

**T.C.
ISTANBUL AYDIN UNIVERSITY
INSTITUTE OF GRADUATE STUDIES**



**HOUSING INDEX AND ECONOMIC FACTORS: A
COMPARATIVE STUDY OF TURKEY AND DEVELOPED
COUNTRIES**

MASTER'S THESIS

Said Aziz SADAAT

**Department of Business
Business Administration Program**

DECEMBER, 2023

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APPROVAL PAGE

DECLARATION

I hereby declare with the respect that the study “Housing index and Economic Factors. A comparative study of Turkey and developed countries”, which I submitted as a Master thesis, is written without any assistance in violation of scientific ethics and traditions in all the processes from the project phase to the conclusion of the thesis and that the works I have benefited are from those shown in the References.
(.../.../20...)

Said Aziz SADAAT

FOREWORD

First and foremost, I would like to express my gratitude to the Almighty Allah for his abundant mercy and protection, which allowed me to complete my dissertation. I am grateful because, without Dr Tayfun Tuncay Tosun's help, I would not have been able to finish my dissertation. Thank you so much, I appreciate your dedication and step-by-step advice for me. I would like to express my gratitude to everyone at Istanbul Aydin University. Especial grateful to my father who makes me proud to have such a wonderful and supportive father as you, and my loving mother, thank you, my family and friends.

December, 2023

Said Aziz SADAAT

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ABSTRACT

A statistical tool used to monitor changes in the cost of residential real estate properties within a given nation or geographic area refers to the housing index. Typically, data is compiled from multiple sources to compute it. It is a helpful tool for spotting real estate market trends and helping you decide whether to buy or sell a property. Housing indices are frequently used by real estate professionals and investors to monitor the performance of their real estate portfolios, determine possible investment opportunities, and evaluate the state of local real estate markets. In order to evaluate the trend comparison between developed and developing countries, this study compared the housing index of Turkey with those of three highly developed nations the United States, the United Kingdom, and Germany. I take into consideration the GDP, population, interest rate, unemployment rate, and debt of those nations and look at how they affect the housing index. Regression analysis was used to analyze the effects using time series secondary data of those nations and the aforementioned factors from 1982 to 2021. The results of the study demonstrated that Turkey's housing index pattern differs from that of developed nations in that interest rates, unemployment rates, and debt are the primary determinants of the housing index in Turkey, in contrast to the United States, where GDP is also a significant determinant of the housing index. Furthermore, it has been determined that debt has a negative impact on the housing index in Turkey, whereas in developed nations, debt has a positive impact. Additionally, it was discovered that the housing index for the UK and Germany was not significantly influenced by interest rates, and that these two nations' GDP and population sizes were additional predictors. In contrast with other developed and developing countries, the UK's unemployment rate was found to negatively affect the housing index.

Keywords: Housing Index, GDP, Unemployment rate, Interest rate, GDP, Population, Debt, Turkey, United States of America (USA), United Kingdom (UK), Germany

KONUT ENDEKSİ VE EKONOMİK FAKTÖRLER: TÜRKİYE VE GELİŞMİŞ ÜLKELER ÜZERİNE KARŞILAŞTIRMALI BİR ARAŞTIRMA

ÖZET

Konut endeksi, belirli bir coğrafi bölge veya ülkedeki konut gayrimenkullerinin fiyatlarındaki değişiklikleri izlemek için kullanılan istatistiksel bir ölçüdür. Genellikle çeşitli kaynaklardan verilerin derlenmesiyle hesaplanır. Emlâk piyasasındaki eğilimleri belirtmek ve mülk alıp satma konusunda bilinçli kararlar vermek için yararlı bir araçtır. Yatırımcılar ve emlâk profesyonelleri, yerel emlâk piyasalarının sağlığını değerlendirmek, potansiyel yatırım fırsatlarını belirlemek ve gayrimenkul portföylerinin performansını izlemek için genellikle konut endekslerini kullanır. Bu araştırmada gelişmiş ve gelişmekte olan ülkeler arasındaki trendleri değerlendirmek için gelişmiş üç ülke olan ABD, İngiltere ve Almanya ile Türkiye konut endeksi karşılaştırması yaptık. Bu ülkelerin faiz oranı, işsizlik oranı, GSYİH, nüfus ve borçlarını hesaplıyor ve bunların konut endeksi üzerindeki etkilerini inceliyoruz. 1982'den 2021'e kadar olan dönemde bu ülkelerin ve yukarıda belirtilen faktörlerin bir zaman serisi ikincil verilerini kullandık ve etki analizi için çoklu doğrusal regresyon yöntemini kullandık. Araştırmanın bulgusu, Türkiye'nin gelişmiş ülkelere kıyasla farklı bir konut endeksi yapısına sahip olduğunu gösterdi. GSYİH konut endeksini etkileyen faktör olarak tanımlandığı ABD'nin aksine, faiz oranı, işsizlik oranı ve borç Türkiye konut endeksini etkileyen ana faktörler olarak bulunmuştur. Ayrıca Türkiye'de borcun konut endeksi üzerinde olumsuz etkisi olduğu, gelişmiş ülkelerde ise borcun olumlu etkisi olduğu tespit edilmiştir. Ek olarak, İngiltere ve Almanya için konut endeksinin faiz oranlarından önemli ölçüde etkilenmediği ve GSYİH ve nüfus büyüklüklerinin bu iki ülkede konut endeksinin belirleyicileri olduğu keşfedildi. Diğer gelişmiş ve gelişmekte olan ülkelere farklı olarak İngiltere'de işsizlik oranının konut endeksini olumsuz etkilediği tespit edilmiştir.

Anahtar Kelimeler: Konut Endeksi, GSYİH, İşsizlik oranı, Faiz oranı, GSYİH, Nüfus, Borç, Türkiye, Amerika Birleşik Devletleri (ABD), Birleşik Krallık (İngiltere), Almanya

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I. INTRODUCTION

A. Housing and Housing Finance

Human has the different desire and housing is one of the desires which is common among people it is an important need for people and housing play an important role in a country's economic development. House is the kind of asset which usually people buy to live in it but the advantage they get with it as time goes by the value of the asset increase in the coming future. (King, 2009). Housing finance plays an important role in the life of the people and also plays important role in the economic development of the state or country, it helps the finance sectors and construction sectors to get on their feet. It helps in developing the urban areas and evaluates the illegal and dangerous construction which can be damaged easily by the natural sudden happening like earthquakes. (Ozkurt and Dogan, 2010).

The housing finance structure in many countries is different and every country has its housing finance process and people have different approaches to that process (Warnock and Warnock, 2008). These different types of schemes and structures give a lot of options to the people to take the money and buy the property (Leece, 2004).

The housing finance system is a process that meets the requirement of borrowers and lenders, the reason this research is conducted is to know the housing finance structure in developed countries and Turkey. As the research knows that personal savings or income from a household cannot be good enough to buy a house. The research will find the different financial systems which are been already made by the government in developed countries and Turkey for the reason to enable people to acquire housing. The research will explore the causes that affect housing finance in developed countries and Turkey.

B. Housing Loan Wellsprings

Numerous significant sources of housing financing involve personal and other reserves provided by banks, pensions, etc. (Boleat, 1985; King, 2009). Diverse procedures and varieties were employed to construct significant housing capital in advanced and emerging countries. (Leece, 2004).

Emerged states possess all been building processes in the housing finance field which are designed based on private-sector organizations and investment marketplace tools (Balogly, 2007). Accommodation capital societies in those nations generate their capital with the assets from payments and principal porch devices issued (Yilmaz and Hepsen, 2008). So, fiscal establishments fulfill the home money requirements of their clients for an extended time principal in emerged republics (Henkel et al., 2021).

Housing terms are not so good in developing countries and do not have enough financial intermediaries which allow needful capital to the housing sector (Reanaud, 1984). Developing nations have non-institutional housing financing that is culturally or traditionally based and consists of savings, assistance from others, loans, or credits. Institutional resources and non-institutional resources are observed as forms of housing capital sources. (Alp et al., 2000; Baloglu, 2007)

C. Non- Institutional Accommodation Funding

There are no policies or procedures pertaining to housing arrangements in the non-institutional housing financing sector. So, there is no real information, no certified records, and no lawful protocols (Kalu et al., 2021). Unofficial housing finance procedures are used in all the developing and under-developing countries (Hossain et al., 2023). The issues faced by developing and under-developing countries are, that it has lacked a good planned financial system that controls accommodation action and economic organizations that offer longstanding resources (Teker, 2005).

As Zehra and Singh stated that non-institutional income for housing finance can be classified under personal savings, funds from friends or relatives, from a colleague, from the sale of assets, or as an inheritance (Zehra and Singh, 2023). After obtaining Potential sources of funds include personal loans from acquaintances,

financial assistance from colleagues, liquidation of assets, or inheritance proceeds. Following the acquisition of funds through various means, individuals typically established accommodation associations and engaged free-lancers in a non-institutionalized lodging approach. (Hepsen, 2010).

D. Institutional Housing Finance

The institutional housing finance process is also known as financial institutions that give capitals to the accommodation segment which is authorized, and approved by the public authorities and is run by the law (Lea, 2000). These kinds of establishments are commonly available in established countries since those have organized prime and inferior lodging marketplaces (Hepsen, 2010).

The crucial features for this operation include the earning level and academic attainment of individuals, prevailing return rates, personal and geographical attributes of the population, and community connections within the locality (Dunham, 2019). The home business process of institutions involves the provision of substantial loans over an extended period through financial intermediaries to facilitate the construction of residences (Warnock, 2008). According to Hepsen's (2010) research, institutional housing finance can be categorized into various types, including specialist housing finance, ordinary monetary organizations, community home sponsorship, and global assets. Hepsen (2010) conducted a study in which he categorized proficient housing finance institutions into three distinct types. These types include bodies recognized by government owned companies and banks, non-government financial segment corporations and loan offering organizations, and saving and home financing corporations. The government's involvement in housing financing is aimed at incentivizing the real estate sector, as it is imperative to provide affordable housing options for individuals belonging to the lower and middle-income brackets (Hepsein, 2010). The financing of public housing may involve the conversion of direct funds towards the development of publicly-built housing infrastructure. Therefore, it is possible that financing for public housing could result in an indirect transfer of capital through the provision of assistance and incentives to individuals (Demir and Palabyil, 2005). Developed nations tend to employ indirect methods of intervention, with direct intervention being relatively infrequent. Governments in developing countries employ a range of interventions in the housing

sector, including financial regulations, financial assistance, mortgage and loan programs, and direct investments. (Komurlu, 2006).

E. Home Financing System

The home financing process was built to fulfill the needs of nonpayers and financiers (Roodman, 2012). According to King's (2009) findings, individual savings held by households may not be sufficient to facilitate the acquisition of a house. Numerous financing processes have been established by governments, private organizations, and individuals to incentivize individuals to acquire housing. This has been done for the aforementioned purpose. The process of housing finance aims to generate a return for the parties or groups that have sought capital through their respective funding rounds. Alternatively, Leece (2004) suggests that lenders may extend loans to debtors in order to facilitate debt repayment.

Diverse housing finance systems are present in every nation. According to Komurlu (2006), in several nations, the banking industry serves as the primary source of capital, whereas in other nations, housing finance enterprises may hold significant importance. In general, Boleat identified some kinds of home financing schemes, namely: the straight track, the pledged track, the credit sponsoring track, and the loan bank track (Bratton and Levitin, 2020).

F. Mortgage Markets and Securitization of Mortgages

The process of obtaining a mortgage involves primary and secondary market transactions. Primary market entities, such as banks and other financial institutions, may provide mortgage loans to individuals seeking to purchase a home through borrowing (Fabarozzi, 2006). Individuals seeking primary market housing typically engage in a search for a residential property to acquire, followed by an application to economic organizations to request a loan. Monetary establishments conduct credit investigation to determine an individual's creditworthiness and eligibility for credit. Upon approval, financial institutions delegate the task of disbursing funds to an authorized individual. Subsequently, the assessed worth is computed and communicated by the duly authorized individual, following which the financial institution or bank provides funding for the acquisition of a residential property. As

per Hepsen's (2010) findings, it can be observed that the potential purchaser is required to pay 25% of the unit's price as the down payment, while the remaining amount is covered by the financial institution.

Securitization refers to the process of assembling illiquid assets into a mortgage pool, which is then presented as security for third-party venture by agents. This approach is typically employed in situations where there is a liquidity concern (Gaschler, 2017). The process of securitization involves the transformation of assets that lack liquidity into assets that possess liquidity. The primary objective of securitization is to enhance the liquidity of money movement and mitigate the danger for liability inventors, as posited by Gaschler (2010). The process of scrutiny of debts facilitates the amalgamation of loan marketplaces with an additional wealth market source. Moreover, it decreases the practice of rationing, thereby decreasing the availability of mortgage credit for mortgage lenders in the context of mortgage loans (Leece, 2004). The result of securitization with regards to securities is commonly mentioned as loan return securities. (Dogru, 2007).

G. Risk Involves in Mortgage

Hepsen (2010), describes five types of risks involved in the mortgage process or system, the payment risk, the interest rate, default, liquidated, and buying power risk. One of the primary risks associated with extended mortgage loans is the potential for payment default. Individuals who have obtained mortgage loans possess the entitlement to make additional payments towards their outstanding balance prior to the loan's maturity date. The risk of repayment arises when obligors are required to fully or partially repay their mortgage loan in advance. This phenomenon can lead to financial instability due to the unpredictability of cash flow. The credit grantor institution faces lower repayment risk when the prevailing offered extraordinary return rate. In the event that the return rate declines, the debtor has the option to refinance their current mortgage debt at a reduced rate. According to Leece (2004) and Fabarozzi (2006), there is a positive correlation between decreasing market rates and an increase in risk. Return rate possibility is a type of hazard that arises from fluctuations in the market return rate over time. In the event of an increase in interest rates, a commercial foundation that has offered a secure return rate loan loan will face a damage because of investment of its funds at a lower return. A decrease of the

return rate is expected to lead to an increase in the value of the mortgage credit. According to Hepsen (2010), investing in a mortgage credit entails a long-term commitment that exposes the investor to heightened interest rate risk. Numerous financial institutions employ underwriting as a means of hedging their interest rate. Underwriting is a process that involves mitigating losses arising from interest-related losses, thereby providing coverage for such losses by the insurance company (Hepsen, 2010). Credit risk arises when mortgage borrowers fail to repay their loans to the lending institution for various reasons (Hepsen, 2010). Liquidity risk refers to the potential inability to convert real estate assets or investments into cash, or the possibility of converting them at a price below the prevailing market rate. In general, the risk associated with mortgage credits is determined by analyzing the discrepancies between their buying and selling prices (Komurlu, 2006). Buying power risk refers to the potential variability of the buying energy of money generated by speculation mechanisms in the future. Due to the extended duration of mortgage credit, inflation poses a significant risk. One potential strategy for mitigating buying power risk is to consider floating rate loan credit as an alternative to fixed interest mortgage loans. This approach may offer borrowers greater flexibility and could potentially reduce their exposure to fluctuations in interest rates. (Hepsen, 2005).

H. Purpose of the Study

This research does a deep investigation on the key things that can affect the supply chain management of housing finance in developed countries and Turkey and its effect on the people and the country's economy.

- To understand the important previous research (literature review) on housing finance in the developed countries and Turkey and identify the main elements which affect the housing both positively and negatively.
- To analyze the housing finance practices and their feature in developing countries and Turkey to know their strengths and weaknesses.
- To construct the theoretical framework after the comparative analysis of developed countries and Turkey's application.
- To collect the secondary data to analyze the data for the reason to know the result

I. Research Questions

- What factors determine the housing index in Turkey, as a developing country?
- Are the determinants of the housing index different in developed countries and a developing country like Turkey?
- What does the fact that the determinants of the housing index are different in developed countries and developing countries such as Turkey indicate?

II. LITERATURE REVIEW

A. Housing Finance Practices in the Developed Countries

The practices of housing finance are widely regarded as critical in developed nations, particularly in relation to the advancement of the real estate industry. Numerous investment instruments have been created and established to facilitate participation in the current housing industry (Warnock, 2008). Numerous developed nations employ distinct housing procedures and conduct extensive research to optimize their efficacy. This section of the research will examine the housing finance systems of various developed nations, including the United States, England, and other countries.

