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The influence of Property Tax on Housing Prices in Israel between 1997 and 2017

Wpływ podatku od nieruchomości na ceny mieszkań w Izraelu w latach 1997-2017

Doctoral dissertation

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Supervisor's signature

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Introduction

1. Research problem

Property tax in most countries is defined as a local tax that is collected by the municipalities. Many countries worldwide use property tax because of its great importance as the local government's primary source of revenue. It encompasses lighting, cleaning, waste management, firefighting and maintenance of gardens and parks, paving roads, as well as other public expenditures. However, this tax type may influence the real estate market and its economy (Bahl et al., 2010). Property taxes are collected annually on land and buildings for residential and commercial use under its jurisdiction. Property tax is considered to be a fair tax for local governments, mainly because of the connection between the types of services found locally (Slack, 2010). Municipal property tax is unique and essential because it is a tax levied on residential property. On the one hand, residential property is a means of creating residential services, and on the other hand, the tax reflects the capital gain from the property's value. Understanding the housing market is very important because it is one of the engines of growth for the entire economy.

Property taxes use many different tax bases, such as the capital value, annual rent, original purchase price, but also the area of land, building or premises. The choice of the tax base is determined by historical, cultural, social or economic factors. It should be noted that most developed countries in the world are dominated by value-based tax in its various forms. The functioning of this type of property tax is already relatively well recognised in the literature. On the other hand, almost half of African and Asian countries and some Central and Eastern European countries are based on various forms of property-based tax. The discussion on this type of property tax generally focuses on stereotypes, its administrative simplicity, possible stability and predictability of tax revenues. In principle, there are no in-depth studies on the impact of area-based property taxes on local property markets. Unfortunately, a view has already been established that a value-based property tax is such an effective instrument for

influencing housing prices that any other form of property tax should be adapted to the pattern associated with developed economies. There is a significant research gap in the area of influence of the area-based property tax on housing prices.

This study focuses on analysing and understanding the municipal tax system in Israel, based on the property area's measurement and the effect of municipal taxes on the residential market over two decades. Due to the importance of the municipal tax, it does not detract from the central government's agenda at the broader national level, and on the other hand, local authorities at the local level. This work may contribute to understanding the relationship between the central government and the local government.

This work is unique in Israel. In this respect, it sheds light and deepens our understanding of the municipal property tax system, relevant to many areas of residents' lives. The tax system in Israel has been expanding in recent years. Comparing tax systems in other countries based on a similar model to Israel's and those with a different system from the Israeli one, Israel may contribute to and stimulate general thinking about the municipal tax and its effect on every resident through their property. The importance of this work is to amend the property tax system in Israel. It is important to indicate that this work focuses on the relationship between property tax area-based housing prices between 1997 and 2017 in Israel, and not on the housing price market's cyclical fluctuations.

The aim of the study is to fill a gap in scientific knowledge and to make decision-makers better understand the relationship between the area-based property tax and housing prices. In addition, this relationship is analysed and evaluated in a highly developed economy such as the one in Israel, the 19th country in the world according to the HDI index in 2019, in an attempt to fill an as yet unrecognised research area.

Several comments and assumptions have been made in this work and it is essential to note first that this is a survey of the housing prices and the number of transactions related solely to new housing which has been purchased and owned by individual buyers. The survey does not include second-hand housing purchased for investment by investors. This work draws on the actual property tax revenues, without exemptions or discounts granted. The work also relates to the property tax levied on residential property and not to the property tax levied on commercial property.

2. Theoretical background

Creating municipal taxes starts from the government through the local authority to the resident, who is the taxpayer and bears the burden of taxes. This relationship is complex between all the parties. The government attempts to reduce the annual aid to local authorities. However, local authorities ask for more independence and freedom to decide policy management and tax collection. Hence, the main theoretical problem is to create a tax system that could balance both local and national interests related to the market and the economy (Christensen, Corrigan, Mendicino and Nishiyama, 2016).

The relationship between the municipality and residents is complicated. From the municipality's perspective, there is a permanent and systematic desire to deepen the collection process by changing the classifications of assets or property valuations. The residents wish to pay as little tax as possible and express this desire during elections.

Although the municipal tax is perceived as a “hated” tax and is not popular among taxpayers, economists still regard it as an appropriate income source for the authorities (Bird and Slack, 2006). The municipal tax is highly influential, both fiscally and non-fiscally. There are generally two commonly used methods of calculating property tax, i.e. the area-based and value-based method.

Calculating property tax by area is prevalent in countries where the real estate market is not sufficiently developed, such as some countries belonging to the former Soviet bloc, Eastern European countries such as Hungary, Romania, Bulgaria, Poland, Israel and even some countries in Africa and Asia (Głuszak, 2015). The second approach relies on value-based estimation and is more common in developed countries such as the UK, France, Germany, Canada, the USA, Japan, Finland and Denmark. Property taxes are calculated using the property's value, including both land and buildings. Every five years, assessors will value the property and set an appropriate rate on the owner using the municipality (Chambers et al., 2009).

Both approaches have advantages and disadvantages. This work focuses on understanding and distinguishing between the two methods. This understanding can help analyse the effect of the municipal tax on residential market prices, an asset that concerns all residents who own property. Hence, understanding the relationship between housing markets and the urban economy is crucial to create a better economic system.

Several researchers believe that property tax should stay in local governments (Connolly and Bell, 2009). To empower local governments, it is essential to avoid imposing hard budget constraints from the central government in order to ensure adequate resource handling to provide public services, which the local governments must provide. Hence, there is a strong linkage between revenue and expenditure, verifying transparency, and taxpayers forcing governments to provide public services commensurate with tax payments. Thus, according to the main guidelines of fiscal federalism, local services, by and large, should be paid for by the beneficiaries, who are the residents (Connolly and Bell, 2010).

The two approaches of calculating property tax according to the area and the property's value are subject to structural distortions stemming from evaluating the property. These distortions exist in almost all countries and create inequality and inefficiency in the tax burden. To reduce distortions that have been created due to methods for evaluating the property some countries create “adjustments” to balance inequality and improve efficiency. These criteria are of great social and economic importance.

There is enormous research analysing property tax computation according to the area and its value from various aspects. There is no uniformity among researchers regarding the question of which method is the best.

Finally, this study focuses on analysing and understanding the municipal tax system in Israel, based on the measurement of the property's area and the effect of municipal taxes on residential prices over two decades.

Due to the importance of the municipal tax, it does not detract from the central government's agenda at the broader national level, and on the other hand, the local authorities at the local level. This study aims to understand the relationship between the central government and the local government in the context of the property tax system.

This work is unique in Israel because it helps understand the municipal property tax system relevant to many residents’ lives. The tax system in Israel expanded between 1997-2017. The comparison of tax systems in other countries with a similar or different approach to the Israeli one may stimulate general thinking about the municipal tax and its effect on every resident through their property. The importance of this dissertation stems from the need to propose and recommend changes in Israel's property tax system.

3. Research objectives and hypothesis

Based on the presented research problem and the literature synthesis, **the main aim of the dissertation is to evaluate the influence of property tax on housing prices in Israel in the years 1997-2017**.

Further research tasks are formulated to achieve the main aim:

1) explanation of the principles of the functioning of housing markets and factors determining housing prices,
2) examination of the differences in the construction of two types of the property tax, i.e. based on the property value and based on the area, using a comparative analysis,
3) examination of the four methods used in the property tax based on the area in four cities in Israel, together with a numerical analysis of tax income and housing prices,
4) analysis of the relationship between property tax income and housing prices. The examination uses a case study of four cities in Israel, a comparative analysis for selected countries using different property tax types, and quantitative methods such as ANOVA, Pearson correlation, regression models as well as cointegration analyses for housing prices and income.

These tasks and the main aim have led to the formulation of the main hypothesis:

[H1]. ***Although property tax in Israel is based on the area, it is strongly related to housing prices.***

Moreover, an additional hypothesis was formulated:

[H2]. ***Despite the four methods of calculating floor space in Israel between 1997 and 2017, the property tax rate in cities with a lower socioeconomic status was higher than in cities with a higher socioeconomic status.***

It is essential to note that the property tax based on area, lacks a correlation between the tax burden and the ability to pay. For example, two taxpayers who own the same area and use it for the same purposes, will pay the same amount of tax, despite the differences in their wealth or income. Regressive property taxation is not at all unique for Israel. It prevails in many other places around the world based on the value of the property as well.

Most countries are dealing with the issue of rising housing prices, which affects, among others, both direct taxation (e.g. sales tax, appreciation tax) and indirect taxation

(e.g. property tax, VAT), since property taxes are levied on assets. It is essential to research the connection between property tax and housing prices; These two variables became a dominant economic activity in Israel between 1997 and 2017.

The municipal tax in Israel, called the Arnona tax, is imposed on the holder of property according to the local authority at the beginning of the year following the central government's directives and published in the local council decree. Each authority is public (Darin, 1999). It is essential to stress that only the residential property tax is examined in this dissertation, without taking into consideration the property tax on commercial (business) property. The main formula for the property tax revenue is:

Property Tax Revenue = Tax rate (per square meter) * Floor space (of property).

4. Research methods

4.1. Hypothetico-deductive method

The research method is a set of actions taken when addressing and solving issues, justifying and systematising answers, as well as a set of assumptions adopted as the framework or guidelines for the study, as has been done in this study when the relationship between property tax and housing prices is examined. It also encompasses all the activities and means used for achieving the results of the study efficiently (Kamiński, 1992, p. 202). In turn, the scientific technique concerns the selection and use of broadly understood means (Hajduk, 2001, p. 199).

In this dissertation, the hypothetico-deductive method has been used. This method was popularised by the Austrian philosopher Karl Raimund Popper. It consists of making hypotheses, making deductive conclusions about the results of the designed experiments, and then confronting them with the actual results of experiments (Grobler, 2008, pp. 63-64).

The hypothetico-deductive method involves the following seven steps: observation, preliminary data gathering, theory formulation, hypothesising, data collection, data analysis, and the interpretation of the results (Sekaran, Bougie, 2020, p. 20).

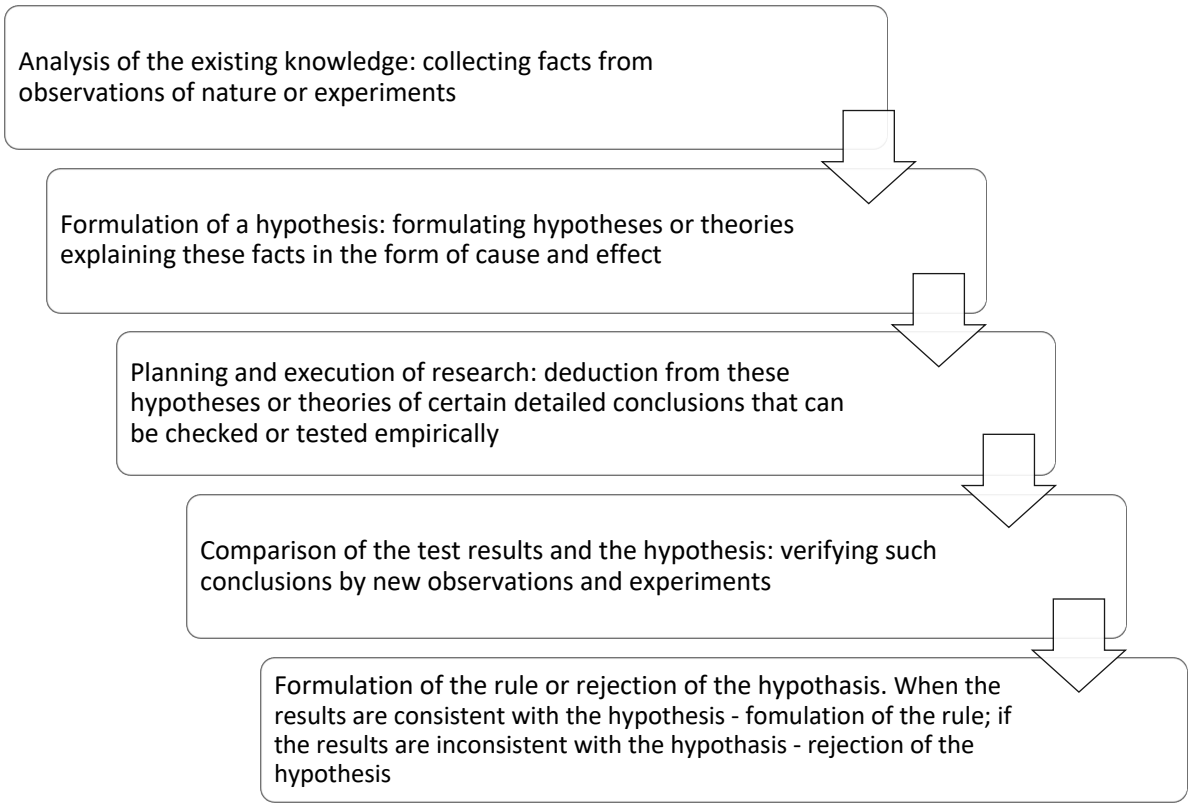
As regards this work, in the first stage, i.e. observation, a research problem has been defined and research questions have been developed. In the next stage, preliminary information gathering, a critical review of literature has been conducted and litigation

regarding property taxes has been reviewed. In the third step called theory formulation, variables have been examined to ascertain their contribution explaining why the issues occur and how they can be resolved.

In the next step, the scientific hypothesis has been formulated. It meets two criteria: testable and falsifiable. There is a possibility to refute the hypothesis. According to Karl Popper, this is important because it is impossible to confirm a hypothesis; there is always a possibility that future research will present that it is false. Hence, failing to falsify a hypothesis does not prove the hypothesis: it remains provisional until it has been disproved.

These data serve as the basis for data analysis. The data gathered have been statistically analysed to see if the above-presented hypotheses have been supported. In the last stage, i.e. the interpretation of data, a decision is made concerning whether the hypotheses have been supported or not by explaining the meaning of the results of data analysis. Based on these deductions, policy recommendations have been formulated.

Research plan using the hypothetical deductive method



4.2. Deductive research in the hypothetico-deductive method

In the hypothetico-deductive method, deductive research has been used for examining a theory concerning the influence of property tax on housing prices in Israel between 1997 and 2017. Deduction means any argumentation based on the logical way of thinking, which arises from logical reasoning to its succession (Krajewski, 1998, p. 74). It is reliable reasoning, i.e. when the premises are true, the conclusion is necessarily proper as well.

At the beginning of composing this dissertation, a broad review of literature was conducted in order to deal with the understanding of the housing market and its uniqueness, focusing on factors that affect housing and models of demand and supply, characterising it as a dual product for residential services and a taxable asset.

After all, property tax is levied on property, which narrows down a broad and in-depth review of the theory and practice in the field of property tax, which this study focuses on. First, if focuses on a review of the two general assessment standard methods, i.e. the area-based and value-based methods in several countries such as Poland, Japan, Ireland and Latvia, and a more specific description of Israel's property tax system by analysing four major cities in Israel as a case study. Finally, this work presents an empirical analysis of the collected data. This leads to specific hypotheses which may be tested when specific observations have been made to test the hypotheses. Analysis of these specific observations ultimately confirms or refutes the original theory.

4.3. Sampling

The sample in this dissertation includes four central cities in Israel such as: Tel Aviv, Jerusalem, Haifa and Beersheba. These cities have been selected according to certain criteria, such as the population size, geographical area and socioeconomic criteria which are described in detail in this work.

These cities constitute case studies to learn about the general trend of the influence of property tax on housing prices in other Israeli cities. The selection of the objects for research is as essential as choosing research types, methods, techniques and analytical perspectives in qualitative research.

4.4. Critical literature review

The critical literature review method relates to the achievements, ideas, issues, knowledge, historical development or current status (Cisek, 2010). The purpose of the analysis method is to capture and characterise the existing achievements, discussion directions and methodology development (Cisek, 2010). The core of the analysis method is a reference to professional and scientific literature available (Jesson and Lacey, 2006, p. 140). In addition, the review of subject literature should be effective (Levy, Yair; Ellis, Timothy J., 2006).

In this work, the review of subject literature has been done extensively following each chapter to support and advance the research. In Chapter 1, the literature review provides a stable and comprehensive basis for understanding the topic of real estate in a broad sense. In Chapter 2, a more comprehensive and focused literature review was conducted on property tax issues while reviewing four countries. Chapter 3 includes a literature review that justifies the proposed study through the methodology that has been chosen. The review of subject literature in Chapter 4 also encompasses studies conducted by researchers from Israel, since this chapter focuses on property tax in Israel.

The analysis was based on the collections of articles and monographs contained in JSTOR, Science-Direct (Elsevier), Taylor and Francis and Wiley databases.

4.5. Case study

Case study research concentrates on collecting data or information about a specific topic, an event or activity such as a specific person, department, business unit or organization. As regards the study, the case is an individual, a group, an organization, an event or a situation the researcher is interested in. The concept behind a case study is to achieve a clear picture of a problem, and one must explore the real-life situation from various angles and perspectives using multiple data collection methods. Along these lines, one may define a case study as a research strategy that involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple methods of data collection (Yin, 2009). It should be indicated that case studies may provide both qualitative and quantitative data for analysis and interpretation. As in experimental research, hypotheses can be developed in the case of studies as well. However, if a particular hypothesis has not

been substantiated in even a single case study, no approval can be established for the alternate hypothesis developed.

This work presents four central cities in Israel such as: Tel Aviv, Jerusalem, Haifa and Beersheba. For the purpose of case studies, data was collected manually, direct from the Central Bureau of Statistics in Israel (CBS). It should be noted that part of this data has not been published yet. Empirical analysis has been conducted for two decades between 1997 and 2017. During these years, there were several significant changes in Israel's financial activity, particularly in housing prices and the property tax system.

4.6. Research techniques, including data collection techniques and data analysis technique

Four cities in Israel will be analysed for the years 1997-2017. The following variables will be gathered: the average cost per square meter for residential property; the average cost per square meter for commercial + residential property; average new housing prices in ownership (NIS thousand); the average number of transactions of new housing in ownership; the Bank of Israel's interest rate; consumer price index; residential property tax (thousand per square meter); residential revenue of property tax (NIS thousand); total property tax (commercial and residential property, area – thousand per meter); total revenue of property tax (commercial and residential property) (NIS thousand); Housing Price Index; socioeconomic group; population (thousands).

The years 1997–2017 were selected for data collection. The year 1997 was chosen due to a significant change. Data was gathered from 1997 to 2017 for several reasons. During these years, the housing market in Israel went through an enormous change, with demand for houses rapidly increasing, and hence, prices almost doubled in 10 years (2007-2017). To manage and regulate this change, the government decided on tax activities. Therefore, this period is extremely indicative of understanding the influence of property tax policy housing prices in Israel**.** In 1997, for the first time, municipal taxes began to be collected from government-owned buildings, although a reduced tax was imposed. In 1997, the government decided to set local authorities' tax rates every year. Furthermore, the local authorities could not exceed those rates. In particular, examining the influence of property tax on housing prices would be beneficial for over 20 years. This period was significant in the development

of the residential market in Israel. In 1997, the government began to reduce the balances and financial aid grants to the authorities, which created an incentive for the authorities to seek creative ways to increase revenues, including adding various classifications of assets to expand the municipal tax base and thus increase property tax collection and the revenues available to the authority.

Data on housing prices and property tax revenue has been gathered from three primary sources**:**

- the Central Bureau of Statistics of Israel (CBS),
- the Minister of Treasury,
- The Bank of Israel.

Data has been gathered on two main types of variables:

1) independent variables,
    a) the average revenue of the residential property tax (thousand NIS),
2) dependent variables,
    a) the average prices of new housing in ownership,
    b) the number of new housings sold in ownership (transactions).

4.7. Data analysis

First, descriptive statistics for the independent and dependent variables are presented. In order to test correlations between property tax and housing price indicators, Pearson correlations have been obtained. Also, linear regressions have been calculated to estimate the contributions of every indicator of changes in housing prices. Appropriate figures illustrate the correlation between the variables**.** A detailed data analysis section has been provided in the methodology chapter. The data have been analysed using Excel and SPSS.

5. Structure of the dissertation

The dissertation has been divided into the introduction, four main chapters and conclusions. Each chapter carries out the following research task (see point 3).

The first chapter of the thesis discusses the demand and supply factors determining housing prices in local property markets. Furthermore, the three key values in housing studies

such as need, choice and responsibility are discussed. On this basis, the hypothesis of tax neutrality concerning the property tax is derived. In the field of housing, the issue concerns residence neutrality interpreted as the necessity to preserve a relation, aiming at unity in the long term, between the costs of renting and the costs of acquiring ownership of a dwelling of a similar housing standard. In the further part of the paper, the significance of housing policy in shaping the results of local housing markets in the aspect of the price, quantity and quality of the housing stock is emphasised. The whole discussion in the first chapter closes with an explanation of the economic models of the functioning of housing markets formulated by DiPasquale and Wheaton and Miles.

The second chapter of the thesis analyses and evaluates the state of research on property tax. The discussion covers both the definition of property tax, the classification of property tax systems and the criteria for assessing property tax. In the theoretical layer, six models for the evaluation of tax systems are analysed. The following section discusses the differences in tax systems in two groups of countries, i.e. Ireland and Japan, which have a value-based property tax system, and Poland and Latvia, which have an area-based property tax system. The analyses are summarised by assessing the tax systems in selected countries according to the criteria of administrative difficulty, fairness and tax efficiency.

The third chapter, which is empirical in nature, focuses on the analysis and evaluation of the functioning of local real estate and property tax markets in Israel. Four different methods of measuring area in the property tax in Israel are explained. Furthermore, an analysis is made of the differences between the residential and the commercial property taxes. The main part of the chapter is the analysis and evaluation of the characteristics of four selected cities in Israel: Tel Aviv, Jerusalem, Haifa and Beersheba between the years 1997 and 2017. This chapter includes 26 figures depicting six variables in each city, besides four more figures for comparing the variables between the four selected cities. In this part of the study, the size of the tax burden is compared with the socio-economic development of individual cities.

The fourth chapter of the thesis analyses and evaluates the relationship between the property tax (in particular tax revenues, but also the tax rate) and housing prices in selected Israeli cities between 1997 and 2017. This part of the thesis uses the tools of descriptive statistics, Pearson correlation, ANOVA analysis of variance, linear regressions and cointegration analysis.

Chapter 1.
Understanding housing markets

1.2. Nature of the housing market

The housing market is one of the issues that are of great interest to many countries. This issue hardly ever moves off the government's agenda due to its importance for the existence of society and because it is one of the growth engines of the economy. As is not the case with other financial markets, understanding the housing market and its principles is a complex challenge, characterised by extreme heterogeneity.

This complexity stems from the fact that housing comprises rents as a substitute product and their macroeconomic variables, which are usually not controlled by real estate market participants, such as supply and demand data, construction costs and fiscal and monetary policy.

The housing market is a dynamic and evolving area because it raises complex issues that accompany its development, such as public housing, the phenomenon of homelessness, and dealing with global crises. It is also essential to explore whether the state should intervene in the housing market; if so, then when and in what way? The answer to this question is complicated because of the wide variety of ways to deal with housing problems from one country to another, regarding short-term and long-term solutions at the state and general level of concern. Apart from the fact that housing constitutes a person's privacy, it is a measure of their social status and wealth accumulated during their entire life.

House price dynamics have usually been modelled in terms of changes in housing demand and supply. The real estate demand is the function of rent rate and variables reflecting the economic activity. Several studies have been conducted exploring changes in the demand for houses (Annett, 2005; Ayuso et al., 2003; Girouard et al., 2006; Sutton, 2002; Terrones and Otrok, 2004).

These studies are generally different in many aspects but do have two common patterns. First, essential elasticity is higher for smaller countries (such as Denmark, Finland, the Netherlands and Norway) and catching-up economies (e.g. Ireland and Spain) than in the samples that include large industrial countries (e.g. the USA, the UK).

Second, in addition to real income and real interest rates, such factors as credit growth, demography, and the supply-side also play a role in determining house prices. Research in this field has revealed several macroeconomic factors that affect the housing market worldwide.

The first factor is the interest rates. Since most people need a mortgage to purchase a house, there is a link between the real interest rate on housing loans and house prices (Sutton 2002). For example, some scholars argue that when the structural changes in Spain's economy happened because of Spain's accession into the Eurozone, the real interest rate on housing loans fell, which was reflected in an increase in house prices (Ayuso, Perez and Saurina, 2004). On the other hand, a decrease in real interest rates for housing loans was noticed when countries were about to join the European Monetary Union, which was further reflected in house prices (Égert and Mihaljek, 2007).

A theory that explains the effect of interest rates on house prices is the user cost theory. The user cost theory provides an outlay that must be incurred to gain access to housing services via home ownership rather than the private market (Browne, Conefrey and Kennedy 2013, p. 6). Moreover, the calculated user cost of capital compared with the annual market cost of rent of an exactly equivalent bundle of services comes with housing (Browne, Conefrey and Kennedy, 2013, p. 6; Capozza et al., 2002).

Over time, house prices have become more sensitive to interest rate changes due to financial liberalisation in European countries, including the United Kingdom (Lacoviello and Minetti, 2003). Previous studies showed that house prices' sensitivity to long-term interest rates intensified when rates were relatively low in the recent past (Himmelberg et al., 2005).

Hence, financial variables such as the interest rate, money and credit supply are related to house price developments (Kasparova and White, 2001), also because there may be credit rationing (Tsatsaronis and Zhu, 2004; Lecat and Mesonnier, 2005).

Differences in real estate price dynamics across countries can also be traced back to differences in the regulatory setting and mortgage market features (Adams and Füss, 2010).

As regards non-economic domestic indicators, Jud and Winkler (2002) conclude, for example, that the growth of the population strongly influences real housing appreciation.

Another factor is the Gross Domestic Product (GDP). The relationship between the gross domestic product and house price dynamics exists and has been reflected through household disposable income (Ayuso, Perez and Saurina 2004). Égert and Mihaljek (2007) also established a strong relationship between the gross domestic product and house prices in Eastern and Central European countries.

One of the essential notions in economics argues that an average propensity to consume increases with income (McCarthy and Peach, 2004). Meaning that if individuals' incomes increase, more people will increase their consumption of houses. The increased income leads to higher demand and higher prices. Hence, income as a demand variable has been measured by the Gross Domestic Product per capita. On the other hand, according to the neoclassical theory of housing demand, the decision to buy a house occurs in parallel with consuming other goods. This theory suggests that consumers optimise their utility, considering the income and price constraints they face.

Additionally, demography and labour market factors are important. These factors influence the housing market through the unemployment rate, the share of the working-age population in the total population and the share of the labour force in the total population (Égert and Mihaljek, 2007). Girouard et al. (2006) argue that demography developments can also raise housing demand, thereby increasing house price levels through their effect on real disposable income. Additionally, they may cause a decline in the average size of a family.

The relationship between employment and house prices has been present in the literature through the life cycle theory, which focuses on how the evolution of employment induces the demand for housing through such aspects as household formation, relocation of workers and demand for higher-quality housing (De La Paz, 2003).

In this vein, Cerny, Miles and Schmidt (2015) explored the role of housing in a model of life cycle choices for UK households that face various forms of uncertainty. The results showed links between the property market, demographic change and pension reform. These results emphasise the need to include a demography change in the economic model for predicting housing prices.

Finally, there are construction costs. The supply side is reflected in house prices through construction costs, which influences house prices through land prices, real wages of construction workers and material costs. In this regard, Égert and Mihaljek (2007) examined the relationship between real wages as a proxy for housing quality and house prices to argue that real wages influence real estate prices through housing quality improvements.

Considering the supply side, an increase in construction costs for builders usually decreases the housing supply, leading to higher housing prices. Therefore, the effects of construction costs on housing prices are expected to be positive.

For housing supply, it has been presumed that although an imbalance may exist in the short run, demand equals supply in the long run. If there is overbuilding in one period, the oversupply will cause house prices to decrease (Glaeser and Gyourko, 2018).

Widely of the existing literature, construction cost inputs fail to behave in a manner consequential with theory. Housing starts (output) should fall with increases in constructing units (input costs). More often than not, empirical research yields the opposite result.

Previous studies showed that higher construction costs might reduce residential construction. Their elasticity is relatively high and very similar to the price elasticity of the starts. Hence, the significant differences in price elasticity estimates for housing starts between the reduced form and starts equations may result from an interaction between problems in the cost data and specification choice (Hufner and Lundsgaard, 2007).

A capital distribution approach for the housing market works by extending home possession, which maximises housing access as capital. In contrast, service distribution entails state intervention within the rental housing market, where the aim is to underpin complete access to adequate accommodation for tenants, notably those on low income (Aalbers, 2015).

In policy analysis, the standard focus concerning housing is on the rental market, and the reduced role of the market in rental accommodation is achieved either through social housing (where the state or agencies operating on its behalf perform the owner's role) or through rent support for personal tenants (e.g. within a kind of income-related housing allowance) (Duranton, Henderson and Strange, 2015).

To summarise, the current section introduces the primary considerations and factors that influence the housing market. While demand in this market is usually high due to the natural

growth of population and businesses, supply cannot always catch up with this growth. Additionally, both demand and supply have been influenced by macro-economic variables. As seen in this section, the factors that mainly influence housing prices are interest rates, the demography and labour markets, as well as construction costs.

