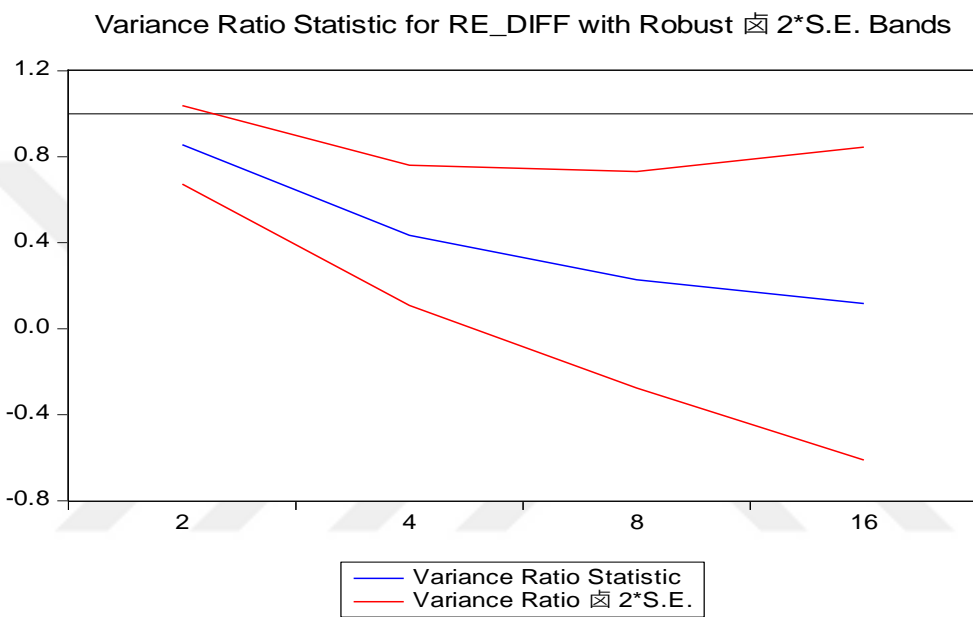
Figure 4.4: Result of robust method presented by graph

The null hypothesis of the martingale is rejected since the p-values are different from zero. If the is no martingale it means that the market for residential real estate is not weak form efficient. Thus we reject the hypothesis of weak –form efficiency. The data used to

The data used to perform rubustness is the return data that has the first level differnce. Robustness is to the ability to ascertain if the main results were not merely driven by underlying assumptions, which at times, gives biased results. Thus, we used this to understand if the altered assumptions could have significant variation with the results.

In summary, the sales prices were collected from the period 01/01 2003 to 01/01/2017. To be able to know if there is the random walk pattern in the series, this

study employed a parametric test (autocorrelation, Variance ratio) and non-parametric test (run test).

The first test, which is the autocorrelation test, rejects the random walk hypothesis for the monthly returns of Istanbul residential market. Since there is no random walk it means that prices are predictable and investors in the market can make excess returns. Thus the market is not weak –form efficient.

The run test rejects the presence of a random walk, meaning that returns are not independent of each other. The test concludes that Istanbul residential market is not market is not weak form efficient.

In addition, the variance ratio test also rejects the presence of a random walk meaning that the weak-form market efficiency theory does not hold for Istanbul residential real estate.

The robust test carried out to minimize possible errors in the result also reject the null hypothesis of a Martingale meaning passed event is not helpful to predict current. Thus we can conclude that Istanbul Residential real estate not observe weak form efficiency.

According to the findings of this empirical study they is evidence that Istanbul real estate market is not efficient in its weak- form since the all the test (autocorrelation, run test and variance ratio test) all rejects the random walk hypothesis. Istanbul residential real estate is inefficient.

5. CONCLUSION

Discussions about real estate market are an old one. The central difference revolves around market forms; be it weak, semi-strong or strong forms. Past and growing literature have taken keen interest in studying the market efficiency. The technical works of Eugene Fama (1970), laid the foundation for the analysis of an efficient market theory. The most important parameter stands to be information on return prices for investors. In the past, finance scholar focused on stock market to test the efficiency of markets. Few or little studies have attempted to test the real estate market using the dynamics or analysis of efficient market hypothesis (EMH). The few studies conducted are mostly in developed countries like the United States of America, Canada, France United Kingdom, just to name a few (Fama and French, 1988).