A. United States

The housing finance sector in the United States of America (USA) is characterized by a high degree of complexity with respect to both primary and secondary markets., as noted by Boleat (1985). Alp and Yilmaz (1999) assert that while various developing and developed nations have tailored their housing finance procedures to suit their respective housing demands, the structure of the housing finance process in the United States is indicative of its underlying functions.

The housing finance process in the United States is a well-established and historical system that originated from informal agreements in the late 19th century. Over time, it has evolved into a formal agreement (Colton, 2002). The establishment of two banks, namely the Federal Management Bank and the Central Home Finance, occurred in the United States in 1916, as documented by Courchane and Giles (2001) and Green and Wachter (2005). According to Colton (2002) and Gurbuz (2002), the housing finance institutions in 1929 consisted of four distinct types, namely money-making banks, saving and finance associations, and investments and credit associations.

New techniques have been developed in the process of housing finance. The initial breakthrough in the housing finance system occurred in the aftermath of the Great Depression, owing to the imperative need for government intervention. The interventions implemented in this study entail the enhancement of the existing system and the establishment of a novel housing finance framework, which received support from both private and public entities by means both direct and indirect (Colton, 2002).

According to Courchane and Giles (2001) and Colton (2002), the writers of this work, Franklin D. Roosevelt's leadership enabled the United States to enter the building sector and create a number of housing companies

In 1934, Congress approved the National Housing Act, which led to the establishment of the Federal Housing Administration (FHA). The primary objective of the FHA was to develop housing standards and facilitate homeownership chances for families (Colton, 2002; 2001). The Government National Loans Association has made its Annual Report for the Year 2011 accessible to the public. In addition, the Veterans Administration was founded in 1934 with the goal of granting home loans to members of the military services who were either actively serving their nation or who had served their country in the past but were no longer in active duty. This was done with the intention of helping veterans transition into civilian life. In the year 1938, the Federal Nationwide Loan Association, sometimes known as Fannie Mae or FNMA, was created. Fannie Mae is the more common name for this organization. The corporation can be referred to by one of the two commonly used abbreviations for it: FNMA or Fannie Mae. to establish a supplementary market for mortgages backed by the Department of Veterans Affairs (VA) and the Federal Housing Administration (FHA). This information has been cited by various sources, including Colton (2002), Gurbuz (2002), and Ayan (2001).

In 1968, Fannie Mae underwent a division resulting in the establishment of two distinct entities. The Government National Mortgage Association (GNMA), also known as Ginnie Mae, was created as a lending institution, as documented by Green and Wachter (2005). The Federal Housing Loan Mortgage Corporation (FHLMC) was recognized in 1970 with the aim of enhancing liquidity, stability, and affordability in the American housing market, as documented by Green and Wachter (2005) and the 2011 Annual Report of the Central Home Credit Loan Corporation

(2011). The figure below displays the various housing finance corporations.

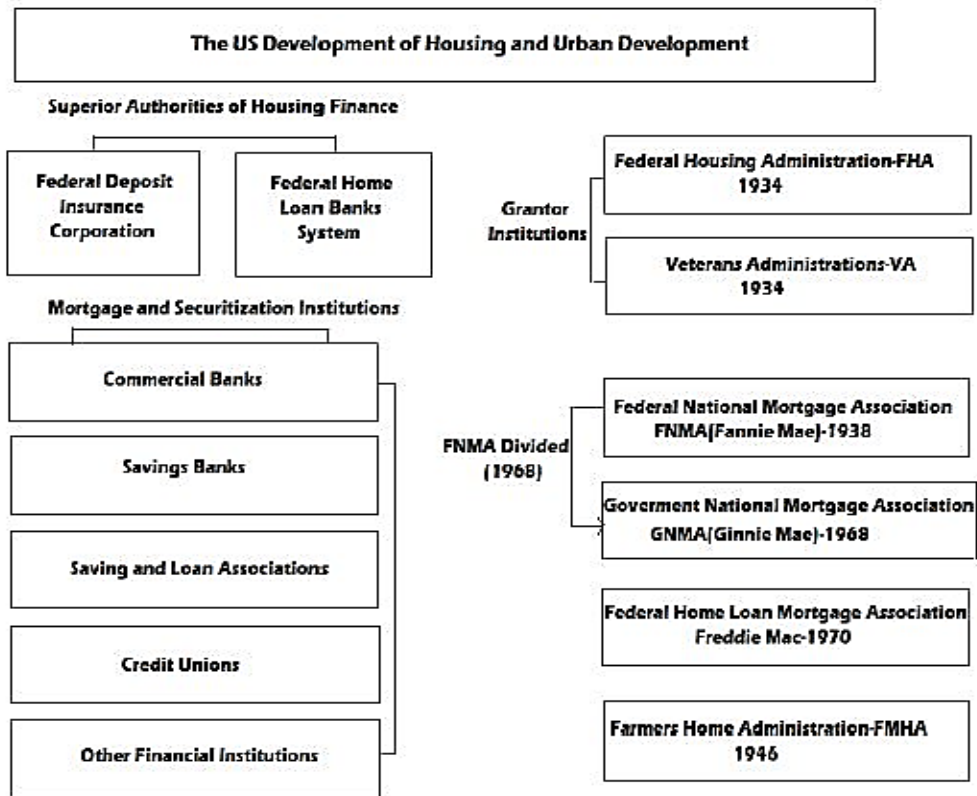


Figure1. Housing Finance Setup in the United State of America.

Source: (Komurlu, et.al 2006)

1. Federal Government Housing Administration

Following the conclusion of the Great Economic Depression in 1929, there was a significant decline in the volume of mortgage transactions in the United States. According to Green and Wachter (2005), the mortgage transaction has resulted in a reduction of investor confidence in mortgage-backed securities (MBSs). Hawtrey (2009) and Hepsen (2010) say that the National Housing Act was used by the Department of Housing and Urban Development (HUD) to make the Federal Housing Administration (FHA) in 1934.

The primary goal of this organization is to provide capital at reduced interest rates, offer mortgage guarantees, and facilitate secondary mortgage placements. The deployment of these commodities facilitated the transformation of the middle and lower socioeconomic strata into self-sufficient households. In addition, the Federal Housing Administration aimed to ensure that mortgage lending institutions were protected from the potential default risk of housing progresses squeezed by

homeowners (Colton, 2002; Green and Wachter, 2005).

According to Green and Wachter (2005), the Federal Housing Administration (FHA) experienced an increase in housing capital with a fixed interest rate and established a system of insurance to protect against default on housing loans. The Federal Housing Administration (FHA) provides insurance to mortgage companies that adhere to the mortgage borrowing process in understanding with the conditions set out by the FHA (Courcane and Giles, 2001). According to Hepsen's (2010) research, the Federal Housing Administration (FHA) was the initial entity to establish the benchmark for mortgage lending.

The Federal Housing Administration (FHA) is a not-for-profit organization that provides insurance to borrowers at reduced rates. The financial resources of the Federal Housing Administration (FHA) are derived from the insurance premiums paid by mortgage loan providers, as noted by Alp and Yimaz (1999). The Federal Housing Administration (FHA) is a prominent mortgage insurance company that has insured over 34 million mortgage creditors since 1934, as reported by Hawtrey (2009).

2. Veterans Administration

The establishment of the Veterans Administration in 1934 was aimed at guaranteeing housing borrowings, as noted by Colton (2002). The Veterans Administration (VA) was established with the purpose of providing affordable housing financing to military personnel returning from combat (Courcane and Giles, 2001). According to Colton (2002), insurance coverage is provided for housing loans obtained by both retired and active-duty military personnel.

The Department of Veterans Affairs exclusively provides insurance for dwelling credits that are subsequently loosened up by contract associations, banks, and select housing finance entities. According to Hepsen (2010), the VA does not permit homeowners who use housing loans similar to those offered by the FHA to make down payments.

3. The Federal National Mortgage Association

The Federal National Mortgage Association (FNMA), commonly known as Fannie Mae, was founded in 1938 with the aim of reorganizing the secondary

mortgage market, ensuring a balance between requesting and supply for real estate, plus providing liquidity for the housing marketplace (Colton, 2002). Primary goals of FNMA are to provide services to housing borrowers who have state assurance and are insured by FHA and VA, as stated by Alo and Yilmaz (1999).

FNMA had worked as per these objectives regarding the housing market in the United States of America until 1968. The actions of FNMA prevented the mortgage market in the United States from reaching an acceptable level during the specified timeframe. In 1968, the classification of the entity resulted in the formation of two corporations as noted by Courchane and Giles (2001) and Colton (2002).

The aforementioned corporation underwent a transformation into a privately owned capital entity, colloquially referred to as the "new Fannie Mae," while still being managed by a government-funded enterprise. Fannie Mae commenced trading of its shares on the New York Stock Exchange, as reported by Lea (2000). According to Lea (2000) and Wallison and Ely (2000), Fannie Mae achieved a high level of efficiency subsequent to its transition to private enterprises with the aid of government funds.

The bifurcation of Fannie Mae into two distinct entities was attributed to its provision of loans through the acquisition of non-government guaranteed mortgages, as documented by Wallison and Ely (2000) and the Annual Report of the Government National Mortgage Association (2011).

During periods of economic instability, Fannie Mae may experience insufficient capital to support housing loans. The issue at hand resulted in the bifurcation of Fannie Mae into two entities, as documented by Colton (2002) and Green and Wachter (2005).

Subsequent to 1971, Fannie Mae commenced the purchase and sale of conventional mortgage loans, notwithstanding the absence of guarantees from the Veterans Administration (VA) and the Federal Housing Administration (FHA) (Boleat, 1985). The aforementioned credit categories were acquired within the mortgage's secondary marketplace is operated by Fannie Mae. This request enhances the level of effectiveness within the housing sector. Besides, FNMA was established in 1981 with the purpose of creating mortgage-backed securities. The contract upheld protections given by Fannie Mae are commonly referred to as "Fannie Mae MBS."

Federal of National Mortgage Association's 2011 Annual Report and Hepsen (2008) confirm that the full imbursement of both the protections' head and interest are guaranteed by Fannie Mae. According to Hawtrey (2009), Fannie Mae holds the largest share in the secondary mortgage market in the United States during the present time.

4. The Government National Mortgage Association

As previously indicated, subsequent to Fannie Mae's classification in 1968, the United State Division of Lodging and Metropolitan Improvement designated the Government National Mortgage Association (GNMA or Ginnie) as the government enterprise in the housing market (Alp and Yilmaz, 1999). The aim was to arrange the operations within the optional home loan market and facilitate the assurance of contract upheld protections (Hawtrey, 2009). The secondary objective was to incentivize securitization protocols within the American housing sector, as posited by (Boleat, 1985; Yilmaz, 2000; Green and Wachter, 2005). Ginnie Mae operates with fully centralized financial plan maintains independence in its financing. The Government National Mortgage Association's 2011 Annual Report is a relevant source of information. The securities issued by this entity are safeguarded by VA and FHA to mitigate the possibility of non-payment, as cited by Boleat (1985) and Courchane and Giles (2001). According to Gurbuz (2002), the primary role of Ginnie Mae is to provide mortgage-backed securities (MBS).

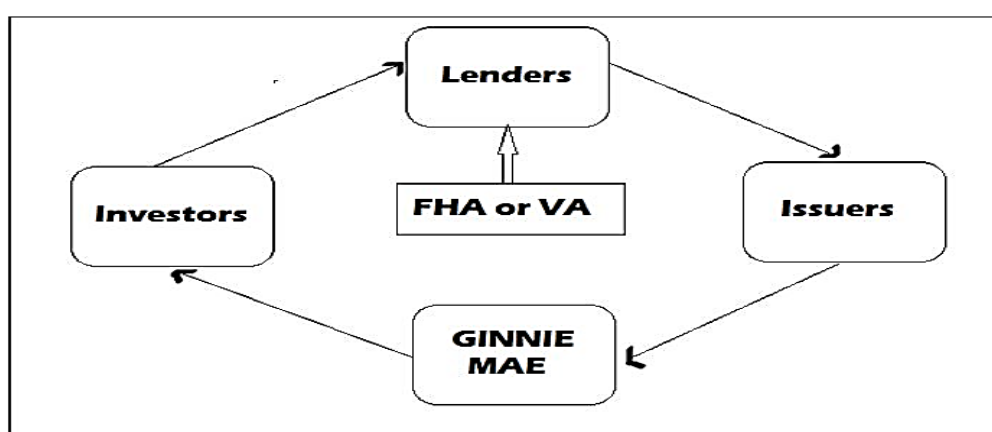


Figure 2. Cash Flow Guidelines Pertaining To GNMA Guarantee Protections.

Source: (2011 Annual Report: Government National Mortgage Association, 2011).

The establishment of contract securitization through pass-through asset-backed securities dates back to 1970, as noted by Lea (2000). According to Yilmaz (2000), this is regarded as a highly consequential advancement in the realm of housing finance protocol. Ginnie Mae facilitated the formation and expansion of the subordinate contract market through its provision of a guarantee on securities issued by private entities. The securities in question must meet the standards set by Ginnie Mae, as outlined by Alp and Yilmaz (1999) and Colton (2002). Furthermore, Ginnie Mae facilitates housing creation to address the issues of the middle class (Ozsan, 2005).

According to Gurbuz (2002), Ginnie Mae and its mortgage-backed securities are backed by VA and FHA insurance, which has resulted in Ginnie Mae gaining considerable esteem among investors. The assurance provided by Ginnie Mae is equivalent to that of the government. According to Ozsan (2005), Ginnie Mae offers securities that possess similar value to treasury bonds and are considered risk-free.

Ginnie Mae securities provide a guarantee of full payment of principal and interest, backed by the unwavering faith and credit of the United States borrower. The confidence instilled in mortgage loans through such assurance has a significant impact on the trade of these loans in the secondary market. The Government National Mortgage Association, commonly known as Ginnie Mae, serves as a crucial financial instrument for all mortgage loans that are insured by the government or guaranteed by the state, as stated in the 2011 Annual Report.

5. The Federal Home Loan Mortgage Corporation

According to (Colton, 2002) findings, the conventional mortgage loans, despite being covered by the state guarantee provided by Ginnie Mae, are not fully encompassed. The Federal Home Loan Mortgage Corporation (FHLMC), also known as Freddie Mac, was established by the United States Congress in 1970 with the purpose of creating auxiliary home loan Marketplaces that offer liquidity for traditional housing loans. This information has been documented by Boleat (1985), Yilmaz (2000), and Colton (2002).

According to Hawtrey (2009), Freddie Mac possesses private funds similar to those of Fannie Mae and operates and competes within the same industry as Fannie Mae. The aforementioned entity creates mortgage pools through the acquisition of

mortgage loans from various financial institutions such as savings associations, credit associations, commercial savings banks, loan banks. Freddie Macintosh issued contract-backed securities in the form of guaranteed mortgage certificates and participation certificates (PCs), which are backed by the underlying contract pool (Hepsen, 2010).

Freddie Macintosh gives an assurance to investors who purchase specific securities, ensuring monthly interest payments and payments based on predetermined rules. The aforementioned entity provides diverse forms of mortgage-backed securities, commonly referred to as collateralized contract commitments, for initial issuance (Hawtrey, 2009). Freddie Macintosh employs a strategy that takes into account the dynamics of both the supply and demand sides of the fund's markets. This organization acquires housing credit from lenders and issues securities that are collateralized by those borrowings, on the demand side. Freddie Mac engages in direct investments in mortgage-backed securities provided by private firms on the supply side, as noted by Wallison and Ely (2000) and Hawtrey (2009).

The implementation of the utilization of the securitization of credits by Ginnie Mae and Freddie Mac served as a driving force for the expeditious establishment of private housing market organizations that sought to provide alternative sources in this realm. In 1977, Salomon Brother and Bank of America gave traditional home loan credits and collateralized contracts upheld protections. Subsequent to the aforementioned applications, private enterprises proceed to formulate their contract pools and execute the method of securitization (Hepsen, 2005). Related to openly assisted ventures, it holds a relatively lower position in terms of garnering investors' confidence, owing to the fact that public assistance is extended to enterprises through state or corporate guarantees for investors. According to Hepsen (2008), the private sector's arrangement aims to provide increased assurances and elevated interest rates for specific securities.