1.2. Needs, choice and responsibility as fundamental values of housing

When evaluating the housing market, it is essential to understand the concepts of need, choice and responsibility because the housing market is one of the most important markets which has massive effects on society. The concepts of needs and choice could justify state intervention in housing, while personal responsibility could bolster the markets (King, 2009, p. 16). Contemporary literature studies on housing needs are scarce and address the fundamental concept to a relatively small degree.

Critical studies relating to housing needs originated in the 20th century. According to Krzekotowski (1939), housing occupies a leading position in the hierarchy of human needs as one of the essential items of individual consumption, and at the same time, it is a social need. The formation of housing needs may have to be assessed as a social process from the perspective of a macro-social and macro-economic scale. Analysing the influence of such factors as demography changes, socioeconomic development, technological progress and deprivation of residential buildings makes it possible to make balance sheets for the whole country, regions, cities, towns or villages, which statistically show the number of dwellings needed and their average, socially justified standards (Brown and King, 2005). The same factors may also assess the formation of housing needs, yet from the perspective of an individual, household or family, stressing the individualisation of needs, the diversity that characterises them and the volatility of the needs over time. They constitute the quality side of housing needs.

These criteria set out various requirements regarding, e.g. housing standards, forms, types of buildings, size of dwellings and their layout. They enable determining the quality structure of a statistical balance sheet of housing needs. In economic terms, individual housing needs are identical to individual preferences determining the structure of the demand for housing (Czeczerda, 1974, p. 121).

Robinson (1979) provides a geographical definition of a need. Corresponding to Robinson's definition, the state must identify a defined population (the state or a particular district within it). The population size determines the scope of a need for assistance (calculated by a formula which accounts for all households unable to pay for housing through the private market) and the standard of housing determined by the state (what is included in the need for each housing unit).

Bradshaw (1972) distinguishes between four types of needs, distinguishing between different households according to a social criterion that identifies the existing shortage as a social problem. The first category is the normative need. The government defines the need according to a specific situation. In other words, this definition of a need makes it possible to differentiate between different populations according to the norms that exist in a specific society. A normative need is a relative need, which can vary from one period to another and from one place to another. The second category is an emotional need. This need is subjective for every person and refers to the single definition of a need. This definition can cause confusion between a person's real needs and desires. The third category is a specific need. It is similar to the emotional need because the person is working to realise this need.

The need has been learned from the consumer behaviour of individuals in a society. A difficulty may arise when distinguishing between a real need and consumers' desire, but it is possible to learn what consumers are consistently prepared to invest in. According to data, the state can allocate limited choices that meet the specific needs of consumers. Bradshaw's last category focuses on a comparative need. Those needs have been used for comparing various segments of the population who can afford housing on the private market to the weaker individuals in a society. By viewing the private market, the state can understand what the citizens of varying means are willing to invest in as regards the housing market. Following these results, it is possible to fulfil the needs that are not naturally filled by the free market to help the weak consumers by defining the need and implementing government activity accordingly.

As discussed by Brown and King (2005), choice describes a rational model as expressing the right to choose on the housing market. The ability to choose increases according to personal beliefs, wishes and the amount of information available to the decision-maker. This definition restricts the person's ability to make the best decision for them, and therefore the

term “right of true choice” has evolved to describe a situation in which a person has to choose the preferred option among several distinct options. Thus, the housing market's choice is a choice between a small number of real options available to the household according to the needs, preferences, resources and limitations of the private household combined with the housing market (King, 2015).

Two regimes of responsibility should be examined concerning the housing market. In the first regime, the decision-maker is held responsible for the outcome, and in the second regime, the best strategy is damage prevention. In the first regime, responsibility has been attributed to the person who created the damage. The connection has made a causal link between the decision-maker and the result. Thus, the responsibility is linked to choosing (if the government makes a choice, the responsibility lies at its feet). The division of responsibility obliges the agent to perform future tasks and obligations in the face of past actions. The second regime of responsibility proposes separating causality from the future task. Goodin (1998) suggests an approach that examines who can restore the situation most effectively. According to Goodin, it may be that the culprit of the situation in the first place is someone who can restore the situation to its previous state in the most efficient manner. However, this may be unnecessary because sometimes, government officials can alleviate the suffering and improve the situation while wasting fewer resources (King, 2015).

To summarise, the current section introduces the primary needs and values of individuals as regards purchasing houses. It seems that housing is not merely a house, but rather it addresses deep social and psychological needs, and hence influencing these needs could also affect housing pricing.

This section showed that the more options consumers have for housing, the higher the possibility of preferring specific housing at the expense of other housing. Understanding these issues is crucial when predicting housing demand and, accordingly, prices.

1.3. Taxation of the production of housing services

Taxing the production of housing services has long been explored to create an appropriate channel by which taxation could benefit the greater good. In this vein, government intervention in the housing market could greatly influence patterns manifested in this market.

Due to the enormous influence of changes in the housing market, balancing prices through taxation systems by the government is sometimes essential (Ivashina and Scharfstein, 2010; Stroebel and Vavra, 2014).

Furthermore, there is a widespread belief that home ownership has significant personal and societal benefits: home ownership is associated with life satisfaction (Rossi and Weber, 1996), and there are perceived positive externalities arising from home owners' incentives to take care of their property and neighbourhoods (Rohe and Stewart, 1996).

According to these beliefs, government intervention in the housing market is broad and focuses on increasing home ownership rates by reducing the relative cost of owner-occupied housing.

Previous studies explored the implications of government intervention in the housing market. Chambers, Garriga and Schlagenhauf (2006) studied the effect of home owners and landlords' asymmetric tax treatment in a general quantitative equilibrium overlapping a generational model with housing and rental markets.

The welfare consequences of removing the asymmetry of the existing tax code depend critically on whether the reform is revenue-neutral. A revenue-neutral reform implies modest welfare gains, while a reform that is not revenue neutral leads to significant welfare losses.

In another study, Gervais (2002) examined the preferential tax treatment of housing capital in a dynamic life-cycle economy where a rental firm provides housing rental services. In his model, the tax system introduces a wedge that makes owning preferable to renting. He finds that mortgage interest deductions and the taxation of imputed rents have only minimal distributional effects.

In their study, Jeske, Krueger and Mitman (2013) build a general equilibrium model with competitive housing and mortgage markets where the government provides banks with insurance against aggregate shocks through its implicit guarantees for GSEs. The guarantee implies a mortgage interest subsidy to home owners, which leads to higher housing stock and increased default rates as mortgage holders increase their leverage. The subsidy mostly benefits high income and high wealth households, and its elimination would lead to an aggregate welfare gain.

Another study examined government intervention in housing conducted by Kiyotaki, Michaelides and Nikolov (2009). The authors studied the distributional consequences of aggregate shocks through their effect on house prices.

They constructed a general equilibrium life-cycle model of a production economy where capital and land have been used to build residential and commercial real estate. When the share of land in real estate is significant, an exogenous shock to expected productivity or the world interest rate leads to large swings in house prices and a significant redistribution between buyers and sellers of houses.

When examining the taxation system that influences production on the housing market, it is essential to understand various taxes on housing prices. Several studies have shown correlations between the socioeconomic factors and housing (e.g. Beltratti and Morana, 2010; Semeraro and Fregonara, 2013).

These studies show that household income is among the parameters that most affect housing prices (Glaeser, 2008; Taltavull de La Paz, 2003; Potepan, 1996). For example, Gibler et al. (2014) emphasized, as regards the Finnish housing market, the predominance of income between the factors that have a positive influence on the decision to move house. In another study, Kryvobokov (2007) showed the importance of income in both market segments in Ukrainian cities.

Some studies have evaluated the influence on pricing determined by sociological components such as the percentage of immigrants in the neighbourhood and a large number of related crimes or the weight of psychological factors, for instance, the presence of neighbouring homes that have recently been renovated (Bowes and Ihlanfeldt, 2001).

Glaeser et al. (2008) have analysed the increase of housing prices related to higher housing quality and construction costs in the last decades, determined by economic parameters such as an increase in income and by behavioural evolution, for instance, improvements in the ability of home owners to influence local decisions, reduction in the ability to bribe regulations, more sophisticated tastes in terms of amenities).

Moreover, several authors have emphasized the role of housing rents on the variations in property values, while high rents lead to an increased demand for housing in both uses and investment, resulting in an increase in prices (Mikhed and Zemčík, 2009; Manganelli, Morano and Tajani, 2014).

Numerous studies have analysed the influence of property taxes on property values (e.g. Edelstein, 1974). For example, Church (1974) used a model of tax capitalisation implemented on a sample of residential properties to show that the modification of property tax rates may significantly influence single-family residential property values.

Song and Zenou (2006) designed an econometric function for 448 urbanised areas, considering socioeconomic variables such as the property tax rate, the population, income, the agricultural rent and transportation expenditure and showed that promoting property taxes results in smaller cities and the reduction of population density. Hefferan and Boyd (2010) have emphasised the need to consider property taxation to define adequate valuation models of appraisal that may reflect the evolution of the economic system and meet recent changes.

Previous studies criticised the empirical generalisation of the principle, according to which higher taxation generates reductive effects on property values, demonstrating the need to specify the assumptions of the implemented models and differentiate the influence of various territorial contexts (King, 1977). Higher taxation should determine more public investments in a local territory from a theoretical aspect, resulting in a higher appreciation of potential buyers' local properties. Another study conducted in Massachusetts has shown that communities that increased their property taxes more rapidly have been characterised by increases in their housing values in the period following the new regulations.

1.4. Neutrality hypotheses in taxing tenants and landlords

The most crucial objective of the tax system is to raise the revenue needed to pay for government spending. Hence, the main objective is to increase revenue without distorting the decisions that individuals and firms would otherwise make for purely economic reasons. Moreover, an imbalanced tax system leads people to apply a more socially extravagant effort to transforming the substance of their activities to decrease their tax payments (Haffner, 2003). One inevitable result of this agreement is that the market consumption of goods and services will be taxed, either directly (as in a consumption tax) or indirectly (as in an income or wage tax, where the money is used to purchase consumption goods).

At a conceptual stage, the tax system departs from the neutral aspect. In other cases, deviations from a neutral tax system express the aims of policy-makers. The tax system encourages home ownership, contributions to charity, health insurance and higher education and discourages smoking and drinking alcohol.

This notion generates several applications. First, taxation systems tend to "broaden the base and lower the rates". This involves two objectives: (1) broadening the base leads to more neutrality between different activities by including more types of income and allowing fewer deductions and credits for particular activities; and (2) reducing tax rates makes the tax code more neutral regarding the choice between working and not working. Second, the government could use the tax code to encourage the desired behaviour like home ownership or college education. It is worth investigating whether the specific goal could be accomplished through a spending program or the tax code. In many cases, a spending program can be more effectively targeted and delivered to serve the goal in question. However, in some cases, subsidising these activities through the tax code may be more efficient. On the other hand, executing social planning through the tax code increases the Internal Revenue Service burden and can increase the complication of tax returns. Nevertheless, if these tax expenditures are converted to spending programs, that complexity would be shifted to another government agency (Alm, 2012).

Logically, to facilitate the economy, any new tax expenditures with behavioural motivation should be implemented as credits rather than deductions. However, gains will come only from reforming the existing system of tax expenditures. These reforms could be designed in a manner that also serves other goals, like reducing the nation's sizeable fiscal gap or offsetting some of the increase in inequality in recent decades. Following the previous principle, taxation could have used to discourage undesired activity (Kornhauser, 2006).

Several studies examined the relative costs of owner-occupied and rental housing and their influence on the choice of tenure (e.g. Dieleman, 2017). Taxes play an essential role in that comparison as they constitute a much easier way to measure differences than management and maintenance costs. The subject literature generally concludes that personal income tax advantages can substantially favour home ownership (Sommer and Sullivan, 2018), indicating that the tax system is not neutral concerning the choice of tenure.

Indeed, differences in user costs relate to differences in tax treatment and differences in production costs. There are some difficulties with the meaning of neutrality. Tenure neutrality has generally been interpreted as equal costs for rental and owner-occupied housing, presumably of the same quality (e.g. Sun, X and Tsang, 2017). In this vein, Haffner (2003) states the possible meanings of tenure neutrality, ranging from equal cash outlays by renters and landlords to equal public spending for either mode. Such requirements attempt to make all players equally strong, level the playing field and let the best one win more efficiently.

Instead, a tenure-neutral tax and subsidies system could be defined as preserving their costs – whichever tenure is cheaper before taxation is still cheaper after taxation. More substantial neutrality might be warranted under certain conditions: a tax system is firmly neutral if it preserves the absolute distinction in user costs. It is important to note that tenure choice cannot be reduced to a comparison of user costs (Lijing et al., 2018); instead, it is a component of that choice that public authorities can influence, mainly through taxation. Hence, user costs mainly depend on particular circumstances such as the terms at which they can borrow funds, types of housing occupied, length of the residence holding period and the local housing performance market.

When tenure neutrality is carefully defined, it shows that it is not equivalent to tenure equity. Therefore, the tax system is equitable concerning tenures if it collects more from households in cheaper tenure. An equitable tax system can affect tenure choice and not be neutral by decreasing the utility of cheaper tenure. On the other hand, an inequitable tax might be tenure-neutral by favouring that tenure which is already further advantageous. Therefore, taxes levied on the production of rental housing services— taxes paid by landlords—are not born by home owners (Chambers et al., 2009).

In principle, the effects of taxation on property prices could be captured using prices and rents observed on the markets to calculate user costs or available income. Elsinga (1996), for instance, carefully compared particular rental and owner-occupied units of the Dutch Randstad, selected to be of equivalent quality. She interviewed households about the purchase price, which allowed her to set up a price index, as the owners had bought their houses at different times.

The change in that index is a central component in her annual user cost of owner-occupied housing, so much so that it dominates the comparison of user costs. During the early-1980s,

when house prices were stable, the user cost of owner-occupied housing was more than that of rental housing. A substantial rise in house prices during the second half of the 1980s exactly reverses the comparison.

A mortgage interest rate also plays an essential role in the comparison, as it seems to influence only the user cost of owner-occupied housing. Indeed, a surprising result of Elsinga's research is that rents do not show changes in interest rates and property prices. They grow perfectly monotonously in the Netherlands. Thus, she presents that home owners are exposed to considerable risks, risks that landlords seem to absorb when they set rents. As a result, home ownership, just like regular stocks, is an asset that can only be recommended to investors that calculate their returns over a very long period or who do not care about the exact costs. This study illustrates the volatility of empirical user costs. It may be more advantageous to own one's home in a specific year when real estate prices increase and interest rates are low, and less advantageous the next year, when prices decline and interest rates rise. To obtain a general result on the relative costs of owner-occupied housing, one could compute the user costs over several years. Still, the date of purchase – peak or trough – would remain important, as well as the date at which a fixed-rate mortgage (the vast majority of mortgage loans in the Netherlands) was taken. Generally, annual changes in real estate prices and interest rates may diminish all other differences between renting and owning, notably tax differences.

1.5. Housing policy aims and instruments

The government has a fundamental role in regulating housing supply and demand for several reasons. First, housing is a necessary product, and hence, it is the government's task to provide housing for every resident and citizen. Second, it is the country which possesses land, and hence every use of land must have the government's authorisation. Finally, housing is an important market that profoundly influences almost every other market (directly or indirectly). It is in the government's interest to regulate this market very carefully (Schwartz, 2014).

However, in modern Western democracies, the most dominant economic approach is the neoliberal one, which does not encourage high governmental involvement, and instead

prioritises private economic factors. Neoliberalism shares some historical roots and some of the basic vocabulary with liberalism in general.

David Harvey formulated another definition in his book entitled "A Brief History of Neoliberalism". He argued that "*Neoliberalism is in the first place a theory of political, economic practices, which propose that human well-being can best be advanced by liberating individual entrepreneurial freedom and skills within an institutional framework distinguished by strong private property rights, free trade and free markets*". Hence, neoliberalism is conceptualised as a set of political beliefs which most prominently and prototypically contain the conviction that the legitimate goals of the state are to guard the individual, while the liberality of individuals is most emphasized, specifically by substantial private property rights (Rodrigues, 2018; Friedman, 2006). Neoliberalism usually conjointly includes the idea that freely adopted market mechanisms are the optimum manner of organizing all exchanges of products and services. Free markets and trade can, as it is believed, release the creative potential (Rose, 2017). Neoliberalism may conjointly embrace a perspective on an ethical virtue: a great and virtuous person is in a position to access relevant markets and perform as a competent actor in these markets. They are willing to receive the risks related to taking part in free markets and adapting to fast changes arising from such participation (Rose, 2017). Individuals are seen as being entirely liable for the implications of the alternatives and decisions they freely make (Rofè et al., 2017). Thus, neoliberalism has been one of the most influential ideologies in recent decades in the housing market. According to neoliberalism, the state decreases its involvement in the housing market and lets the private sector control the supply.

Since the 1990s, housing markets have grown in developed economies. In the United States, the United Kingdom, Denmark, Australia and Japan, today's residential mortgage markets show between 50% and 100% of the Gross Domestic Product (Fernandezand Aalbers, 2016), from the previous Soviet bloc of Central Asia and Eastern Europe (e.g. Kazakhstan and Ukraine) to Latin America (e.g. Chile, Mexico, Peru and Brazil), and from Africa (e.g. South Africa) to Asia (e.g. India, Thailand, and China).

The control of the housing markets by finance has been a massive and prevailing trend, so much that a publication of the World Bank just over a decade later stated that 'the [housing finance] genie is out of the bottle' (Buckley, Kallergis and Wainer, 2016).

Within the new economics, where housing targets at gaining wealth, the chance of making additional value depends on the speed and range of transactions capable of generating worth appreciation. Within the same means as in different social fields, housing is stricken by the wholesale disassembly of basic institutional welfare, and therefore the mobilisation of a spread of policies meant to increase market discipline, competition and commodification (Peck, Brenner and Theodore, 2017).

The reduction of housing project stock adversely affected the provision of housing for the poor. Predominantly, dwellings occupied by non-whites, migrants and people on low income became stigmatised and were frequently associated with drug dealing, violence and theft. These areas became part of a 'redlining' map, associated with the fanciful mapmaking of 'undesirable' areas shared by realtors (Aalbers, 2013).

The deterioration associated with the future demolition of public flats rendered an even more vulnerable and already deprived population, leading to long waiting lists, keeping many people in inadequate housing conditions, and adversely moving their expenditure into alternative areas such as food, insurance cover and health (Rolnik, 2009). The reduction of funding and disapproval of housing projects, also as legislation adopted to relieve rental markets, were essential in constituting demand for the new product awaiting its launch: credit for all to market home ownership, a central element of an increasingly individualised and consumption-based society (Berger, Imbierowicz and Rauch, 2016).

The earth science of 'redlining' was translated into the language of credit grading, generating what within the American mortgage market became referred to as subprime disposal (Aalbers, 2011).

In some countries, selling public housing to tenants has been seen to extend home ownership while decreasing state expenditure. The privatisation of public and social housing has taken numerous forms, including the sale of public rented housing through the right-to-buy policies to sitting tenants (in the UK), property transfers to non-profit actors (in the Netherlands and the UK), and in some cases, to profit-maximising actors (in Germany) (Wijburg and Aalbers, 2017).

Large-scale privatisation of public housing occurred in countries undergoing the transition from planned to market economies. In parallel to public housing restrictions, tenant-

protection legislation has been revised in some developed and developing countries (Aalbers, 2011).

For the last decade (since the great economic crisis in 2008), more economists have been calling governments to re-intervene in the private housing market and to regulate this market. Some of the longest established and most intrusive housing policy instruments are regulations relating to the private rented sector, usually concerning building standards and tenancy conditions, and extending to rent controls (Hufner and Lundsgaard, 2007). In other words, housing policy instruments translate into how the municipalities can perform a vital budget to support citizens' services.

1.6. DiPasquale and Wheaton's model of the real estate market

One of the most exciting challenges for economists is understanding the economic principles of the real estate market. Real estate is different from other financial markets in several essential aspects. It is characterised by extreme heterogeneity due to the locational and physical attributes of property. Participants in such a market face significant transaction costs, carrying costs, illiquidity and tax considerations. They also face substantial search costs stemming from the heterogeneity of real estate.

Investors have just a limited possibility of exploiting forecast decreases in property values because of the impossibility of a short sale of a specific asset and the absence of liquid real estate futures contracts. These high frictions suggest that the real estate market might generally not be efficient in the sense that other financial markets are. Like other markets, the housing market is also basically defined by the balance between supply and demand.

Since housing is a durable good, housing supply is determined not only by the production decisions of the builders of new units but also by the decisions made by the owners of housing concerning the conversion of the existing stock of housing. The owners may decide to rehabilitate an existing unit to increase the flow of housing services delivered by that unit or decrease maintenance of an existing unit, decreasing the flow of housing services.

Moreover, government policy can have a profound influence on the operation of the housing market. Rental assistance increases the demand for housing services. A long-run influence on the price depends on the supply response determined by the price elasticity

of the supplier. Government policy has also influenced the market's supply side directly by constructing public housing and tax policy to encourage private construction of new rental housing. These interventions raise an essential policy question concerning the extent to which these policies result in net additions to the housing stock or crowd out the private activity (Glaeser and Gyourko, 2018).

Several economists have tried to formulate the real estate market. One of the most influential models in this domain was formulated by DiPasquale and Wheaton (1992). The popularity of this model is expressed by numerous studies that use their formulation and fall into four broad categories: (1) those where the model is used as a framework for the explanation of historic real estate development; (2) those where the model is used as a source of empirically testable hypotheses, sometimes providing extensions; (3) those that provide extensions of the model, with only theoretical analyses; and (4) those that provide extensions and use the extended model in empirical applications.

In DiPasquale and Wheaton (1994), the equation used for studying housing demand and price is as follows:

$$H_t(\beta_1 R_t + \beta_2 OWN_t + \beta_3 WAGE_t + \beta_4 P_t + \beta_5 U_t) = S_t \tag{2.1}$$

where H indicates the total number of households, R is the rent index, OWN is the age-expected home ownership rate, WAGE is the permanent income per household, P is the price index of single-family housing, U is the annual user cost of home ownership, and S is the stock of single-family housing.

The variables in the parentheses are the housing demand determinants. Equation (2.1) means that, in equilibrium, the number of households who desire to own houses equals the total stock of houses, i.e. the quantity demanded equals the quantity supplied. Rearranging Equation (2.1) will deliver the following market-clearing price equation:

$$P_t^* = (\frac{1}{\beta_4})[\frac{S_t}{H_t} - \beta_1 R_t - \beta_2 OWN_t - \beta_3 WAGE_t - \beta_5 U_t] \tag{2.2}$$

where P* represents the market-clearing price.

Equation (2.2) implicitly assumes that the market price data observed in each period are in market equilibrium. It assumes that the house price adjusts swiftly to clear the market according to changes in the exogenous demand determinants and the housing stock.

However, the market-clearing assumption may be too strong to make in the real world. The market price may not always be in equilibrium. Wheaton (1999) developed a dynamic version of the DW1 in which the equilibrium house price has serially correlated even when the market clears in each period. To relax this assumption, DiPasquale and Wheaton (1994) incorporate Equation (2.2) into Equation (2.3) and obtain Equation (2.4):

$$P_t = \tau P_t^* + (1-\tau)P_{t-1} \tag{2.3}$$

$$P_t = \frac{\tau}{\beta_4}\left(\frac{S_t}{H_t} - \beta_1 R_t - \beta_2 OWN_t - \beta_3 WAGE_t - \beta_5 U_t\right) + (1-\tau)P_{t-1} \tag{2.4}$$

Equation (2.3) indicates that the price level at a particular period has been determined by both the equilibrium price and the price level in previous periods. τ measures the adjustment speed of the price towards the equilibrium and (1- τ) represents the price stickiness. If τ equals 1, the price adjusts rapidly to clear the market in each period, so P is always equal to P*. Then, Equation (2.4) is identical to Equation (2.2). If τ is between 0 and 1, the price partially adjusts to the equilibrium and is partly affected by the price level in the previous period. By estimating Equation (2.4), the DW2 finds that the term P (t-1) is significant, and the price of the US housing market is correlated.

An important strength of this model is its high pedagogical power and attractive compactness in terms of presentation. The DW model assumes that the capital rate is exogenous. Furthermore, it glosses over the distinction between the capital rate and the inverse of the gross income multiplier; it does not reveal the long-run equilibrium at a glance; it discovers a specific adjustment process, and it ignores expectations and vacancies (see figure 1).

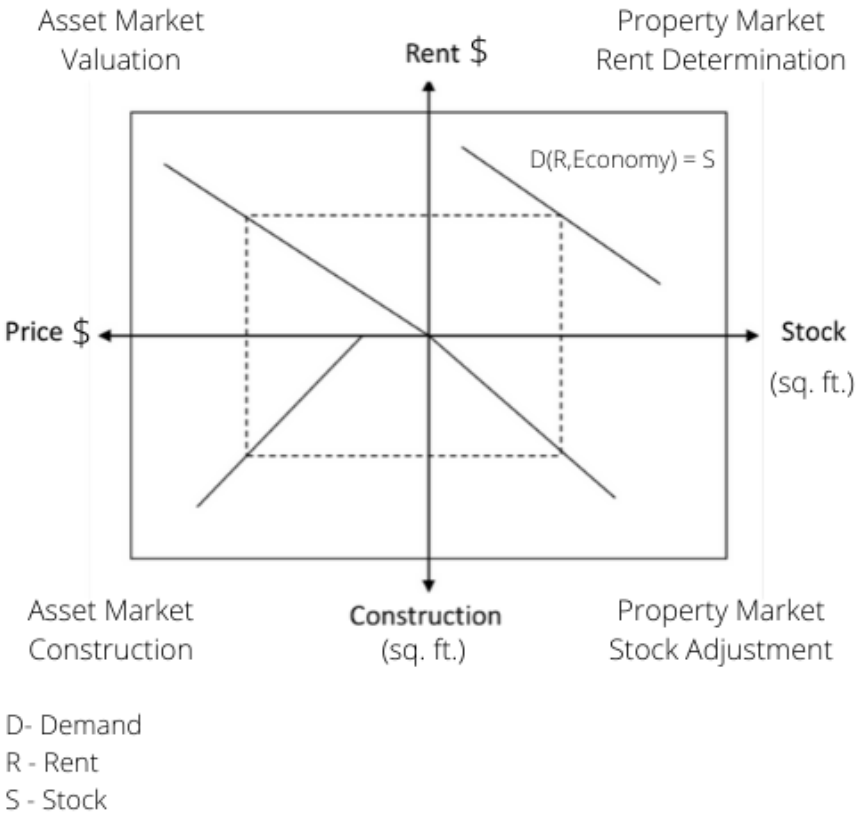


Figure 1. DiPasquale and Wheaton model

Source: Denise DiPasquale and William C. Wheaton, Urban Economics and Real Estate Market, 1996

According to the DW model, the increased property tax rate will rotate clockwise, reduce asset prices, reduce construction and raise rents. These processes are assumed to be based on the value and static model of property tax. The decreased property tax rate will rotate counter-clockwise, increase asset prices, increase construction, and finally decrease rents.

Table 1. Summary of DiPasquale and Wheaton model

Specification	Asset prices	Construction	Rents
Property tax rate increase Clockwise	Reduce	Reduce	Increase
Property tax rate decease Counter-clockwise	Increase	Increase	Decrease

Source: the author's own analysis based on the DiPasquale and Wheaton model.

In contrast to the DW model (value-based), this work shows that the property tax rate refers to the area-based method, useful in Israel. In the following parts of dissertation the author will try to find a relation between property tax and housing prices in the area-based property tax system as applied in Israel.

1.7. David Miles's model of the residential market

David Miles developed a model of changes, over time and across locations, in housing and housing costs. The aim of the model is to understand how housing wealth and the cost of housing moved in the past and how they might develop in the future. To build this model, Miles used a framework that combines features of a Ramsey two-sector growth model with a residential development model that tracks the population's change over time.

Miles found in his model that so long as improvement in travel technology proceeds at a pace that is in a fixed proportion to the growth in productive potential (the sum of labour force growth and global productivity growth), there is a balanced growth path with no change in real house prices. However, when travel improvement falls back, we are no longer on a balanced growth path, and thus real house prices and rents rise. There is very high sensitivity to the overall trajectory of average housing costs in two parameters:

1) the flexibility of substitution between land and structure in creating housing,
2) the elasticity of substitution between housing and consumption goods in utility.

Small changes in these elasticities dramatically influence the evolution of average housing costs over the following decades.

The model presents aggregate savings and production, and the levels of interest rates have simultaneously been calculated with the stock of housing, and where house values differ across the economy because the land is not homogenous. The model focused on the evolution over long horizons in the value of properties relative to income and other goods and how differences across regions vary as populations and average income change.

According to David Miles's model, the influence of the tax system makes housing more attractive due to reduced property tax rates. The introduction of more favourable tax breaks on mortgage loans could lead to favourable owner-occupation. Because housing stock has been fixed in the short-run (i.e. the housing stock is predetermined in the model), the price

must rise for the market to move on to a new unique path of convergence. Unlike the housing stock, housing prices can move as the equilibrium must be preserved in the market.

It should be highlighted that David Miles's model refers to the assumption that the method of measuring housing is value-based and not area-based, which is the focus in this work. Nevertheless, the model has provided an understanding of the interrelationships in housing markets that will be used later in the thesis.