The novelty of this research is centred on the choice of the case study, which is purely an emerging capital market-Turkey. This study drew inspiration from theoretical and empirical write-ups to set its general methodology. Wide literature exists on testing the efficiency of markets e.g. Fama and French (1988), Fama (1991), which, portrayed for the developed markets. For the less developed market examples are Chang and Ting (2000), Alam et al (2007), just to name a few. All these studies differ in the market types, the time period of the study and the methodology applied for analysing market efficiency. Assuming markets are efficient in their weak -form, participants like investors, mortgage bankers, and so many others would not have to care about passed movement of prices. If this assumption is true, it will be impossible to get additional information from analysing

historical prices and as a result investors will not be able to earn excess returns by just studying the market.

The central objective of this thesis is to sustain arguments for market efficiency in Istanbul, in its weak form. That is, if real estate returns for the future could be ascertained using past prices. In such an analysis, the concept of randomness becomes instrumental. Randomness translates efficiency and to test for this randomness in residential real estate, we followed a plethora of empirical literature to set our empirical methodology. The empirical methodology employed here is the random walk model as supported by Nisar and Hanif (2012), Schindler (2010), Ananzeh, (2014). To detect randomness (Random Walk), of residential real estate market prices, there is a statistical process as put forward by Schindler (2010). The study however used parametric and non-parametric techniques to test for randomness of a time series analysis.

Data for this research is sourced from REIDEN and it's a time series data and as a common assumption, the data has to be stationary. Stationarity here, means the mean, the variance are all are constant over time. If otherwise, the results will be bias. Thus, in situation of non-stationarity, we proceed to calculating the first differencing (time-to-time periods). All this effectuated under a unit root testing. After this preliminary examination, the data is ready and set for analysis; the first stage, which tests for autocorrelation, captures the randomness of returns in the housing market, the second stage tracks and explains the concept of independence of returns. The last stage, which is variance ratio testing, investigates if returns are predictable or random.

Summarily, first test, autocorrelation rejects the random walk hypothesis for the monthly returns; the second-run test, rejects the presence of a random walk, meaning that returns are not independent of each other. The variance ratio test also rejects the presence of a random walk meaning that the weak-form market efficiency theory does not hold for Istanbul residential real estate.

Of the three tests (autocorrelation, run test, variance ratio test), the results obtained cast doubt on the theory of efficient market hypothesis. The result completely rejects the presence of a random walk, thereby, signalling that returns are not independent of each other. We go further to control the results if they are not influenced by

underlying assumptions (robustness). Thus an error-minimizing test conducted, again rejects the null hypothesis (Martingale- where past information can't help to predict the future) and accepts the alternative. We therefore conclude the European side of Istanbul, Turkey is not exhibiting the features or characteristics of an efficient market hypothesis as coined by Fama in 1970.

In the spirit of exiting literature, the empirical findings are in consistence with a large body of existing finance literature; Gu (2002). Schindler et al (2009) Maier and Herath (2009) Schindler (2010) Yakie (2016). Since it is believed that markets can be inefficient and over time can changed to be efficient (Ananzeh, 2014), (Ergul ,1995).

REFERENCES

Abrosimoval, N., Dissanaike.G, & Linowski (2002), :Testing the Weak-Form Efficiency of the Russian Stock, paper presented to EFA Berlin Meeting, 11 Mar 2002.

Alexakis.C. (1992) 'An Empirical Investigation of the Efficient Market Hypothesis : The case of the Athens stock Exchange' PhD thesis, University of York Heslington

Alam, M.M., Alam, K.A., and Uddin, M.C.S. (2007) 'Market Depth and Risk Return Analysis of Dhaka Stock Exchange: An Empirical Test of Market Efficiency', Publisher- ASA University Review, Vol. 1(1), pp. 93-101. (ISSN 1997-6925, ASA University,Bangladesh)

Ananzeh.N.I, (2014) 'Testing the Weak Form of Efficient Market Hypothesis; Empirical Evidence form Jordan', International Business and Management Vol.9, No.2, 2014,pp, 119-123

Arvanitidis.P.A, (2015), The Economics of Urban Property markets ;An institutional economics analysis ,New Yorkm, NY 10017

Bachelier L. (1900), 'Theory of speculation', A thesis presented to the Faculty of Sciences of the Academy of Paris on March 29, 1900. Originally published in Annales de l'Ecole Normale Supérieure, 27, 21-86.