The standard procedure for housing finance in the United States can be summarized as follows: The organization extends mortgage credit to borrowers and subsequently transfers the corresponding receivables to secondary market entities for sale. The standard risk has been transformed. This factor provides an opportunity to modify the lower interest rate. The FHLMC, FNMA, and GHMA are secondary market institutions that engage in the acquisition of credit receivable mortgages,

which are then aggregated into a mortgage pool. Securities are issued based on the assets in this pool and subsequently sold to investors. In the United States, the duration of housing loans can vary between 5 and 30 years, with the credit amount typically covering approximately 75% of the total value of the property. It is recommended that individuals seeking housing loans ensure that the residual components of the housing value are shared with the home purchaser, thereby mitigating certain types of risks (Gurbuz, 2002). Figure 3 below illustrates the federal contract spendings in United States from 2017 to 2021.

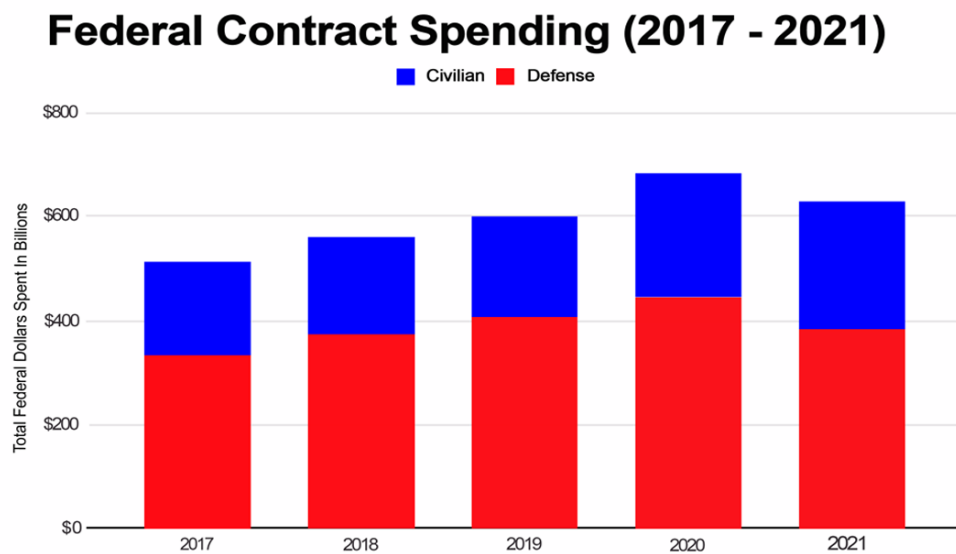


Figure 3: Federal Contract Spending (2017-2021)

The United States populace is grappling with significant concerns pertaining to reduced interest and inflation rates, which have had a notable impact on the homeownership rate, which has remained above 60 percent for several years.

The rate of home ownership was 63% in 1965 and increased to 69.1% in 2005. According to Callis and Kresin (2011), the rate of homeownership experienced a decline to 66 percent and 4 percent, respectively, due to economic disparities and crises in 2011. The United States experienced a series of mortgage-related issues in 2007, which had a detrimental effect on the country's housing finance system as a whole. Following the Great Depression, the United States government endeavored to establish a viable mortgage market. The State constructs and supports various governmental enterprises in pursuit of these objectives. The issue of mortgage problems highlights the direct implications on the American housing finance system. The following discourse expounds on the causative factors of mortgage difficulties.

6. Reason for 2008 Mortgage Crisis

The financial crisis of 2008 in the United States of America had a significant impact on the country's economy, comparable to that of the Economic crisis in 1929 (Allen and Carletti, 2010; Ökte, 2012). The monetary emergency that commenced in August-2007 was rooted in the real estate market of the United States. The current situation is commonly referred to as a mortgage crisis. The adverse effects of the Mortgage crisis on the financial markets of the United States have been widely observed, with its repercussions extending to both developed and developing nations (Kutlu and Demirci, 2011).

In 2007, the subprime contract industry in the United States experienced a collapse, resulting in a range of issues across all housing procedures (Bianco, 2008). The occurrence of the mortgage crisis was contingent upon a confluence of various factors. The primary causes of the issues are outlined below:

a. Monetary Policies Exhibiting Weaknesses FED

The economic downturn at the beginning of the 2000s was attributed to the surge in prices of high-tech companies and the 9/11 attacks in the United States, as reported by (Kutlu and Demirci 2011, Ökte 2012). In an effort to mitigate monetary downturn and promote economic growth, Federal Reserve of the United States implemented a reduction in transient loan fees from 6.5 percent to 1 percent during the that is all spanning from 2000-2003. This information has been corroborated by various sources, including Bianco (2008), Basti (2009), (Kutlu and Demirci (2011), and Ökte (2012).

Verick and Islam (2010) suggest that the Federal Reserve's belief in the reduced security of interest rates may be attributed to the lower inflation rates observed in the United States. According to (Kutlu and Demirci 2011), the reduction of short-term interest rates to 1 percent resulted in decreased mortgage borrowings by banks. The reduced mortgage interest rates incentivized individuals to acquire homes through subprime mortgage borrowings, as noted by (Basti 2009) and (Ökte 2012). During this particular time frame, owing to a heightened need for residential accommodations, the importance of the housing industry experienced a swift escalation. According to (Kutlu and Demirci 2011), there has been an increase in the allocation of larger funds to this particular sector, and housing has emerged as a

noteworthy investment instrument.

Consequently, the exorbitant housing expenses rendered unaffordable for households to procure residences in 2004 (Allen and Carletti, 2010). The Federal Reserve has initiated an expansion in loan fees with the aim of reducing the rate of economic expansion and inflation in the housing market, as noted by Allen and Carletti (2010) and Kutlu and Demirci (2011). Between 2004 and 2006, the Federal Reserve increased interest rates 17 times, resulting in a rise from 1 percent to 5.25 percent (Bianco, 2008; Basti, 2009; Kutlu and Demirci, 2011). The adjustable mortgage interest rates experienced an increase. Individuals who have taken out subprime mortgage loans may be unable to meet their monthly credit payment obligations. According to Verick and Islam (2010) and Kutlu and Demirci (2011), the rationale behind the increased cost of monthly mortgage payments for homeowners was due to the adjustable mortgage interest rates. The graph below represents the interest rates in Us from 1962 to 2022.

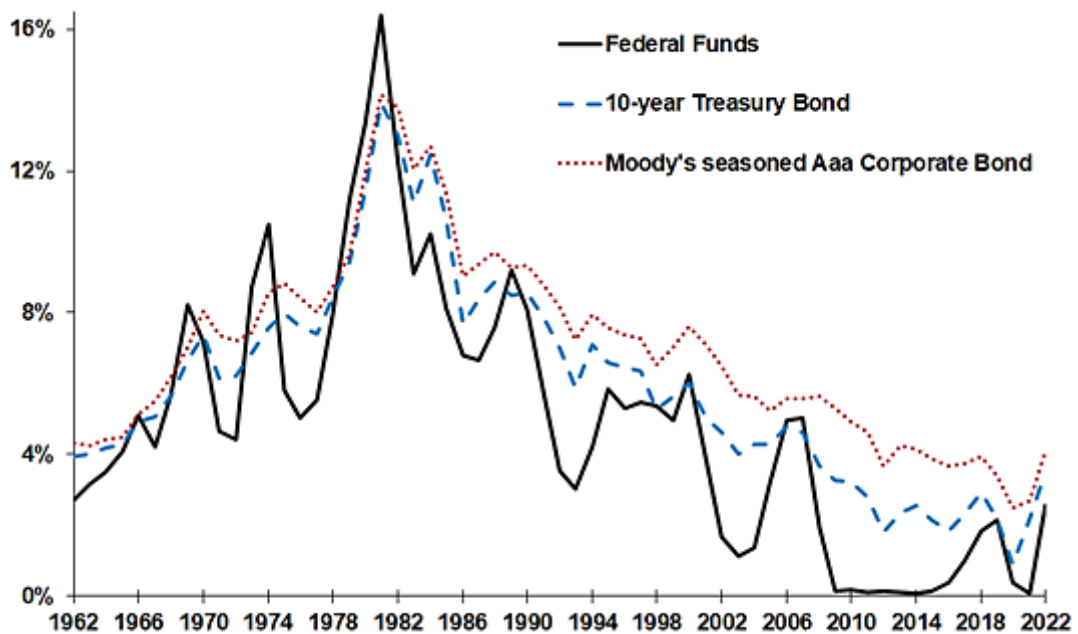


Figure 4: Interest Rates, US, 1962-2021 and September 2022

Source: (Zulauf, 2022)

b. The Real Estate Market Boom

The topic of mortgages arose as a result of the swift growth of the American housing sector in 2007, culminating in a worldwide monetary emergency in 2008 (Bianco, 2008, 2009). The implementation and adherence to policies by the Federal

Reserve have resulted in an increase in the average cost of residential properties. Mah and Lim (2008) found that housing expenses in the United States experienced a 40% increase from 2000 to 2006. The increase in housing costs led to the construction of new dwellings, which in turn caused a rise in vacant residential units. Allen and Carletti (2010: 5) reported a notable increase in the real estate sector, which is commonly known as the housing boom. According to Ermisoglu et al. (2008) and Bianco (2008), the real estate industry experienced a significant reduction in housing costs in early 2006, consequent to the recession's effects.

Similarly, specific subprime mortgage loans may entail no responsibility for the reimbursement of credit. The reasoning for this is that the increase in exceptional mortgage debt led to a consistent appreciation of the value of their residential property, as demonstrated by the research conducted by Basti (2009) and Kutlu and Demirci (2011). The repercussions of this occurrence were experienced throughout various financial sectors, resulting in a notable upswing in the real estate market in 2007. The aforementioned statement is corroborated by the scholarly contributions of Mah and (Lim 2008), Bianco (2008), Allen and Carletti (2010), and Ökte (2012). Mah and Lim (2008) observed that the increase in the rate of default and foreclosure was a consequence of the housing bubble's collapse. As per Basti's (2009) findings, the quantity of housing foreclosures recorded in 2006 amounted to 2.2 million. Bianco (2008) posited that the housing market's downfall led to a substantial decrease in property estimations, bringing about the deficiency of trillions of dollars. Verick and Islam (2010) posit that the expansion of the housing market is a noteworthy element that contributes to the predicaments encountered by mortgage borrowers.

c. Gigantic Expansions in the Sub-prime Mortgage Loans

The primary factor contributing to the mortgage predicament is the acquisition of high-risk subprime contract advances, as stated by Bianco (2008). The escalation in subprime contract advances can be attributed to reduced loan costs, amplified risk-taking by loan specialists, and provision of higher-risk loans (Basti, 2009; Kutlu and Demirci, 2011). According to Mah and Lim (2008), the term "subprime mortgage" refers to the practice of extending credit to households that lack assets, a stable income, and a positive loan repayment history. During the Bush administration, the government directed Lending rates from Fannie Mae and Freddie

Mac will be reasonable, to imprudent mortgage borrowers in order to aid those with lower incomes (Basti, 2009: 92).

The heightening of subprime contract borrowings and housing expenses initiated a rise in volume. According to Basti (2009), the rise in housing expenses had incentivized creditors to anticipate further increases in costs. This led them to believe that they could sell their homes at higher prices, even if they were unable to meet their mortgage payments.

Financial organizations tend to take greater risks in order to increase their profits, as they benefit from lower interest rates. This often leads to the provision of subprime mortgage loans to homeowners seeking credit (Kutlu and Demirci, 2011). According to Mah and Lim (2008), financial organizations provided subprime mortgage credits amounting to 1.5 trillion dollars to homeowners between 2004 and 2006.

According to Basti's (2009) findings, the proportion of subprime mortgage credits within total mortgage borrowings increased from 6% in 2002 to 20% in 2022. According to Kutlu and Demirci (2011), a total of 5 million housing units were acquired through subprime mortgage loans between 2001 and 2006. This resulted in a gradual increase in homeownership rates, reaching 69.1 percent in 2005, as reported by Callis and Kresin (2011).

Exorbitant financing costs were a typical component of subprime contract credits, due to the increased risk associated with lending to borrowers with poor credit histories. Additionally, a sizeable percentage Extremely high financing expenses that were manageable were frequently associated with subprime contract credit. Typically, subprime mortgage loans were characterized by a fixed interest rate over a period of two to three years. According to Kutlu and Demirci (2011), manageable interest rates were introduced in line with market interest rates, following a period of two to three years.

According to Ermisoglu et al. (2008), the escalation in rates post-2004 resulted in a surge in the monthly payments for feasible subprime mortgage loans, rendering it difficult for borrowers to meet their payment obligations. According to Bianco (2008:13), the subprime mortgage industry in the United States experienced a collapse in 2007.

d. Far and Wide Securitization

The increase in the number of risky advances on subprime contracts resulted in a critical proportion of these finance receivables being securitized by financial institutions. Following the process of securitization, mortgage brokers and other financial institutions proceeded to vend portions or entireties of mortgages to investors, as per the works of Basti (2009) and Allen and Cartetti (2010). Securitization is a process that facilitates the transfer of contract upheld protections are utilized to move credit takes a chance starting with one monetary foundation then onto the next (Mah and Lim, 2008). These securities purchased by investors looking for high returns. Kutlu and Demirci (2011) assert that the postponement of borrowing resulted in losses for both the banks that were granted credit and the investors who were seeking securitized credits.

According to Kutu and Demirci (2011), the securitization of subprime mortgage credit receivables led to each year rise in the issuance of mortgage-backed securities (MBS), with a goal of achieving \$520.6 billion 2022. The data is presented in the diagram shown beneath.

The debentures of subprime mortgages that were securitized and sold to investors larger from 54 percent in the year 2001, to 75 percent in 2006 (Bianco, 2008). Brokerage companies, that organize and sell subprime mortgage borrowings to investors, increased larger earnings. Indeed, after the beginning of the defaults in mortgage credit repayments, the values of mortgage-backed securities credits have declined rapidly. So, financial organizations invested in this asset have been opened to a bigger volume of losses (Allen and Carletti, 2010; Kutlu and Demirci, 2011).

In addition, Alan Greenspan, a long-time admirer of the Federal Reserve, posited that the root cause of the mortgage crisis was not solely attributed to the structuring of mortgage loans, but also to the bundling of credits within mortgage pools and their subsequent sale to further financial organizations (Ermisoglu et al., 2008; Basti, 2009).

The volume of collateralized debt obligations (CDOs) has experienced an upsurge, due to the investors' demand for higher returns on their mortgage loans with greater risk. Following the economic downturn in the real estate sector, there was a decrease in liquidity rates within the market, resulting in mortgage companies being

unable to vend collateralized debt securities to investment firms. Consequently, there was a significant decrease the worth of collateralized obligation protections, leading stockholders to liquidate them at a rate ranging from 20% to 40% below their true worth (Kutlu and Demirce, 2011).

In 2007, the practice of providing collateralized credits and mortgage-backed securities was suspended until a state guarantee was established. According to Ermisoglu et al. (2008), the CDO in question had a total volume of 11 trillion and 750 billion U.S. dollars as of January 2008. In these circumstances, it is observed that the decrease in value is not limited to high-risk mortgage-backed securities, but also extends to low-risk mortgage-backed securities. Consequently, financial institutions ceased interbank lending due to the potential for future losses, insecurity, and increased market risks (Kutlu and Demirci, 2011).

e. Fundamentals Imperfections in the Rating Organizations Plan of Action

According to Allen and Carletti (2010), the companies responsible for assessing the risk of securities bear a significant responsibility for the decline of the mortgage market. Prior to the issue at hand, the financial institution had allocated significant capital towards contract-supported protections, as the credit scores allocated by rating offices did not accurately reflect their true worth. Prior to the crisis, there were numerous challenges encountered by companies involved in the process of rating. The primary noteworthy concern associated with the evaluation scores assigned to banks and other financial institutions pertains to their sponsorship and financing by said entities. According to Bianco (2008), Basti (2009), and Allen and Carletti (2010), it is not within the purview of rating agencies to conduct goal assessments.