1.8. Summary

The first chapter elaborates upon the theoretical background of the housing market and specifies the economic, cultural and social factors that could affect house prices and demand.

The housing market is a dynamic and evolving area because it raises complex issues that accompany its development, such as public housing, the phenomenon of homelessness and dealing with global crises. It is also essential to explore whether the state should intervene in the housing market.

The most common definition of real estate is the national stock of buildings, the land they are built on and all vacant land. Real estate is a durable capital good; its production and price are determined in an asset, capital and market. In this market, the demand to own real estate assets must equal their supply.

The government has a fundamental role in regulating housing supply and demand. Housing is a necessary product, and the government’s task is to provide housing for every resident and citizen.; housing is an important market that profoundly influences almost every other market (directly or indirectly). It is in the government’s interest to regulate this market very carefully.

Several economists have tried to formulate the real estate market. One of the most influential models described in this chapter was formulated by DiPasquale and Wheaton (1992). This model's popularity is expressed by numerous studies that use their formulation and, besides David Miles's model, it developed changes, over time and across locations, in housing and housing costs. The model’s aim is to understand how housing wealth and the cost of housing moved in the past and how they might develop in the future.

One of the most impressive economic environments is the housing market. Researchers have tried to explain variables for predicting housing prices. It seems that housing is a multi-

dimensional commodity that can be regarded both as a durable consumer good offering a flow of services such as shelter and an asset for investment by which rental income or capital gains are earned.

The market price of land is usually determined by the proportion of investors willing to pay a reservation price for the entire land supply. The demand for land at any given price depends on the number of investors who have a reservation price higher than or equivalent to that price and sufficient resources to pay their reservation price.

Since the late 1990s, a significant housing boom coupled with substantial money and credit growth emerged in the United States and industrialised countries. It took place in an environment of vital financial innovation, and as it turned out, poor risk management, lack of transparency, weak incentives and increasing leverage. The turn from a boom to bust and crisis started with the troubles on the US sub-prime mortgage market in early 2007. Concerning a sharp weakening of the housing segment in many countries and the global nature of the financial crisis, there were increased calls for monetary and regulatory policy-makers to consider the emerging housing price booms in their policy assessments and develop early-warning devices for their identification. These booms might (ultimately) turn into a reverse phenomenon, i.e. busts. Fundamental factors drive booms and busts, but they might be compounded by altered market expectations and even speculative actions. They may significantly boost growth and demand in booms and depress these variables in busts.

The first chapter also emphasises the importance of government intervention that could balance the market's needs and the requirement to gather tax appropriately. Moreover, in addition to the government's role, several other factors are at play, such as interest rates, gross domestic product, demography and labour market factors, as well as construction costs.

One of the types of taxes that have been imposed on assets, either residential or commercial-business, is the property tax. Unlike other real estate taxes, this tax does not depend on selling or purchasing property, but it is a fixed tax.

Chapter two continues the subject of real estate, but it deals with an in-depth theoretical review of the local tax imposed on property as it is called property tax or municipal tax. The subject of this work is researched and analysed. Real estate taxation is standard in almost every country in the world. The ownership or rights to use real estate are considered to be wealth, for which a capital gain must be paid.

Chapter 2.

Property tax in theory and housing practice

2.1. Definition of the property tax system

Property tax is a type of tax paid on property owned by an individual or other legal entity, such as a corporation. Property tax is most commonly a real estate ad-valorem tax, which can be considered a regressive tax. It is calculated by a local government where the property is located and paid by the property owner. The tax is usually based on the value or area of the owned property, including land. However, many jurisdictions also tax tangible personal property, such as cars and boats.

The amount owners owe in property tax is determined by multiplying the property tax rate by the current area or market value of property. Most taxing authorities will recalculate the tax rate annually. Almost all property taxes are levied on real property, which is legally defined and classified.

One of the important ways in which the government can control housing prices is through the taxation system. The housing prices influence state and local tax revenues in many ways. Five channels are significant. The first and second channels, i.e. the property tax and transfer tax, are a direct function of the real estate value and transactions – the third and fourth channels are related to the sales tax. Sales of materials in construction directly affect sales tax revenues.

Besides, there is an indirect effect on sales tax revenues related to household expenses: if changes in housing wealth affect the home owners' consumption, then a massive drop in real estate values can decrease the sales tax revenues from all types of goods and services. Finally, personal income tax revenues are affected by reduced employment related to construction and the real estate activity.

This work concentrates on property tax and the influence of this specific taxation system on housing prices. Property taxes are by far the most essential taxes at the local level, accounting for around three-quarters of local governments' tax revenues. The property tax encompasses residential real property, commercial, business and farm real property, as well as personal property.

Residential real property accounts for approximately 60 percent of taxable estimation and is the most significant tax base component by a vital margin; industrial, commercial and farm property amounts to 30 percent, and personal property is less than 10 percent.

Lutz (2008) explains two aspects of this relationship. Firstly, he estimates the magnitude of the change in residential property tax revenues produced by a change in house prices. This analysis affects the policy offset. Secondly, he explores the timing of the relationship between house price appreciation and residential property tax revenue. Lutz (2008) concludes that the elasticity of property tax revenue with respect to home prices equals 0.4, indicating that policy-makers tend to offset 60 percent of house price changes by moving the effective tax rate contrary to the house price change. The influence of house price changes on property taxes does not occur on average until three years following the change in house prices. This long lag likely reflects three institutional features of the property tax. First, the property tax is estimated in a backward-looking manner, as the current year's taxes are based on the estimated value of property in the previous year. Second, the assessed values often lag market values. Sometimes, this lag is by design or legal mandate, and in other cases, it is because of "poor" administration. This may sometimes be intentional, particularly in jurisdictions that elect their tax assessors. These factors may influence the lag. Third, most states have a particular form of cap and limit on increases in property tax rates, tax revenues or taxable assessments. In times of rapid house price growth, these limits will prevent revenues or evaluation from growing at the same pace as market values. Thus, a 'stock' of untaxed assessment will develop (Norregaard, 2013).

It is essential to note that these estimates have limitations regarding estimating the current situation because the typical house price reduction in the sample used in Lutz (2008) is relatively small compared to the declines which have taken place over the last several years. Nevertheless, the results strongly suggest that policy-makers buffer adverse house price shocks by raising property tax rates. Although the magnitude of the response varies

significantly from specification to specification, it is generally impossible to defer the hypothesis that house price declines do not affect residential property tax revenues (Lutz, 2008).

Property tax has a significant influence on local government revenues. Several works focus more specifically on the effects of property tax limitations on local government revenues. Skidmore and Scorsone (2011) analyse Michigan municipalities and find that the combination of property tax limitations and housing price declines has been the dominant cause of the deterioration in local fiscal conditions. Wallin and Zabel (2011), likewise, concluded that the influence of the Massachusetts Proposition 2½ on local revenues was significant and negative and has led to several cities and towns attempting to override votes.

The municipalities' reliance on property tax has both strengths and weaknesses. As argued especially by Mieszkowski and Zodrow (1989) and more recently by Zodrow (2001), in their comprehensive surveys of the property tax literature, the tax seems likely to have a somewhat progressive influence on the distribution of income, and it may also have relatively small distortive effects. However, it is also quite visible to those who must pay the tax, it is difficult to administer and it is a stable source of revenues (Oates, 2001).

Indeed, the property tax has often been portrayed as an unpopular, hard-to-administer and inelastic tax. However, this last feature, in particular, has proven an essential advantage in the recent recession. Therefore, the local governments' reliance on the property tax rather than on more elastic sources of revenue like income, sales and excise taxes has – so far, in any event – helped local governments to avoid some severe problems experienced by many other governments in the current economic situation.

Given its administration's institutional realities, it may take several assessment cycles (e.g. years) before the changes in the market values of properties are accurately reflected in the assessed values and, ultimately, in property tax collections.

2.2. Classification of property tax systems

Classification allows states to impose a tax on a different kind of property in a non-uniform manner. The most common categories in classified systems are residential, agricultural,

commercial and industrial properties, with residential and agricultural classes generally assigned lower ratios or rates**.**

Property taxes have traditionally been used to finance local public goods, such as schools, the police, fire protection, recreational facilities, local roads and local public transportation. This well-known user fee equivalence leads economists to expect people to resent the property tax less than other taxes.

Property values are affected by both the benefits derived from local services and the taxes that are capitalised. Because taxpayers are willing to pay for better services, the value of these services translates into higher property values (Bird and Slack, 2006).

However, a competing view sees the property tax as a tax on capital that results in distortions in the taxpayers' housing market and fiscal decisions (Zodrow, 2001). The property tax discourages construction and results in the lack of use of land. Both the benefit-based and capital tax approach have some validity. It is essential to indicate that the property tax is not purely a benefit tax due to the fact that home owners who improve their houses will face higher taxes and, therefore, will be discouraged from doing so.

Moreover, property tax is regarded as a fair tax for local governments because it is immovable. It is impossible to shift location in response to the tax, and it cannot be hidden. Even the owner of vacant property is taxed under the property tax.

Changes in property tax have made it possible to be capitalised into property values in a particular community, and in the long term, tax differentials may affect where people locate, and these effects are lower than the distortions created by the income and sales taxes at the local level.

To the extent that local governments only levy the property tax, it may be an essential local autonomy tool. Furthermore, tax rates must be determined locally and not by the senior levels of the government (Oates, 2010).

Analysing property tax shows that it is a highly visible tax. Unlike income tax, for example, property tax is not withheld at the source. Instead, taxpayers have to pay it in periodic lump-sum payments. As a result, taxpayers tend to be overly aware of the property taxes they pay. Property tax also finances expenditures such as garbage collection, roads and neighbourhood parks.

Studies argue that residents are more willing to pay for local services if they rate their government and service provision highly (Simonsen and Robbins, 2003). Visibility is desirable from a decision-making perspective because it makes taxpayers aware of the costs of local public services. This awareness enhances accountability, which is a good thing from both an economic (challenging budget constraint) and political (democratic) perspective. Concurrently, visibility restricts the ability of local governments to raise or reform the tax.

Non-residential property includes a wide diversity of property uses, including commercial uses, industrial uses and particular uses. As indicated earlier, the effective property tax rate (property taxes relative to market value) on non-residential property is generally higher than on residential property. This difference is hard to justify, at least following economic theory. Commercial property taxes at the local level may also result in tax exporting whereby the tax on commercial and industrial property is shifted onto consumers and owners of capital who may not live in the tax jurisdiction (Yuan and Cordes, 2009).

One of the essential characteristics of property tax is that it is an inelastic tax. The tax base does not increase automatically over time because property values respond more slowly to annual changes in economic activity than income. Therefore, to maintain residential property tax revenues in real terms or raise residential property tax revenues, jurisdictions have to raise the tax rate to increase tax revenues. The resulting imposition of estimation limitations, tax rate limits and exemptions has further reduced the tax and elasticity (Bahl, Martinez-Vazquez and Youngman, 2010).

The property tax base has been reduced in some jurisdictions due to explicit policy decisions to limit the use of property taxes by authorities through exemptions, tax and expenditure limits, as well as tax incentives in order to attract businesses.

In the USA, property taxes are collected by local governments – municipalities and school districts being the most important. State governments collect the remaining 5 percent of property taxes. In 2002, property taxes accounted for 46 percent of local governments' revenue.

However, the degree to which local governments depend on property taxes varies from state to state. In Alabama, property taxes make up only 20 percent of local revenue; in New England states, property taxes make up more than 80 percent of local revenue (Emrath, 2002).

A practical way to measure the tax rate on property is to divide the property taxes paid by its market value. Property is linked to all of the local jurisdictions in which it is situated. It might be a single jurisdiction but it is usually a combination, such as a municipality, a school district, a county, a water district, a sewer district. These typically do not have boundaries that coincide, so two neighbours may vote and pay taxes in the same municipality but in different school districts or water districts.

Each jurisdiction sets a property tax rate, and its county's assessor establishes the market value of each property. A residence-specific tax bill is computed to sum up all the relevant jurisdictions. When a resident votes, they are given a ballot with the right mix of jurisdictions. The impact of property taxes on the property's gross-of-tax price is salient when the property is purchased because the vital calculation is the ratio of the gross-of-tax housing costs to the prospective buyer's income. Households cannot obtain a mortgage if lenders consider this ratio to be overly high. Thus, if two properties have the same net-of-tax price, but one has higher property taxes, a household may well say that they cannot purchase the property with higher taxes.

Property tax is influenced not only by regulatory considerations but also by competition between municipalities. Hence, cities from different metropolitan areas compete with each other, without the participation of smaller municipalities. Strauss-Kahn and Vives (2009) show that the USA's headquarters are concentrated in urban areas due to the agglomeration externalities and the need for infrastructure.

They note that headquarters are quite mobile and have been attracted by low corporate taxes. The majority of municipalities do not attract any foreign affiliates since such affiliates have to meet other conditions such as appropriate infrastructure, skill levels and an abundance of workforce in order to be able to compete for investments; they are usually only fulfilled by urban centres. Tax competition literature has identified size differences (expressed as differences in labour endowments) as a factor for explaining why different jurisdictions are affected asymmetrically by tax competition (Wilson, 1991). In these two-jurisdiction models, a small jurisdiction suffers a more significant outflow of capital after an increase in its capital tax rate than the more significant competitor, so that the smaller jurisdiction sets lower tax rates than the bigger one. A standard asymmetric tax competition model bears important implications for empirical work on spatial interaction patterns. The size effect interacts with

the neighbourhood effect since tax rates can react more strongly to more giant neighbours than to the smaller ones.

It is interesting to notice that property tax has often been regarded as the “most hated” tax (Brunori, 2003). It is important to remark that property taxes have not been withheld at source, and they finance evident services such as roads, policing and garbage collection. Visibility makes governments accountable for this tax type, but it makes different property tax challenging to sell politically and even complicate to reform relative to other taxes. Unpopularity stems from the potential for volatility and unpredictability of a tax based on the market value (Sheffrin, 2010).

2.3. Equity, efficiency and the fiscal meaning of property tax systems

Property taxes have historically been local taxes because immovable property cannot be moved in response to a tax, and services funded by the local government usually benefit from property values (Bird and Slack, 2004). Municipal taxes, like any tax system, should aspire to an ideal tax system that includes: horizontal and vertical equity, fiscal and economic efficiency, flexibility to cope with changes in income and sensitivity to economic growth. These processes are essential to create a more efficient tax system:

1) Horizontal equity,
2) Vertical equity,
3) Fiscal efficiency,
4) Economic efficiency.

In the equity dimension of the tax system, two vertical and horizontal plans are distinguished, where vertical justice is a tax whose value changes according to the changes in the value of an asset, whereas horizontal equity shows that when two similar assets are equal to the same tax, they must be identical.

The government needs to create a tax code that decreases economic and social gaps between groups in the population (Allen, Dare and Riegel, 2010). In the local context, horizontal equity in taxes implies that a tax should be imposed equally for assets from the same area or a similar business value. On the other hand, vertical justice does not necessarily require the same tax policy.

Regarding the horizontal equity criterion in property tax administration, all similar properties must be assessed at the same assessment ratio level between the evaluated value and the real value. As for the vertical equity criterion, assessment ratios must be equal across property market values (Thrall, 1979).

Furthermore, horizontal inequity occurs when similarly valued homes are assessed at different values, so finally, one receives different tax reports on the same assets. Vertical inequity is present when assessment ratios are significantly dissimilar for different price ranges of property values. In some situations, this process is acceptable for assessment, as some properties are unique, and variances in the real estate market exist. When evaluation ratios are higher for low-valued properties than high-valued properties, the property tax system can be regressive. When the opposite is the case, the property tax system can be described as progressive (Sunderman et al., 1990).

Smith (2000, p. 35) argues that vertical inequity can occur due to periodic assessments, appraiser subjectivity and information asymmetries at the time of estimation. The political environment of the evaluation process and the tendency of assessors towards the centre value in their estimates on media properties should be considered to balance between overestimation and underestimation (Smith, 2000; McMillen and Weber, 2008). Research on vertical equity of the property tax document a systematic estimation bias in inner cities and metropolitan areas compared to the suburbs; recent foreclosures appear to have a modest effect on vertical equity (Strauss and Strauss, 2004; McMillen, 2011; Payton, 2012a).

Most of the ratio studies indicate the vertical progressivity of property tax. Many note that the least expensive properties are significantly over-assessed relative to all others. Previous studies found that the most expensive properties pay the lowest effective tax rates (Cox and Studer, 1997; McMillen, 2011, 2013). A few authors make conjectures about the U-shaped distribution of the assessment ratios over sales prices (Johnson, 1958; Oldman and Aaron, 1965): some of the most expensive properties may be occasionally over-assessed because they are unique, rarely sold and challenging to be assessed accurately.

The vertical equity research on property assessment is based on Paglin and Fogarty's 1972 model. Their model tests whether the assessed values of residential property varies from the sales prices of this property. If the intercept in the model is zero, no vertical inequity has been found in the sample. If the intercept is positive and significant, then the property tax system

is vertically regressive. Paglin and Fogarty (1972) base their model on the relationship between the assessed value and the market value.

Horizontal inequity occurs when there are different assessments for property with the same market value, whereas vertical inequity occurs when property ranges from low to high market values; assessment is regressive (progressive) when the higher valued property has been assessed a lower (higher) fraction of the value. Linearity provides an enduring and correct way of conceptualising inequity in tax assessments.

Paglin and Fogarty failed to define the market value adequately or to recognise that the market value is inherently unobservable. They state that the "market value is measured by the sales price data" (p. 557). They were unaware that earlier papers by Cheng (1970a, 1970b) dealt with statistical issues associated with using sales prices to measure the unobservable market value and issues associated with the correct choice of the functional form. Reinmuth (1977) based his criticism of Paglin and Fogarty on Cheng's work. Thus, the literature on equity in tax assessment began to focus on statistical issues.

The IAAO model relates assessment ratios to sale prices for a matched property sample (IAAO 1978). The sale price coefficient is of interest here: if the coefficient is different from zero, then differently priced properties are assessed differently by an assessor, which is evidence of vertical inequity. If the coefficient is negative, then inexpensive properties are assessed at a higher fraction of their sales price than the high valued properties, and the property tax assessment is regressive. If the coefficient is positive, then the inexpensive properties are assessed at a lower fraction of their sales price than the high-value properties, and the property tax is progressive.

There are six models described in the subject literature for analysing tax methods (Allen, 2003).

1) Paglin and Fogarty's (1972) model proposes that inequity can be detected when the intercept term in the following equation is different from zero:

$$AV = a_{\mathbf{0}} + a_1 SP$$

AV = Assessment Value,

SP = Sales Price.

2) Cheng's (1974) model is defined as a linear log model, as shown in the following equation. The coefficient of interest in this model is a. If this slope is equal to one, there is no vertical inequity.

$$lnAV = a_{\mathbf{o}} + a_1 \ln SP$$

3) The IAAO (1978) model relied on the assessment ratio (assessed value divided by sales price) as a dependent variable. In this model, the coefficient of SP indicates the presence of detectable vertical inequity. If the coefficient is zero, that means there is no vertical inequality.

$$\frac{AV}{SP} = a_{\mathbf{o}} + a_1 SP$$

4) Bell's (1984) model includes a quadratic term to address potential non-linearity in the data. If the coefficient on this term is significantly different from zero, the model reduces to Paglin and Fogarty's (1972) model.

$$AV = a_{\mathbf{o}} + a_1 SP + a_2\, SP^2$$

5) Clapp's (1990) model introduces an instrumental variable method that incorporates information from both the assessed value and sales price into a dependent variable using two-stage least squares regression (OLS).

This instrumental variable is first regressed on the natural log of AV, and the predicted values from this first stage regression are then regressed on the natural log of SP.

$$\ln AV = a_0 + a_0 Z\ (stage\ one)$$

$$\ln SP = B_0 + B_1 \ln AV\ (stage\ two)$$

6) Sunderman et al. (1990) proposed using spline regression modelling when analysing assessment equity. Spline regression techniques are useful when different functions explain different regions of a data set.

$$AV = a_{00} + a_{10}\, SP + a_{01}\, LOW + a_{02}\, HIGH + a_1 LOW\ SP + a_{12} HIGH\ SP$$

Both approaches of horizontal and vertical tax systems have been criticised for violating the OLS assumptions, and explicitly, for the endogeneity of the sales price to the assessment ratio that results in an "error in variables" and for the non-normal distribution of the

assessment ratios, which are bounded by zero on the left-hand side and unbounded on the right-hand side.

In addition, an ideal tax system should promote both fiscal and economic efficiency. Efficiency is related to the principle of welfare, whereby the imposition of tax on the taxpayer enables them to benefit from the public services provided by the authorities.

There is a distinction between efficiency, which is mainly related to tax revenues, and this is achieved when administrative costs are a clear and understandable probability for the taxpayer, compared to defined economic efficiency when there is no effect or at least a small tax effect on the taxpayer's decisions to work, save and consume.

An efficient tax system will fulfil its purpose as neutral as it relates to economic decisions in the private sector. This work will address in detail these two criteria of justice and efficiency in the municipal tax system. "*The principle of property tax equity can be discussed on two levels: 1) horizontal equity − means similar treatment of taxpayers in similar material situations; it means that the amount of tax paid on any property with a specific value is the same; 2) vertical equity − stands for different treatment of taxpayers in different material situations; the method of establishing property tax can be considered equal vertically if a proportionally higher tax is paid on higher-priced property*" (Gluszak, p. 71).

Generally, horizontal equity implies that the government gives the same treatment to people in an identical situation. Horizontal equity makes sure people will not be discriminated against on grounds such as race, gender, different work types. Horizontal equity also requires a tax system that does not give preferential treatment to specific individuals or companies. On the other hand, vertical equity focuses on redistributing income within society. It implies that individuals with higher income should pay higher taxes. Therefore, vertical equity requires proportional or progressive taxes.

As noted above, the two methods of calculating property tax according to the property's area and value are subject to structural distortions stemming from the same method each uses regarding the estimation of the property. This distortion exists in almost all countries. These distortions create inequality and inefficiency in the tax burden.

Some countries try to reduce these distortions by creating "adjustments" to balance the inequality and improve efficiency. These criteria are of great social and economic importance (McCluskey and Franzsen, 2005).

How can we achieve horizontal and vertical equity? A local tax should satisfy the following requirements (Bird, 2006): first, the tax should yield adequate revenues to meet local needs. Second, the tax should be stable and predictable over time. Third, it should not be possible to export the tax burden to non-residents except to the extent that such burdens convey benefits that the non-residents obtain from local services. Fourth, the tax base is visible to ensure accountability. Finally, taxpayers should perceive the tax to be reasonably fair and relatively easy to administer.

Based on these considerations, Bird and Slack 2007 reviewed several types of municipality taxes and considered that the most appropriate tax at the local level is the tax on real property. Assigning the property tax to local governments is relatively immobile and, therefore, less visible and relatively simple and easy to administer. It is easy to identify the tax base and compile information on it at the local level, and hence, local governments have a comparative advantage in levying the tax. This type of a tax assumes a quasi-benefit revenue role, and therefore, is more acceptable. Thus, it evokes a higher degree of compliance.

Applying a specific property tax system has fiscal consequences for the local government. From the point of view of benefits, by burdening accumulated wealth, property taxes have less distortionary effects on resource allocation than income and consumption taxes (Norregaard, 2013). Secondly, property taxes are a more stable source of revenue than other forms of taxation as their tax base is mostly immovable, and the legally defined value of property is less volatile than income and consumption tax bases (Lutz et al., 2011). Thirdly, as the property tax base is responsive to the quality and amount of local public goods and the fiscal burden, revenue-maximising politicians may have incentives to deliver services at a lower cost (Glaeser, 1996; Cabral and Hoxby, 2012).

Any other way in the increase in property taxation might worsen a country's fiscal balance. Firstly, levies on property may discourage individuals from wealth accumulation, reducing the propensity to save and invest (Kopczuk and Slemrod, 2001). Secondly, non-recurrent taxes on property transfers may reduce market transactions and increase market price volatility. Thirdly, salience of property taxes raises the incentive to engage in tax avoidance and evasion (Kopczuk, 2010).

Recent institutional reforms have aimed at strengthening fiscal governance and rules in several advanced economies. These rules promote nationwide fiscal sustainability and have

significant consequences for managing public finances in decentralised countries (Spilimbergo et al., 2009). Conventional wisdom suggests that fiscal autonomy should be conferred to achieve the goal of fiscal responsibility.

2.4. Property tax and residential markets

Although this work focused on the property tax levied according to the area of the property in Israel, in order to expand the knowledge and methods used both similarly and differently, four countries have been selected for this research, two of which apply property tax collection according to the area method, i.e. Poland and Latvia, and the other two apply property tax collection based on property value, i.e. Japan and Ireland. These countries differ in terms of the size of their populations, the continent they are situated on, their characterisation and culture. It is emphasized that in this case each country has adopted its provisions regarding the property tax system separately.

It may be noted that approximately 44 countries out of 192 apply the area-based property tax collection. This means that most of the other countries apply the property value-based method. That is why most studies concentrate mainly on researching the latter method of property collection. This subchapter will explain precisely how the fiscal meaning of the two methods of property tax systems is expressed, as manifested in different states.

2.4.1. Value-based property tax approach in Ireland and Japan

Ireland is a democratic state with a written constitution and a popularly elected president with mostly ceremonial powers. With its capital is Dublin, Ireland has about 6.5 million people.

Property tax in Ireland is based on the value of residential markets. The tax is assessed on residential properties, with the owner of a property being liable. This valuation of housing assets was used as the basis for a half-year payment in 2013, as well as three further full-year payments in 2014, 2015. Property tax due is calculated through market bands. The initial national central rate of property tax constitutes 0.18% of the property's value up to one million pounds, and in the case of properties valued over one million pounds, 0.25% on balance.

Historically, national rates were revoked in 1978. Rates were a highly disliked tax, considering new property tax needs and which aspects of rates generated that unpopularity. Rates were widely regarded as unfair. Properties had not been revalued for many years; revalued discrepancies arose in relative valuations. That indicates the importance of regular updating of the valuation base for the property (McCluskey, 1999). Another feature that contributed to the unpopularity was that rates were a highly salient tax, payable directly by the taxpayer in two lump sums each year.

The Residential Property Tax was introduced in 1983 and abolished in 1997. This tax had both a high property value exemption limit and an income exemption limit. This combination resulted in a tax applied only to a small proportion of the population and generated minimal revenue. Therefore, the experience with this tax is of limited value when considering a much deeper property tax. Given that the tax applied to about 5 percent of households, determining the relevant properties and owners had to be a key concern. With a general tax, the problems and the enforcement mechanisms would be slightly different.

In the early-2000s, the treatment of housing by Ireland's tax system was one of the most generous in the OECD – deduction tax from mortgage interest payments while not taxing property values, capital gains or imputed rent (OECD, 2006). By 2006, the property tax revenue in Ireland had increased to approximately 9 percent of the total revenue, putting Ireland into the group where property taxes had a crucial role, supplying close to 10 percent of the total revenue against the OECD and EU 15 average of about 5 percent.

Of course, this pattern primarily reflects that in Ireland, stamp duties on house purchases provided the primary source of residential property tax revenues. The revenue from such taxes increased rapidly during the prolonged housing boom but decreased sharply as the number of transactions declined. Amounts payable in stamp duty were decreased by Budget 2008.

One coherent approach is to set up a system under which a property tax deeper approximates the tax on owner-occupiers' imputed rent. It is owner-occupation that has had an active tax-favoured status. It may be adequate to have some form of property tax for the rental sector, but it should not be assumed that this would have precisely the same goals as a property tax on the owner-occupied sector. While the imputed income from owner-occupation has not been monetised or taxed, there is revenue collected by the rental group,

which is subject to taxation. Hence, there have also been generous tax incentives for the rental sector, some of which have currently been cancelled. A property tax in the rental group might be planned to ensure a "minimum tax" so that tax breaks do not play a significant role in offsetting rental income for tax purposes (Ryan, 2009).

The design of the value-based property tax for the Irish government involves a series of choices, and the influence on households may vary substantially depending on the precise design chosen. The relationship between property tax liabilities and the ability to pay depends on the value of propery.

Furthermore, these issues using data for a nationally representative sample of Irish households, including information on housing values and incomes from all sources. The influence of full and partial waivers on property tax for low-income households and examine the influence of net liabilities on households across different income levels.

When considering the best property tax system, the following considerations have taken into account:

1) differences in the aggregate housing stock across local authority areas,
2) potential differences in demand for local government services across regions,
3) differences in the expenses of the supply of local municipality services,
4) the central government has enabled local authorities to decide on needs and resources.

Callan et al. (2010) explore that a property tax would not have such an extreme effect. They indicate that property tax values levied at the same rate across the country would see Dublin contribute a share of revenue, which is substantially higher than its share of income or local authority expenditure.

A recurrent tax on housing property has two significant advantages over a transaction-based tax such as stamp duty. First, stamp duty is a barrier to mobility, encouraging owner-occupiers to stay in the same home. Therefore, this works against the efficient use of the housing stock and discourages labour market mobility.