Black. F (1986) 'Noise',The journal of Finance, Volume 41, Viewed 22 December 2016,<http://onlinelibrary.wiley.com/doi/10.1111/j.1540-6261.1986.tb04513.x/full>.

Badru.R (nd) 'Testing the Weak Form of the Efficient Market Hypothesis for Three Emerging Econmomies' Academic journal, viewed on 25th of January 2017, https://www.academia.edu/8027782/EFFICIENT_MARKET_HYPOTHESIS

Brown, G.R. (1991), Property Investment and the Capital Markets, E. and F.N. Spon, London.

Butler, K.C., and S.J. Malaikah (1992) 'Efficiency and Inefficiency in Thinly Traded Stock Markets: Kuwait and Saudi Arabia', *Journal of Banking and Finance* 16(1), 197-210.

Case, K.E. and Shiller, R. (1989) 'The Efficiency of the Market for Single-Family Homes' American Economic Review 79, 125–137.

Case, K.E., and Shiller R.J. (1990) 'Forecasting Prices and Excess Returns in the Housing Market', *Journal of the American Real Estate and Urban Economics Association* 18(3), 253-273.

Case, K.E., Shiller R.J., & Weiss A.N. (1991): Index-Based Futures and Options Markets in Real Estate, *Cowles Foundation Discussion Paper*, No. 1006.

Case, K.E., R.J. Shiller, and A.N. Weiss (1995): Mortgage Default Risk and Real Estate Prices: The Use of Index-Based Futures and Options in Real Estate, *NBER Working Paper Series*, No. 5078.

Central Bank of the Republic of Turkey Report (2016) 'Housing index' viewed on the 8th December 2016http://www.tcmb.gov.tr/wps/wcm/connect/TCMB+EN/TCMB+EN/Main+Menu/STATISTICS/Real+Sector+Statistics/

Clayton, J. (1998) 'Further Evidence on Real Estate Efficiency', *Journal of Real Estate Research*, 15(1/2), pp. 41-57.

Chang, K.P, and Ting K.S. (2000) 'A Variance Ratio Test of the Random Walk Hypothesis for Taiwan's Stock Market', *Applied Financial Economics* 10(5), 525-532.

Cheung, K. C. and Coutts, J. A (2001). 'A note on weak form market efficiency in security prices :Evidence from the Hong Kong stock exchange', Applied Economics Letters 8, 407-410.

Chow, K.V., and K.C. Denning (1993): "A Simple Multiple Variance Ratio Test", Journal of Econometrics 58(3), 385-401.

Ciller. B (2007) 'Turkish Residential Real Estate Investment Analysis' Masters thesis, Babson College.

Collier international Turkey report (2016), viewed 13 December 2016 < http://www.colliers.com/-/media/files/emea/turkey/research/reviews/2016-1-turkey-review.pdf?la=tr-tr

Coşkun.Y.(2010) 'An Analysis of the Strengths and weakness of the Turkey Real Estate Market' available at http://dx.doi.org/10.2139/ssrn.1641211

Daily Sabah (2016), https://www.dailysabah.com/turkey/2016/01/28/turkeys-population-expanding-istanbul-still-most-crowded-city viewed on the 3rd of December 2016

Darrat, A. F., and Glascock, J. L., (1993) 'On the Real Estate Market Efficiency', Journal of Real Estate Finance and Economics 7: 55-72.

Deloitte report (2014) 'Turkish Real Estate Market' viewed on 18th February 2017 https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/Real%20Estate/EN_RealEstate2014_11072014.pdf

Eakins, G.& Mishkin, S. (2012), Financial Markets and Institutions,19th edition Boston: Prentice Hall.