However, it is worth noting that rating agencies may encounter difficulties in consistently identifying the financial challenges faced by financial institutions due to limited access to information (Basti, 2009; Verick and Islam, 2010). Frequently, individuals acquired knowledge regarding matters belatedly. One additional concern pertains to the fact that credit rating agencies solely assess the likelihood of default, without taking into account the potential for liquidity risk, as noted by Allen and Carletti (2010). The handicaps in question were not disclosed to investors by rating agencies. Prior to the onset of the crisis, credit rating agencies experienced a lack of success (Mah and Lim, 2008; Basti, 2009). Following the onset of the financial

crisis, their credit ratings began to decrease.

B. Germany

According to Komurlu (2006), even developed nations such as Germany encountered significant housing challenges following the First and Second World Wars, primarily due to the unavailability of larger existing housing units that were rendered unusable as a result of the wars. According to Gurbuz (2002), during 2nd World-War, around 80% of the accommodation inventory in Germany endured damage. Housing development commenced immediately after World War II to alleviate the housing shortage. In addition, it is noteworthy that housing finance has emerged as a critical financial market procedure in Germany, as stated by Komurlu (2006). According to Gurbuz (2002), the resolution of housing issues in Germany can be attributed to the country's economic stability and effective housing policies. According to Komurlu (2006), approximately five million new residential properties were constructed in Germany by 1976.

In Germany, the Mortgage System and Contractual System are utilized in the creation of housing finance procedures. According to Gurbuz (2002), the housing finance institutions in Germany comprise of mortgage organizations, saving the entities referred to are financial institutions, namely banks, constructing saving banks (Bausparkassen), Central Revenue Institutions, Credit Cooperatives, Regional, and Commercial Banking Companies, and Special Funded Banks. The aforementioned entity is a non-governmental organization that operates solely on privately sourced funds. According to Hepsen's (2010) findings, the mortgage credits offered by the institution are exclusively limited to long-term loans, with short-term loans being strictly prohibited. The establishment of Building Saving Banks (Bausparkassen) following World War I has made significant contributions to the housing finance process in Germany. According to Kilic (2007), building saving banks in Germany are currently being operated in a more efficient manner.

According to Kilic (2007) and Boleat (2004), the standard procedure of Bausparkassen systems can be described as: Individuals who intend to avail housing credit through a savings contract in the future are required to save at a specific time in Bausparkassen at an interest rate lower than prevailing market rates.

Individuals who have successfully fulfilled the necessary requirements are eligible to obtain a loan at a reduced interest rate for an extended period, solely for

the purpose of financing a residential property. Bausparkassen offers lower interest rates for credit and savings in comparison to prevailing market terms. The efficacy of these systems is contingent upon the minimization of interest rates. According to Boleat (2004), individuals opt to receive a lower interest rate on their savings in exchange for the ability to access housing credit at a reduced interest rate. The credits in question are derived from individuals who allocate funds towards a down payment for a residential property and subsequently invest said capital in Bausparkassen, as documented by Boleat (2004) and Kilic (2007).

The provision of capital for housing through the establishment of building saving banks has been effectively implemented in Germany. There are 17 privately-owned banks in Germany that operate from their own buildings. In the country, there are a total of 28 building saving banks, of which 11 are publicly owned. A significant number of houses constructed through financing from these banks have an estimated value of approximately 13 million, and this trend commenced post-World War II. According to Kilic (2007), approximately 800 billion Euros have been allocated for the construction and renovation of buildings.

The "Pfandbrief" model is a commonly employed residential financing structure in Germany operates together with building the savings banks. Pfandbrief is a type of bond that is backed by mortgages and is acquired through the process of securitization. The German securitization process involves the aggregation of housing loans into a pool, which serves as the basis for the issuance of "Pfandbriefe" as outlined by Mastroeni (2001).

According to Hepsen (2008), the volume of the Pfandbrief system had reached \$182.5 billion as of the conclusion of 2007. According to Lea (2000) and Mastroeni (2001), the Pfandbrief market constitutes the most extensive classification of the German security market and addresses the main non-legislative security market across Europe. The efficacy of this system is contingent upon the proficient operation of the private mortgage market in Germany, as posited by Hepsen (2008). Figure. 5 illustrates the three aspects of the Pfandbrief framework, specifically families, contract banks and financial backers (both individual and institutional), and banks, as described by Hepsen (2010).

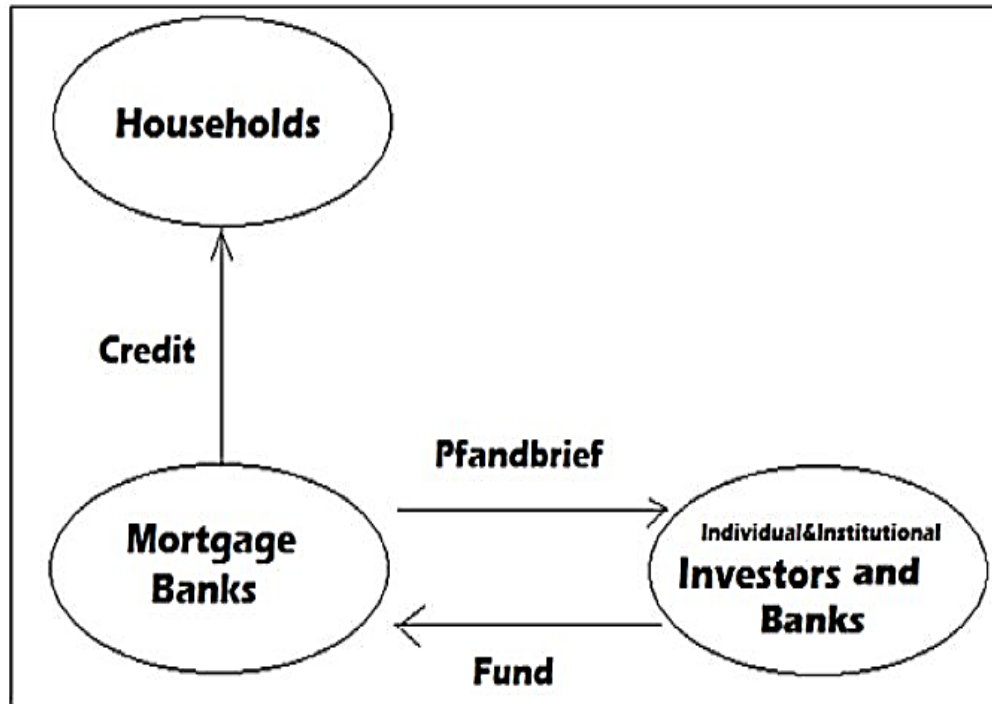


Figure 5: Pfandbrief Mechanism.

Source: Hepsen (2010)

According to Stephens (2003), the German mortgage banks exhibit high levels of efficiency and are regarded as the most prosperous financial institutions in Europe. Mortgage banks provide families approach finances that are raised through the issuance of Pfandbrief. Pfandbrief securities are also issued by mortgage banks on the basis of credit receivables, which are subsequently sold to banks and investors (Mastroeni, 2001). According to Ozsan (2005), the real estate sector is eligible to receive housing loans with maturities of as long as 25 years ensuing to the issuance of these protections.

According to Mastroeni's (2001) findings, Mortgage Banks offer loans that cover up to 60% of the expenses associated with housing production. The residual portion of the housing cost is expected to be provided by the individual who has submitted an application for the housing loan. According to Ozsan's (2005) research, this particular application has the ability to mitigate the default risk associated with housing loans.

As per the Mortgage Laws of Germany, it is stipulated that mortgage banks are prohibited from assuming interest rate risk in relation to the issuance of mortgage loans. Consequently, it is imperative that securitized assets exhibit a comparable

maturity to that of housing loans. Housing loan borrowers are legally prohibited from making early payments except after a certain period has elapsed. According to previous studies (Dogru, 2007; Komurlu, 2006), borrowers who make loan payments prior to the maturity date are subject to an early payment penalty.

The German government refrains from direct involvement in the real estate market as a lodging maker. Notwithstanding, offers specific motivators like expense exclusions, charge allowances, and particular loan fees for contract bonds. This works with the deluge of private capital towards the development of housing units. According to Komurlu (2006), the production and ownership of houses is carried out by individuals and companies using their own resources. The German housing system is characterized by a high degree of efficiency and boasts the largest proportion of mortgage loans in Europe. According to Stephens (2003), numerous nations adopt and implement certain features of this particular system.

The housing market is a crucial component of the economy since it is a gauge of both the financial stability and general well-being of a country. Housing indices, which are comprehensive metrics that integrate variables like property prices, rental rates, and affordability, are essential to comprehending the dynamics of the housing market (Mohammed and Sulyman, 2019). These indicators provide insightful information about the state of the economy and societal welfare. The complex relationship between housing indices and economic variables is examined in this literature review, which focuses on Turkey as well as six developed nations: the US, Germany, Japan, Canada, Australia, and the UK. Through a thorough analysis of several empirical studies undertaken worldwide, this review aims to offer a comprehensive and nuanced understanding of the intricate relationship between housing market dynamics and economic indicators.

- **Empirical Studies**
- **Insights from Different Countries**
- **United States:**

The housing market in the United States, which has been the focus of much research, exhibits a variety of influential elements. The influence of interest rates on home markets is demonstrated by the recent research that identified that reduction in interest rates increases the affordability of housing, stimulating demand and raising

housing indexes (Petrini and Teixeira, 2023). Furthermore, changes in demographics, such as the increase in millennial homebuyers, alter patterns of housing demand, which in turn affects housing indices (Baker, 2021).

The housing market in the United States has been significantly shaped by government policies and regulations. A research examined how policy changes affect the stability of housing (Smith, 2018). The study discovered that certain measures, such housing subsidies and mortgage assistance programmes, have a positive impact on home affordability. These laws made it easier to become a homeowner, which increased demand and raised housing indices. Studies examining the aftermath of the 2008 financial crisis have also demonstrated the critical impact that rules aiming at guaranteeing lending practises and preventing housing market bubbles have played in sustaining market stability (Spatt, 2020).

Indicators of the economy like GDP growth have a strong correlation with US housing indexes. A 2020 study by investigated the connection between developments in the housing market and economic growth (Vartanyan, 2020). The research findings indicate a favourable correlation between periods of strong economic growth and heightened demand for housing, which in turn affects housing prices and indexes. This link emphasises the mutually beneficial relationship between economic growth and the housing market, showing that a healthy economy frequently leads to a successful housing market (Vartanyan, 2020).

Furthermore, research examining the effects of international trade laws on housing indices demonstrates how closely the U.S. housing market is linked to developments in the world economy (Garriga and Hedlund, 2020). An empirical study examined how trade tariffs affected the housing market. The study discovered that market uncertainties were caused by trade tensions and tariff increases, which had an impact on consumer confidence and home demand (Francke and Korevaar, 2021). This outside effect highlights how important it is to have a thorough grasp of both national and global economic variables when analysing the dynamics of the property market.

To sum up, the empirical researches carried out in the United States offers a comprehensive comprehension of the factors influencing housing indices. The U.S. housing market is affected by a number of factors, including interest rates, government regulations, demographic changes, economic indicators, and worldwide

economic trends. The formulation of effective policies to ensure the stability and sustainability of the housing sector in the United States in the face of constantly shifting economic conditions requires policymakers and scholars to take into account these complex causes (Berger et al., 2020).

- **China:**

The housing market in China has expanded and changed dramatically in the last few decades. Tom (2020) studied China's housing indexes longitudinally between 1990 and 2019. The study found that the main causes of the increase in housing demand and prices were urbanisation and economic reforms. The results highlight the complex interplay in emerging nations between housing indices, urban development, and economic policies (Tom, A. 2020).

Furthermore, demographic changes have had a big impact on China's housing market dynamics. Li and et al (2019) study emphasised how population expansion affects the demand for housing (Li et al., 2019). Property values and housing indices rose as a result of the nation's growing middle class and growing population, which increased demand for housing. This trend highlighted the influence of demographic variables on local property markets and was especially noticeable in major urban centres with higher population densities.

China's housing market is regulated mostly by government policies. The impacts of government actions on house prices were empirically investigated and their results showed that policies like lending guidelines and limitations on property purchases have a direct impact on housing indices and affordability (Li et al., 2020). Stricter measures to quell the overheated housing market caused swings in housing indices, highlighting the fine balance needed in governmental actions to preserve market stability.

China's housing sector also shown sensitivity to developments in the world economy. 2020 saw Li and Zhong conduct research on how China's housing indexes were affected by global economic conditions. Major trading partners' economies experiencing downturns had a detrimental impact on China's exports and, in turn, employment rates (Li and Zhong, 2020). Housing indices were harmed by this economic volatility, which also affected consumer confidence and housing demand. Because of this interdependence, studying housing markets requires a comprehensive

grasp of both local and global economic issues.

In conclusion, empirical research shows that the housing market in China is a result of a complex interaction between urbanisation, population changes, governmental regulations, and international economic trends (Fu et al., 2021). Policymakers and scholars attempting to understand the complexities of housing market dynamics in one of the greatest economies in the world must have a thorough understanding of these complex determinants. The interconnection of these variables emphasises how comprehensive and flexible regulations are needed to guarantee stable and sustainable growth in China's housing sector (Dong et al., 2021).

- **Germany:**

Numerous empirical studies have been conducted on the German housing market, offering important insights into the variables affecting housing indices in this developed country. Researchers examined the regulations governing the rental market and found that strict rental restrictions had an adverse effect on the stability of housing (Müller, 2019). According to the research, these laws had an effect on housing affordability by stabilising rental costs and promoting market equilibrium. This stability highlights the significance of regulatory frameworks in maintaining market steadiness and has important ramifications for housing indexes.

Affordable housing and income levels are important factors in Germany's housing market, as investigation show (Granath Hansson, 2019). The study found a favourable relationship between growing salaries and a rise in the demand for homes, which raised prices and affected housing indexes. The delicate equilibrium that policymakers must maintain is shown by the challenge of preventing market imbalances by striking a balance between income growth and home affordability (Midões and Seré, 2021).

German housing market dynamics have been significantly shaped by government actions. Research showed how government subsidies affect the demand for homes (Kholodilin, 2020). According to the study, targeted subsidies increased demand and, as a result, housing indices, hence improving housing affordability. Furthermore, by encouraging sustainable housing practises, energy-efficient housing projects have influenced housing indices in addition to being in line with environmental goals (Lorek and Spangenberg, 2019).

The housing market in Germany has also been permanently impacted by urbanisation and population expansion. A 2019 study investigated how urbanisation affected the demand for homes (Strohbach et al., 2019). The study found that as more people move into metropolitan areas, there is a greater demand for housing, which raises property values and raises housing indices. This trend highlights the difficulties brought about by growing urban populations and emphasises the role that urbanisation has played in influencing the dynamics of the housing market.

In addition, the German home market has proven resilient in the face of worldwide economic volatility. Empirical research demonstrated how flexible the housing market is in times of economic recession (Mannar, 2019). Stimulus plans and smart measures from the government reduced negative impacts, preserving market stability and affecting housing indexes. This tenacity is evidence of how well government initiatives to protect the housing industry in hard economic times worked.

In conclusion, empirical research has shed light on the factors that determine Germany's housing market and has highlighted the importance of income levels, government initiatives, urbanisation, regulatory frameworks, and market resilience. Together, these elements influence housing indices, which show how flexible and stable the German housing market is. These studies offer important insights that policymakers and researchers may use to develop comprehensive plans that will guarantee Germany's housing sector is prosperous and balanced.

- **Japan:**

Japan's housing market has been thoroughly examined through a variety of empirical investigations. It is a dynamic interplay of cultural, economic, and policy elements. Suzuki's (2020) study clarified how Japan's ageing population affects housing demand and provided insightful information about market trends. The study found that the ageing population was driving changes in housing requirements, which in turn caused changes in demand patterns and housing indices (Suzuki, 2020). This demographic component is crucial in determining the market's structure and highlights how crucial it is to comprehend the particular housing requirements of an ageing population.

Japan's stable housing market is largely due to government regulations and

initiatives. Research like that done by Xu and Zhou (2019) brought attention to the effect that housing subsidies have on demand and affordability. First-time homebuyer subsidies increased housing affordability by igniting demand, which in turn affected housing indexes (Xu and Zhou, 2019). The direct effects of these homeownership-promoting policy measures on market dynamics highlight the impact of government interventions on housing indices.