Second, as is evident in the Irish case, stamp duties are influenced by the housing cycle, with more substantial revenues during a boom, and lower revenues during a downturn, as is the case at present. A recurrent tax on the residential property helps to provide a more stable

source of revenue. Indeed, taxes related to property may also play a role as macroeconomic stabilisers (Muellbauer, 2005; Conefrey and FitzGerald, 2010). Hence, Ireland implemented site value taxation (SVT), envisaged in the previous Renewed Programme for Government (Government of Ireland, 2009). The Commission on Taxation (2009) had considered this approach but stressed that it was rarely used for tax collection in other countries despite the economic rationale. Lyons (2011) explored the system in Denmark and presented an approach towards implementing a Site Value Tax in Ireland. The method has been used. It is necessary to evaluate housing assets in Ireland reliably. Computer-assisted mass assessors combined the skills of valuers with hedonic regression models of house prices to reassess the housing stock within approximately two years (McCluskey et al., 2007). The approach of regression models relates to observing the price of a house to its characteristics (location, size, number of bedrooms). Once this relationship has been found, it is possible to predict the value of the house with reasonable accuracy, given the knowledge of a small number of critical characteristics. The process does not need to be purely mechanical: the values can adjust the initial estimates. In Ireland, the property tax system has been changed several times. The system is based on the property's value, yet it is subject to self-assessment.

Japan, located in East Asia, is an archipelago of 6,852 islands in the Pacific Ocean. It is a constitutional monarchy, with Tokyo as its capital. More than 99% of the population of Japan speaks Japanese. Japan's economy is the largest in the world after the United States and the People's Republic of China. Japan's currency is the yen. Japan is a sovereign state whereby the power of the Emperor is minimal. He is "the symbol of the State and the unity of the people". The executive power is held chiefly by the Prime Minister and his cabinet, while sovereignty is vested in Japanese people. Japan is divided into 47 prefectures, each overseen by an elected governor, legislature and administrative bureaucracy. Each prefecture includes cities, towns and villages. The state is currently undergoing administrative reorganization by merging some towns and villages, and this process is expected to cut the administrative costs.

Taxable fixed property in Japan includes (a) land, (b) houses and buildings, and (c) tangible business assets, which are depreciable for income tax and corporation tax. The tax base is the taxable fixed property's assessment value listed in each municipality's property tax register book. Although municipalities administer the assessment, a unified formula for assessing the

taxable fixed property value has been determined by the Minister of Public Management, Home Affairs, Posts and Telecommunications of the Japanese government. With a uniform formula, each municipality's estimation has unified Japan to ensure that the system is fair and equitable.

The assessed value of land is determined by considering the actual market prices of several similar tracts of land. Each assessment is made taking into account the kind of land (such as residential land, agricultural land, forest). Specific standard plots of land for evaluation in certain areas of each municipality are selected for each kind of land, and the assessed value is allocated to the land facing the main roads. The value of each plot is estimated concerning the value of the land of a standard plot, considering the surrounding conditions.

Agricultural lands are estimated in the same way as residential lands by selecting a standard plot for agricultural land estimation in each area. Agricultural lands in “urbanised areas” of the city planning areas are assessed as if the land was residential. For agricultural land designated as an “agricultural green area”, the tax is levied on agricultural land, even though a property is located in “the urbanised area”.

From the housing policy, the amount of tax for houses mentioned below has decreased in the following manner: (1) new housing built by March 31, 2002, with floor space of 50 to 280 square meters: the tax amount is decreased by 50% for space up to 120 square meters in the first three taxable years; (2) for new fire-proof residential buildings with more storeys built by March 31, 2002, with floor space between 50 to 280 square meters (as for housing for rent, the range of floor space between 35 and 280 square meters): the tax is decreased by 50% for the first five taxable years. The taxable value of tangible business assets is determined by considering the cost and amount of depreciation.

In Japan, the Local Tax Law stipulates local taxes that municipalities can levy. A standard tax rate has also been stipulated in the Law, and each local government is expected to adopt this rate when it levies local taxes. Property tax is a flat rate of 1.4% from the taxable value. The maximum tax rate is conditioned in the Law, which gives each local government the power to impose a fixed property tax at up to 2.1% instead of the standard rate of 1.4%. Out of 3230 municipalities, 280 municipalities have applied a tax rate of over 1.4% (Kanemoto, 1997).

Property tax is levied by the municipalities in which the taxable property is situated. The persons, who are listed as owners of taxable fixed property in the tax register book as of January 1 of each year, must pay the fixed property tax. The tax is paid in four payments, usually in April, July, December and the following February. Each local government sends taxpayers a tax form that includes the tax due as of January 1. According to this policy, taxpayers pay the tax either through banks or post offices or directly to the municipality.

Each municipality must gather a tax register book for the taxable fixed property. These registers used to be collected in the form of paper documents, but now, with the Local Tax Law, the municipalities use digital disks or other electronic devices as a substitute to the register books. The tax register book is available to taxpayers for over 20 days from March 1 every year. Taxpayers can check the book and object to the Fixed Asset Assessment Council on the assessed value of their fixed assets. The assessed value of houses or land and buildings listed in the tax register book is revised after three years according to the market price of land and the cost of replacing houses or buildings. The estimated value of tangible business assets in the tax register book is revised annually. All owners of taxable tangible business assets must report to the municipalities the fact that they have situated the details needed to assess such tangible business assets (Moriguchi and Saez, 2008).

According to the Japanese policy, citizens can register their rights to land or buildings when they purchase or transfer the fixed property. The Ministry of Justice keeps fixed property registry files regarding such purchases or transfers. It is convenient for the authorities to use this file to examine their tax register book for the fixed property tax. Following a boom in land prices, the whole land taxation system was reviewed in detail in a special report in 1990. The nominal rates of necessary property taxes, as indicated, were 1.4-2.1 percent of the estimated value. In addition, 0.3 percent for the city planning tax and an additional 1.4 percent (on acquisition cost) for the individual land-holding tax. However, in 1990 the effective tax rate of the property tax alone was only 1 percent of the official assessment (as set each year) and for all three taxes on land holdings, only 1.5 percent, as a result of the relief for residential land, and especially the marked under-valuation of assessed values for taxation. Japan has an orderly property tax system, based on the assessment of the property value, and, according to the formula determined by the Minister for Public Management.

To conclude the case studies, Ireland and Japan were assessed with the use of the expert method using the four criteria discussed earlier. The results are presented in Table 2.

Table 2. Comparing property tax systems in Ireland and Japan

Specification	Ireland	Japan
Simplicity	++	+
Fairness and equity	+	++
Economic efficiency	—	+
Fiscal efficiency	+	++

Evaluation scale: ++ very good results, + good results, - weak results, — very weak results.

Source: the author's own research.

2.4.2. Area-based property tax approach in Poland and Latvia

Poland is a representative democracy whose government structure centres on the Council of Ministers, led by the prime minister. According to the Global Peace Index, Poland ranks in the top 20 percent of the world's most peaceful countries.

Poland has a predominately area-based property tax system. It is essential to indicate that the Polish property tax system is based on two completely different systems (Kokot, 2009). One of them considers the property value as the tax base, while the other system considers physical parameters in the particular area. The current system is the result of constant changes to the rules. It has been created due to the permanent adaptation to the current political situation, but, despite these changes, it is still largely shaped by the past social and economic system. Several primary considerations led to the reform of the tax system:

- gradual unification of property taxes leading to the creation of a group of benefits in the taxable amount.
- striving to simplify the construction of individual taxes,
- continuous improvement of existing regulations, without attempts to implement a thorough reform of the system.

Poland's property tax system is currently regulated by the provisions of three legal acts and includes taxes on real estate, agricultural land and forestry. Hence, the reforms have significantly influenced the following types of property: land, buildings or their parts,

construction structures or their parts related to running a business. The tax base for land is the area, for buildings or parts thereof – the usable area, and for construction structures or their parts related to running a business – the initial value or market value. The municipal council determines the tax rate, yet it cannot exceed statutory rates, updated annually by the Minister of Finance with an announcement published in the Polish Monitor.

Despite the variance existing in tax rates according to the Polish legal order, it is rare for municipalities to use this option. Unfortunately, even though introducing a cadastral tax in Poland is the subject of debates and discussions among academics, state officials and politicians, there is no widely accepted idea for fulfilling this task. Despite the fact that the current system disincentivises proper allocation of capital and space, its equity raises widespread doubts (Renigier-Bilozor, 2017).

To improve the effectiveness of collecting property tax, accurate and reliable data management is necessary. The have been some significant challenges, including the instability of the 1980s, Poland's entry into the European Union, the development of an information society, the introduction of widely understood technology, issues regarding the quality of data in real estate registers and the availability of this data.

Work on the computerisation of court registers in Poland began in 1995 and aimed to replace the then paper books with electronic books and create nationwide uniform land and mortgage registers (Stefanska, 2011). The preparatory work lasted for several years to provide public, free access to land and mortgage registers in 2010 through an official website of the Ministry of Justice. Entries in paper books were discontinued, and the implemented IT system replaced paper records, but the migration of books into electronic databases has not yet been completed.

Another vital data management initiative critical for better management of property tax systems is constructing an Integrated Real Estate System (ZSIN). The main tasks of ZSIN include: maintaining a central repository of copies of cadastre data sets, monitoring the consistency and quality of cadastre data sets, exchanging data in the form of electronic documents between the cadastre and, among other things, property registers, checking land and mortgage registers by land courts, verifying the compliance of cadastre data with data contained in, among others, property registers, making available to public administrate bodies cadastre data sets which are necessary for the implementation of their statutory tasks,

conducting spatial analyses on cadastre data sets covering areas more significant than one point (Walacik, 2016).

Following intensive work regarding ZSIN, property tax systems are supported in it (Janowski 2018; Brzezicka and Wisniewski, 2016). Its peak should occur in 2020; after this date, all data, including cadastral, will meet the highest quality standards, and their availability is to be facilitated by potential recipients following standards adopted throughout the European Union. Using ZSIN significantly improves the assessment for value-based recurrent property taxes that make use of price data from recent transactions and apply them to comparable properties. The prices must depend on the tax base.

Some recurrent property taxes are assessed on the capital value of properties, and thus require evidence of achieved sales prices. Others are assessed on the annual value and require evidence of market rentals. When capital values are not available, rentals and yields are known; they can be estimated using the income method.

These are a few examples of the crucial need for a sound data management system. Good market evidence requires efficient and transparent markets with adequate numbers of transactions of each property type in each location. Without these, assessors face empty cells for no comparable price information (Konowalczuk and Polczyk, 2018).

Poland has also developed detailed systems of valuation of infrastructure written in necessary legal acts and valuation standards in its regulatory framework. The professional standards of property appraisers in Poland are closely related to the development of professionals and professional organizations. The inspiration to create the first methodological basis for the valuation led to a different experience, particularly regarding the TEGoVA and RICS standards.

The first professional standards of the National Council of the Polish Federation of Property Valuers' Associations were published in 1995, and they were kept updated between 1996 and 2004. The standards, constituting for many years the first methodological basis, due to changes in the law over the years, became merely auxiliary material, similar to any other type of publications. The Polish Federation of Valuers' Associations took up the challenge a few years ago to develop professional standards based on the latest solutions proposed by TEGoVA and IVSC.

Despite this process, there is an imbalance between Europe and the Polish national system in some areas. It is related to the specific regulations in force in Poland. The valuation standards comprise a productive achievement encompassing both general and very detailed issues, consisting of those specific only to the Polish reality.

The present system and its components are continually developing to adapt to the latest assessment theory and practice achievements and harmonise with European and global systems. According to the latest amendment to the law, the minister responsible for construction, planning, spatial development and housing shall establish and publish applicable professional standards.

Poland has made significant changes to the property tax system, and especially after joining the European Union, the changes included a combination of technological tools and the promotion of property tax legislation.

Latvia, situated in north-eastern Europe along the Baltic Sea, borders with Russia, Estonia, Lithuania, Belarus and Lithuania. Latvia was primarily an agricultural country with seafaring, fishing and forestry as the most relevant economic factors**.** Like its Baltic neighbours, Latvia has made a rapid transition to the free market since the early 1990s**.** According to this transition, a quarter of the population in Latvia is primarily Russian-speaking. Latvia has a population of 2.4 million, of which 69% live in urban areas. Unlike the other Baltic states, Latvia has a few kinds of local government such as rural authorities and towns, local urban governments (called republican or big cities), and regional governments. There are nearly 500 rural municipalities and 73 towns, mostly with populations of less than 5,000. Furthermore, there are 26 district-level governments and seven cities, which perform both regional and municipal functions. Regions have their budgets and indirectly elected councils, but financially they are almost entirely dependent upon transfers. However, rural municipalities govern less developed areas and have fewer functions than their urban counterparts. Although the municipalities, as noted below, have their “own” significant tax revenue from land and property taxes accrued to those governments, the central government determines all local taxes, including both the tax base and the tax rate.

The current property tax system in Latvia came into force only in 1998 and more fully in 2000. Previously, separate taxes were levied on property and land (mainly buildings) under the 1991 acts on Land Tax and Property Tax. The Real Estate Tax levied by the 1998 law was

imposed on buildings and land at a rate of 1.5% of cadastral value (market-based) until 2002, and after that, at a rate of 1.0%. The national government sets these rates, and local governments cannot modify them. Moreover, local governments are empowered to grant reliefs of up to 90% for some classes of taxpayers.

Since the year 2000, in the Baltic States, approximately 50% of the real estate reported has been registered in Title Book (Land Register). The State Land Service of Latvia is responsible for the land cadastre and the building register, while the Title Book Office maintains the real property rights record (register). Registration began in 1993 and was completed in 1999. While registration of legal ownership is not complete, the rights to 610,000 properties were registered in the land register at the end of 2001.

The tax system is supposed to be a "market-based" capital value, calculated following mass valuation principles taking into account the price levels in the real estate market as determined from an analysis over at least two years. Reassessment is required at least every five years. Land and buildings are to be valued separately. Until 2003, "constructions" were, taxed on the book or inventory value. Although the real estate tax is a national tax, local and national governments are responsible for its administration and collecting data on taxable properties. Latvia is a very young country which gained renewed independence only on August 21, 1991. In 2016 Latvia joined the OCED. In recent years Latvia has been promoting the property tax system by reorganizing property registration and increasing revenues.

To conclude the case studies, Poland and Latvia were assessed with the use of the expert method using the four criteria discussed earlier. The results are presented in Table 3.

Table 3. **Comparing property tax systems in Poland and Latvia**

Specifications	Poland	Latvia
Simplicity	+	+
Fairness and equity	++	+
Economic efficiency	++	—
Fiscal efficiency	+	—

Evaluation scale: ++ very good results, + good results, - weak results, — very weak results

Source: the author's own research.

2.5. Summary

This chapter has presented two central systems of property tax – the area-based system and the value-based system. These two approaches aim to create an accurate assessment system that could reliably estimate assets and property and, therefore, could also create the citizens' compliance to pay the tax.

The area-based system is considered to be simple and requires relatively little information to calculate. Calculating the property tax based on an area requires only the area measurements and no other data, and thus obviating the need for the costly collection and analysis of market data and evaluations. Moreover, the area's measurements are more objective than the estimations of the market value of property because assessors make judgments about comparable properties as the basis for their estimates of the market value. Therefore, the area-based valuation is less contestable than the market-based valuation, and hence requires less effort and fewer resources. This method is most common among developed countries that do not have the resources for gathering large quantities of information. However, this type of taxation does not consider other factors, for example, the socioeconomic level of the neighbourhood.

As opposed to the area-based evaluation, the value-based evaluation is based on the economic evaluation of residences and housing and depends on various considerations such as the location, socioeconomic level of the population in this location and other factors. Hence, this calculation is significantly more complex and requires extensive data management which enables comparing different locations – this approach to property taxation is used in most countries.

In addition, tax systems should also address vertical and horizontal tax justice. These types of justice are distinguished when vertical justice is a tax whose value changes according to the change's asset, whereas horizontal justice shows that when two similar assets are equal to the same tax, they must be identical.

To better understand the area-based and value-based approaches, the chapter has presented four countries that use different assessment methods: Ireland and Japan, which implement the value-based method, compared to Latvia and Poland, which use the area-based calculation method. The comparison of methods highlights the significant variance between estimating property tax methods worldwide in different countries.

The second chapter elaborates upon the application of property tax on the housing market. The third chapter will present property tax in Israel. The calculation method has a relatively simple formula which consists in multiplying the housing area by the tax tariff. This formula yields the final payment for each year. Since there is no similar method in municipalities in Israel, several districts are gathered together.

The method of measurement used in Israel is also based on the measurement of the property area, based on 12 classifications such as residential, office, industrial, workshops, banks, hotels, car parks, occupancy land, occupancy land used for event planning, agricultural structure, occupancy land in a high-intensity plant. There is a different tariff multiplied by the property area for each classification, which results in the property tax for each year.

In Israel, there is an extreme lack of uniformity between the authorities regarding property tax rates per square meter, which creates distortions, so that the property tax levied on a property in Tel Aviv is different from the property tax levied on a property in the same area in Jerusalem.

Moreover, there are distortions, inequalities and significant gaps between the municipal property tax and commercial property tax in Israel. These distortions have led to a lack of incentive for the local authorities to invest in residential construction, which requires more services increasing the authority's expenses. Consequently, it has affected both the demand and availability of assets, contributing to a rise in house prices in Israel.

Due to the importance of the property tax in Israel, we can expect to find a significant and robust relationship between the property tax and housing prices in Israel, further discussed in the next sections of this work.

Chapter 3.

Property taxation and residential markets in Israel

3.1. Evaluation of the contemporary property tax system in Israel

The municipal tax in Israel is called the Annona tax (Annona or the general property tax) and is imposed on the holder of a property according to the local authority's rates at the beginning of the year following the central government's directives published in the local council decree. Each authority is public (Darin, 1999). In Israel, there are 261 municipalities, which include: cities, local councils and regional councils. Until 1968 property tax was collected by the central government through the Ministry of Finance, and then part of the proceeds was transferred to the local authority to finance its expenses. Following the repeal of property taxes, the general municipal tax was introduced in Israel. The local authority collects municipal property taxes to finance the basket of services provided by the residents' authority, who reside within the authority's jurisdiction.

The municipal council imposes the general municipal tax for the fiscal year under the municipal tax decree, under the authority conferred on it by the State Economic Arrangements Law (legislative amendments to achieve the budget objectives, 1992) and subject to state economic regulations (general municipal local government regulations, 2007). The property tax rates are determined by the local authority in the tax decree once a year. However, the authority is subject to minimum and maximum limits, and the annual local rate increases according to the central government's rates. The authority sends the tax assessment to the actual holder of each property (residential, commercial, agricultural land and occupied land). The tax calculation is done by multiplying the rate in the property area, taking into account three main criteria: the type of property, its area (in square meters) and the area in which the property is located. The Israeli Supreme Court explicitly stated in ECJ 8588/00 that these criteria comprise a closed list.

The property tax assessment contains seven elements: the property's identity, the property area, the use made of the property, the classification of the property, the premises and exemptions, and the amount of tax levied. The property tax is due every two months, though it can be paid once a year. Interest payments are subject to interest and linkage differences according to section 4 of the Local Authorities Law (Interest and Linkage Differences on Compulsory Payments, 1980). In Israel, each authority has adopted a particular method. Lack of uniformity between the authorities' measurement has created inequalities and caused disputes between residents and the authorities, and as a result, the number of claims for legal decisions in the courts has increased.

In Israel, there are four methods for measuring property areas that are described in the local property tax levy orders published each year. The four methods are as follows:

1) **Net Area:** the complete area of the housing, not including balconies, also includes the area under the inner and outer walls. In the case of shared walls with other housing, each housing extends halfway,
2) **Gross Area:** the housing's complete area, together with the housing's proportion in the stairwell. The housing's relative area determines the stairwell's relative area compared to all housings in the building,
3) **Net-Net Method:** the housing (floor), including covered balconies, does not include the area outside the exterior walls, such as open balconies and areas lower than the minimum ceiling height,
4) **Gross-Gross Method:** gross area including all possible extras, such as parking space, warehouses, the relative part of the housing on the roof and the stairwell.

Furthermore, in Israel, there is a clear distinction between residential property tax and tax for non-residential property (e.g. commercial). In many parts of Israel, the residential property tax is significantly higher than the non-residential property tax.

In the light of the gradual decline in central government assistance budgets (balancing grants), the authorities have been forced to rely on business taxes and not to build housing that increases the population, a fact that forces the authorities to increase the high financing costs of the services basket for residents in areas, such as educational needs, infrastructure. This preference of the authorities to invest in the commercialisation of land and less in residential property, on the one hand, has led to a low supply of housing and, on the other

hand, a significant demand for residential housing, which has increased as the number of residents has increased from both a natural increase and new residents joining the authorities.

The public debate in Israel has dealt with the real estate crisis and all its problems and solutions, mainly resulting from the government policy, which focused predominantly on the relationship between the citizen and the government, with the local government hardly participating in any housing policy. The Israeli government has changed its approach in recent years after realising that the authorities are a key and vital factor in the chain of increasing housing supply as a result of the "roof agreements" under which the government assists financially and bears some of the costs as an incentive to build and develop new residential neighbourhoods, thereby reducing the demand.

Only a few studies have tried to assess patterns in the housing market in Israel. Moshe Bar-Nathan, Michael Beenstock and Yoel Haitovsky (1998) found that house prices in Israel react strongly to demand shocks, and price misalignments display considerable persistence. Doron Sayag (2012) focuses on the evolution of house prices at the regional level over 1999-2009 and applies the hedonic price method to calculate price indices for nine sub-regions. This contribution emphasises that different varying price trends across the areas under investigation emanate from differences in local unemployment rates, regional disposable household income, regional balance of migration and other regional parameters such as the unsold inventory level and the number of housing starts. The studies of the sub-areas emphasise the importance of analysing housing markets since every sub-area has different properties affecting its dynamics.

Rostowicz (2001) examined the relationship between various taxes imposed upon the landlords of land and buildings and upon buyers, sellers and users of real estate, and the marketing methods of real estate via tax shelters anonymity. The results showed that tax policies affect people's compliance to pay taxes and their house purchasing plans. Hence, the author concluded that the more people understand the tax policy at the municipal level, the less they resist paying the taxes. Moreover, this study emphasises the importance of effective tax policies for planning the housing market in Israel.

In a recent study, Ben-Tovim (2016) estimated the price elasticity of the demand for homes in Israel, based on bunching of home transactions at the tax kink point – the price where the

marginal sales tax changes (from 0% to 3.5%). The analysis was carried out on the data consisting of all residential purchases in 2008-2014 and information on the purchase tax system. This work presents that the price elasticity of the demand for residential homes of sole-dwelling purchasers is -0.046 on average, that is the lower limit of the elasticity calculated in other research in Israel and abroad, all of which used other methods. Hence, one may expect a minor behavioural response from sole-dwelling purchasers in Israel to a small tax rate change.

3.2. Needs, choice and responsibility in Israel

As for the housing market, these concepts could be treated as follows. First, it is essential to note that owning a house has an emotional aspect as one feels security when living in their own property. Hence, this security is regarded as a "need." The emotional sentiment of Israel is established around the memory of the Holocaust. For Jewish people, returning to their ancestral land after two thousand years of exile, there is an emotional need to own a property in Israel. Even if the housing conditions do not meet their needs, this emotional value is a significant motive.

On the other hand, the government's policy to enable a free choice for those in need of public housing aims to create a sense of social equality and prevent negative stigmatisation. In the mid-1990s, after enacting the Basic Law: Human Dignity and Liberty (1992), the Supreme Court in Israel declared the right to shelter as a fundamental right to which all citizens are entitled. A lack of shelter is a violation of individual dignity, "a person without basic housing is a person whose human dignity has been violated" (LCA 4905/98 Yossi Gamzu v. Naama Yeshayahu, given on March 19, 2001).

When discussing the concept of "choice" on the Israeli housing market, since 1999, the Israeli government limited its involvement in the private market in general and the public market in light of the privacy policy adopted by the Israeli government, which believed that the free market would function more efficiently. In the public market, the government of Israel stopped building new housing. Moreover, the state sold the existing housing in the public housing stock at significantly discounted prices ("liquidation sale").

According to the Public Housing Law (Acquisition Rights), the government is supposed to set up a fund to be managed by the Ministry of Housing and Construction, and the proceeds from the sale should be transferred to the fund for the construction of new public housing (Rofè, Pashtan and Hornik, 2017). While public housing in Israel has shrunk, the opposite trend has taken place in the OECD countries, and resources have been allocated to increase the public housing supply.

Control of the housing market can be in the hands of the state or households. When shifting the control to the citizens who are direct beneficiaries of housing, they can obtain quality housing. The public receives control through its financial capabilities (Rofè, Pashtan and Hornik, 2017).

The more households can invest in housing, the more options they have for housing, and the possibility of preferring individual housing at the expense of other housing. Accordingly, the Israeli government launched the "Price Per Occupant" initiative ("Me'chir La'Mishtaken"), according to which young couples are entitled to a discount and get a real choice of good quality housing and affordable prices in many cities. Eligible couples can apply in as many cities as they like, and thus control their future residence if they are successful.

As for the concept of "responsibility", at the beginning of the 21st century, there was agreement among central researchers that a combination of two factors causes homelessness, i.e. structural and personal factors (Main, 1998). Accordingly, a review of the policy on homelessness may discern two main issues: the first is social exclusion and the second is the response to the needs of the homeless in terms of housing and the social and economic integration into the society. Most countries struggle to eradicate or reduce the phenomenon while emphasising prevention, early intervention, emergency intervention and long-term support strategies. In Israel, following the 1996 legislation, the government allocated financial resources to the Ministry of Social Affairs and municipal authorities, specifically for the citizens who were unable to live in proper housing. As part of the government policy application, shelters that provided housing, food and professional assistance have been established.

Between 1997 and 2017, significant changes occurred in Israel's housing prices. Hence, the importance of this study was to examine the relationships between the property tax and housing prices in Israel.

Traditionally, Israeli people have had a propensity to invest in property and have a relatively high owner occupancy rate and more robust investment demand. These factors cause an upward trend and volatile fluctuations in housing prices. Therefore, capturing the manner of fluctuations is of great interest to the government, scholars and the industry. Whereas many previous housing studies have suggested non-linearity in housing price behaviour in different regions or countries, the primary aim of this paper is to examine the influence of the property tax on housing prices in Israel. This thesis presents the Israeli housing market, and specifically the influence of property tax changes on the demand and prices. These results have several important implications. First, there are policy implications, especially for setting the economic parameters that could influence housing prices. Increasing the interest rate has often been used by the Israeli government to dampen the housing price inflation. An increased requirement for bank reserves has also been used to produce multiple contractions of the money supply.

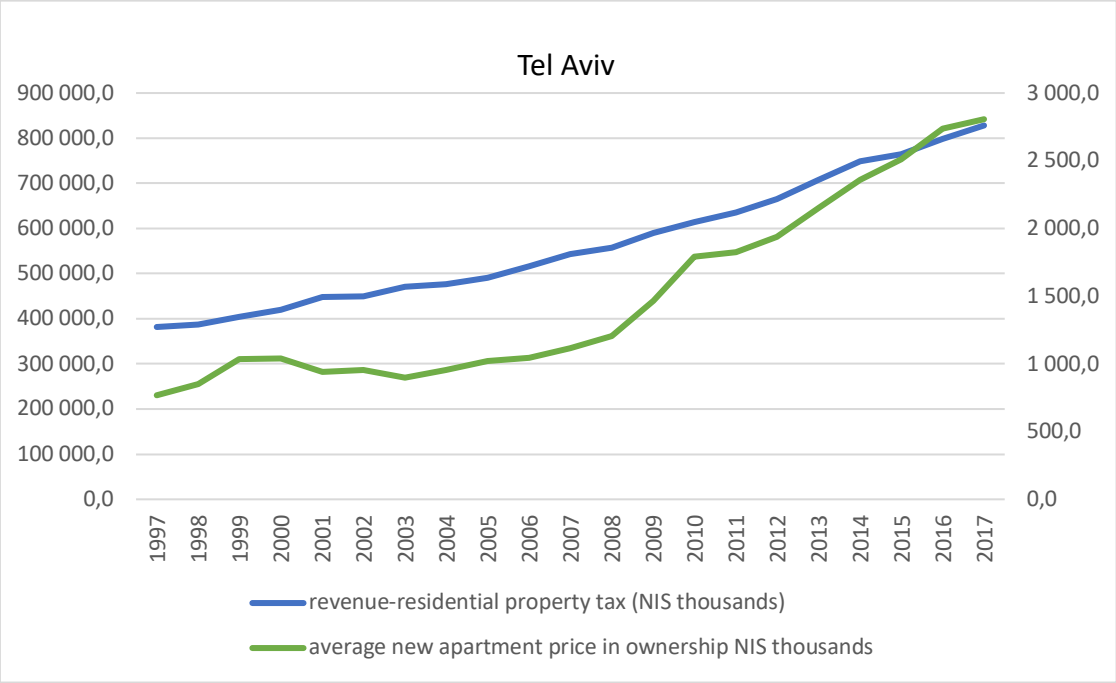
Although the government can use interest rates to put a brake on the housing market when prices rise too quickly, housing prices in Israel have recently begun to rise quickly again, causing severe affordability problems. Although governments can use monetary policy to adjust the housing-market conditions and prevent significant changes in the housing market, the government should be cautious when using monetary policy as a tool.