Evans, A. W., (1995) 'The Property Market: Ninety Per Cent Efficient?' Urban Studies 32 (1),pp. 5-30.

Evans, R. D., and Rayburn, W. B, (1991) 'The Effect of School Desegregation Decisions on Single-Family Housing Prices', Journal of Real Estate Research 6 (2), 207-216.

Ergul.N, (1995) 'The Efficient Market hypothesis Revisited: Some Evidence from the Istanbul Stock Exchange', PhD thesis ,Brunel University

Essays, UK. (November 2013). The Significance Behind The Efficient Market Hypothesis. Retrieved from https://www.ukessays.com/dissertation/literature-review/the-significance-behind-the-efficient-market-hypothesis.php?cref=1

Europe Real Estate Yearbook (2007) ,viewed on 3rd of December 2016https://books.google.com.tr/books?id=6jueFU4oSHAC&printsec=frontcover#v=onepage&q&f=false

Fama, E. F., (1965) 'The behaviour of stock market prices‖', Journal of Business, Vol.38, No.1, pp.34–105.

Fama, E.F. (1991) 'Efficient Capital Markets II', *Journal of Finance* 46(5), 1575-1617.

Fama, E.F. (1970) 'Efficient Capital Markets: A Review of Theory and Empirical Work', *Journal of Finance* 25(2), 383-417.

Fama, E.F., and K.R. French (1988) 'Permanent and Temporary Components of Stock Market Prices', *Journal of Political Economy* 96(2), 246-273.

FESSUD (2014) 'Financialisation and the Financial and Economic Crises; The case of Turkey', Journal of Economic Literature Classification paper No 21

Fu, Y. & Ng, L. K. (2001), 'Market Efficiency and Return Statistics: Evidence from Real Estate and Stock Markets Using a Present-Value Approach', Real Estate Economics, 29: 227–250. doi:10.1111/1080-8620.00009

Farlex Financial Dictionary. (2012) Farlex, Inc. Inefficient market

Gary .S (2012) 'Testing Weak-Form Market Efficiency of Developing Markets: Evidence from the Baltic Stock Exchange' Disssertation , University of St Andrews.

Gau, G.W. (1984) 'Weak Form Test of the Efficiency of Real Estate Investment Markets', *Financial Review* 19(4), 301-320.

Gau, G.W. (1985) 'Public Information and Abnormal Returns in Real Estate Investemnt', *Journal of the American Real Estate and Urban Economics Association* 13(1), 15-31.

Gau, George W.,(1984) 'Weak Form Tests of the Efficiency of Real Estate Investment Markets', The Financial Review, Vol. 19, pp. 301-20.

Gau, George W., ((1987). Efficient Real Estate Markets: Paradox or Paradigm, *Areuea Journal*, Vol. 15, No. 2, pp. 1-12.

Gatzlaff, D. H. And Tirtiroglu, D. (1995) 'Real Estate Market Efficiency: Issues and Evidence', *Journal of Real Estate Literature*, 3, pp. 157-189

Gimba .V.K, (n.d) 'Testing the Weak –form Efficiency Market Hypothesis: Evidence From Nigerian Stock Market', Journal of applied statistic Vol.3.No. 1, pp. 124-128

Grossman, S.& Stiglitz, J. E., (1980) 'On the Impossibility of Informationally Efficient Markets', American Economic Review 70: 393-408.

Graham .S, and Hyun-Jung .R(June 2003) 'Variance ratio test of the random walk hypothesis for European emerging stock markets',The European Journal of Finance 9,290-300.

Guo, S. & Wang, Z, (2008) 'Market efficiency anomalies : A study of seasonality effect on the Chinese stock exchange', Dissertation. Umeå. Available at: <http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-1581>.

Gu, A.Y. (2002) 'The Predictability of House Prices', *Journal of Real Estate Research* 24(3), 213-233.

Guntermann, K. L., and Smith, R. L (1987) 'Efficiency of the Market for Residential Real Estate', Land Economics 63: 34-45

Guntermann, K. L., and Norrbin, S. C (1991), 'Empirical Tests of Real Estate Market Efficiency', Journal of Real Estate Finance and Economics 4: 297-313.