Japan's housing market patterns have been greatly influenced by urbanisation and population density. Hashimoto et al. (2020) investigated the connection between housing costs and population density. According to the study, there was more demand in densely populated metropolitan regions, which increased real estate prices and had an impact on housing indexes (Hashimoto et al., 2020). This phenomenon highlights the impact of population density on housing market dynamics and highlights the necessity for tailored interventions in densely populated areas. It is directly linked to Japan's restricted land availability.

The GDP growth rate in particular has been a key economic indicator for Japan's property market. Lim et al. (2017) study examined the connection between housing demand and economic growth. The findings of the study demonstrated a positive relationship between GDP growth and housing indices, suggesting that times of economic prosperity boost demand for housing and raise prices (Lim et al., 2017). The relationship between housing market developments and economic growth emphasises how crucial economic stability is to supporting housing indices.

Studies looking at housing choices also show that cultural variables have an impact on Japan's housing market. An empirical study investigated how cultural preferences affect home demand and design (Daniels, 2021). The study discovered that housing choices were impacted by cultural preferences for particular architectural types, which in turn affected market demand and housing indices. The complex dynamics of Japan's housing market are highlighted by the varied housing market landscape that is created by the interplay of cultural, economic, and demographic factors.

In conclusion, empirical research has shed light on a wide range of variables that affect Japan's housing market, such as government regulations, urbanisation, economic indicators, and cultural preferences. The complex structure of Japan's housing market is reflected in the way these diverse components interact to affect

housing indexes. These studies provide insightful information that policymakers and scholars can use to highlight the importance of holistic approaches that take into account the interaction of cultural, economic, and policy aspects in understanding and forming Japan's housing market.

- **Canada:**

A great deal of empirical study has been conducted on Canada's housing market, which is a complex ecosystem influenced by a number of economic, demographic, and policy issues. The effect of governmental policies on regional differences in housing markets was investigated in Anderson's (2018) study. The study demonstrated how taxation and mortgage laws, among other policy actions, shape housing indices across provinces. According to the study, measures taken to ensure responsible lending practises and reduce speculative activity affected housing demand, which in turn affected prices and housing indices (Anderson, E. 2018). These results highlight the significance of customised policy interventions in resolving regional differences in Canada's housing market.

According to an empirical research, income levels and home affordability are important factors that influence the housing market in Canada (Leviton-Reid et al., 2022). According to the report, there is a direct link between growing salaries and rising housing demand, which drives up property values and affects housing indices. The difficulty, meanwhile, is striking a balance between income growth and housing affordability, especially in cities where housing costs have risen faster than income growth. This disparity emphasises the necessity of focused policies that deal with issues of affordability and guarantee a long-term equilibrium between housing costs and income levels.

The demand for housing in Canada has been greatly impacted by immigration trends and population increase. Cochrane and Poot's (2021) research investigated the connection between immigration and housing market patterns. According to the report, there is a greater demand for housing due to immigration, especially in urban areas where there is a large immigrant population. Due to the increased demand, home prices were under pressure to rise, which in turn affected housing indexes. Demand for housing brought on by immigration emphasises the necessity of housing policies that can meet the varied requirements of the expanding population and

highlights the relationship between housing indices and demographic considerations (Cochrane and Poot, 2021).

The characteristics of the Canadian housing market have been significantly shaped by government actions. A study examined how government subsidies affect the affordability of homes (Callaghan, 2020). According to the study, specific incentives had a beneficial impact on first-time homebuyers' housing demand, which raised housing indices and property prices. The competitive housing market that has resulted from these homeownership-promoting measures highlights the influence of government initiatives on housing indices (Callaghan, 2020).

Employment rates and GDP growth are two economic variables that have a strong correlation with changes in Canada's housing market. A study found a favourable correlation between rising economic growth and rising housing demand, which in turn raised property values and had an impact on housing indices (Schembri, 2022). Stability in the economy, as evidenced by GDP growth and employment prospects, boosts consumer confidence, which in turn drives demand for housing and shapes market dynamics.

In conclusion, empirical research has shed light on a wide range of variables that affect Canada's housing market, such as local regulations, income distribution, population growth, government initiatives, and economic indicators. The complex structure of Canada's housing sector is reflected in the way these many components interact to affect housing indices. These studies provide important insights that policymakers and researchers can use to highlight the need for comprehensive solutions that address affordability issues, demographic transitions, and geographical inequities in order to ensure a balanced and thriving housing market in Canada.

- **Australia:**

Empirical studies have focused on Australia's housing industry because of its complicated dynamics and strong expansion. Researchers that have studied the effect of interest rates on housing indexes showed a significant relationship between rising housing demand and reduced loan rates, which in turn raised property values and had an impact on housing indices (Abelson and Chung, 2005). This relationship highlights how vulnerable Australia's housing market is to changes in monetary policy and highlights how important interest rates are in determining market patterns.

Australia's housing market has been greatly impacted by demographic variables, especially migration patterns and population expansion. A study investigated the connection between housing demand and population growth. According to the report, immigration's rapid population expansion increased demand for homes, especially in urban regions (Yates et al., 2017). The increase in demand had a direct effect on housing indexes by driving up real estate prices. Demand generated by population growth emphasises the necessity of housing regulations that take into account the expanding population and handle the issues brought on by changing demographics.

Australia's housing market dynamics have been significantly shaped by government policies and actions. Research examined how first-time homebuyer grants affected the demand and affordability of housing. According to the study, first-time buyers' demand for homes was positively impacted by government incentives, which in turn stimulated the market and had an effect on housing indices (Gan and Hill, 2009). The competitive housing market that has resulted from these homeownership-promoting measures has demonstrated the influence of government initiatives on housing indices.

Australia's housing market patterns have been greatly influenced by urbanisation and regional differences. Study examined how urbanisation affects housing costs. According to the report, there was more demand in metropolitan areas, which raised property values and affected housing indices (Rahman, 2010). Diverse market circumstances have also been brought about by geographical differences in home affordability and economic opportunity. Rapid price increases have been observed in urban centres, especially in Sydney and Melbourne, which is indicative of the effect of supply-demand imbalances on housing indexes.

There is a strong correlation between the employment rate and economic growth and the movements in Australia's property market. Research conducted in 2019 examined the connection between home demand and economic stability. According to the research, times of strong economic expansion were favourably associated with higher housing demand, which raised property values and had an impact on housing indices (Lowe, 2019). Consumer confidence is increased by economic stability, which in turn increases demand for homes and modifies market dynamics.

In conclusion, empirical research has revealed a wide range of factors that influence Australia's housing market, such as interest rates, population growth, government actions, urbanisation, and economic indicators. The complex structure of Australia's housing sector is reflected in the way these diverse components interact to affect housing indexes. These studies provide important insights that policymakers and researchers may use to highlight the need for comprehensive plans that address affordability issues, demographic trends, and geographical inequities in order to ensure a balanced and profitable housing market in Australia.

- **United Kingdom:**

Numerous empirical studies have been conducted on the housing market in the United Kingdom, providing insight into the various factors that affect housing indices. Studies that look at how political developments affect the housing market include Robinson's (2020) study. The study examined the impact of Brexit and found that political unpredictability influenced market sentiment and caused swings in house values (Robinson, 2020). This result emphasises the necessity of a comprehensive study of housing indices by highlighting the relationship between political developments and market dynamics.

A key element of monetary policy, interest rates have significantly influenced the UK housing market. Study investigated the connection between interest rates and home demand. According to the study, reduced interest rates boosted the market for homes, raising property values and impacting housing indices (Christophers, 2019). The Bank of England's monetary policies directly affect borrowing costs, demonstrating the complex relationship between the central bank's actions and developments in the housing market.

The housing market in the United Kingdom has been greatly impacted by demographic issues, including population increase and household formation. Adler and Ansell's (2020) study looked into how housing demand is affected by population expansion. The study discovered that there was an increased need for housing due to both changing household patterns and an expanding population. This spike in demand had a direct effect on housing indices by driving up home prices. Population-driven demand emphasises the necessity of housing regulations that take into account households' changing requirements, underscoring the significance of

taking demographic factors into account while analysing the housing market (Adler and Ansell, 2020).

The dynamics of the UK housing market have been significantly shaped by government interventions and housing policies. A number of studies have looked into the effect of government subsidies on housing affordability. According to the research, specific incentives had a beneficial impact on first-time home purchasers' demand for housing, which raised property values and affected housing indices. Furthermore, programmes like the Help to Buy programmes have increased demand for homes, highlighting the influence of governmental measures on market trends (Braakmann and McDonald, 2020).

Economic measures like GDP growth and employment rates have a direct correlation with changes in the UK housing market. Miles and Monro (2021) looked into the connection between housing demand and economic stability in their studies. According to the study, times of strong economic expansion were favourably associated with higher housing demand, which raised property values and had an impact on housing indices. Consumer confidence is increased by economic stability, which in turn increases demand for homes and modifies market dynamics (Miles and Monro, 2021).

In conclusion, empirical research has revealed that a wide variety of factors, such as political developments, interest rates, demographic changes, government initiatives, and economic indicators, influence the UK housing market. The complex structure of the UK housing market is reflected in the way these diverse factors interact to affect housing indexes. These studies offer important insights for policymakers and researchers, highlighting the necessity of all-encompassing solutions that tackle political unpredictability, affordability issues, and changing demographic trends in order to guarantee a stable and thriving housing market in the United Kingdom.

- **Turkey:**

Turkey's fast urbanisation, expanding population, and varied economic environment provide for a distinctive viewpoint in the country's housing market. Over the years, changes in government policy, economic conditions, and rates of urbanisation have all had a substantial impact on the housing industry in the nation.

In-depth empirical research has been conducted on Turkey's housing market, which is a dynamic and changing industry. These studies have provided important insights into the country's distinct characteristics in comparison to developed nations. The part played by government initiatives is one important factor. Turkey, in contrast to many wealthy countries, has put in place substantial incentive and subsidy programmes to support housing affordability and increase demand. The government's proactive attitude which illustrate how tax breaks and subsidies have fueled a boom in housing investments and subsequently impacted housing indices (Yılmaz, 2019). The sharp difference in policy approaches is evident in the fact that industrialised nations such as the United States frequently depend on market-driven systems with few direct government interventions.

- **Urbanization and Housing Demand:**

The quickening rate of urbanisation is one of the characteristics that make up Turkey's housing market. Significant population migration from rural areas to urban centres has raised demand for homes. One of the longitudinal study emphasises how housing indicators are affected by urbanisation. The need for housing increases as cities grow to accommodate the expanding population, which in turn raises property prices and raises housing indices (Özdemir Sarı, 2019). The rise of urbanisation also affects the kind of housing that people desire, with a move towards apartments in urban areas having an effect on the dynamics of the housing market.

The housing market in Turkey demonstrates a distinct fusion of cultural elements impacting investment and housing inclinations. A research examined how cultural views on homeownership affect market movements. According to the survey, there is a significant cultural preference for homeownership, which has helped the real estate industry (Korkmaz, 2019). This cultural inclination is in opposition to rental-oriented communities found in industrialised nations such as Germany, where long-term rentals are typical. In contrast to developed countries, Turkey's concentration on homeownership produces unique market dynamics that have an impact on housing indexes and investment strategies.

- **Government Policies and Incentives:**

Turkey's housing market has been significantly shaped by government actions. The comparative analysis by Yeşilbağ (2020) highlights how government

policies affect the dynamics of the housing market. The Turkish government has put in place a number of incentives, such as tax breaks, mortgage support programmes, and subsidies, with the goal of encouraging homeownership and increasing demand for homes. These measures have affected housing indices in addition to affordability. They have also increased the number of housing transactions (Yeşilbağ, 2020).

- **Economic Fluctuations and Housing Market Resilience:**

Turkey's real estate sector has proven resilient in the face of economic upheavals. The housing industry has held up fairly well in spite of uncertain economic times. Rising middle class demand and economic changes have increased house demand. The housing market has been less negatively impacted by the government's strategic measures, such as stimulus packages and interest rate modifications, during economic downturns. As a result, Turkey's housing indexes have demonstrated exceptional stability, demonstrating the market's capacity to adjust to shifting economic circumstances.

Furthermore, a lot of study has been done on how Turkey's housing market is affected by changes in the world economy. Foreign direct investments in the Turkish real estate market frequently increased during times of instability in the global economy, which drove up prices and had an impact on housing indices. Turkey differs from many industrialised nations, such as Germany, where the property market is comparatively shielded from fluctuations in the global economy, by virtue of its interdependence with it .

Turkey's housing market is significantly shaped by population dynamics. The young population of the nation, as seen by the expanding number of young workers, has raised the number of households and raised housing demand. Research highlighted how the need for cheap housing, especially in urban areas, has been fueled by the influx of young, first-time buyers (Coskun et al., 2020). This demographic trend stands in stark contrast to the ageing populations of many industrialised nations, such as Germany and Japan, where a variety of age-related factors influence housing demands. Gaining an understanding of these differences in demographics gives important background for analysing housing markets between countries.

- **Challenges and Future Prospects:**

Although the Turkish housing industry has proven resilient, there are still problems with affordability, housing quality, and regional differences. Affordability is still a major issue, impeding the chances of homeownership, particularly for low- and middle-class families. Comprehensive policies centred on housing quality requirements, affordability, and urban planning are needed to address these issues. Furthermore, in order to support the expanding population, continued urbanisation calls for the use of sustainable development strategies and effective infrastructure design.

Quality and affordability remain significant challenges in Turkey's housing sector. Empirical studies pointed out that the disparity between housing quality and pricing often leads to market imbalances (Coskun et al., 2020). Although demand remains high, especially in urban centers, concerns regarding housing quality and affordability persist, indicating the need for comprehensive policy interventions. These challenges, distinct to Turkey's context, further differentiate its housing market dynamics from those of developed nations.

In conclusion, the dynamic landscape of Turkey's housing market is formed by factors such as economic volatility, government policies, and urbanisation. To effectively create plans for sustainable housing market expansion, policymakers and academics must have a thorough understanding of the complex interactions among these components. A balanced and healthy housing sector for Turkey's residents will depend heavily on strategic policies and interventions as the country's economy and demographics continue to change.

This thorough analysis of the literature offers a nuanced look at the complex relationship between housing indices and economic variables in Turkey and six other developed nations. This review provides important insights into the complex structure of housing markets and the range of economic factors influencing housing indices by examining empirical research. The results highlight how crucial it is to comprehend the intricate processes influencing housing markets, giving academics and policymakers vital knowledge for well-informed choices and additional study.

III. RESEARCH METHODOLOGY

In this part of the research will explain how the study is conducted. This chapter will discuss important factors such as the definition of variables, the research design, the population studied, and how the data has been collected. This research design will cover the data collection, the type of research has been conducted, analysis methods, and the priorities as researchers. The process of sample selection and the procedures used to collect the data, including how the variables are measured. The analysis techniques will help to understand the relationship between housing index, GDP, interest rates, unemployment rates, populations and debt ratios of the sample countries. A multiple linear regression analysis approach is used for this study and secondary data has been taken from the World Bank database to perform this research.

A. Research Design

There are three different types of research designs: quantitative, qualitative, and mixed methods. The choice of design depends on the specific issues that the study aims to address. For this particular study, this study is using a multiple linear regression analysis method, using time series data for comprehensive explanation. The main data is taken using the official source of World Bank database to facilitate statistical analysis. This study employs a time series technique, which means that data will be collected at a different time in order to address the research inquiries. For this review, the unit of analysis will be four countries and 40 years of their data for the said variables.