A tight monetary policy reduces not only the housing investment but also other interest-sensitive investments, such as stocks. Therefore, attention needs to be paid to developing a monetary policy that responds to overall economic stability rather than policy explicitly directed at the housing market.

3.3. Consequences of the property tax system on housing prices in Israel

The figures below show the apparent lack of uniformity and the changes in the residential property tax in four main district cities in Israel in the years 1997-2017, which may be seen on the basis of such factors as the average new housing price in ownership (thousand NIS), average number of transactions of new housing in ownership, the changes in total revenue from property tax (residential + commercial), the changes in total revenue from property tax (residential + commercial) and the cost per square meter for new residential property prices.

Although this study does not concentrate on the property tax for commercial property, it is used in figures to get a broader picture of the data collection and to see the changes visually. According to the following Figures, both the property tax and average housing prices increased since 1997. A similar increasing trend between the two lines may also be shown in each city.

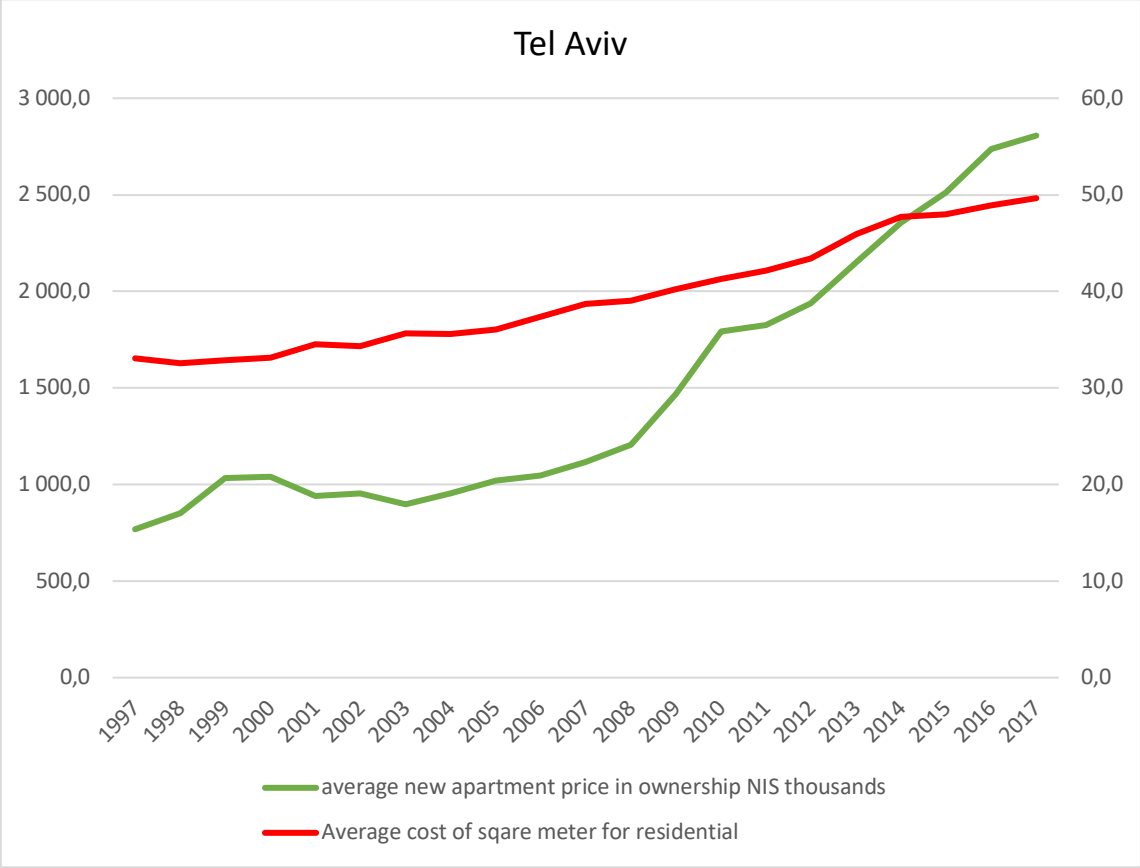


Explanations: X-axis – the timeline; Y-axis (blue line) – residential property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 2. The influence of residential property tax revenue on new housing prices in the years 1997-2017 in Tel Aviv

***Source**:* the author's own calculations based on the CBS data

Figure 2 shows that in Tel Aviv, during the period in question, the average housing price (in thousand NIS) rose sharply, i.e. approximately four times over two decades. In contrast, the revenue from the property tax increased only by 2.5 times. Because the property tax is not flexible, the changes in it are relatively slow.

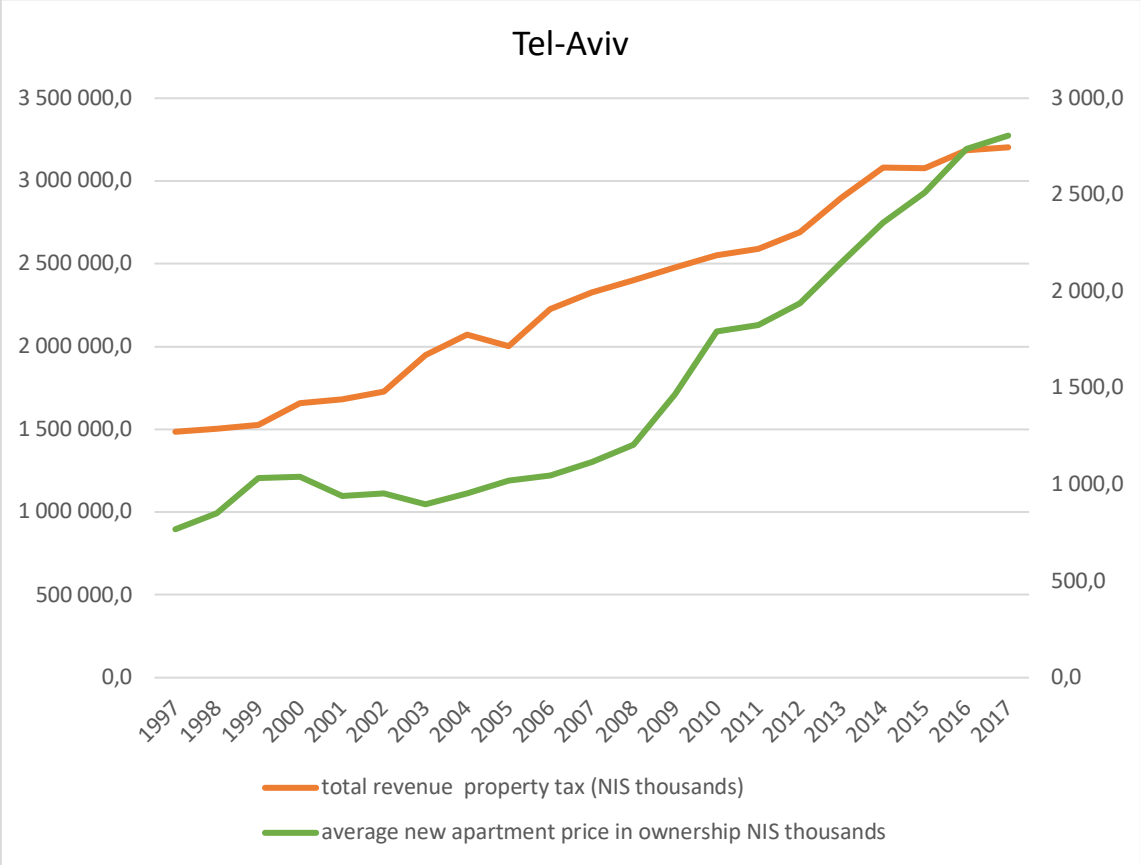


Explanations: X-axis – the timeline; Y-axis (red line) – cost per square meter for residential property; Y-axis (green line) – average housing price in thousand NIS.

Figure 3. The influence of cost per square meter for residential property on average new housing prices in the years 1997-2017 in Tel Aviv

***Source**:* the author's own calculations based on the CBS data

Figure 3 presents the cost per square meter for new residential property prices in Tel Aviv. They increase very moderately, which explains that Tel Aviv invested more in developing business centres than in residences. As a result, Tel Aviv may lose the property tax revenue from residential property.

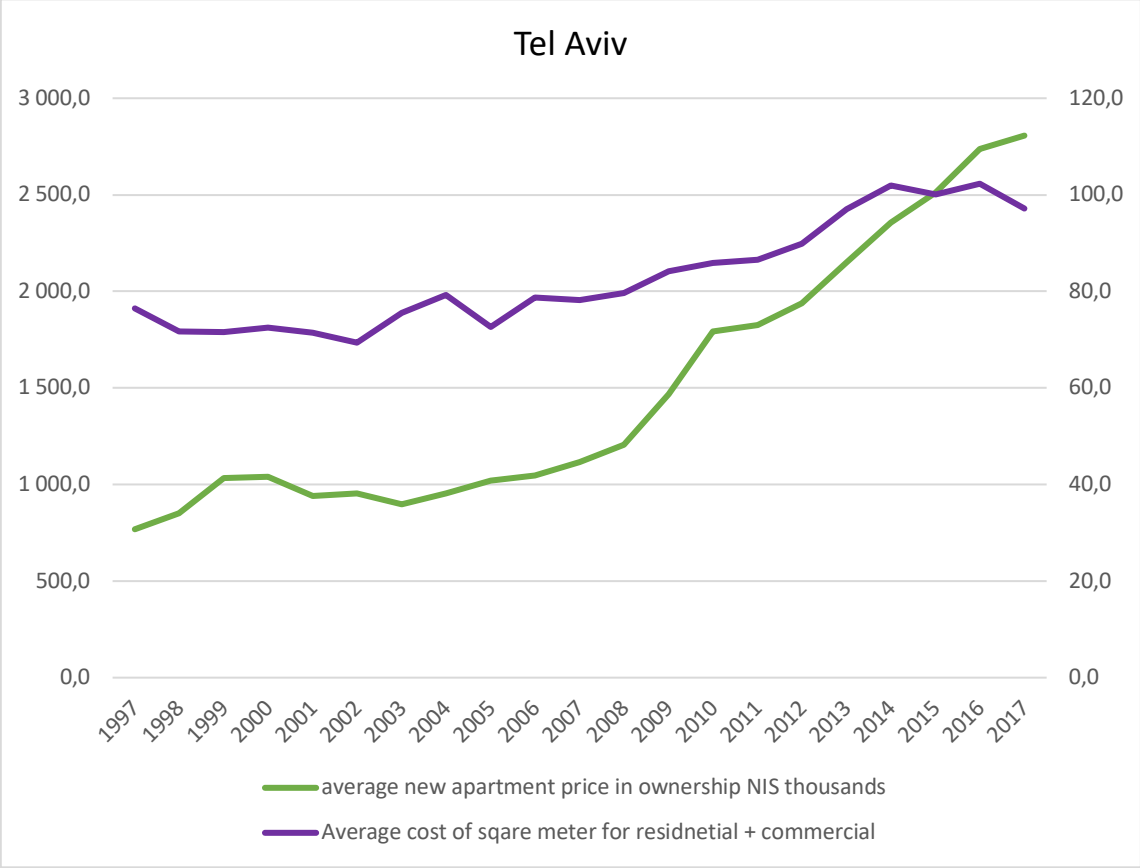


Explanations: X-axis – the timeline; Y-axis (orange line) – total property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 4. The changes in total revenue from property tax (residential + commercial) and average new housing prices in the years 1997-2017 in Tel Aviv

***Source**:* the author's own calculations based on the CBS data

Figure 4 shows that the total revenue from property tax (residential + commercial) (orange line) tripled over 20 years. This fact shows that Tel Aviv invested more in commercial real estate development than residential housing. Moreover, the average housing price (in thousand NIS; green line) rose sharply in Tel Aviv.

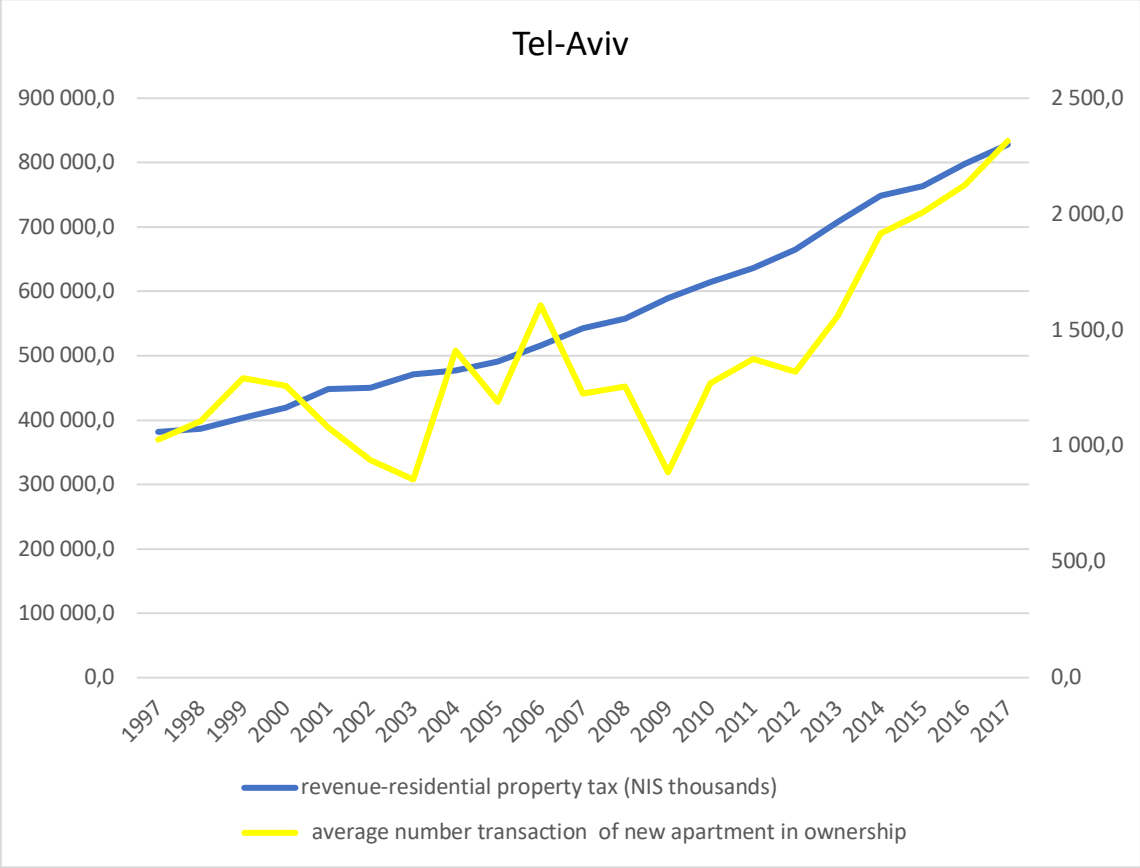


Explanations: X-axis – the timeline; Y-axis (purple line) – total residential + commercial property tax by the square meter; Y-axis (green line) – average housing price in thousand NIS.

Figure 5. The changes in total revenue from property tax (residential + commercial) and average new housing prices in the years 1997-2017 in Tel Aviv

***Source**:* the author's own calculations based on the CBS data

Even when the residential and commercial property tax has been added, the square meter's property tax is still relatively moderate over the period of 20 years. This phenomenon may be explained because it is challenging to carry out reforms in the property tax system, as the subject literature also refers to this fact when discussing reforms.

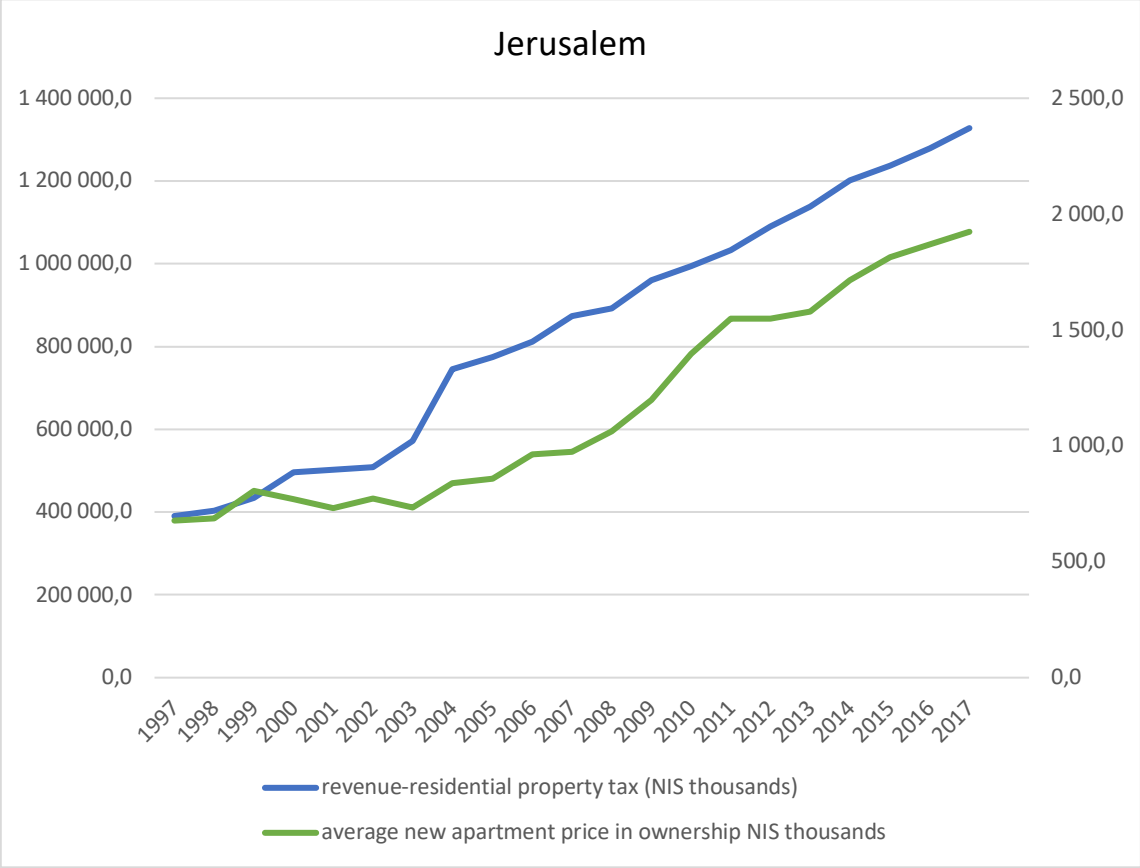


Explanations: X-axis – the timeline; Y-axis (yellow line) – average number of transactions of new housing in ownership; Y-axis (blue line) – revenue from residential property tax.

Figure 6. Average number of transactions of new housing in ownership and revenue from residential property tax in the years 1997-2017 in Tel Aviv

***Source**:* the author's own calculations based on the CBS data

Although the number of transactions (yellow line) was unstable and highly volatile, property tax revenues (blue line) were steadily rising, which shows that the supply increased, and therefore the housing prices increased respectively.

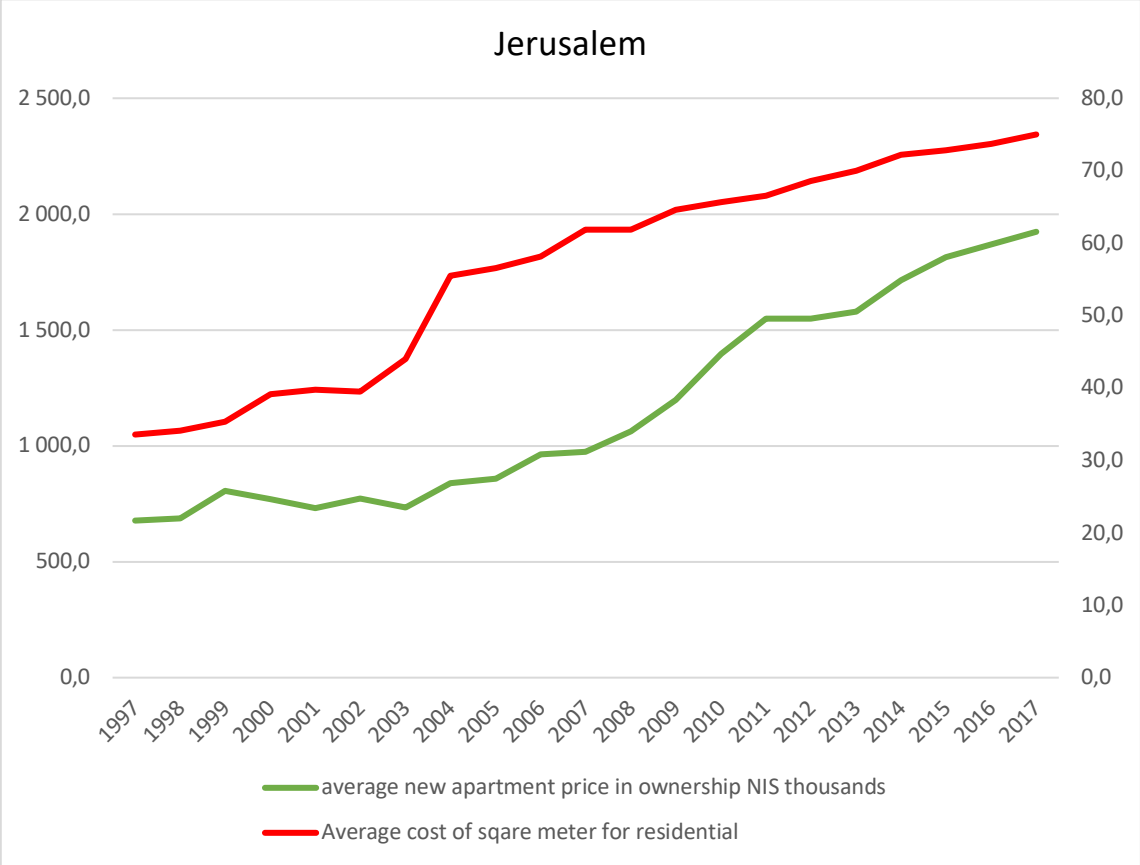


Explanations: X-axis – the timeline; Y-axis (blue line) residential property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 7. The influence of residential property tax revenue on new housing prices in the years 1997-2017 in Jerusalem

***Source**:* the author's own calculations based on the CBS data

Figure 7 shows that according to descriptive statistics in this research, the property tax rate in Jerusalem was the highest in the four cities examined in the study. It is reflected in a significant increase in property tax income, which has increased fourfold over 20 years (blue line). However, the average housing price in (thousand NIS; green line) increases three-time during 20 years.

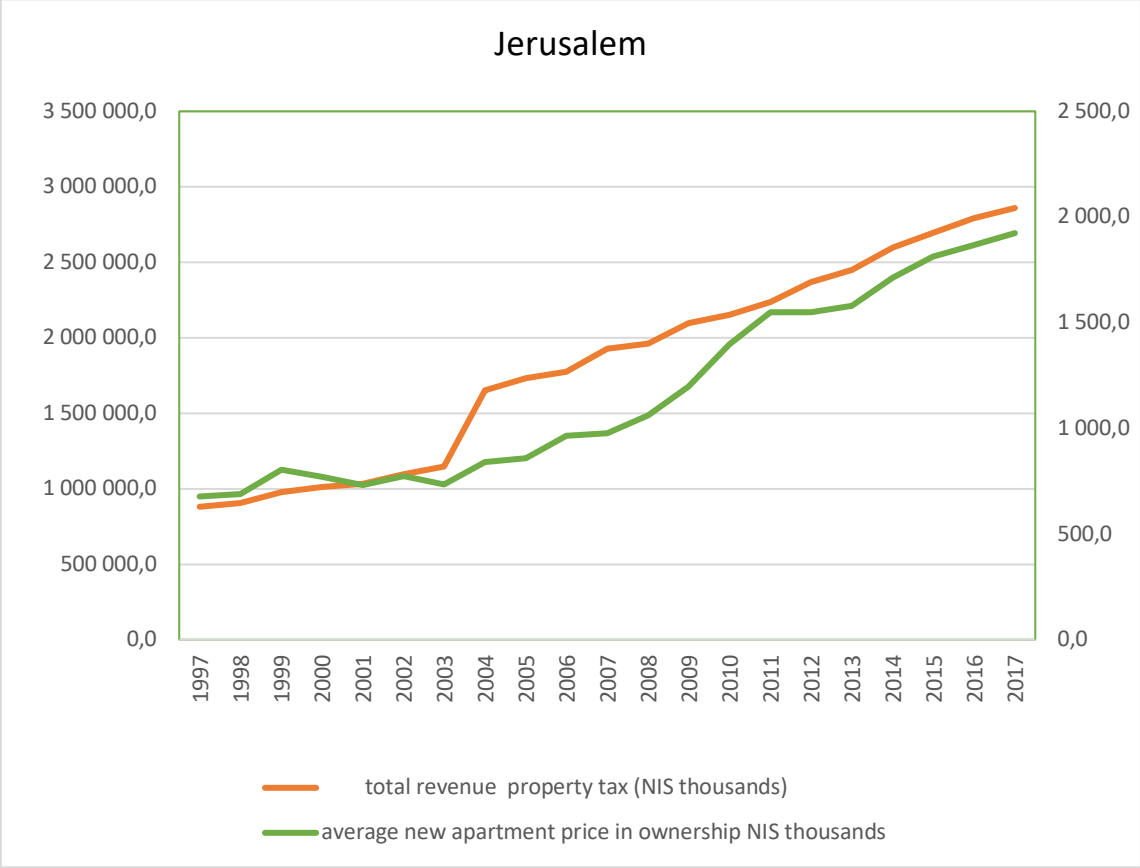


Explanations: X-axis – the timeline; Y-axis (red line) cost per square meter for residential property; Y-axis (green line) – average housing price in thousand NIS.

Figure 8. The influence of the cost per square meter for residential property on average new housing prices in the years 1997-2017 in Jerusalem

***Source**:* the author's own calculations based on the CBS data

Figure 8 shows that the cost per square meter (red line) for residential property increased, and the average housing price in thousand NIS (Green line) tripled in Jerusalem between 1997 and 2017.

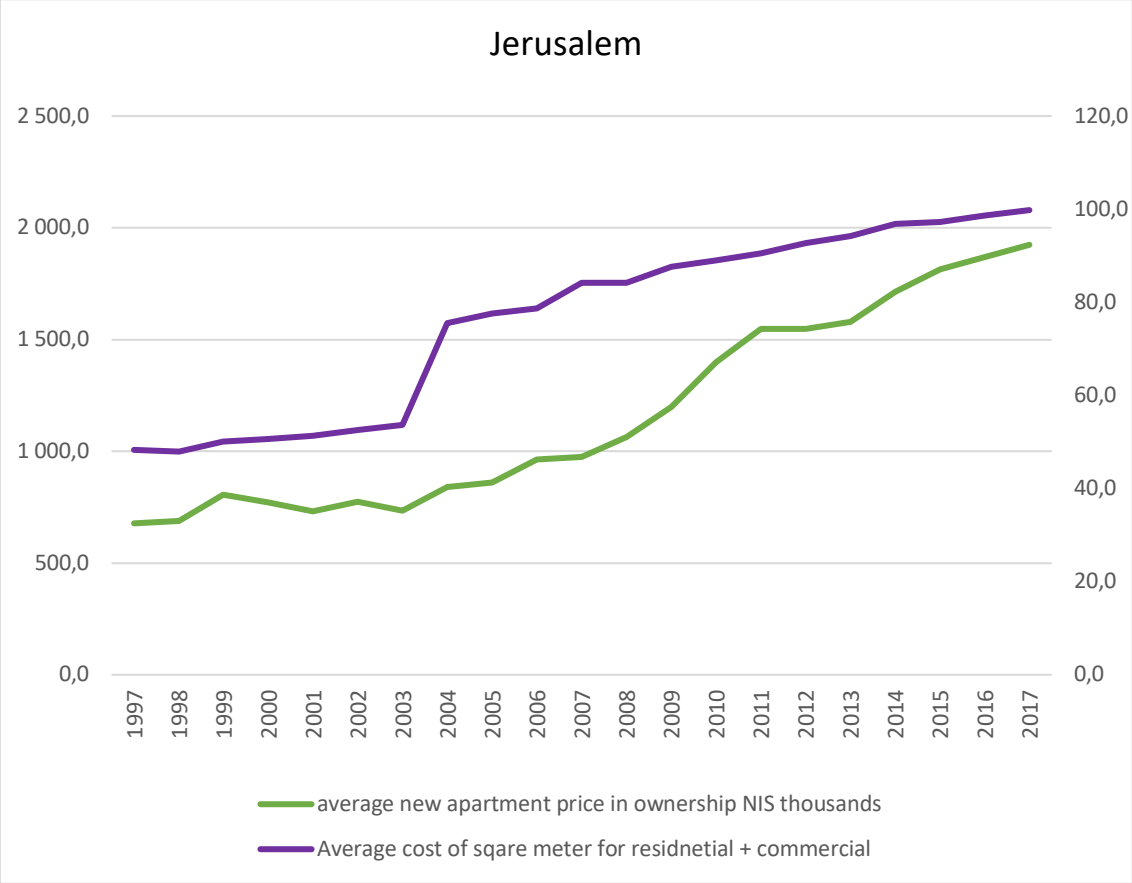


Explanations: X-axis – the timeline; Y-axis (orange line) – total property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 9. The changes in total revenue from property tax (residential + commercial) and average new housing prices in the years 1997-2017 in Jerusalem

***Source**:* the author's own calculations based on the CBS data

Figure 9 presents total revenue from property tax (residential + commercial) (orange line). The property tax on non-residential property includes a wide variety of property uses, including commercial uses (such as offices, banks, retail outlets, restaurants and hotels), industrial uses (such as mines, manufacturing plants and shipyards), and particular uses (such as pipelines and railway rights-of-way). In most developed countries, including Israel, the property tax on commercial property is much more expensive than the residential property tax.