Guntermann K.L, and Norrbin .S.C (1991) 'Empirical tests of real Estate Market Efficiency',Journal of Real Estate Finance and Economics,4:297-313.

Gürlesel .C.F (2012) 'Main Indicators of Real Estate Sector In Turkey 2011' The Association of Real Estate investment companies

GYODER,(2015)<http://www.gyoder.org.tr/img/mccontent/20131023104456_2835 roadshow2012_gyoder.pdf>, viewed on the 4th of January 2017

GYODER,(2016)<http://www.gyoder.org.tr/img/mccontent/20160304174613_2783 2016-march-turkish-real-estate-sector-report-2mart-10-00.pdf>, viewed on the 6th January 2017

Habibour R , Islam.E , Hossain.S ,& Naser.M.S. (2016) 'Is the capital market of Bangladesh Efficient?', working Paper series :WP No 1614

Hamilton. B. and Schwab.R (1985) 'Expected Appreciation in Urban Housing Markets', *Journal of Urban Economics*, Vol. 18, pp. 103-18. .

Hassan, M. K. & Chowdhury, S. S. H., (2008), 'Efficiency of Bangladesh stock market: Evidence from monthly index and individual firm data', Applied Financial Economics Vol. 18 , Iss. 9,2008

Hassan MK, & Maroney NC (2004) 'Thin trading, nonlinearity and market efficiency of a small emerging stock market: evidence from Bangladesh' Int. J. Appl. Bus. Econ. Res., 2(2)

Investorpedia (2017) http://www.investopedia.com/exam-guide/cfa-level-1/securities-markets/weak-semistrong-strong-emh-efficient-market-hypothesis.asp, viewed on the 25th of January 2017

Islam.A & Khaled .M, (2005), 'Tests of Weak-Form Efficiency of the Dhaka Stock Exchange' Journal of Business Finance and Accounting ,32(7/8),1613-1624

Islam.S.M.N and Clark.C.(2005) 'Are Emerging financial Markets efficient?Some Evidence from the Models of the Thai Stock Market', Dissertation, Victoria University

Istanbul House Investment Report (2016) ' Domestic Sector Overview', viewed on 5th December 2016 athttp://www.istanbulhouseinvestment.com/industry-overview.htm

Ito and Hirono (1993) 'Efficiency of the Tokyo Housing market', Journal of National Bureau of Economic Research; working paper No. 4382.

Jeboisho .C.E,(2014) 'Testing the weak Form of Efficient Market Hypothesis at Nairobi Stock Exchange', Dissertation ,University of Nairobi

Jensen, M. C. (1978) 'Some Anomalous Evidence Regarding Market Efficiency', Journal of Financial Economics, Vol. 6, Nos. 2/3 (1978) 95-101.

Karl L, Guntermann & Richard L. Smith(1987) ' Efficiency of the for Real Estate Market Efficiency', Land Economics Vol. 63, No. 1 (Feb., 1987), pp. 34-45

Kleiman, Robert T, Payne, James E. & Sahu, Anandi, 'Random Walks and Market Efficiency: Evidence from International Real Estate', Journal of Real Estate Research, Vol. 24, No. 3, 2002. Available at SSRN: https://ssrn.com/abstract=986626

JLLreport (2015) viewed on 4th of January 2017 http://www.jll.com.tr/turkey/engb/Research/JLL_YARIYIL_RAP_ENG_MAX.pdf

JLL report (2016) Viewed 12 of December 2016 (http://www.jll.com.tr/turkey/engb/Research/JLL%20Turkey%20Commercial%20Real%20Estate%20Market%20Overview%202016%20H1%20Report.pdf

Kesikli (2016) 'Real estate' viewed on the 12th of February 2017 at http://www.kesikli.com/real-estate/

Kimmons(n,d) https://www.thebalance.com/top-major-types-of-real-estate-property-2866989 viewed on Friday the 4th of November 2016

Kuo, C.-L. (1996 'Serial Correlation and Seasonality in the Real Estate Market', *Journal of Real Estate Finance and Economics* 12(2), 139-162.