B. Proposed Model Framework

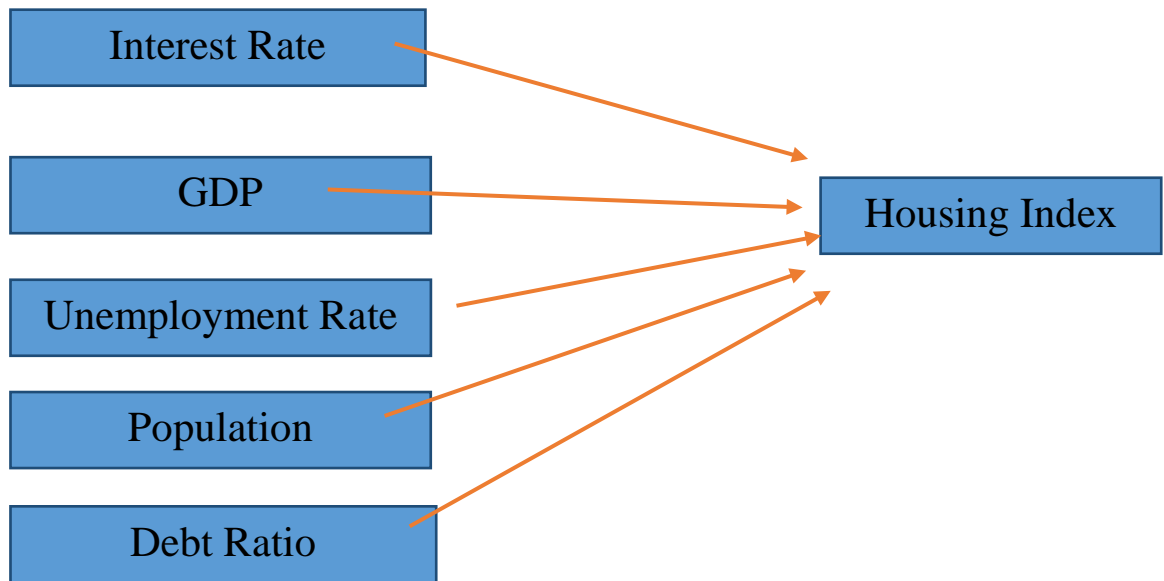


Figure 6: Proposed Model Framework

C. Population and Sampling Design

The target population of this study will be the economic indicators of Turkey, the USA, the UK and Germany. This study will examine the impact of GDP, interest rate, unemployment rate, debt and population over the housing index of three developed and one developing country to examine the pattern of effects in different economies.

D. Sample Size

This study has taken a sample size of 40 years from 1982 to 2021 for the recognition of the effects of GDP, interest rate, unemployment rate, debt and population over the housing index because the data for these 40 years is available for all the under consideration countries and have an enough size to perform time series analysis to produce the decision and to compare the trends in different economies.

E. Sampling Technique

This study has used a convenient sampling technique to choose the data for 40 years from 1982 to 2021. The reason behind this choice is the availability of data for all the under study countries for a same span. The data for some of these variables was found from 1961 but for other variables and for some countries it was not available so, this study choose a sample of 40 years where the data of all the required variables and for all four countries will be available.

F. Variables and Measures

1. Housing Index

A housing index is a statistical measure that tracks changes in the prices of houses or properties over time in a specific geographic region. It is calculated based on the prices of a sample of properties sold within the region during a given period, such as a month or a year. Housing indices are widely used by real estate professionals, economists, and policymakers to monitor trends in the housing market and make informed decisions. According to Investopedia, a housing index is "a statistical tool used to measure the changes in the value of residential real estate in a geographic area."

In simpler terms, a housing index is a way of keeping track of how much houses are worth in a particular area. It helps people understand whether housing prices are going up or down, which can be useful for buying or selling a home, investing in real estate, or making decisions related to housing policy (Hassan et al., 2021).

2. Gross Domestic Product (GDP)

GDP, or Gross Domestic Product, is a measure of the total value of all goods and services produced within a country during a specific period, usually a year. It is often used as an indicator of a country's economic growth and development, and is calculated by adding together the value of all final goods and services produced in a country. According to the Bureau of Economic Analysis, GDP is defined as "the value of the goods and services produced by the nation's economy less the value of the goods and services used up in production."

In simpler terms, GDP is a way of measuring the size of a country's economy by adding up the total value of everything produced within the country's borders, including goods and services like cars, clothing, and healthcare. It helps policymakers, economists, and investors understand how the economy is performing and make informed decisions based on that information (Bureau of Economic Analysis).

3. Interest Rate:

An interest rate is the percentage charged by a lender to a borrower for the use of money over a certain period of time. It is typically expressed as an annual percentage rate (APR) and can vary depending on a number of factors, such as the borrower's creditworthiness, the type of loan or credit product, and the overall state of the economy. According to the Federal Reserve, an interest rate is defined as "the amount of interest due per period, as a proportion of the amount lent, deposited or borrowed."

In simpler terms, an interest rate is the cost of borrowing money, or the compensation that a lender receives for allowing a borrower to use their money. It is an important factor to consider when taking out a loan or opening a credit account, as it can significantly impact the total amount of money owed over time (Federal Reserves).

4. Unemployment Rate

Unemployment rate is a measure of the percentage of the labor force in a country that is currently unemployed but actively seeking employment. It is an important indicator of the health of the labor market and overall economy, as it reflects the availability of jobs and the willingness of individuals to work. According to the Bureau of Labor Statistics, unemployment rate is defined as "the percentage of the labor force that is unemployed, but actively seeking employment and willing to work."

In simpler terms, the unemployment rate is the proportion of people in the workforce who are without a job but are actively looking for one. This rate is often used by economists, policymakers, and businesses to assess the overall health of the job market and make informed decisions based on that information (Bureau of Labor

Statistics).

5. Population

Population refers to the total number of people living in a specific geographic area, such as a city, state, country, or world. It is an important concept in many fields, including demographics, sociology, and economics, as it helps researchers understand the characteristics and needs of a particular group of people. According to the United Nations, population is defined as "the total number of persons inhabiting a country, city, or any district or area."

In simpler terms, population is the number of people living in a particular place at a particular time. It can be used to study and analyze a wide range of issues, from healthcare and education to urban planning and environmental sustainability (United Nations).

6. Debt Ratio

Debt is an obligation or liability to repay a sum of money that has been borrowed from a lender. It is a common financial term that is used in both personal and business contexts, and can take many forms, such as loans, credit card balances, and mortgages. According to Investopedia, debt is defined as "an amount of money borrowed by one party from another, often for making large purchases or investments that they could not afford on their own."

In simpler terms, debt is money that is owed to someone else and must be paid back with interest over time. It is important to manage debt responsibly to avoid financial hardship and maintain a good credit score. (Investopedia)

G. Data collection

To collect information for this study, this study used secondary data collection from the World Bank official database containing the information regarding the key economic indicators of approximately all countries. These figures are submitted by the country's government and also collected by the World Bank officials time to time. The database contains a vast variety of data for numerous economic factors for around more than 200 countries for many years but this study select the data for four under consideration countries Turkey, the USA, the UK and

Germany and of only six variables defined above, under the scope of this research.

H. Techniques for Data Analysis

The data analysis is technique is one of the most important parts of research because the entire research study is dependent upon the results. The tool that was used in this research was time series regression using the Economic Views (E-Views) version 9. The analysis conducted in E-views comprises of unit root test, regression analysis, normality of residuals, heteroskedasticity testing, autocorrelation testing, multicollinearity testing and the stability of the residuals testing.

IV. DATA ANALYSIS

Data is related to time series. Natural logarithms of all dependent and independent variables are taken. The variables used in the study are shown below, the unit for GDP is \$, interest rate in %, unemployment rate in %, log of population in millions, (t) indicates time:

(i) Dependent Variable:

$\ln HI_t = \text{Log of Housing Index}$

(ii) Independent Variables:

$\ln HI_t = \text{Log of Housing Index}$

$\ln GDP_t = \text{Log of Gross Domestic Product}$

$\ln IR_t = \text{Log of Interest Rate}$

$\ln UE_t = \text{Log of Unemployment Rate}$

$\ln P_t = \text{Log of Population}$

$\ln D_t = \text{Log of household Debt}$

One of the most important metrics used in financial and economic research, especially when analysing real estate markets, is the Log of Housing Index. Many statistical and econometric issues with raw index values are resolved by logarithmic translation of housing indexes. In order to stabilise variance, linearize relationships, and enable a more insightful interpretation of percentage changes in housing prices, researchers calculate the natural logarithm of the housing index. When working with datasets that exhibit heteroscedasticity or simulating the exponential nature of price changes, this transformation is quite helpful. In empirical research aiming to comprehend the dynamics of housing markets, evaluate the influence of different factors on housing prices, and create accurate forecasting models, the Log of Housing Index is essential. By using it, researchers can improve the robustness of statistical analyses and obtain a more accurate and comprehensible picture of the intricate

relationships seen in the real estate industry.

Key indicators in the field of economic study, including the logarithmic transformation of the GDP, interest rate, unemployment rate, population, and household debt, are often used. Logarithms are used in these situations because they are based on statistical and economic principles that try to solve problems with unprocessed data. To address issues with heteroscedasticity and nonlinearity, researchers calculate the natural logarithm of certain economic variables. The Log of GDP smoothes out variations for analytical purposes, allowing for a more nuanced view of economic growth trends. Similarly, a more stable representation of the interest rate, unemployment rate, population, and debt is made possible by applying logarithmic transformations, which improves the ability of researchers to identify proportionate changes. In order to create strong statistical frameworks for investigating the complex correlations between these basic economic variables and to produce thorough and precise studies, the logarithmic approach is essential to econometric modelling.

This study separates empirical analyses according to countries so; the analysis of different countries has been illustrated separately below.

A. Turkey

Table 1. ADF Stationarity Testing for Turkey

Series	Intercept		Trend and Intercept		None	
	T Stat	Prob.	T Stat	Prob.	T Stat	Prob.
LHI	1.945	0.059	1.297	0.202	0.685	0.498
D(LHI)	5.071*	0.000	4.105*	0.000	6.803*	0.000
LGDP	1.157	0.254	0.005	0.996	0.000	1.000
D(LGDP)	3.796*	0.001	6.081*	0.000	1.464	0.151
LIR	1.738	0.090	1.658	0.105	1.204	0.236
D(LIR)	4.851*	0.000	7.758*	0.000	9.050*	0.000
LUE	0.818	0.418	0.293	0.771	0.697	0.490
D(LUE)	3.295*	0.002	2.821*	0.008	4.333*	0.000
LD	7.534	0.000	1.027	0.311	0.624	0.536
D(LD)	5.577*	0.000	6.733*	0.000	7.758*	0.000

Note: (*) indicates statistical significance at the one percent level. All variables are integrated stationary at first I(1) difference. Augmented Dickey-Fuller Test is used as the unit root test.

Since the probabilities of unit root test appeared greater than 0.05 which refer accept the test of unit root test which narrated as: there happen a unit root in the variable and it is an indicator of non-stationary in the time series. But these probabilities became less than the level of significance and refer to reject the unit root null hypotheses at first difference and these series became stationary at first difference. Therefore, the estimation equation will be performed at first difference of these variables.

Table 2. Multiple Regression Test Results for Turkey

	Coefficient	Std. Error	t-Statistic	Prob.
Constant	2.726**	1.028	2.651	0.0121
LIR(-1)	0.017**	0.071	0.243	0.0409
LUE(-1)	0.281**	0.355	0.794	0.0326
LD(-1)	-0,951**	0.517	-1,837	0.0275
R-squared	0.884			
Adjusted R-squared	0.737			
F-statistic	1.365			
Prob (F-statistic)	0.026			

1. Note: (**) indicates statistical significance at the five percent level.

While modeling the Housing Index for Turkey at first difference, it is observed that Turkey's interest rate, unemployment rate and debt ratio has a significant effect on the dependent variable. Three independent variable explain 73.7% of the total variation in the housing index. Also, one unit increase in one lagged interest rate has found to increase 0.01745 units in one lagged housing index, one unit increase in unemployment rate is found responsible for the 0.282 units increase in the housing index, while one unit increase in the debt is forcing 0.9514 unit decreases in the target variable. Since the probability value of F-Statistic is less than 5%, so the model is considered significant. As a result, the proposed Model for the housing index of Turkey is $. InHI(-1)_t = 2,72 + 0.01InIR(-1)_t + 0.28InUR(-1)_t - 0.95InD(-1)_t$.

It is necessary to test the assumptions of the estimated multiple regression model econometrically. These assumptions are (a) normality, (b) autocorrelation, (c) constant variance, (d) multilinearity and (e) stabilization. These tests are conducted sequentially in all countries in this study to test the assumptions of multiple linear

regressions.

Table 3. Normality Test for Turkey

	Results
Mean	-0.000
Median	0.037
Max	0.218
Min	-0.359
Std. Dev.	0.142
Skewness	-0.712
Kurtosis	0.976
Jarque-Bera	3.296
Probability	0.192

The significance level, which refers to accepting the assumption of normality for the residuals generated by the proposed model, is far over 5% because of the probability value for the Jarque-Bera test, which is a crucial condition for time series and econometric modelling and analysis.

Table 4 Heteroskedasticity test for Turkey

F-statistic	0.632591	Prob. F(4,34)	0.6427
Obs*R-squared	2.701.431	Prob. Chi-Square(4)	0.609
Scaled explained SS	2.029.435	Prob. Chi-Square(4)	0.7303

Since all Breusch-Pagan Godfrey test p-values for F and Chi-Square statistics are more than 0.05, indicating that H_0 bearing the assumption of no heteroskedasticity should be rejected and that there was no substantial evidence of heteroskedasticity or misspecification in the suggested model.

Table 5 Autocorrelation LM Test for Turkey

F-statistic	1.242.654	Prob. F(2,32)	0.1422
Obs*R-squared	1.704.868	Prob. Chi-Square(2)	0.1928

While observing the Durbin-Watson statistic of the model which was 1.74425 for the examination of autocorrelation in the proposed time series analysis, also the Breusch-Godfrey Serial Correlation LM Test for the first order was utilized. The null hypothesis for the test is accepted and there is no substantial autocorrelation among

the errors produced by the suggested estimation model, since the probability values of the F and Chi-square tests are both greater than 5%.

Table 6. Variance Inflation Factor Multicollinearity Test for Turkey

Predictors	Coefficient Variance	Un-centered VIF	Centered VIF
C	105.704	1829.05	NA
LIR(-1)	0.005	1.828	1.996
LUE(-1)	0.126	1.788	2.164
LD(-1)	0.268	1.159	1.795

Another issue that could impact the precision and importance of a multiple regression model is multicollinearity. The variable inflation factor, or VIF, is used to measure it, and if its values are more than 5 it is considered to exist (Liao and Valliant, 2012: 53). It means that no meaningful relationship connecting the independent variables and the residuals was discovered. Since all of the "Centred VIF" values in our model are within the intended range, there is no evidence of multicollinearity in the proposed model, according to the analysis.

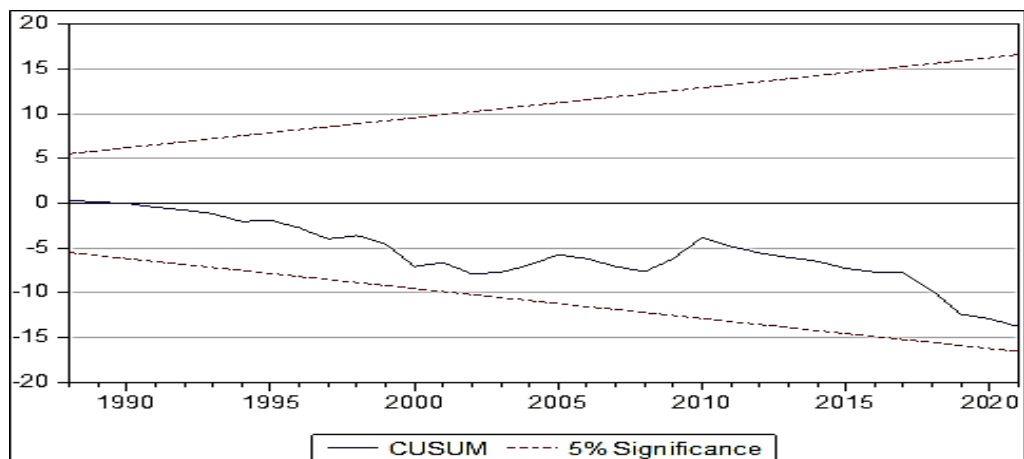


Figure 7 Stability test:

The total number of recursive residuals is used in the CUSUM examination, a statistical technique that evaluates the stability of statistical relationships over time. This test was created by Brown et al. (1975), and Kramer (1986) presented a different variance estimate for disruptions in regression. The cumulative total is shown together with 5% significant lines in the CUSUM test. The results of the CUSUM test suggest that the suggested model for the Turkish housing index is correctly constructed. The model is appropriately defined and remains unchanged throughout time, as seen in Figure 7 above, according to the results of the CUSUM test.