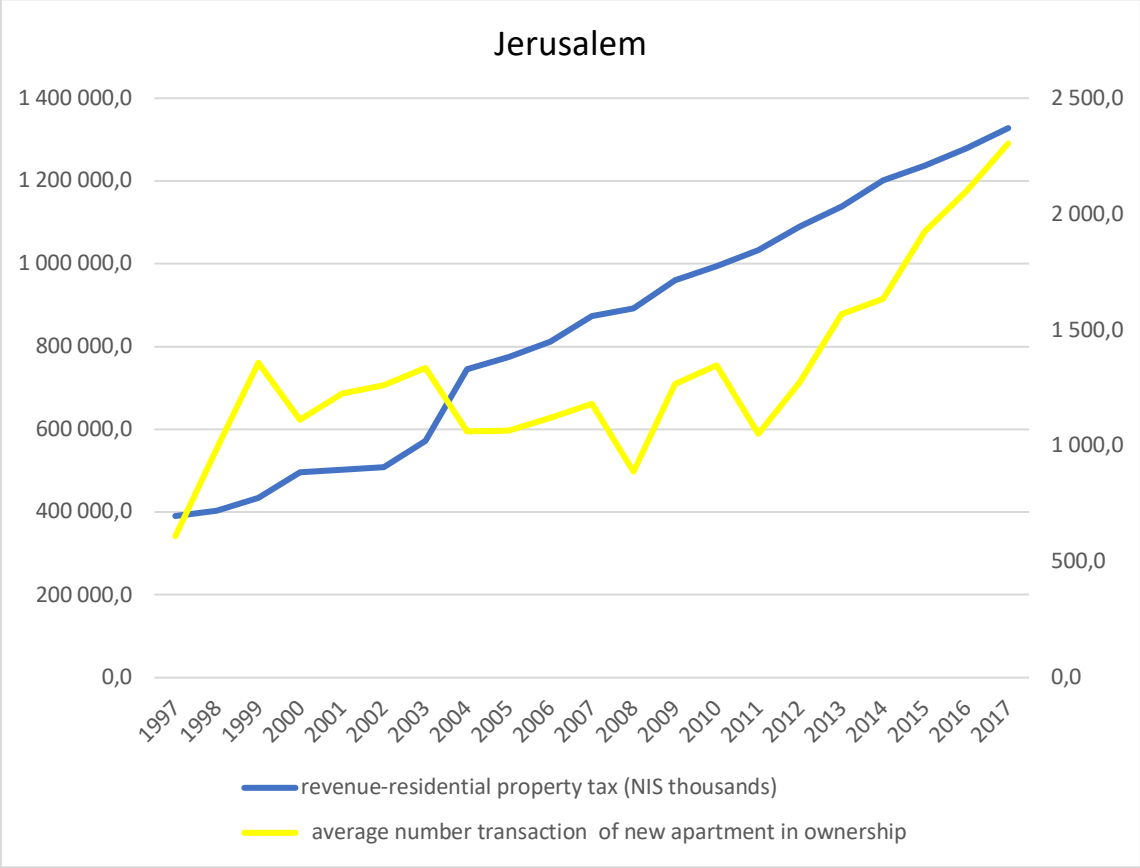


Explanations: X-axis – the timeline; Y-axis (purple line) – total residential + commercial property tax by the square meter; Y-axis (green line) – average housing price in thousand NIS

Figure 10. The average cost per square meter for residential + commercial property and average new housing prices in the years 1997-2017 in Jerusalem

***Source**:* the author's own calculations based on the CBS data

Figure 10 shows that the average cost per square meter for residential + commercial property in Jerusalem is relatively moderate, i.e. it doubled over 20 years (purple line).

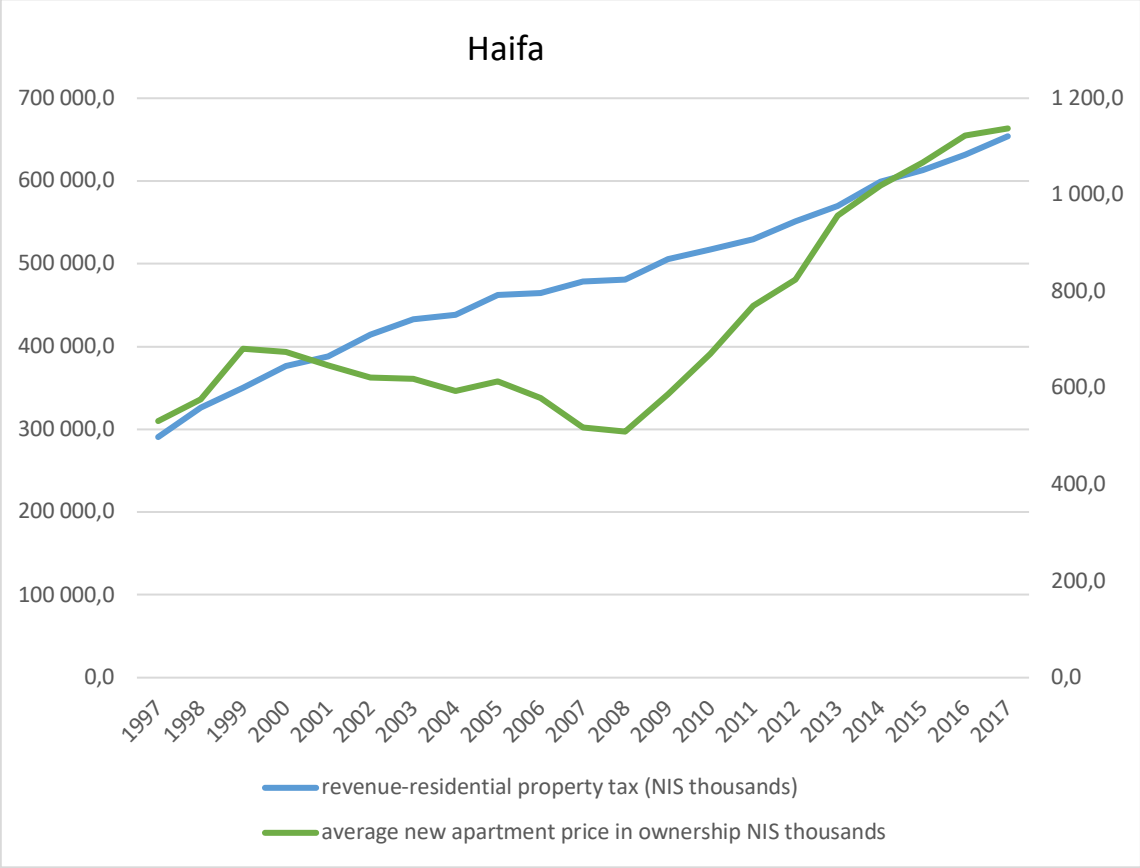


Explanations: X-axis – the timeline; Y-axis (yellow line) – average number of transactions of new housing in ownership; Y-axis (blue line) – revenue from residential property tax.

Figure 11. Average number of transactions of new housing in ownership and revenue from residential property tax in the years 1997-2017 in Jerusalem

***Source**:* the author's own calculations based on the CBS data

Figure 11 shows that the revenue from residential property tax in Jerusalem in the years 1997-2017 increased together with the average number of transactions of new housing in ownership (yellow line); although the line is volatile, it shows a rising trend. What may be noticed is that the number of transactions decreased in the years 2007-2008, probably due to the subprime crisis.

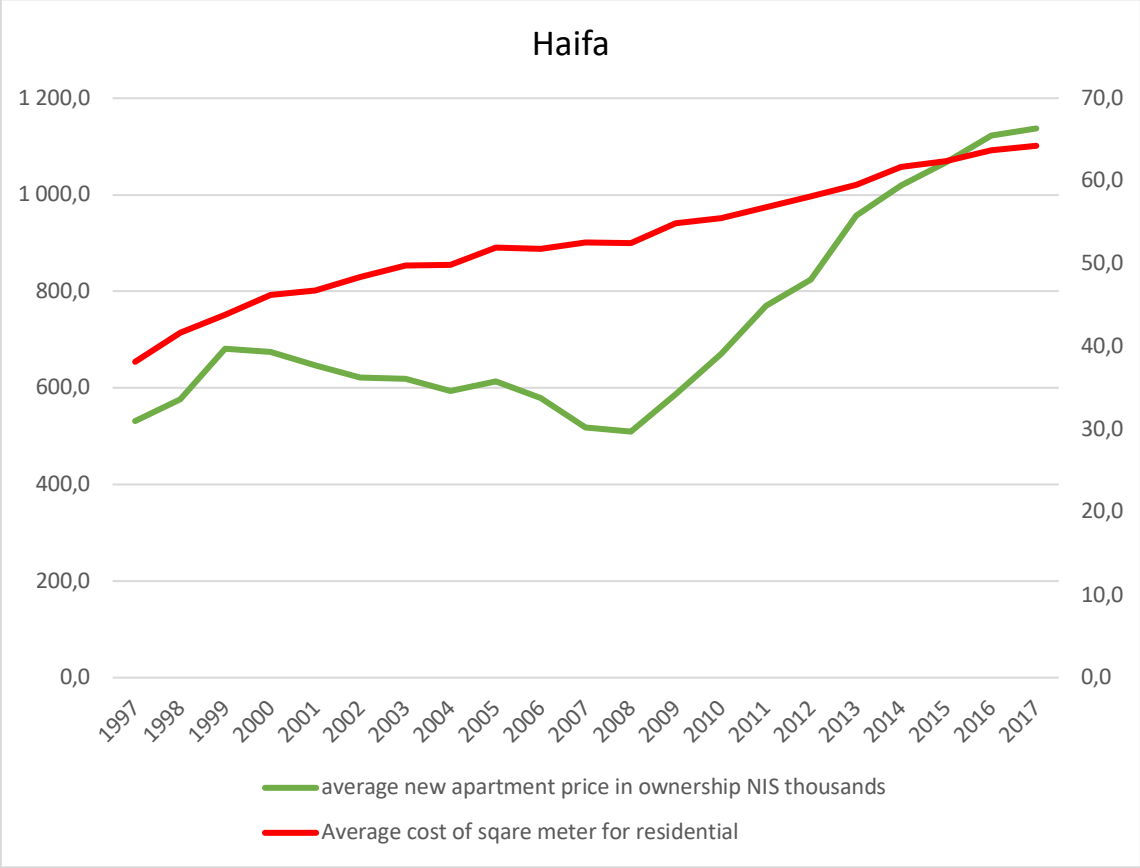


Explanations: X-axis – the timeline; Y-axis (blue line) residential property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 12. The influence of residential property tax revenue on new housing prices in the years 1997-2017 in Haifa

***Source**:* the author's own calculations based on the CBS data

Figure 12 presents an increase in the residential property tax revenue in Haifa but the average housing price in thousand NIS shows more fluctuation; still the trend is consistently rising, except for the 2007-2008 subprime crisis.

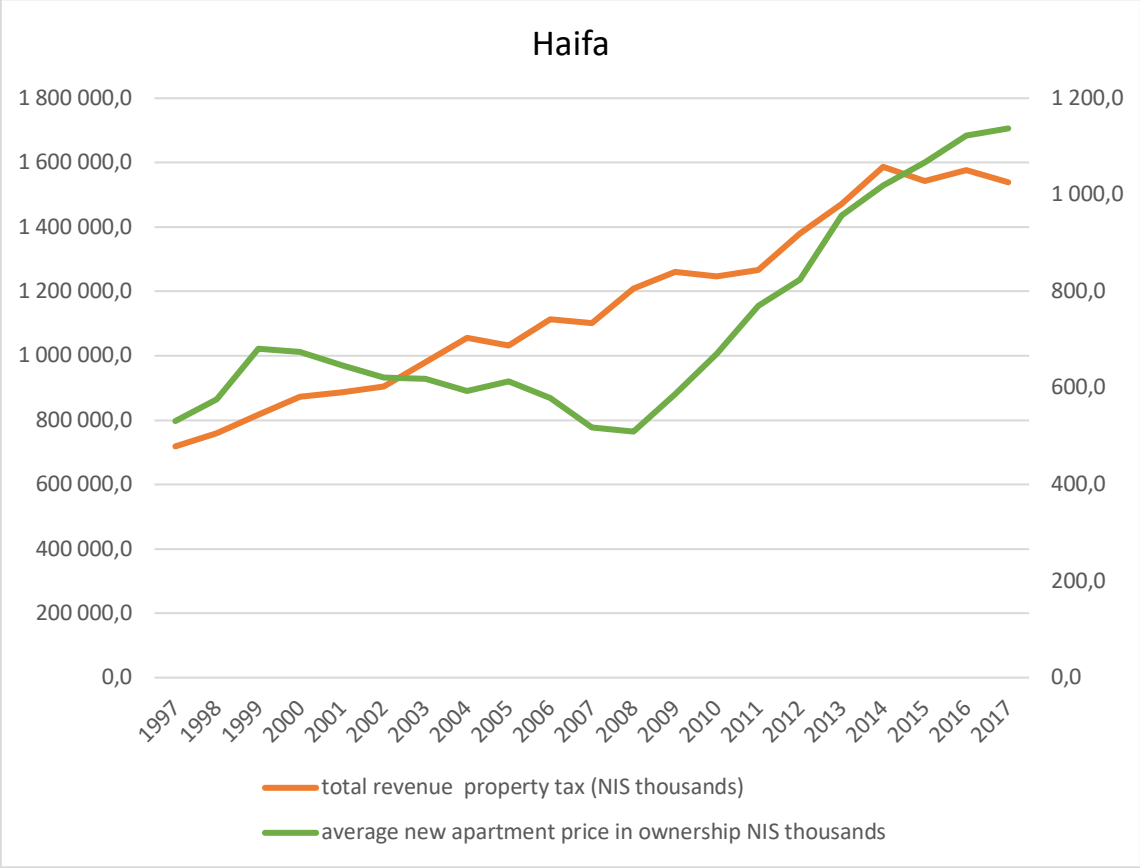


Explanations: X-axis – the timeline; Y-axis (red line) cost per square meter for residential property; Y-axis (green line) – average housing price in thousand NIS.

Figure 13. The influence of the cost per square meter for residential property on average new housing prices in the years 1997-2017 in Haifa

***Source**:* the author's own calculations based on the CBS data

Figure 13 illustrates the cost per square meter for residential property (red line) in Haifa rose less than two-fold for the 20 year-period. The average housing price (green line) also shows only a two-fold increase.

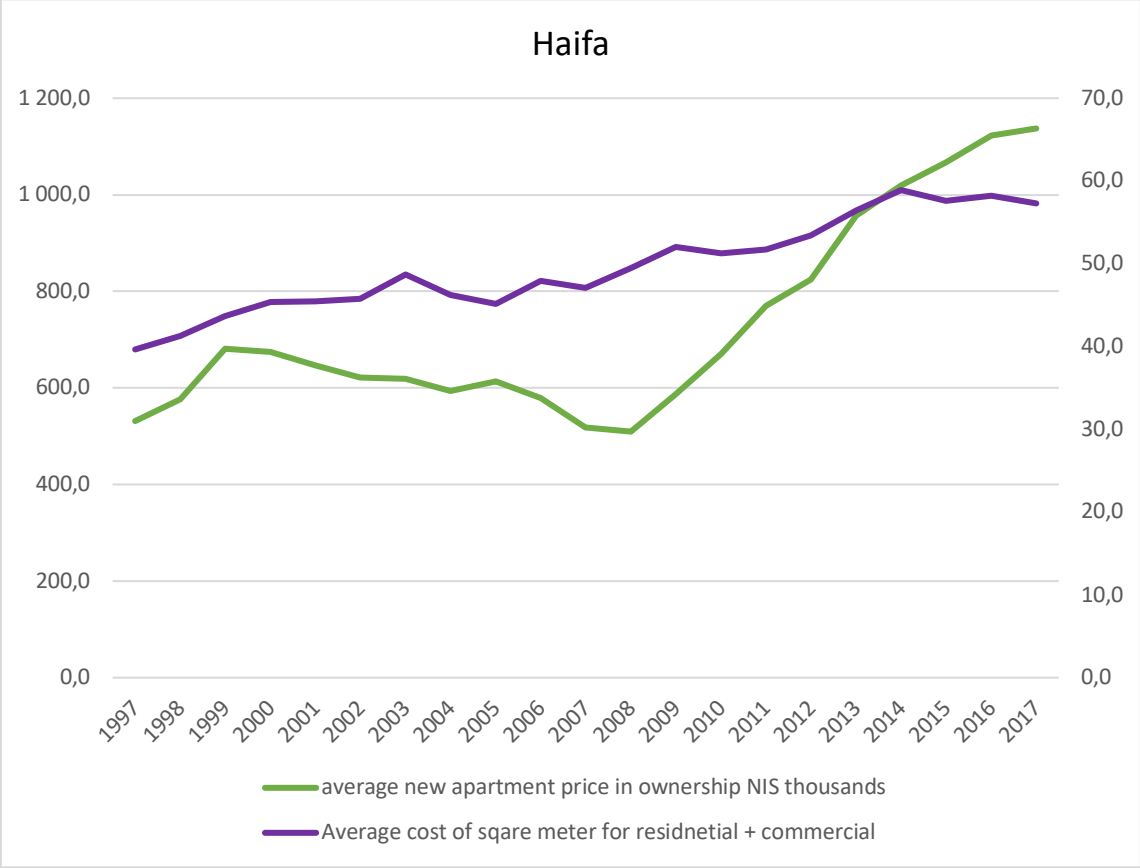


Explanations: X-axis – the timeline; Y-axis (orange line) – total property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 14. The changes in total revenue from property tax (residential + commercial) and average new housing prices in the years 1997-2017 in Haifa

***Source**:* the author's own calculations based on the CBS data

Figure 14 shows that the total revenue changes from property tax (residential + commercial; orange line) grows two-fold. The average new housing price (in thousand NIS) only doubled (green line) over 20 years in Haifa.

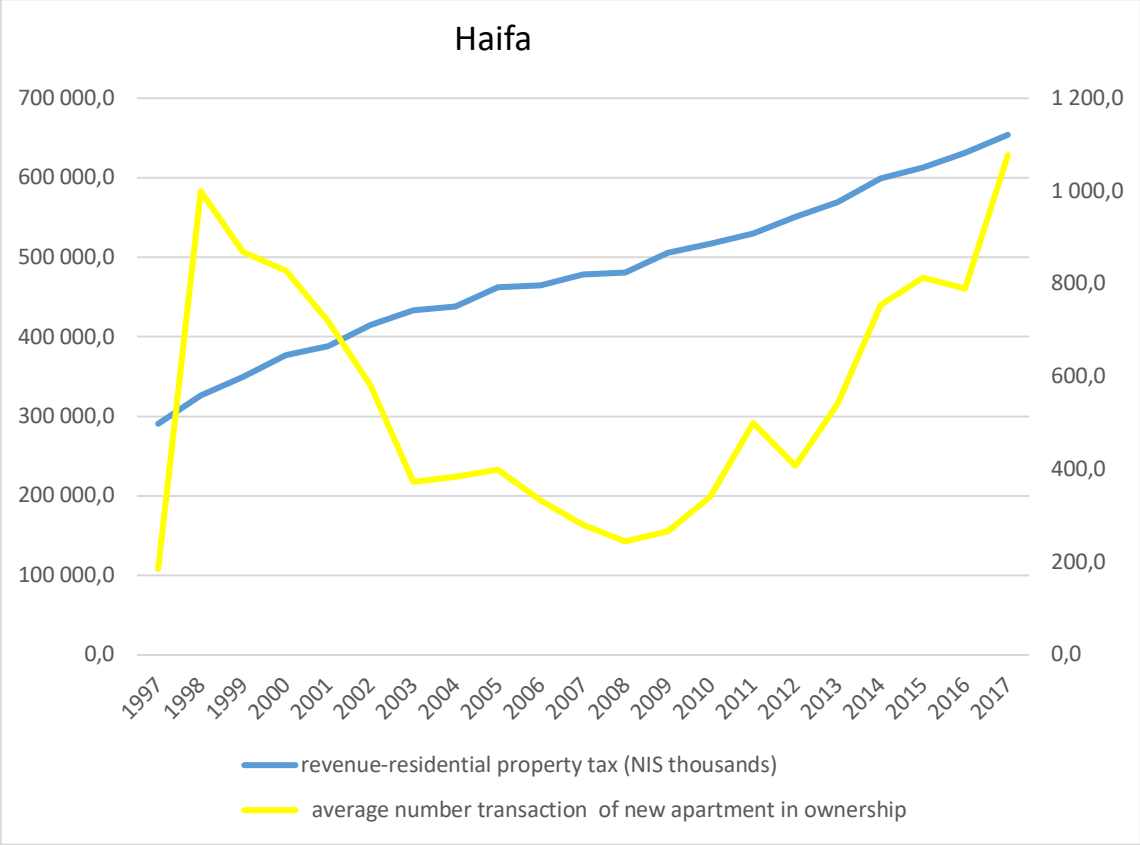


Explanations: X-axis – the timeline; Y-axis (purple line) – total residential + commercial property tax by the square meter; Y-axis (green line) – average housing price in thousand NIS.

Figure 15. The average cost per square meter for residential + commercial property and average new housing prices in the years 1997-2017 in Haifa

***Source**:* the author's own calculations based on the CBS data

Figure 15 shows the average cost per square meter for residential + commercial property (purple line); there was a relatively small rise in the years 1997-2017 in Haifa.

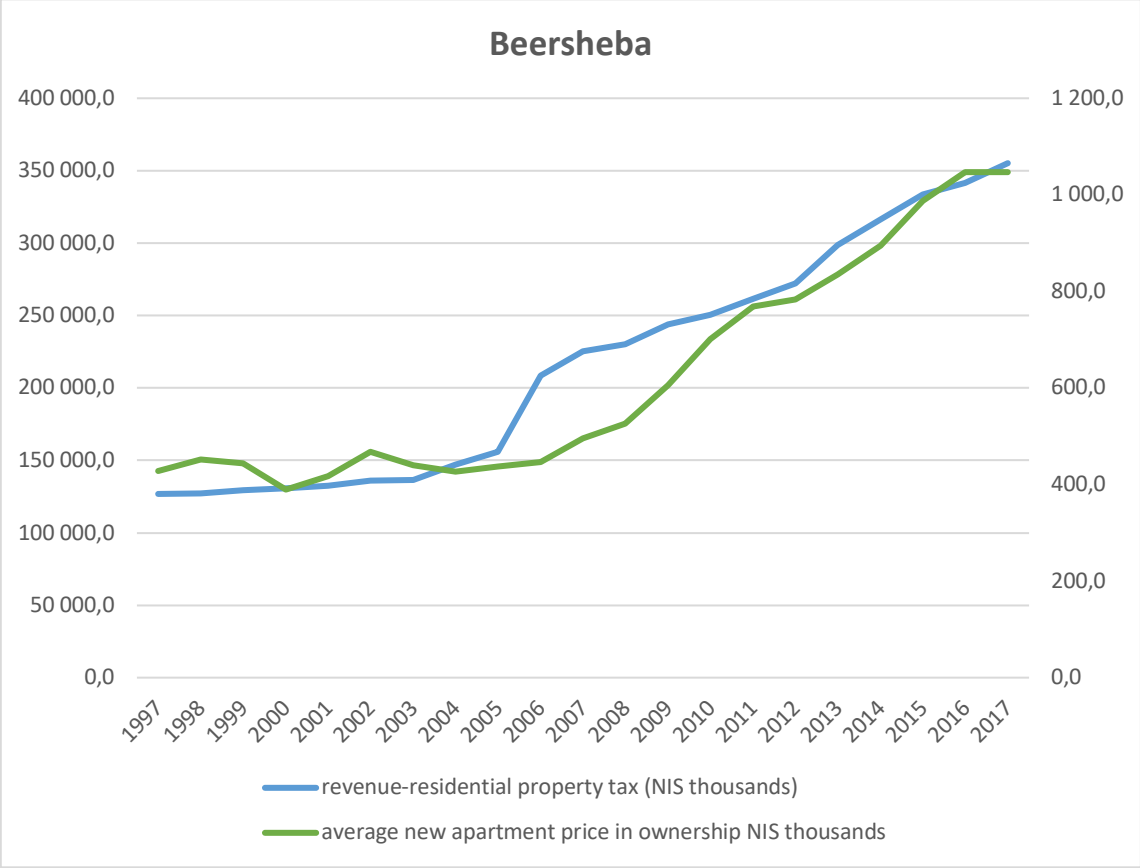


Explanations: X-axis – the timeline; Y-axis (yellow line) – average number of transactions of new housing in ownership; Y-axis (blue line) – revenue from residential property tax.

Figure 16. Average number of transactions of new housing in ownership and revenue from residential property tax in the years 1997-2017 in Haifa

***Source**:* the author's own calculations based on the CBS data

Figure 16 presents the average number of new housing transactions in ownership (yellow line), which is not stable. This instability could stem from other factors, as we can learn from the first theoretical chapter in this work. However, despite the revenue, the residential property tax still grows in the years 1997-2017 in Haifa (blue line).

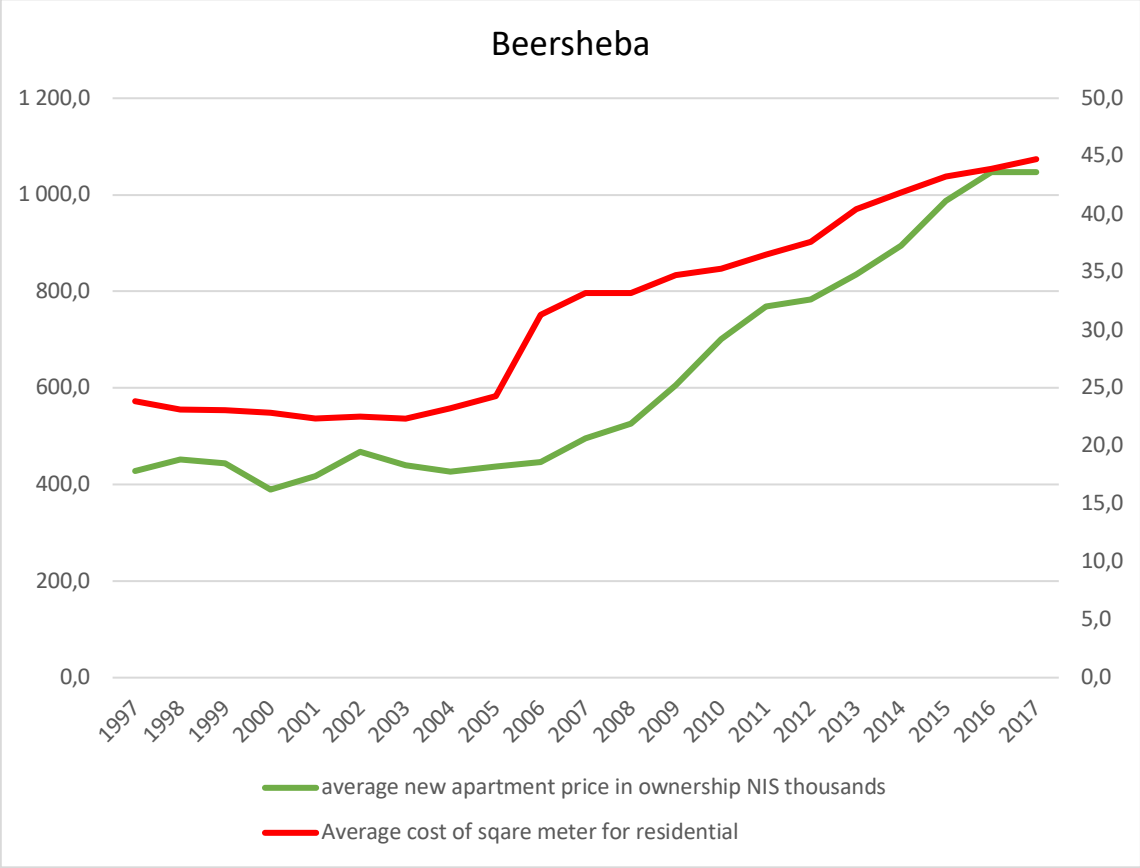


Explanations: X-axis – the timeline; Y-axis (blue line) residential property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 17. The influence of residential property tax revenue on new housing prices in the years 1997-2017 in Beersheba

***Source**:* the author's own calculations based on the CBS data

Figure 17 shows that in Beersheba, the residential property tax revenue and the average housing prices (in thousand NIS) increased simultaneously in the years 1997-2017. Generally, Beersheba is in a gap compared to the other cities. It is reflected in all aspects in this work.