Larsen.E.R &Weum .S (2007) 'Testing the Efficiency of the Norwegian Housing market', Discussion paper no .506 available at http://ideas.repec.org/s/ssb/dispap.html viewed on the 28th of December 2016

Lee, C. F., Chen, G-M. and Rui, O.M.(2001) 'Stock Returns and Volatility on China's Stock Markets' Journal of Financial Research Vol XXIV,No.4,Pages 523-543

Linneman, P. (1986) 'An Empirical Test of the Efficiency of the Housing Market', *Journal of Urban Economics* 20(2), 140-154.

Lo, A.W., and A.C. MacKinlay (1988): 'Stock Market Prices Do Not Follow RandomWalks: Evidence from a Simple Specification Test', The Review of Financial Studies 1(1), 41-66.

Lo, A.W., and A.C. MacKinlay (1989): 'The Size and Power of the Variance Ratio Test inFinite Samples', Journal of Econometrics 40(2), 203-238.

Maier.G and Herath.S, (2009) 'Real Estate Market Efficiency. A Survey of Literature'. *SRE - Discussion Papers*, 2009/07. Institut für Regional- und Umweltwirtschaft, WU Vienna University of Economics and Business, Vienna.

Malkiel.B.G (2003) 'The Efficient Market Hypothesis and Its Critics' , Journal of Economic Perspectives—Volume 17, Number 1

Man .K.F. &Chau K.W. (n.d) 'Is the existence of property cycles consistent with the Efficient Market Hypothesis' , Retrieved from http://www.prres.net/papers. Viewed on the 5th December 2016.

Maxim.M. R, Miti. T.A, & S.M Arifuzzaman (2013) 'Is Dhaka Stock Exchange (DSE) Efficient? A Comparison of Efficiency Before and After the Market Crisis of 2010'Journal of Asian Business, Volume 3, Number 4/2013 (Issue 6) ISSN 2305-8730 (Online)

Mobarek.A , Mollah & Bhuyan .R(2008) 'Market efficiency in Emerging Stock Market: Evidence from Bangladesh'Journal of Emerging Market Finance viewed on the 4th of November 2016 at http://emf.sagepub.com/cgi/content/refs/7/1/17

Niemczak and G. Smith(2013) 'Middle Eastern stock markets: absolute, evolving and relative efficiency' Journal of Applied Financial Economics Vol. 23 , Iss. 3,2013

 viewed on 21st September 2016 at http://dx.doi.org/10.1080/09603107.2012.714068

Nisar.S. and Hanif .M.(2012) 'Testing Weak form of Efficient Market Hypothesis: Empirical Evidence from South –Asia', World Applied Sciences Journal 17(4):414-421

Oak .S and Andrew W.P.(2003) 'Evidence for Weak-Form Market Efficiency in Hotel Real Estate markets', Journal of Hospitality and Tourism Research Vol.27(4),436-447

Phan.K.C,and Zhou.J,(2014) 'Market efficiency in emerging stock markets', Journal of Business and Management (IOSR-JBM)□e-ISSN: 2278-487X, p-ISSN: 2319-7668,Volume 16, Issue 4. Ver. IV, PP 61-73 www.iosrjournals.org

Oxford Business Grouped (2012) 'Construction and Real estate' viewed on the 15 of February 2017 at Lhttps://www.oxfordbusinessgroup.com/overview/rising-star-increasingly-affluent-population-drives-demand-homes-while-istanbul%E2%80%99s-role-business

Pearson, K. (1905), "The Problem of the Random Walk" Nature no. 1867 v. 72, pp. 294 and 342.

Rahmann.F.H (2004): Inefficiencies in the international Housing Market. Global asset and wealth management program *Financial Economics*, 6(2), pp. 95-101.

Raff, R. A. And Webb, J. R. (1997) 'Agency Costs and Inefficiency in Commercial Real Estate', *Journal of Real Estate Portfolio Management*, 3(1), pp. 19-36.

Raquib, M. &Alom, H. (2015), 'Are the Emerging Capital Markets Weak Form Efficient ?- Evidence fro the Model of the Dhaka Stock Exchange ',Universal Journal of Accounting and Finance, Vol,3, No,pp.1-8.