B. United State of America

Table 7 ADF Stationarity Testing for United State

Series	Intercept		Trend and Intercept		None	
	T Stat	Prob.	T Stat	Prob.	T stat	Prob.
LHI	1.254	0.217	1.035	0.307	0.034	0.973
D(LHI)	1.572	0.124	1.694*	0.098	1.787	0.082
D(LHI,2)	4.332*	0.000	3.558*	0.001	6.803*	0.000
LGDP	2.009	0.052	0.098	0.922	0.022	0.982
D(LGDP)	1.741	0.090	2.489*	0.017	1.762	0.086
D(LGDP,2)	5.360	0.000	6.011*	0.000	5.359*	0.000
LIR	0.584	0.563	0.837	0.408	0.887	0.380
D(LIR)	5.577	0.000	6.894*	0.000	6.803*	0.000
D(LIR,2)	5.071	0.000	8.741*	0.000	8.282*	0.000
LUE	1.714	0.095	1.113	0.272	0.731	0.469
D(LUE)	6.171*	0.000	3.969*	0.000	6.081*	0.000
D(LUE,2)	6.803*	0.000	8.741*	0.000	7.022*	0.000
LP	3.439*	0.001	0.000	1.000	1.140	0.261
D(LP)	0.010	0.992	0.323	0.748	1.045	0.303
D(LP,2)	6.894*	0.000	8.3764*	0.000	8.741*	0.000
LD	0.034	0.973	0.201	0.842	0.001	1.000
D(LD)	3.797*	0.001	3.247*	0.002	4.105*	0.000
D(LD,2)	7.463*	0.000	9.049*	0.000	7.534*	0.000

Note: (*) indicates statistical significance at the one percent level. All variables are integrated stationary at second I(2) difference. Augmented Dickey-Fuller Test is used as the unit root test.

Since the probabilities of unit root test appeared greater than 0.05 which refer accept the H0 of unit root test which narrated as: there happen a unit root in the variable and it is an indicator of non-stationarity in the time series. But these probabilities became less than the level of significance and refer to reject the unit root null hypotheses for all the variables at second difference and these series became stationary at that stage. Therefore, the regression analysis will be performed at second difference of these variables.

Table 8: Multiple Regression Test Results for United States

	Coefficient	Std. Error	t-Statistic	Prob.
C	0.955	2.689	0.355	0.725
LGDP(-2)	0.680**	0.114	5.982	0.000
LIR(-2)	0.012**	0.009	1.303	0.020
LUE(-2)	0.040**	0.026	1.548	0.013
LD(-2)	0.135**	0.043	3.130	0.004
R-squared	0.995			
Adjusted R-squared	0.995			
S.E. of regression	0.012			
Sum squared resid	0.005			
Log likelihood	124.359			
F-statistic	1435.91**			
Prob(F-statistic)	0.000			

Note: (**) indicates statistical significance at the five percent level

While modeling the housing index for USA at second difference it is observed that American GDP, interest rate, unemployment rate and debt ratio have a significant effect on the target variable. These four predictors explain 99.53% of the total variation in the housing index.

Also, it was discovered that a one-unit increase in the GDP's second lag corresponded to a 0.6804-unit increase in the housing index's second lag, one-unit increase in interest rate has found responsible to increase 0.01237 units in the housing index, one-unit increase in unemployment rate is identified responsible for the 0.04011 units increase in the housing index, while one-unit increase in the debt is forcing 0.1350-unit increase in the target variable. Since the probability of F-Statistic is less than 5% so the model is considered significant.

The proposed estimation model for the housing index is $LHI(-2) = 0.6804 LGDP(-2) + 0.1234 LIR(-2) + 0.0401 LUE(-2) + 0.135 LD(-2)$.

Table 9: Normality Test for United States

	Results
Mean	0
Median	0.002
Max	0.212
Min	-0.019
Std. Dev.	0.011
Skewness	0.115
Kurtosis	2.12
Jarque-Bera	1.309
Probability	0.519

Also, After checking the normality results, The assumption of normality has been accepted for the residuals produced by the proposed model, which is a crucial criterion for time series and econometric modelling and analysis, the probability value for the Jarque-Bera test must be substantially above 5% the significance.

Table 10: Heteroskedasticity Test for United States

F-statistic	2.80884	Prob. F(5,34)	0.315
Obs*R-squared	11.6927	Prob.Chi-Square(5)	0.392
Scaled explained SS	4.17488	Prob.Chi-Square(5)	0.5245

Here also, All of the p-values for F and Chi-Square statistics under the Breusch-Pagan Godfrey test are greater than 0.05, indicating that Ho should not be rejected under the assumption of no heteroskedasticity, and that the proposed model is not significantly misspecified.

Table 11: Autocorrelation LM test for united state

F-statistic	45.80896	Prob. F(2,32)	0.435
Obs*R-squared	29.64551	Prob. Chi-Square(2)	0.536

While observing the Durbin-Watson statistic in the regression estimation of the model which was 1.8277 for the examination of autocorrelation in the proposed time series model the Breusch-Godfrey Serial Correlation LM Test is used, which applies the null hypothesis that there is no serial or autocorrelation. Since the null hypothesis for the test is accepted and both the probability values of the F and Chi-square statistics are greater than 0.05, it can be deduced that there is no substantial evidence of autocorrelation among the residuals produced by the suggested estimate model.

Table 12 VIF test for Multicollinearity for United states

Variable	Coefficient Variance	Un-centered VIF	Centered VIF
C	7.23053	2106387	NA
LGDP(-2)	0.012935	60527.67	2.135051
LIR(-2)	9.01E-05	55.79102	2.733682
LUE(-2)	0.000672	119.1688	2.135841
LD(-2)	0.001861	2027.851	1.262084

Another issue that could impact the precision and importance of a multiple regression model is multicollinearity. Variance Inflation Factor (VIF) is used to measure it, and if its values are greater than 5 it is considered to exist (Liao and Valliant, 2012: 53). It means that no meaningful relationship between the independent variables and the residuals was discovered. This study may conclude that there is no

evidence of multicollinearity in the proposed model because all of the "Centred VIF" values in model fall within the required range.

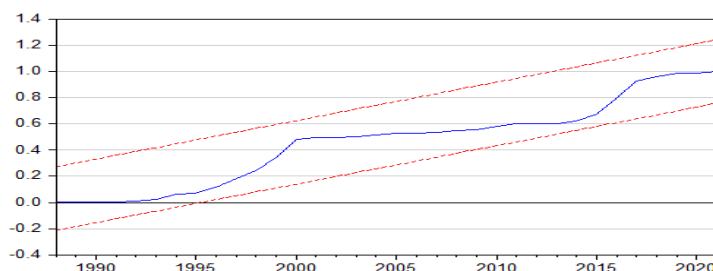


Figure 8: Stability

The cumulative sum of recursive residuals is used in the CUSUM test, a statistical technique that evaluates the stability of regression relationships over time. This test was presented a different variance estimate for disruptions in regression. The cumulative total is shown together with 5% significant lines in the CUSUM test. The results of the CUSUM test suggest that the suggested model for the US housing index is correctly constructed. The CUSUM test shows that the model is appropriately formulated and that it remains unchanged over time, as shown in the image above.

C. United Kingdom (UK)

Table 13 ADF Stationarity Testing for united Kingdom

Series	Intercept		Trend and Intercept		None	
	T stat	Prob.	T stat	Prob.	T stat	Prob.
LHI	0.907	0.370	0.578	0.567	0.064	0.950
D(LHI)	1.768*	0.085	1.517	0.137	2.196	0.034
D(LHI,2)	4.333	0.000	3.634*	0.001	5.577*	0.000
LGDP	1.072	0.290	0.313	0.756	0.013	0.990
D(LGDP)	2.017*	0.051	2.026*	0.050	2.134*	0.039
D(LGDP,2)	4.333*	0.000	3.797	0.001	5.450*	0.000
LIR	0.109	0.914	0.753	0.456	0.939	0.353
D(LIR)	1.020	0.314	0.388	0.700	2.199*	0.034
D(LIR,2)	4.333*	0.000	4.105*	0.000	5.450*	0.000
LUE	1.222	0.229	1.002	0.323	1.051	0.300
D(LUE)	2.493*	0.017	2.032*	0.049	3.524*	0.001
D(LUE,2)	7.242*	0.000	3.969*	0.000	5.533*	0.000
LP	0.609	0.546	0.044	0.965	0.014	0.989
D(LP)	0.482	0.633	1.467	0.151	0.381	0.706
D(LP,2)	4.629*	0.000	6.171*	0.000	5.794*	0.000
LD	0.869	0.390	0.274	0.786	0.001	0.999
D(LD)	2.983*	0.005	2.329*	0.025	3.371*	0.002
D(LD,2)	5.954*	0.000	4.333*	0.000	6.803*	0.000

Note: (*) indicates statistical significance at the one percent level. All variables are integrated stationary at second I (2) difference. Augmented Dickey-Fuller Test is used as the unit root test.

Since the probabilities of unit root test appeared greater than 0.05 which refer accept the H0 of unit root test which narrated as: there happen a unit root in the variable and it is an indicator of non-stationary in the time series. But these probabilities became less than the level of significance and refer to reject the unit root null hypotheses for all the variables at second difference and these series became stationary at that stage. Therefore, the regression analysis will be performed at second difference of these variables.

Table 14 :Multiple Regression Test Results for United Kingdom

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.468**	3.585	-4.872	0.000
LGD -2	2.526**	0.566	4.460	0.000
LUE -2	-0.11872**	0.118	-1.006	0.032
LP -2	1.588**	0.957	1.660	0.011
LD -2	0.050**	0.055	0.909	0.037
R-squared	0.976			
Adjusted R-squared	0.975			
S.E. of regression	0.050			
Sum squared resid	0.086			
Log likelihood	66.020			
F-statistic	274.500			
Prob(F-statistic)	0.000			

Note: (**) indicates statistical significance at the five percent level

While modeling the housing index for UK at second difference it is observed that English GDP, unemployment rate, UK population and debt ratio have a significant effect on the target variable. These four predictors explain 97.58% of the total variation in the housing index. The housing index will be -17.4681 units if GDP, unemployment rate, population and the debt of the country become zero.

Also, one unit increase in GDP has found to increase 2.526425 units in the housing index, one unit increase in unemployment rate has found responsible to decrease 0.11872 units in the housing index, one unit increase in population is identified responsible for the 1.58887 units increase in the housing index, while one unit increase in the debt is forcing 0.050154 unit increase in the target variable. Since the p-value of F-Statistic is less than 0.05 so the model is considered significant.

The proposed estimation model for housing index will be $LHI (-2) = - 17.468 + 2.526 LGDP (-2) - 0.1187 LUE (-2) + 1.5889 LP (-2) + 0.0515 LD (-2)$

Table 15 Normality Test for UK

	Results
Mean	0
Median	0.004
Max	0.065
Min	-0.101
Std. Dev.	0.041
Skewness	-0.521
Kurtosis	2.718
Jarque-Bera	1.847
Probability	0.397

Also in this examination in order to accept the assumption of normality for the residuals produced by the proposed model, which is a crucial criterion for time series and econometric modelling and analysis, the probability value for the Jarque-Bera test must be substantially above 5% the significance

Table 16 Heteroskedasticity Test United Kingdom

F-statistic	1.830314	Prob. F(5,34)	0.1332
Obs*R-squared	8.483184	Prob. Chi-Square(5)	0.1315
Scaled explained SS	3.905195	Prob. Chi-Square(5)	0.5631

Here also, all of the p-values for F and Chi-Square statistics under the Breusch-Pagan Godfrey test are greater than 0.05, indicating that H_0 should not be rejected under the assumption of no heteroskedasticity, and that the proposed model is not significantly mis specified.

Table 17 Autocorrelation LM test for United Kingdom

F-statistic	77.195	Prob. F(2,32)	0.1129
Obs*R-squared	33.13268	Prob. Chi-Square(2)	0.1220

While observing the Durbin-Watson statistic in the regression estimation of the model which was 1.618137 for the examination of autocorrelation in the proposed time series model the Breusch-Godfrey Serial Correlation LM Test possessing null hypothesis of no serial or auto correlation is applied. Since both the probability values of F and Chi-square statistic are greater than 0.05 which refer to accept the null hypothesis for the test and conclude that there is no significant evidence of

autocorrelation among the residuals generated by the proposed estimation model.

Table 18 VIF test for Multicollinearity for united kingdom

Variable	Coefficient Variance	Un-centered VIF	Centered VIF
C	12.85279	202561.1	NA
LGDP -2	0.320812	105755.4	3.830637
LUE -2	0.013931	115.9444	1.187853
LP -2	0.916052	329440.3	0.792824
LD-2	0.003043	133.7162	1.437481

The accuracy and significance of a multiple regression model may be impacted by multicollinearity, another issue. If the Variance Inflation Factor (VIF) value is less than 5 (Liao and Valliant, 2012: 53), it is considered to be low. It means that no meaningful relationship between the residuals and the independent variables was discovered. All of the "Centred VIF" values in our model fall within the intended range, so this study can conclude that there is no evidence of Multicollinearity in the proposed model.

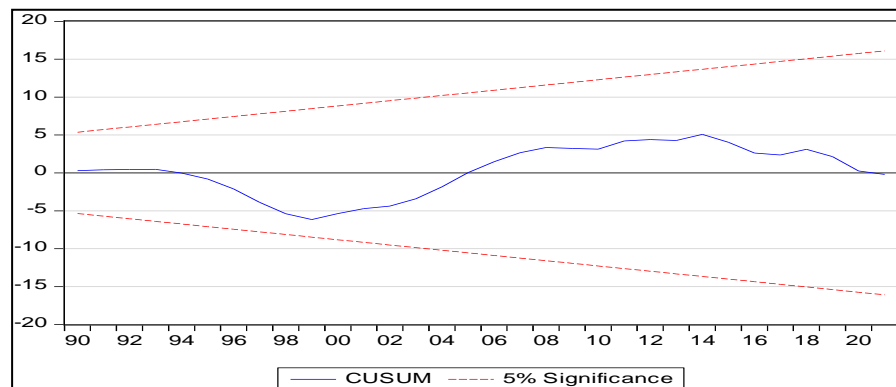


Figure 9. Stability:

The cumulative sum of recursive residuals is used in the CUSUM test, a statistical technique that evaluates the stability of regression relationships over time. This test presented a different variance estimate for disruptions in regression. The cumulative total is shown together with 5% significant lines in the CUSUM test. The results of the CUSUM test suggest that the suggested model for the US housing index is correctly constructed. The CUSUM test shows that the model is appropriately formulated and that it remains unchanged over time, as shown in the image above.

D. Germany

Table 19 ADF Stationarity Testing for Germany

Series	Intercept		Trend and Intercept		None	
	T Stat	Prob.	T Stat	Prob.	T Stat	Prob.
LHI	0.573	0.570	0.430	0.670	0.111	0.912
D(LHI)	1.670	0.103	1.720*	0.093	1.856*	0.071
D(LHI,2)	3.278*	0.002	2.612*	0.013	4.333*	0.000
LGDP	0.812	0.422	1.660	0.105	0.000	1.000
D(LGDP)	6.893*	0.000	6.893*	0.000	3.416*	0.002
D(LGDP,2)	7.758	0.000	5.577*	0.000	5.794*	0.000
LUE	0.567	0.574	0.455	0.652	0.678	0.502
D(LUE)	3.494*	0.001	2.998*	0.005	4.333*	0.000
D(LUE,2)	7.758*	0.000	4.333*	0.000	7.021*	0.000
LP	0.793	0.433	0.436	0.666	0.074	0.942
D(LP)	1.927*	0.061	1.407	0.167	2.629*	0.012
D(LP,2)	7.758*	0.000	5.794*	0.000	5.562*	0.000
LD	1.353	0.184	0.070	0.945	0.147	0.884
D(LD)	2.869*	0.007	3.191*	0.003	3.734*	0.001
D(LD,2)	7.982*	0.000	4.105*	0.000	5.533*	0.000

Note: (*) indicates statistical significance at the one percent level. All variables are integrated stationary. at second I(2) difference. Augmented Dickey-Fuller Test is used as the unit root test

Since the probabilities of unit root test appeared greater than 0.05 which refer accept the H0 of unit root test which narrated as: there happen a unit root in the variable and it is an indicator of non-stationarity in the time series. But these probabilities became less than the level of significance and refer to reject the unit root null hypotheses for all the variables at second difference and these series became stationary at that stage. Therefore, the regression analysis will be performed at second difference of these variables.