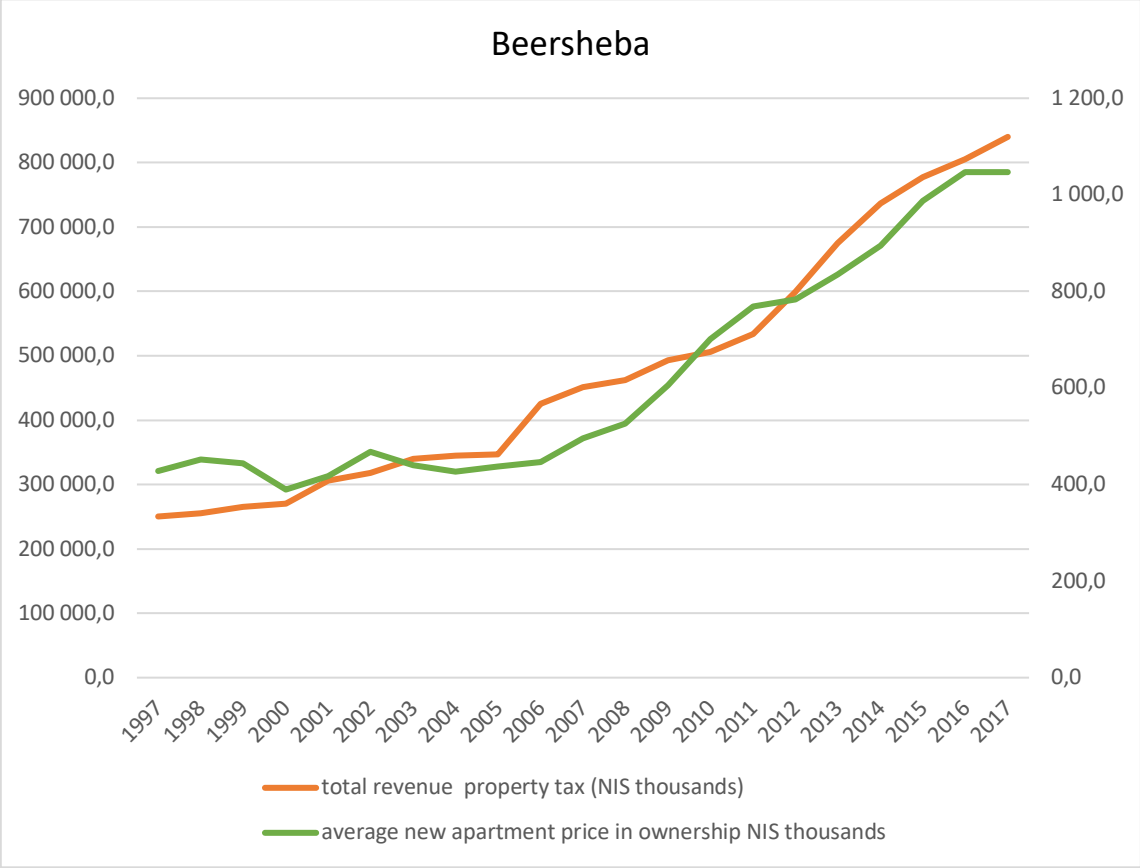


Explanations: X-axis – the timeline; Y-axis (red line) cost per square meter for residential property; Y-axis (green line) – average housing price in thousand NIS.

Figure 18. The influence of the cost per square meter for residential property on average new housing prices in the years 1997-2017 in Beersheba

***Source**:* the author's own calculations based on the CBS data

Figure 18 shows that there was a two-fold increase in the cost per square meter for residential property (red line) and almost a three-fold increase in new housing prices (green line) in the years 1997-2017 in Beersheba.

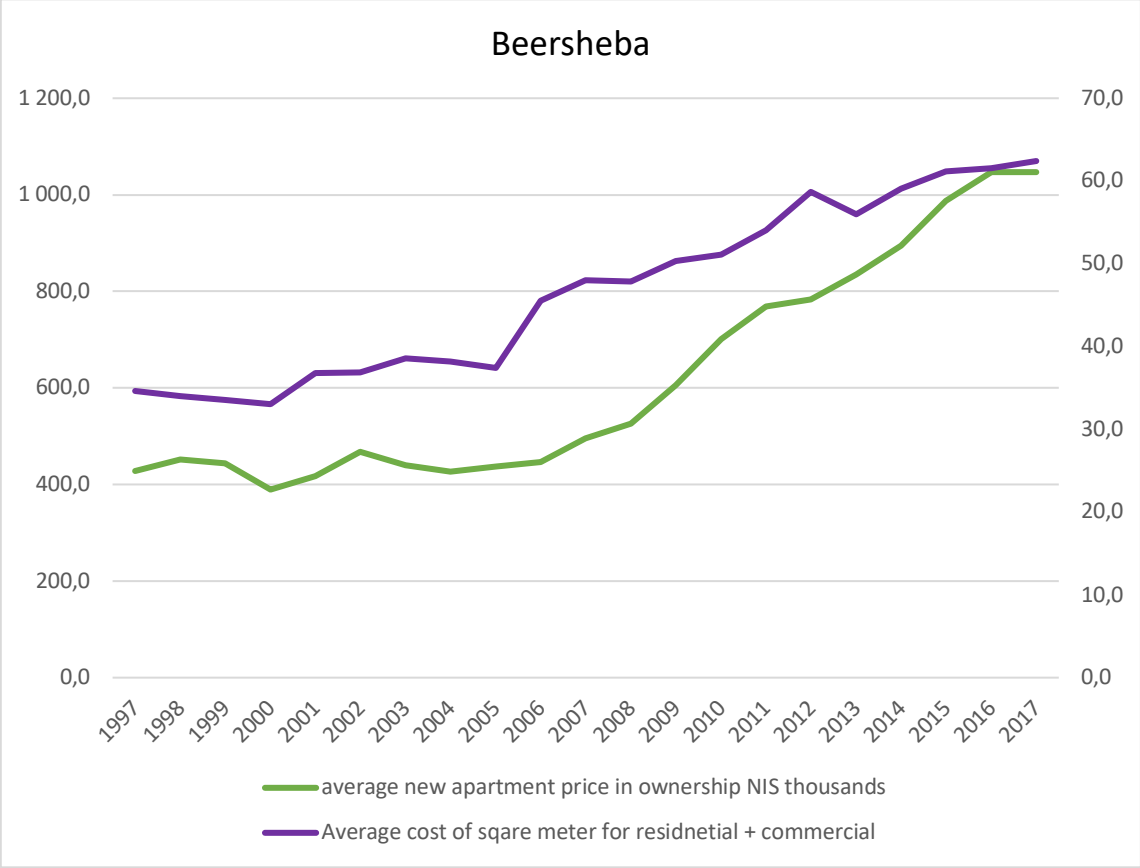


Explanations: X-axis – the timeline; Y-axis (orange line) – total property tax revenue; Y-axis (green line) – average housing price in thousand NIS.

Figure 19. The changes in total revenue from property tax (residential + commercial) and average new housing prices in the years 1997-2017 in Beersheba

***Source**:* the author's own calculations based on the CBS data

Figure 19 shows that the total revenue from property tax (residential + commercial; orange line) rose three-fold and it almost tripled in new housing prices (green line) in the years 1997-2017 in Beersheba. It is important to note that Beersheba has made significant progress in recent years, and the Israeli government has invested much money to develop this central city in the desert.

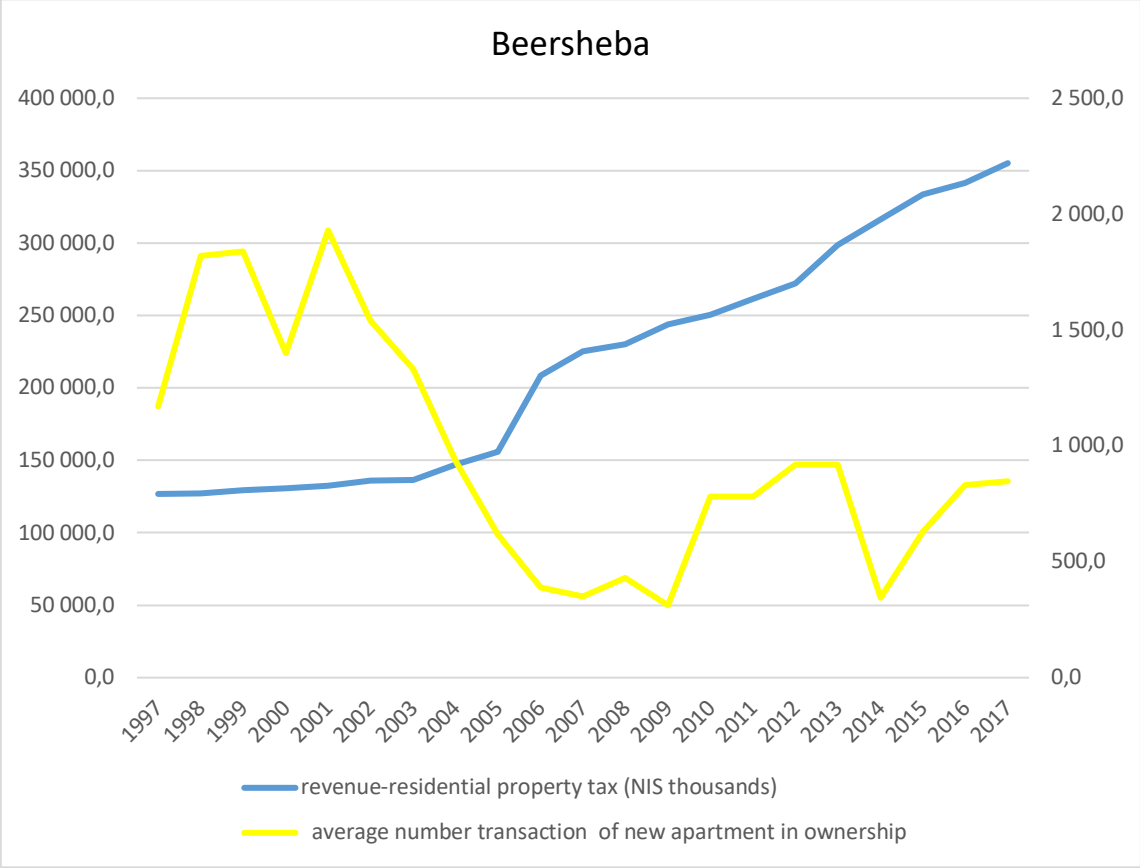


Explanations: X-axis – the timeline; Y-axis (purple line) – total residential + commercial property tax by the square meter; Y-axis (green line) – average housing price in thousand NIS.

Figure 20. The average cost per square meter for residential + commercial property and average new housing prices in the years 1997-2017 in Beersheba

***Source**:* the author's own calculations based on the CBS data

Figure 20 shows that there was a two-fold increase in the average cost per square meter for residential + commercial property (purple line) and almost a three-fold increase in new housing prices (green line). It is the same ratio as in the other cities, which stems from the fact that the tax rate is higher on non-residential property than on residential property.

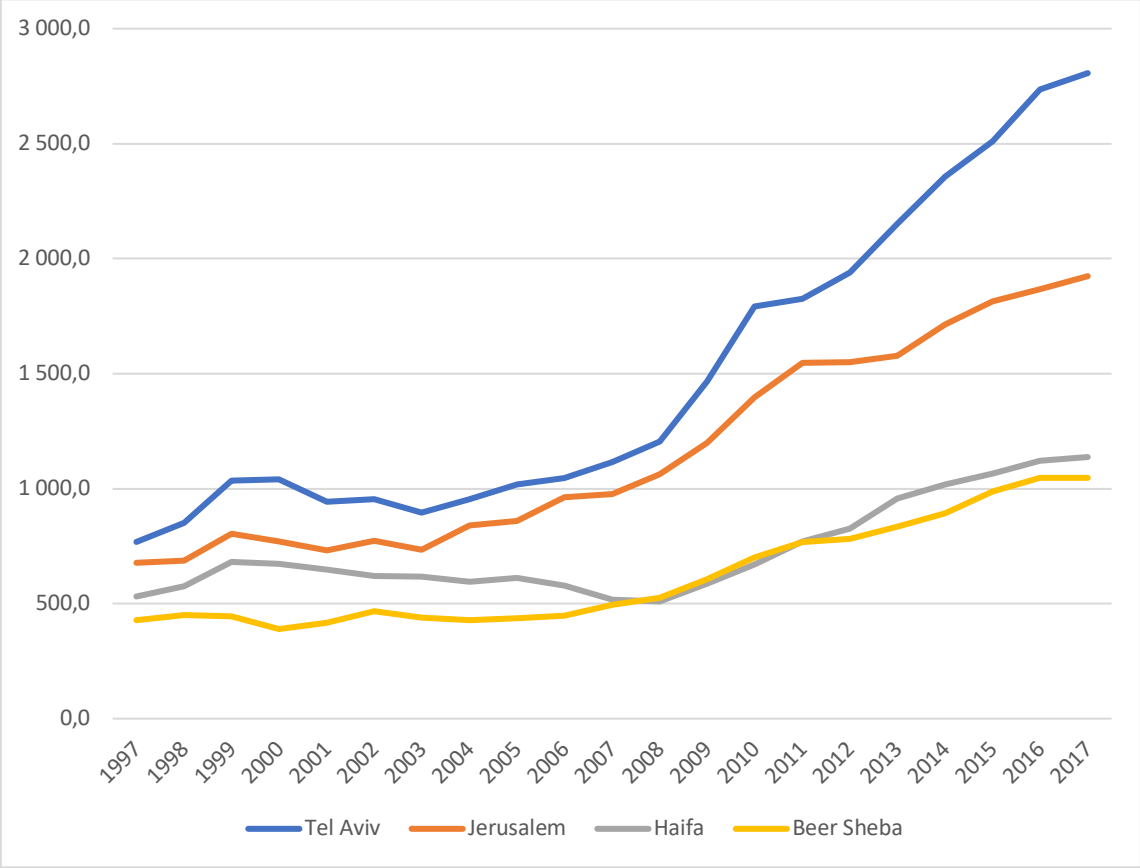


Explanations: X-axis – the timeline; Y-axis (yellow line) – average number of transactions of new housing in ownership; Y-axis (blue line) – revenue from residential property tax.

Figure 21. Average number of transactions of new housing in ownership and revenue from residential property tax in the years 1997-2017 in Beersheba

***Source**:* the author's own calculations based on the CBS data

Figure 21 shows that in Beersheba, even though the average number of transactions of new housing in ownership decreases, the revenue from the residential property tax increases. It may be explained by the fact that Beersheba decided to develop commercial property more in order to increase the revenues.

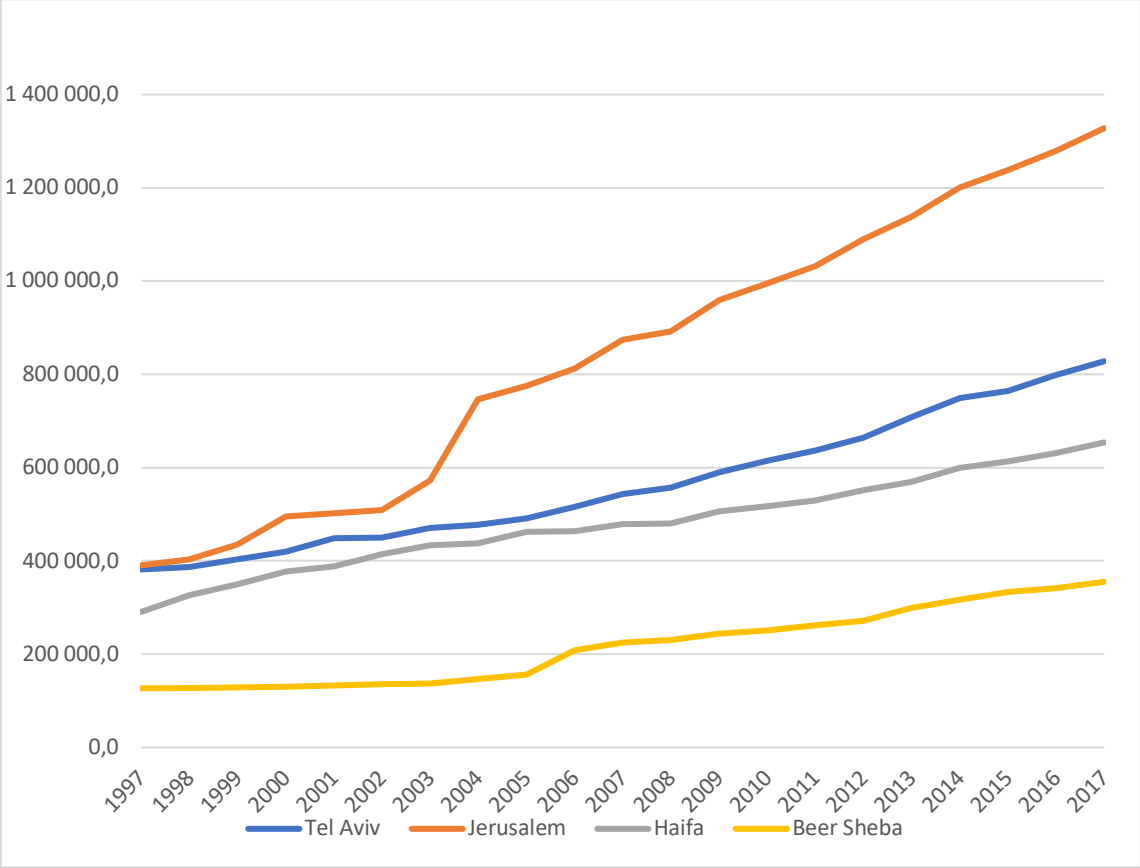


Explanations: X-axis – the timeline; Y-axis – average new housing prices in ownership (blue – Tel Aviv, orange – Jerusalem, grey – Haifa, yellow – Beersheba).

Figure 22. Average new housing prices in ownership (in thousand NIS) in the years 1997-2017

***Source**:* the author's own calculations based on the CBS data

Figure 22 presents the average new housing prices in ownership (in thousand NIS) for the four cities. As may be noted, there was a sharp rise in Tel Aviv and Jerusalem compared to Haifa and Beersheba, which means that housing is costly in Tel Aviv and Jerusalem.

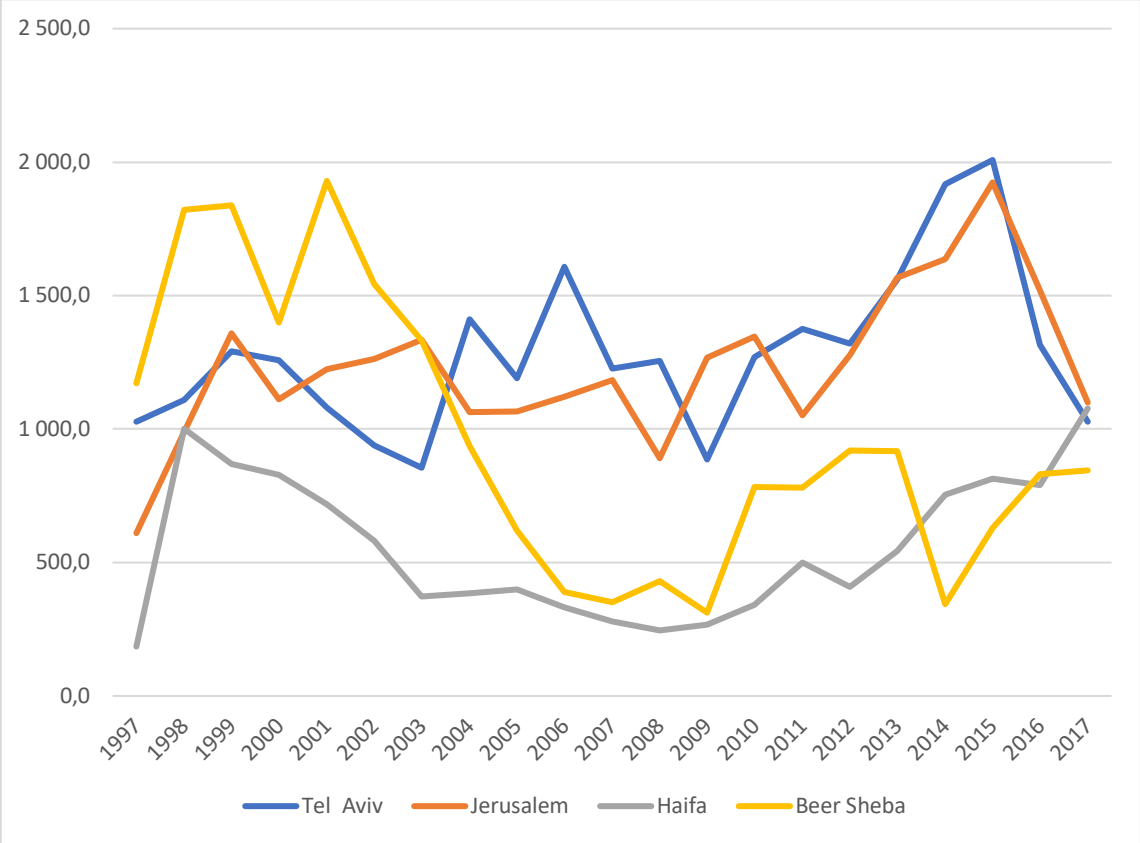


Explanations: X-axis – the timeline; Y-axis – revenue from residential property tax (blue – Tel Aviv, orange – Jerusalem, grey – Haifa, yellow – Beersheba).

Figure 23. Revenue from residential property tax (in thousand NIS) in the years 1997-2017

***Source**:* the author's own calculations based on the CBS data

Figure 23 illustrates a significant difference in revenue among the cities for the 20 year-period. However, in each city, it may be seen that the total revenue over 20 years was moderate. In turn, low property tax revenues lead to a decrease in municipal services. In the author's opinion, a dramatic decrease in the property tax revenue compared to the growing expenses created the crisis of the municipalities, which began in 1995 in Israel.

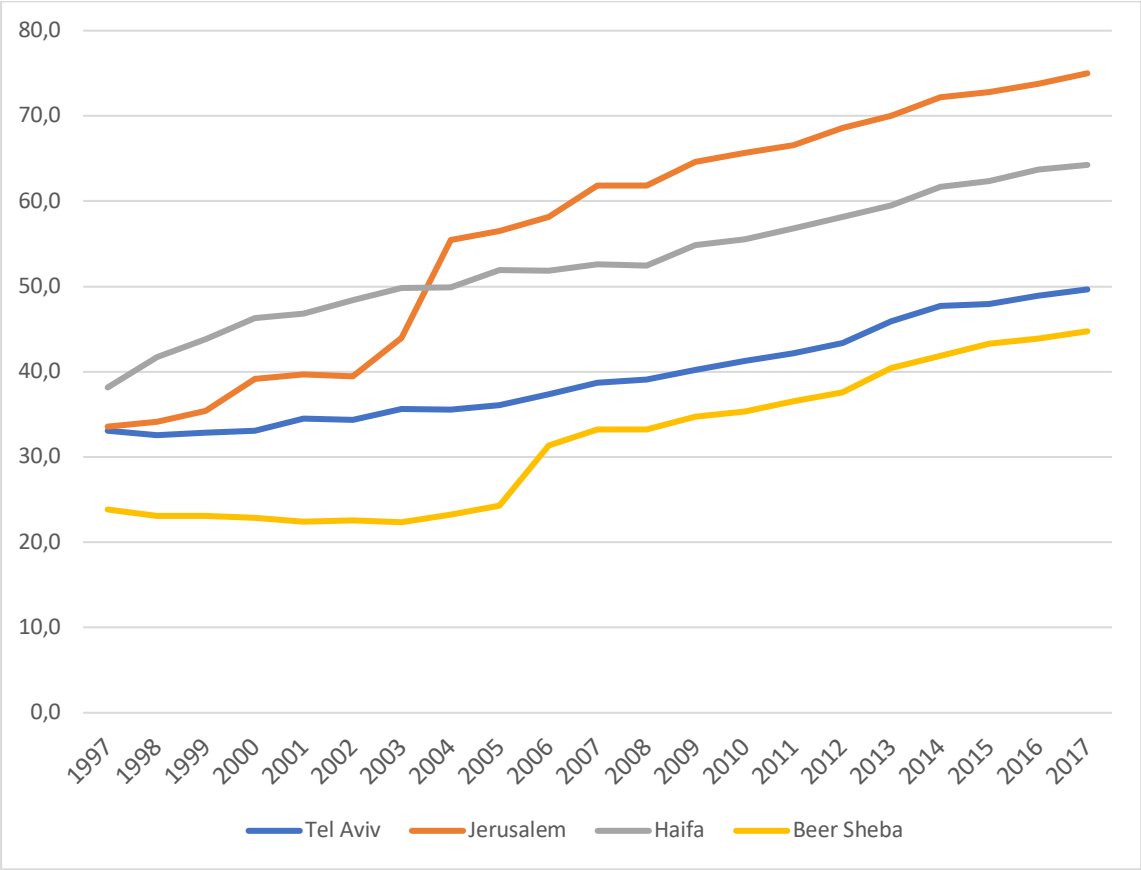


Explanations: X-axis – the timeline; Y-axis – average number of new housing transactions in ownership (blue – Tel Aviv, orange – Jerusalem, grey – Haifa, yellow – Beersheba).

Figure 24. Average number of new housing transactions in ownership in the years 1997-2017

***Source**:* the author's own calculations based on the CBS data

Figure 24 shows instability in all four cities. From 1997 to 1999, there was an increase in the number of transactions. However, much volatility began then, probably due to the low supply of new housing. According to the above figure, it is relative that Tel Aviv and Jerusalem maintained stability in contrast to Haifa and Beersheba.



Explanations: X-axis – the timeline; Y-axis – average cost per square meter for residential property (blue – Tel Aviv, orange – Jerusalem, grey – Haifa, yellow – Beersheba).

Figure 25. Average cost per square meter for residential property in the years 1997-2017

***Source**:* the author's own calculations based on the CBS data

Interestingly, the average rate of property tax per square meter in residential property in Tel Aviv for the 20 year-period is NIS 39.5 per square meter, while the average municipal tax rate in Jerusalem the same period is NIS 55.6 per square meter. This gap does not reflect the fact that Tel Aviv is in the socioeconomic cluster eight, while Jerusalem is in the socioeconomic cluster two. It may be explained by the fact that Tel Aviv bases most of its income from property tax on business rather than housing. It can also be seen that the average municipal tax rate in Haifa for the 20 year-period is NIS 52.9 per square meter and it is in the socioeconomic cluster seven, whereas the average municipal tax rate in Beersheba is NIS 31.6 per square meter (see Table 4).

Table 4. Property tax per meter – change between 1997 and 2017

City	1997	2017	Change
Tel Aviv	33.1	49.7	50.15%
Jerusalem	33.6	75	123.21%
Haifa	38.2	64.3	68.32%
Beersheba	23.8	44.7	87.81%

Source: the author's own calculations.

These differences indicate a municipal tax system that requires amendment. Because of these inequalities and unfairness, it is appropriate to make comprehensive municipal property tax rates. As a result of the government significantly reducing aid to the authorities, incentives were created by the authorities to increase property tax revenues, thus investing more in developing business centres and less in residential neighbourhoods, which indirectly contributed to the low supply that did not meet the demand, and consequently increased housing prices.

The tax base was limited by the extreme disparity between the four cities surveyed. This distortion does not only result in inequality, but it also causes financial damage to the authorities, and thus loses a large part of the municipal tax revenue resulting from the decline in the residents' quality and the quality of services.

Israel's government has dealt with housing prices without much sharing with the local authorities. It would be desirable for the central government to provide incentives such as land deforestation and financial aid to the authorities, building residential neighbourhoods, and increasing the housing supply within the municipalities.

3.4. Policy recommendations

Municipal property tax is significant since it affects every property. Although the authorities are the ones who levy the municipal tax, the Israeli government remains involved in all things related to this tax. For example, it sets the minimum and maximum rates of municipal tax rates every year and decides on all requests for authorities on property tax issues, such as

who is entitled to receive full discounts and exemptions or part of the property tax. Therefore, the authorities are constrained and have to act following government policy.

To the best of the author's knowledge, this is the first study that examines the association between housing prices and property tax in Israel. Hence, the results are essential for policy-makers both at the municipal and government levels, with the following implications and recommendations:

Firstly, the main result of this study is the positive relationship found between property tax and housing prices. Hence, policy-makers need to understand the close relationship between these two parameters. A similar increase in both costs could lead to greater inequality in the population, because it creates two groups: on the one hand, families that could afford both high housing prices and high property tax, and on the other hand, families that could only afford low-price and low property tax houses. This pattern is highly essential since the government and municipalities could reduce the inequality at least partially by regulating the property tax.

Secondly, the findings of the study contribute to preparing interventions in both the government and local authorities dealing with care problems and coping with rising housing prices. As has been widely discussed in the first chapter, housing market prices are influenced by many parameters, with some of them being under the government's ability to control (e.g. bank interest). Hence, when affecting these parameters, both housing prices and property tax might decline.

Thirdly, the results of the study shed light on the multiple and indirect influence of the property tax on housing prices in Israel, which explains why contractors, when selling housing, do not necessarily inform the buyers about the cost of property taxes. It has been recommended that the tariff of property tax shall be clear and accessible to the public.