Real estate market. (n.d.) *West's Encyclopedia of American Law, edition 2*. (2008). Viewd on 1st of February 2017 at http://legaldictionary.thefreedictionary.com/Real+estate+market

Real Estate Industry report (2016) 'Investment support and promotion agency of Turkey' viewed on 7 th December 2016 http://www.invest.gov.tr/en-us/sectors/pages/realestate.aspx

Realtymogul report (2017) 'Class A,Class B and Class C properties' viewed on 1st of February 2017 https://www.realtymogul.com/resource-center/articles/what-is-class-a-class-b-or-class-c-property

Regnault .J (1863), *Calcul des chances et philosophie de la bourse*, 1edn, Mallet-Bachelier and Castel, Paris.

Samuelson, P. (1965) 'Proof that Properly Anticipated Prices Fluctuate Randomly', Industrial Management Review, Spring 6, 41-49.

Sayce.S. , Smith.J, Cooper.R., & Rowland.P (2006), Real Estate Appraisal From Value to Worth ,1st edition pg 135-137,2006):

Schindler, F., N. Rottke, and R. Fuess (2009) 'Testing the Predictability and Efficiency of Securitized Real Estate Markets', *ZEW Discussion Paper Series*, No. 09-054.

Schindler.F, Rottke.N & Füss.R (2009) 'Testing the predictability and Efficiency of Securitized real Estate Markets', ZEW Discussion Paper ,No.09-054

Schindler, F. (2010) **'**Market efficiency in the Emerging Securitized Real Estate markets' ,*ZEW Discussion Paper,*No. 10-033

Schindler, F. (2010) 'Further Evidence on the (In-) Efficiency of the U.S. Housing Market', *ZEW Discussion Paper Series*, No. 10-004

Sewell, M. (2011*) '*History of the Efficient Market Hypothesis' http://www.cs.ucl.ac.uk/fileadmin/UCLCS/images/Research_Student_Information/RN_11_04.pdf Viewed on the 3rd of November 2016

Shaker.A.T,(2013) 'Testing the Weak-Form Efficiency of the Finnish and Swedish Stock Markets', PhD Student, Department of Finance University of Vaasa, Finland

Shiller, R. J.(2003) "From Efficient Markets Theory to Behavioral Finance ." *Journal of Economic Perspectives*, 17(1): 83-104.

Smith, G., Jefferies, K. & Ryoo, H-J (2002) 'African Stock Markets: Multiple VarianceRatioTestsofRandomWalks', Journal of Applied Financial Economics,Vol. 12, No. 7, pp. 475–84.

Smith, G. (2011). 'The changing and relative efficiency of European emerging stock markets.' The European Journal of Finance, DOI:10.1080/1351847X.2011.628682

Stefan. I (2009) 'Testing the Efficient Markets Hypothesis: A Behavioral Approach to the Current economic crisis', Senior Honors Thesis, University of California, Berkeley

Sterman, J, (2000) 'Case Study: Boom and Bust in Real Estate Markets' Chapter 17 - Supply Chains and the Origins of Oscillations, *Business Dynamics: Systems thinking and modeling for a complex world*. McGraw Hill.

Summers, L. (1986) 'Does the Stock Market Rationally Reflect Fundamental Values?', *Journal of Finance* 41(3), 591-600.

Turel, A. and Koc .H. (2014) 'Housing Production under Less-Regulated Market Conditions in Turkey', Journal of Housing and the Built Environment ,doi;10,1007/s10901-014-9393-6.

Turksat (2013) ' Housing statistic' viewed on the 15th of January 2017

http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=0

Turkish Statistical Institute(2015)

Turkish Statistical Institute report (2016) 'Building Permits" viewed on 12 of December 2016 http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=21762

Uddin, Md. G. S. & Shakila, Y.(2008) 'Random Walk Model in the Dhaka Stock Exchange: An Empirical Evidence of Daily Return‖', Journal of Business Administration, Vol.35, No.1&2, pp.75-86.

UK Essays (November 2013). Efficient Market Hypothesis. [online]. Available from: http://www.ukessays.co.uk/essays/strategic-management/efficient-market-hypothesis.php?cref=1 ,viewed on 25th January 2017.