Table 20 Multiple Regression Test Results for Germany

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-21.305	3.636	-5.860	0.000
LGDP-2	0.952	0.142	6.718	0.000
LUE -2	0.101	0.043	2.361	0.024
LP-2	2.323	0.509	4.567	0.000
LD-2	0.253	0.059	4.313	0.000
R-squared	0.992			
Adjusted R-squared	0.991			
S.E. of regression	0.012			
Sum squared resid	0.005			
Log likelihood	123.166			
F-statistic	813.171			
Prob F-statistic	0.000			

Note: (**) indicates statistical significance at the five percent level

While modeling the housing index for Germany at second difference it is observed that English GDP, unemployment rate, their population and debt ratio have a significant effect on the target variable. These four predictors explain 99.17% of the total variation in the housing index. The housing index will be -21.3059 units if GDP, unemployment rate, population and the debt of the country become zero.

Also, one-unit increase in GDP has found to increase 0.952031 units in the housing index, one-unit increase in unemployment rate has found responsible to increase 0.101028 units in the housing index, one unit increase in population is identified responsible for the 2.323888 units increase in the housing index, while one unit increase in the debt is forcing 0.253023 unit increase in the target variable. Since the p-value of F-Statistic is less than 0.05 so the model is considered significant.

The proposed estimation model for housing index will be $LHI (-2) = - 21.3059 + 0.952 LGDP (-2) + 0.101 LUE (-2) + 2.324 LP (-2) + 0.253 LD (-2)$

Table20: Normality Test for Germany

	Results
Mean	0
Median	-0.002
Max	0.016
Min	-0.016
Std. Dev.	0.009
Skewness	0.129
Kurtosis	2.151
Jarque-Bera	1.246
Probability	0.536

Also for this country, in this examination in order to accept the assumption of normality for the residuals produced by the proposed model, which is a crucial criterion for time series and econometric modelling and analysis, the probability value for the Jarque-Bera test must be substantially above 5% the significance threshold.

Table 21: Heteroskedasticity Test for Germany

F-statistic	4.138209	Prob. F(5,34)	0.4801
Obs*R-squared	15.13304	Prob. Chi-Square(5)	0.3982
Scaled explained SS	5.419738	Prob. Chi-Square(5)	0.3668

Here also, all in order to reject H_0 carrying the assumption of no heteroskedasticity and to conclude that there was no substantial evidence of heteroskedasticity or misspecification in the suggested model, the p-values for F and Chi-Square statistics under the Breusch-Pagan Godfrey test are greater than 0.05.

Table 22 Autocorrelation LM test for Germany

F-statistic	21.09744	Prob. F(2,32)	0.678
Obs*R-squared	22.74814	Prob. Chi-Square(2)	0.711

While observing the Durbin-Watson statistic in the regression estimation of the model which was 1.9921 for the examination of autocorrelation in the proposed time series model the Breusch-Godfrey Serial Correlation LM Test possessing null hypothesis of no serial or auto correlation is applied. Since the null hypothesis for the test is accepted and both the probability values of the F and Chi-square statistics are greater than 0.05, it can be deduced that there is no substantial evidence of autocorrelation among the residuals produced by the suggested estimate model.

Table 23 VIF test for Multicollinearity for Germany

Variable	Coefficient Variance	Un-centered VIF	Centered VIF
C	13.21832	3627785	NA
LGDP(-2)	0.020084	113206.3	3.232572
LUE(-2)	0.001832	411.2106	4.947508
LP(-2)	0.258965	4445573	0.629424
LD(-2)	0.003441	2896.08	1.376236

Another issue that could impact the precision and importance of a multiple regression model is multicollinearity. Variance Inflation Factor (VIF) is used to measure it, and if its values are less than 5 it is considered to exist (Liao and Valliant, 2012: 53). It means that no meaningful relationship between the independent variables and the residuals was discovered. This study may conclude that there is no evidence of

multicollinearity in the proposed model because all of the "Centred VIF" values in our model fall within the required range.

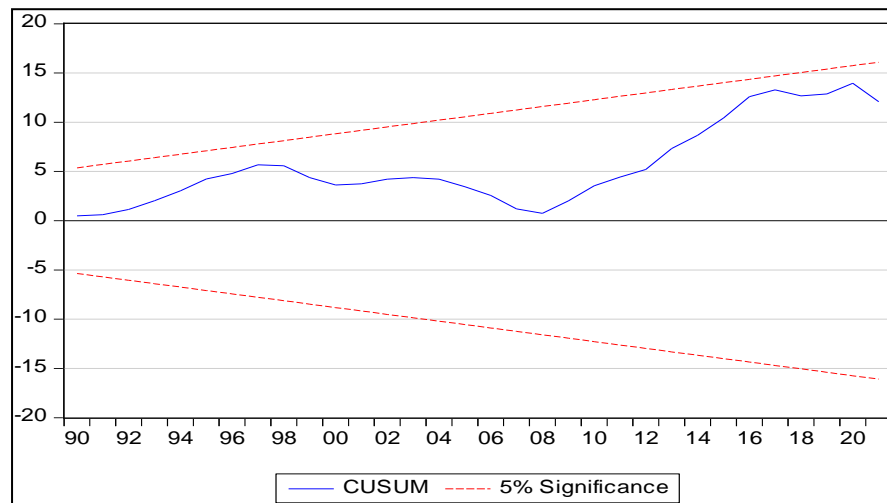


Figure 10. Stability

The cumulative sum of recursive residuals is used in the CUSUM test, a statistical technique that evaluates the stability of regression relationships over time. This test was created by Brown et al. (1975), and Kramer (1986) presented a different variance estimate for disruptions in regression. The cumulative total is shown together with 5% significant lines in the CUSUM test. The results of the CUSUM test suggest that the suggested model for the US housing index is correctly constructed. The CUSUM test demonstrates that the model is appropriately formulated and that it remains unchanged over time, as shown in the image above.

E. Comparison of four countries:

By comparing the economies and the housing index of four countries it is observed that some of the variables which are found significant in Turkey are not significant for the developing countries. Also some significant predictors of those countries are not found significant in Turkey case.

Table 24 Comparison of the coefficients of four countries

Variables	Turkey	USA	UK	Germany
C	2.72656		-17.468	-21.306
Interest Rate	0.01745	0.01237		
Unemployment Rate	0.28199	0.04011	-0.1187	0.10103
Debt	-0.9514	0.13502	0.05015	0.25302
GDP		0.68039	2.52643	0.95203
Population			1.58887	2.32389

The Turkey and USA housing indexes are influenced by the interest rates while it doesn't affect the housing index in UK and Germany. The unemployment rate is found to have a significant effect on the housing index in Turkey, USA and Germany but have an adverse effect in UK. The debt is identified with a negative effect on the housing index in Turkey while it is identified with a positive effect on the housing indexes of the developed countries. GDP doesn't found to have any effect on the housing index in Turkey while it is found influencing in all the developed countries. The population is also found ineffective in Turkey and USA while it is found with the significant effect on the housing index of UK and Germany.

V. CONCLUSION, DISCUSSION AND RECOMMENDATIONS

A. Conclusion

In conclusion, with a particular emphasis on the comparative study of Turkey and industrialised nations, the literature review has given readers a thorough grasp of the complex relationship between housing indices and economic determinants. The amalgamation of prior research has shed light on this relationship's complexity, emphasising the different ways that housing indices function as both indicators and modifiers of economic dynamics.

By studying relevant literature, we have seen the complex relationship that exists between housing markets and the overall state of the economy. The significance of housing in determining wealth, its influence on consumer spending, and its vulnerability to changes in interest rates and macroeconomic policy have become recurring issues. Furthermore, the literature study has emphasised the significance of taking into account regional and national issues, recognising the distinct features that set Turkey apart from developed nations.

The knowledge gathered from this assessment of the literature will provide us with a strong basis for comprehending the complexity involved in the link between housing indices and economic factors as we proceed with our comparative analysis. Our research will be informed by the synthesis of current knowledge, enabling a nuanced exploration of the housing market dynamics and their implications for the wider economic environment that are comparable and different between Turkey and developed countries.

We plan to provide significant insights to the body of literature by delving into the empirical findings from our comparative analysis in the upcoming portions of our research article. Our research attempts to provide light on the particular nuances of the Turkish housing market within the global economic framework by bridging the theory-practice gap.

Turkey's housing market is generally more unstable and of worse quality than that of wealthy nations, but it is also more reasonably priced. Turkey is still having difficulty meeting the demands of its expanding population, especially in metropolitan areas where there is a severe housing shortage, despite notable success in increasing the number of housing units. This suggests that Turkey's property market is riskier and more dynamic than those in developed nations. Turkey has taken steps to improve the quality of its housing, but it still has a long way to go before achieving the levels of wealthy nations. This research was conducted for three developed countries USA, UK and Germany along with one developing country i.e. Turkey for the examination of housing trend based on the data available for year 1982 to 2021. The impact of interest rate, unemployment rate, GDP, Population and Debt was examined and tested using time series regression analysis. In order to investigate interest rate, unemployment rate, GDP, Population and Debt were taken as independent variable while housing index was our dependent variable. The beneficial purpose was to make aware the housing industry and the government about the factor influencing the housing demand and pattern and to address the problem of the economic indicators on it.

Using time series data, this thesis carried out a thorough research of the housing markets in four nations: Germany, the United States, the United Kingdom, and Turkey. The natural logarithms of several economic variables, such as the logarithms of the population (InP), debt (InD), interest rate (InIR), housing index (InHI), unemployment rate (InUE), and GDP (InGDP) were the main focus of the investigation. The aim of the study was to appraise the influence of economic factors on house prices and comprehend the workings of housing markets.

The significance of employing the Log of Housing Index in financial and economic research—particularly in the analysis of real estate markets—was brought up in the first session. The logarithmic transformation offers a more consistent representation of home prices and makes it easier to interpret percentage fluctuations, hence addressing statistical and econometric concerns. In a similar vein, the study stressed the use of logarithmic transformations to improve the statistical studies' robustness for important economic metrics like GDP, interest rates, unemployment rates, population, and debt.

Next, each nation underwent a unique empirical investigation, beginning with Turkey. Differentiating was necessary since the Augmented Dickey-Fuller (ADF) stationarity tests verified that all variables were integrated stationary at first difference (I(1)). The findings of Turkey's multiple regression test showed that the Housing Index was highly impacted by the interest rate, unemployment rate, and debt ratio. The stability tests validated the proposed model's reliability, and the model described 73.7% of the overall variation in the housing index.

Going on to the US, the results of the multiple regression analysis demonstrated the substantial effects of the GDP, interest rate, unemployment rate, and debt on the Housing Index, and the ADF stationarity tests suggested the need for second differencing (I(2)). 99.53% of the variation in the total was explained by the model, indicating a high degree of predictability. The model's dependability was further confirmed by the autocorrelation, heteroskedasticity, and normality tests.

Similar protocols were used for the UK, and second differencing was indicated by the ADF stationarity test. The findings of the multiple regression analysis demonstrated the substantial impact of GDP, unemployment rate, population, and debt on the Housing Index, accounting for 97.58% of the variation in the index. The model's validity was confirmed by assumption tests for autocorrelation, heteroskedasticity, and normality.

A similar pattern was seen in the analysis for Germany, which confirmed the importance of GDP, unemployment rate, population, and debt in explaining changes in home prices. The reliability of the Germany model was confirmed by assumption tests, which explained 95.84% of the total variation.

This research offers insightful information about the characteristics of the housing markets in four different nations. The analysis emphasises how important economic variables are in determining property prices, including GDP, interest rates, unemployment rates, population, and debt. The suggested regression models provide a basis for comprehending and forecasting patterns in the housing market for each nation. It is suggested that more study be done to determine the effects of other factors, do sensitivity studies, and evaluate the predictive accuracy of the models over longer time frames. All things considered, this study advances the subject of real estate economics and gives investors and policymakers a foundation on which to make wise housing market choices.

The key findings or decisions obtained by the study are:

Turkey housing index is positively affected by its interest rate, unemployment rate and have a negative effect of debt. USA housing index is positively affected by its interest rate, unemployment rate, GDP and debt. UK housing index is positively affected by its unemployment rate, GDP, Population and debt. Germany housing index is positively affected by its unemployment rate, GDP, Population and debt. The effect of debt in Turkey is significantly different as compare to all the developed countries. Its effect was found negative in Turkey while it was observed with positive effects in other countries.

Interest rate was found effective only in Turkey and USA while this factor was identified insignificant in UK and Germany.

GDP found with massive effect on housing index in developed countries but it was identified to have an insignificant effect in Turkey.

Population was also determined with huge effect on housing index in UK and Germany but found insignificant in Turkey and USA

In conclusion, Turkey's housing market is generally more unstable and of worse quality than that of wealthy nations, but it is also more reasonably priced. Turkey is still having difficulty meeting the demands of its expanding population, especially in metropolitan areas where there is a severe housing shortage, despite notable success in increasing the number of housing units. This suggests that Turkey's property market is riskier and more dynamic than those in developed nations. Turkey has taken steps to improve the quality of its housing, but it still has a long way to go before achieving the levels of wealthy nations.

B. Recommendations

The results of the study are very much beneficial from business, investments and monetary perspective. Governments can gain advantage to plan the increase in their housing index by controlling the identified attributes. They can analyze which path way they should adopt to attract the customers towards housing business and investments in contrast with the developed countries economic models.

The study indicated which factors impact housing most with the help of these

results housing industry and government now know how they can satisfy their consumers demand and maintain their housing image in the market in comparison to the developed countries.

Turkey should work more on its GDP and Population growth and to bring these factors into account when planning and offering the housing projects. According to the findings, Turkey can increase its housing index by increasing its interest rate.

Unethically, the housing index can be increased by increasing the unemployment rate. The only justification seems to support this statement that peoples will have attraction towards houses purchase if they get retired and get some remuneration money to invest in the housing sector. Housing index can also be increased by reducing Turkey debts.

The housing index of Turkey is identified as a tool used to monitor changes in residential property prices over time. The index calculates a weighted average of different types of properties, such as apartments, houses, and villas. The housing market in Turkey has historically been quite volatile, experiencing fluctuations in prices and demand identified due to change in their interest rate, unemployment rate and debt. The index has was observed both growth and decline, influenced by factors like unemployment rate, interest rates, debt and other government policies. Recently, the COVID-19 pandemic has caused a slowdown in Turkey's housing market, leading to decreased demand, sales volume, and prices in some areas. Nevertheless, the government has implemented various initiatives, such as tax incentives, low-interest rates, and infrastructure investments, to support the housing sector and stabilize the market. Investors and homebuyers can use the housing index of Turkey to gain insight into the current state of the country's real estate market and make informed decisions.

1. Recommendations for future studies

The results of this study provided some influential factors of the turkey housing index and its comparison with the developed countries. It is important to note that there are likely many other research questions that could be investigated in this field, depending on the specific interests of the researcher. Here this study are recommending some research scopes that could be explored in relation to Turkey's

housing index in future researches:

1. Examine the accessibility and affordability of housing for vulnerable groups, such as low-income households, refugees, and immigrants.
2. Analyze the factors that affect the volatility and stability of Turkey's housing market, including economic indicators, government policies, and international trends.
3. Investigate how environmental factors, such as climate change, air pollution, and natural disasters, impact the quality and safety of housing in Turkey.
4. Explore the effectiveness of Turkey's housing policies and programs, such as public housing initiatives, mortgage schemes, and regulatory frameworks, in addressing the housing needs of its population.
5. Assess the social and cultural aspects of housing in Turkey, including how housing shapes identity, community, and social relations.
6. Investigate the use of sustainable design practices and innovative technologies in the construction and maintenance of housing in Turkey.
7. Analyze the impact of urbanization and globalization on Turkey's housing market, including the growth of informal settlements and the displacement of marginalized communities.

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