Work bank data base (2015) 'World Bank national account data ,and oecd national Acconts data files viewd on the 17th of September 2016 at http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=TR

World Bank (2016) Turkey's population and GDP ,viewed on 20th September 2016 http://www.worldbank.org/en/country/turkey/overview.

Yajie. S, (2016) 'Market Efficiency and House Price Dynamics in Residential Real Estate Market of China, http://scholarbank.nus.edu.sg/handle/10635/126231 viewed on the 13 of February 2017

APPENDIX

Table A.1: FDI to Turkey and Real estate market in USD

year	FDI Total	Real estate	Real Esate/FDI
2007	22,046	2,926	13%
2008	18,269	2,937	16%
2009	8,629	1,782	21%
2010	9,099	2,494	27%
2011	16,176	2,013	12%
2012	13,282	2,636	20%
2013	12,457	3,049	24%
2014	12,530	4,321	34%
Nov.2015	14,116	3,706	26%

Table A.2: GDP Growth rate development of Turkey in USD

year	
2000	266568000000
2007	647155000000
2008	730337000000
2009	614554000000
2010	731168000000
2011	774754000000
2012	788863000000
2013	823243000000
2014	798797000000
2015	718221000000

Table A.3:

Apartment unit sold	
year	Amount
2008	427105
2009	531746
2010	357341
2011	419000
2012H1	202127

Table A.4:

Prediction for Office inventory in Istanbul Million SM	
Year	Amount
2012	3.80
2013	4.10
2014	4.30
2015	4.50
2016	4.80
2017	5.00
2023	7.00

Table A.5:

Office Inventory in Istanbul (SQM)	
YEAR	
2002	1441505
2003	
2004	
2005	1657688
2006	
2007	2086385
2008	2657524

2009	2877024
2010	3073024
2011	3413834
2012	3715034
2013	4200000

RESUME

PERSONAL
INFORMATION

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Sex Female | Date of birth 20/03/1988 | Nationality Cameroonian

STUDIES APPLIED FOR   Master In Business Administration

WORK EXPERIENCE

06/2013–01/2015   Loan Officer

Gladston Cooperative Credit Union, Bamenda (Cameroon)

- Daily control and making sure all accounts are balanced at the end of the day

- Data entry into internal systems

-Appraising the credit worthiness of customers and making necessary recommendations for granting of loans

- Recording financial transactions

-Operate cash register and adding machine in order to manage cash for sold items

06/2012–08/2012	**Receptionist**
	Tikar Cooperative Credit Union, Bamenda (Cameroon)
	-Handle customers inquiries, complaints, billing questions and payment extension request
	-Calm angry callers and repair trust

EDUCATION AND TRAINING

| 09/2015–Present | **Master |n Business Management** |
| | Istanbul Aydin University, Istanbul (Turkey) |

09/2007–09/2012	**Bachelors Degree in Business Administration and Management of Enterprise**
	University Of Yaounde II Soa, Yaounde (Cameroon)
	Strategic Management
	Human Resource Management
	Game theory
	Econometrics
	Operational Research
	Cooperate Finance
	Economic Policy
	Creation D'entreprise
	Professional Project
	Public Economics

| 01/2012–12/2012 | **Diploma in Computerised Accounting** |

CITEC Yaounde, Yaounde (Cameroon)

Computerised Accounting

Cost Accounting

Financial Management

Financial Maths

Word Processing

Data Processing

09/2005–09/2007	Advanced Level
	Government Bilingual High School, Kumbo (Cameroon)
	Economics
	Geography
	Mathmatics

PERSONAL SKILLS

Mother tongue(s)	English

Other language(s)

UNDERSTANDING		SPEAKING		WRITING
Listening	Reading	Spoken interaction	Spoken production	

French					
	A2	A2	A2	A2	A2

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user

Common European Framework of Reference for Languages

Digital competence

SELF-ASSESSMENT				
Information	Communication	Content	Safety	Problem

processing		creation		solving
Independent user	Independent user	Independent user	Independent user	Basic user

[Digital competences - Self-assessment grid](#)