3.5. Summary

To conclude, these results emphasise the importance of property tax as a tool to control housing prices. The findings show a positive correlation between the housing prices and property taxes in all the cities and municipalities in this study despite the socioeconomic status variance. Since the municipal tax is one of the most significant sources of income for

all authorities, public financing principles are broadly concerned with issues arising from the authorities' decision-making processes, the tax structure and the nature of the municipal tax.

Government assistance to the local municipality should be proportionate to the socioeconomic cluster. The government has to re-examine the entire property tax exemption criteria and exemptions, since the criteria have not been discussed for many years. It is recommended for policy-makers to establish a committee or authority that will determine national uniformity when it comes to asset classifications to collect the property tax that is appropriate for residential and business property.

More autonomy should be given to municipal tax authorities, on the one hand, because they know and understand the needs of the residents well and, on the other hand, they continue to monitor and control the government. Therefore, it is crucial to reduce the centralisation of the central government.

The government must encourage and assist the authorities by allocating land for residential construction and developing new neighbourhoods to meet the demand. It is recommended that the property tax should be imposed only on the property owners and not on the tenants since the renters abandon the property and leave property tax obligations to the authorities. As a result, the authorities begin to have deficits.

It is advisable to open a mechanism for the authorities to warn them that the taxpayer is likely to fail to pay the municipal tax. Such a warning to the taxpayer should help avoid accumulating debt.

Testing the property tax revenue based on the property area measurement concerning property values, it may be concluded that housing prices grew dramatically in Israel in the twenty-year period. The property tax revenue does reflect the property's value due to the lack of property tax in Israel.

Chapter 4.

Empirical analysis of the property tax and housing prices in Tel Aviv, Jerusalem, Haifa and Beersheba

4.1. Research methodological framework

4.1.1. The spatial scope and selection of case studies

To examine the main objective of this work, the case of Israel has been chosen. Mainly, the data is based on four cities in Israel: Tel Aviv, Jerusalem, Haifa and Beersheba. All of these cities are urban cities, which makes it possible to compare similar tax collecting methods. These cities have been chosen due to the following reasons:

1) each city represents a regional district, and therefore it serves as the metropolis of its district: Haifa in the northern district, Beersheba in the south, Tel Aviv in the central district and Jerusalem in the eastern district. It also includes the capital city, and therefore represents a broad picture,
2) each city represents a different socioeconomic level: Tel Aviv – 8 out of 10, Haifa – 7 out of 10, Beersheba – 5 out of 10 and Jerusalem – 2 out of 10.

The size and composition of the population vary between these cities: in Jerusalem, there are 919,400 residents including the Arab minority; Haifa has 283,600 residents including the Arab minority; Beersheba has a Bedouin minority, and a total population of 209,000; Tel Aviv has an Arab minority (who live in the city called Jaffa) and has a total of 451,500 residents. The volume of residential property tax revenues for different housing prices varies from city to city, so the selected cities provide a broad picture of trends when considering the influence of property tax on housing prices. Hence, a comparison between these cities is essential to present a relatively representative picture of the Israeli population.

4.1.2. Time scope and data description

The data covers the period from 1997 to 2017. During those years, the housing market in Israel went through enormous changes. When the demand for housing rapidly increased, prices almost doubled within 10 years (2007-2017). To manage and regulate such a change, the government decided on tax activities. Therefore, this period is extremely informative in understanding the influence of the tax policy on the housing market in Israel.

The data on housing prices and property taxes was gathered from three primary sources**:**

- The Central Bureau of Statistics of Israel,
- The Ministry of Treasury
- The Bank of Israel.

The data was gathered for two main variables**:**

1) Independent variables**,**
   a) the average property tax revenue from the residential property (in thousand NIS),
2) dependent variables**,**
   b) the average prices of new housing in ownership (in thousand NIS),
   c) the number of new housing sold in ownership (transactions).

4.1.3. Statistical analysis tools

Descriptive statistics, ANOVA analysis and regression estimates are used in this chapter. First, descriptive statistics were made for each city to describe the distribution of each city's variables. The type of distribution affects the statistical tests that were chosen and the differences between the cities were computed by one-way ANOVA and Tukey post hoc tests. A one-way ANOVA is a statistical test that compares the variance in the group means within a sample while considering only one independent variable or factor. This procedure test is hypothesis-based, meaning that it aims to evaluate multiple mutually exclusive theories about a data set.

A correlation matrix between the variables was done for each city separately, and the cities' average. The changes in residential property tax revenue (in thousand NIS) for the years 1997-2017 are shown via scatter plots for each city and the cities' average. Finally, linear regression was done for each city separately and for the cities' average to compare them.

These regression estimates are used in order to explain the relationship between a dependent variable and independent variables. The formula defines the simplest form of the regression equation with one dependent and one independent variable:

$$y = c + b*x$$

where:

y = estimated dependent variable score,

c = constant,

b = regression coefficient,

x = score on the independent variable.

The level of significance of the analyses is 5%.

Several assumptions were made in the regression model calculations, as outlined below:

1) there is a linear relationship between the explanatory variable and the explained variable,
2) homoscedasticity: the variance of random disturbances is constant for each observation,
3) there is no correlation between random disturbances,
4) no or little multicollinearity,
5) random disturbances are normally distributed.

The data has been analysed using SPSS software version 25.

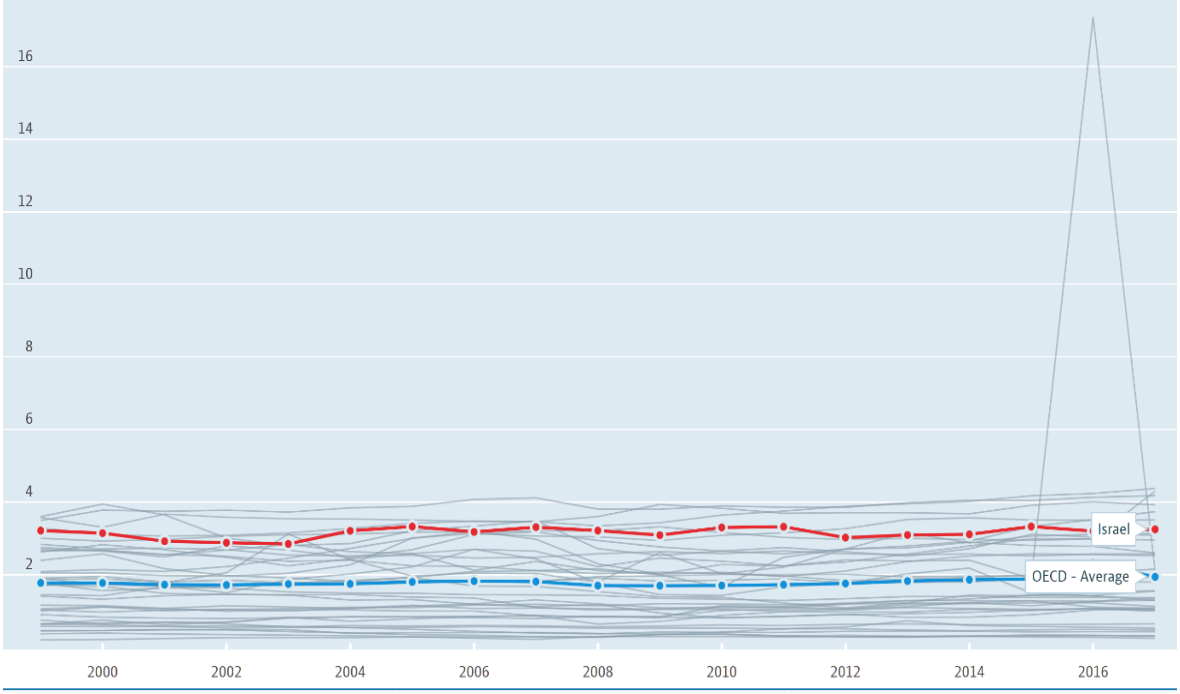
4.2. Results of descriptive statistics

Tables (5-8) describe the descriptive statistics of the annual average housing price owned by tenants (in thousand NIS), the number of transactions (number of new housing in ownership sold), the Bank of Israel interest rate, the residential property tax (in thousand square meters), the CPI, the residential property tax revenue (in thousand NIS), the Housing Price Index and the number of inhabitants (in thousands) for the cities of Tel Aviv, Jerusalem, Haifa and Beersheba (respectively) in the years 1997-2017.

The values of the Bank of Israel interest rate, CPI and the Housing Price Index are the same in all tables. The mean Bank of Israel interest rate is 4.46 (SD = 4.04), with a median of 3.67

and a range of 0.10 – 13.60. The mean CPI is 107.61 (SD = 15.68), with a median of 103.30 and a range of 98.90 – 158.10. The mean Housing Price Index is 247.66 (SD = 78.80), with a median of 196.51 and 182.36 – 410.29. Over the years, the property tax was about 3% of the GDP in Israel in comparison with about 1.7% of the GDP in the OECD average.

Figure 26 shows that the average tax burden on Israel's properties is almost twice (3%) the average tax burden practiced in the OECD countries (1.7%). As a political step, the Israeli government has raised indirect taxes and avoided raising direct taxes. They also show that the property tax in Israel is very significant.



Note: The figure reflects recurrent and non-recurrent property taxes. Individual lines present each OECD country. What is highlighted in the above table is Israel's property tax – the red line, in comparison to the property tax in the OCED average – the blue line.

Figure 26. Comparison between Israel's and OECD's average in property tax (% of GDP)

Source: based on https://data.oecd.org/tax/tax-revenue.htm

4.2.1. The case of Tel Aviv

Tel Aviv is the second largest city in Israel, the city of the economic and technological centre. It is ranked 25th in the Global Financial Centres Index. Tel Aviv has the largest economy per capita in the Middle East. Moreover, the city ranks 31st with the highest cost of living in the world. Tel Aviv has a population of 451,523 spread over 52,000 dunams (52 km^2; 20 sq. mi).

According to the data from the Central Bureau of Statistics (CBS), as of 2009, Tel Aviv's population is growing at an annual rate of 0.5 percent. Jews constitute 91.8 percent of the population; Muslims, Arabs and Christians make up 4.2 percent, and the remainder belongs to other groups (including various Christian and Asian communities). In Tel Aviv, many languages are spoken in addition to Hebrew. Furthermore, according to some estimates, about 50,000 undocumented African and Asian foreign workers live in the city. Compared with Western cities, crime in Tel Aviv is relatively low.

Tel Aviv's population reached a peak in the 1960s at around 390,000, but decreased to 317,000 in the late 1980s, because high property prices forced families out. Since the 1990s, the population has steadily grown. Today, the population is young and growing. In 2006, 18,500 people left, and 22,000 people moved to the city; the average age of residents was 35.8 in 1983 and 34 in 2008. The population over the age of 65 stands at 14.6 percent compared with 19% in 1983.

The mean annual average housing price owned by tenants (in thousand NIS) is 1495.84 (SD = 675.57), with a median of 1115.30 and a range of 768.20 – 2806.70. The mean number of transactions (number of new housings in ownership sold) is 1282.29 (SD = 300.98), with a median of 1258.00 and a range of 855.00 – 2008.00.

The average cost of a square meter is 39.53 (SD= 5.79), with a range of 32.55 – 49.65. The mean residential property billing space (in thousand square meters) is 14130.94 (SD = 1471.33), with a median of 14037.50 and a range of 11534.00 – 16678.00. The mean residential property tax revenue (in thousand square meters) is 14130.63 (SD = 1471.33), with a median of 14037.50 and a range of 11534.00 – 16678.00. The mean residential property tax revenue (in thousand NIS) is 27298.89 (SD = 3735.15), with a median of 29437.70 and a range of 19437.00 – 31439.00.

The mean Revenue of residential property (in thousand NIS) is 566489.48 (SD = 141451.38), with a median of 542990.00 and a range of 381713 – 828150. The mean number of inhabitants (in thousand) is 389.78 (SD = 31.58), with a median of 390.10 and a range of 347.20 – 443.90.

The socioeconomic cluster of Tel Aviv is eight (out of 10, the highest score).

Table 5. Descriptive statistics of the variables for the city of Tel Aviv

Variable	Mean (SD)	Median	Range
Average cost per square meter	39.53 (5.79)	38.68	32.55 – 49.65
Annual average housing price owned by tenants (in thousand NIS)	1495.84 (675.57)	1115.30	768.20 – 2806.70
Number of transactions (number of new housing in ownership sold)	1282.29 (300.98)	1258.00	855.00 – 2008.00
Bank of Israel interest rate	4.46 (4.04)	3.67	0.10 – 13.60
Residential property billing space (in thousand square meters)	14130.94 (1471.33)	14037.50	11534.00 – 16678.00
Total property tax (in thousand square meters)	27298.89 (3735.15)	29437.70	19437.00 – 31439.00
Consumer Price Index	107.61 (15.68)	103.30	98.90 – 158.10
Total property tax revenue (in thousand NIS)	2054694.14 (887592.66)	2073198.00	1.485.31 – 3186578.00
Revenue from residential property (in thousand NIS)	566489.48 (141451.38)	542990.00	381713 – 828150
Housing Price Index	247.66 (78.80)	196.51	182.36 – 410.29
Number of inhabitants (in thousand)	389.78 (31.58)	390.10	347.20 – 443.90

Source: the author's own calculations based on CBS data.

4.2.2. The case of Jerusalem

Jerusalem – the capital city of Israel, also called the holy city – is the most populated city in Israel. Its population in 2016 was 882,700 people, of which Jews comprised 60.8% (536,600), Muslims – 36.2% (319,800), Christians – 1.8% (15,800), and unclassified – 1.2% (10,300). The demographics, and especially the Jewish-Arab population division, play a significant role in the dispute over Jerusalem. In 1998, the Jerusalem Development Authority proposed expanding the city limits to the west to include more areas densely populated by Jews.

The mean annual average housing price owned by tenants (in thousand NIS) is 1165.53 (SD = 440.18), with a median of 975.60 and a range of 677.60 – 1923.90. The mean number of transactions (number of new housing in ownership sold) is 1233.57 (SD = 281.07), with a median of 1225.00 and a range of 610 – 1924.

The average cost of a square meter is 54.69 (SD= 13.51), with a range of 33.56 – 73.74. The mean residential property billing space (in thousand square meters) is 14427.98 (SD = 1869.68), with a median of 14144.00 and a range of 11635.00 – 17703.60. The mean residential property tax revenue (in thousand square meters) is 23237.82 (SD = 3132.84), with a median of 22878.00 and a range of 18231.00 – 28842.60. The mean residential property tax revenue (in thousand NIS) is 1753619.90 (SD = 611382.63), with a median of 1869480.00 and a range of 880509 – 2790970.00. The mean revenue from residential property (in thousand NIS) is 825581.76 (SD = 300156.44), with a median of 871861.00 and a range of 390510.00 – 1327874.00. The mean number of inhabitants (in thousand) is 751.90 (SD = 85.11), with a median of 747.60 and a range of 627.80 – 910.30.

Table 6. Descriptive statistics of the variables for the city of Jerusalem

Variable	Mean (SD)	Median	Range
Average cost per square meter	54.69 (13.51)	56.53	33.56-73.74
Annual average housing price owned by tenants (in thousand NIS)	1165.53 (440.18)	975.60	677.60 – 1923.90
Number of transactions (number of new housing in ownership sold)	1233.57 (281.07)	1225.00	610 – 1924
Bank of Israel interest rate	4.46 (4.04)	3.67	0.10 – 13.60
Residential property billing space (in thousand square meters)	14428.03 (1869.63)	14144.00	11635.00 – 17703.60
Total residential property tax (in thousand square meters)	27299.08 (3735.08)	22878.00	18231.0 28842.6
CPI	107.61 (15.68)	103.30	98.90 – 158.10
Total property tax revenue (in thousand NIS)	1753619.90 (611382.63)	1869480.00	880509 – 2059650
Revenue from residential property (in thousand NIS)	825581.76 (300156.44)	871861.00	390510.00 – 1327874.00
Housing Price Index	247.66 (78.80)	196.51	182.36 – 410.29
Number of inhabitants (in thousand)	751.90 (85.11)	747.60	627.80 – 910.30

Source: the author's own calculations based on CBS data.

4.2.3. The case of Haifa

Haifa is the third-largest city with a population of 283,640 (in 2018). There is the main seaport located on Israel's Mediterranean coastline in the Bay of Haifa, covering 63.7 square kilometres (24.6 sq. mi). The socioeconomic cluster of Haifa over the years is seven.

Haifa consists of 103,000 households. 25% of Haifa's population is made up by immigrants from the former Soviet Union. Arabs constitute 10% of Haifa's population; Haifa has commonly been shown as a model of co-existence between Arabs and Jews. However, as a result of new projects and improving infrastructure, Haifa has succeeded to reverse its population decline, reducing emigration while attracting more internal migration into the city. The mean annual average housing price owned by tenants (in thousand NIS) is 730.21 (SD = 207.68), with a median of 647.20 and a range of 509.60 – 1137.00. The mean number of transactions (number of new housing in ownership sold) is 556.57 (SD = 267.45), with a median of 500.00 and a range of 185.00 – 1077.00.

The average cost per square meter is 52.87 (SD= 7.27), with a range of 38.15 – 64.25. The mean residential property billing space (in thousand square meters) is 8980.48 (SD = 172.57), with a median of 9098.00 and a range of 7618.00 – 10179.00. The mean residential property tax revenue (in thousand square meters) is 22702.43 (SD = 3747.94), with a median of 23364.00 and a range of 12926.00 – 27075.00. The mean residential property tax revenue (in thousand NIS) is 1157956.52 (SD = 281499.54), with a median of 1112709.00 and a range of 718410.00 – 1586934.00. The mean revenue of residential property (in thousand NIS) is 479762.57 (SD = 101795.12), with a median of 478278.00 and a range of 290663.00 – 654068.00. The mean number of inhabitants (in thousand) is 270.38 (SD = 5.13), with a median of 269.40 and a range of 263.40 – 281.10.

Table 7. Descriptive statistics of the variables for the city of Haifa

Variable	Mean (SD)	Median	Range
Average cost per square meter	52.87 (7.27)	52.46	38.15-64.25
Annual average new housing price owned by tenants (in thousand NIS)	730.21 (207.68)	647.20	531.7 – 1137.00

Number of transactions (number of new housing in ownership sold)	556.57 (267.45)	500.00	185.00 – 1077.00
Bank of Israel interest rate	4.46 (4.04)	3.67	0.10 – 13.60
Residential property billing space (in thousand square meters)	8980.48 (172.57)	9098.00	7618.00 – 10179.00
Total residential property tax (in thousand square meters)	22702.43 (3747.94)	23364.00	18119.00 – 26855.0
CPI	107.61 (15.68)	103.30	98.90 – 158.10
Total property tax revenue (in thousand NIS))	1157956.52 (281499.54)	1112709.00	718410.00 – 1586934.00
Revenue from residential property (in thousand NIS)	479762.57 (101795.12)	478278.00	290663.00 – 654068.00
Housing Price Index	247.66 (78.80)	196.51	182.36 – 410.29
Number of inhabitants (in thousand)	270.38 (5.13)	269.40	263.40 – 281.10

Source: the author's own calculations based on CBS data.

4.2.4. The case of Beersheba

One of the fastest-growing cities in Israel is Beersheba. It has a population of about 200,000, and it is the largest centre of southern Israel. Beersheba is the second-largest city after Jerusalem, covering an area of 117,500 dunams. The National Council for Planning and Building approved a plan to increase the metropolitan population area to 1 million by 2030. Arabs in Beersheba represent about 10% of the population (20,000 people). The socioeconomic cluster of Beersheba over the years is five.

The mean annual average housing price owned by tenants (in thousand NIS) is 620.94 (SD = 228.84), with a median of 496.10 and a range of 389.50 – 1047.00. The mean number of transactions (number of new housing in ownership sold) is 958.14 (SD = 513.10), with a median of 846.00 and a range of 312.00 – 1930.00.

The average cost per square meter is 31.61 (SD= 8.33), with a range of 22.35 – 44.74. The mean residential property billing space (in thousand square meters) is 6676.41 (SD = 803.31), with a median of 6782.40 and a range of 5317.40 – 7938.40. The mean residential property

tax revenue (in thousand square meters) is 9850.48 (SD = 1857.02), with a median of 9405.90 and a range of 7219.80 – 13458.40. The mean residential property tax revenue (in thousand NIS) is 476390.14 (SD = 194320.66), with a median of 451507.00 and a range of 250310.00 – 840024.00. The mean revenue of residential property (in thousand NIS) is 217116.43 (SD = 81284.02), with a median of 225110.00 and a range of 126818.00 – 355196.00. The mean number of inhabitants (in thousand) is 187.50 (SD = 13.45), with a median of 186.10 and a range of 160.60 – 207.60.

Table 8. Descriptive statistics of the variables for the city of Beersheba

Variable	Mean (SD)	Median	Range
Average cost per square meter	31.61 (8.33)	33.19	22.35-44.74
Annual average housing price owned by tenants (in thousand NIS)	620.94 (228.84)	496.10	389.50 – 1047.00
Number of transactions (number of housing sold)	958.14 (513.10)	846.00	1171.0 846.0
Bank of Israel interest rate	4.46 (4.04)	3.67	0.10 – 13.60
Residential property billing space (in thousand square meters)	6676.41 (803.31)	6782.40	5317.40 – 7938.40
Total residential property tax (in thousand square meters)	9850.48 (1857.02)	9405.90	7219.80 – 13458.40
CPI	107.61 (15.68)	103.30	98.90 – 158.10
Total property tax revenue (in thousand NIS)	476390.14 (194320.66)	451507.00	250310.00 – 840024.00
Revenue from residential property (in thousand NIS)	217116.43 (81284.02)	225110.00	126818.00 – 355196.00
Housing Price Index	247.66 (78.80)	196.51	182.36 – 410.29
Number of inhabitants (in thousand)	187.50 (13.45)	186.10	160.60 – 207.60

Source: the author's own calculations based on CBS data.

4.3. Results of the ANOVA and Tukey tests

The differences between the cities have been checked using a one-way ANOVA and Tukey post hoc test. There are significant differences among the cities at all the factors.

Several assumptions were made in the ANOVA model calculations, as detailed below:

- experimental errors of the data are normally distributed,
- equal variances between treatments; homogeneity of variances; homoscedasticity,
- independence of samples; each sample is randomly selected and independent,
- two variables should be measured at the level,
- independent variables should consist of two groups or more independent categories,
- typically, a one-way ANOVA test is used when having three groups or fewer independent categories,
- there is no connection between the observations in each group or between the groups themselves.

As for the annual average housing price ($F(3,83) = 18.41$, $p < 0.01$): Tel Aviv ($M = 1165.53$, $SD = 675.57$) is higher than Jerusalem ($M=1165.53$, $SD = 440.18$) ($p < .05$), Haifa ($M = 729.47$, $SD = 206.19$) ($p < .01$) and Beersheba ($M = 620.94$, $SD = 228.84$) ($p < .01$). Jerusalem is higher than Haifa ($p < .01$) and Beersheba ($p < .01$).

As regards the number of transactions (number of new housing sold) ($F(3,83) = 18.45$, $p < .01$): Tel Aviv ($M = 1282.29$, $SD = 300.98$), Jerusalem ($M = 1233.57$, $SD = 281.07$) and Beersheba ($M = 958.14$, $SD = 513.10$) are separately higher than Haifa ($M = 556.57$, $SD = 267.45$) ($p < .01$).

When it comes to the residential property billing space (in thousand square meters) ($F(3,83) = 182.10$, $p < 0.01$): Tel Aviv ($M = 14130.94$, $SD = 1471.33$) is higher the Haifa ($M = 8980.48$, $SD = 172.57$) ($p < .01$) and Beersheba ($M = 6676.47$, $SD = 803.31$) ($p < .01$). Jerusalem ($M = 14428.03$, $SD = 1869.63$) is higher the Haifa ($p < .01$) and Beersheba ($p < .01$). Haifa is higher the Beersheba ($p < .01$).

As far as the total residential property tax revenue (in thousand square meters) is concerned ($F(3,83) = 116.50$, $p < 0.01$): Tel Aviv ($M = 27299.08$, $SD = 3735.08$) is higher than Jerusalem ($M = 23237.81$, $SD = 3132.84$) ($p < .05$), Haifa ($M = 22702.43$, $SD = 3747.94$)

($p < .01$) and Beersheba ($M = 9850.48$, $SD = 1857.02$) ($p < .01$). Jerusalem is higher than Beersheba ($p < .01$), and Haifa is higher than Beersheba ($p < .01$).

In the total residential property tax revenue (in thousand NIS) ($F(3,83) = 62.73$, $p < 0.01$): Tel Aviv ($M = 2293926.57$, $SD = 572584.67$) is higher than Haifa ($M = 1157956.52$, $SD = 281499.54$) ($p < .01$) and Beersheba ($M = 476390.14$, $SD = 194320.66$) ($p < .01$). Jerusalem ($M= 1753619.90$, $SD = 611382.63$) is higher than Haifa ($p < .05$) and Beersheba ($p < .01$). Haifa is higher than Beersheba ($p < .01$).

In the revenue from residential property (in thousand NIS) ($F(3,83) = 41.61$, $p < 0.01$): Tel Aviv ($M = 566489.48$, $SD = 141451.38$) is lower than Jerusalem ($M = 825581.76$, $SD = 300156.44$) ($p < .01$) but higher than Beersheba ($M = 217116.43$, $SD = 81284.02$) ($p < .01$). Jerusalem is higher than Haifa ($M = 479762.57$, $SD = 101795.12$) ($p < .01$) and Beersheba ($p < .01$). Haifa is higher than Beersheba ($p < .01$).

Last but not least, in the number of inhabitants (in thousand) ($F(3,83) = 616.09$, $p < 0.01$): Tel Aviv ($M = 389.78$, $SD = 31.58$) is lower than Jerusalem ($M = 751.90.19$, $SD = 444.77$) ($p < .05$), but higher than Haifa ($M = 270.38$, $SD = 5.13$) ($p < .01$) and Beersheba ($M = 187.50$, $SD = 13.45$) ($p < .01$). Jerusalem is higher than Haifa ($p < .01$) and Beersheba ($p < .01$). Haifa is higher than Beersheba ($p < .01$).

Table 9. Differences between Tel Aviv, Jerusalem Haifa and Beersheba

Variable	Tel Aviv Mean (SD)	Jerusalem Mean (SD)	Haifa Mean (SD)	Beersheba Mean (SD)	F (df)	p
Average cost per square meter	39.53 (5.79)	54.69 (13.51)	52.87 (7.27)	31.61 (8.33)	30.15 (3,83)	< .01
Annual average housing price owned by tenants (in thousand NIS)	1495.84 (675.57)	1165.53 (440.18)	729.47 (206.19)	620.94 (228.84)	18.41 (3,83)	< .01
Number of transactions (number of housing sold)	1282.29 (300.98)	1233.57 (281.07)	556.57 (267.45)	958.14 (513.10)	18.45 (3,83)	< .01
Residential property billing space (in thousand square meters)	14130.94 (1471.33)	14427.98 (1869.68)	8980.48 (172.57)	6676.41 (803.31)	182.10 (3,83)	< .01

Total residential property tax revenue (in thousand square meters)	27299.08 (3132.84)	23237.81 (3132.84)	22702.43 (3747.94)	9850.48 (1857.02)	116.50 (3,83)	< .01
Total residential property tax revenue (in thousand NIS)	2293926.57 (572584.67)	1753619.90 (611382.63)	1157956.52 (281499.54)	476390.14 (194320.66)	62.73 (3,83)	< .01
Revenue from residential property (in thousand NIS)	566489.48 (141451.38)	825581.76 (300156.44)	479762.57 (101795.12)	217116.43 (81284.02)	41.61 (3,83)	< .01
Number of inhabitants (in thousand)	389.78 (31.58)	751.90 (85.11)	270.38 (5.13)	187.50 (13.45)	616.09 (3,83)	< .01

Source: the author's own calculations based on CBS data.

4.4. Correlation matrix

A correlation matrix was made for each city independently and for the combined mean of all the cities: Tel Aviv, Jerusalem, Haifa and Beersheba.

4.4.1. Correlation matrix between variables in Tel Aviv

The annual average housing price has positive correlations with the number of transactions (number of housing sold) ($r = .47$, $p < .05$), the average cost per square meter ($r = .97$, $p < .01$), the residential property billing space ($r = .93$, $p < .01$), the residential property tax (in thousand square meters) ($r = .74$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .92$, $p < .01$), the revenue from residential property ($r = .97$, $p < .01$), the number of inhabitants ($r = .94$, $p < .01$) and the Housing Price Index ($r = .99$, $p < .01$); and a negative correlation with the Bank of Israel interest rate ($r = -.76$, $p < .01$).

The number of transactions (number of housing sold) has positive correlations with the average cost per square meter ($r = .50$, $p < .05$), the residential property billing space ($r = .43$, $p < .05$), the residential property tax revenue (in thousand square meters) ($r = 53$, $p < .05$), the residential property tax revenue (in thousand NIS) ($r = .47$, $p < .05$), the revenue from

residential property ($r = .47$, $p < .05$), the number of inhabitants ($r = .46$, $p < .05$), as well as the Housing Price Index ($r = .45$, $p < .05$).

The residential property billing space has positive correlations with the average cost per square meter ($r = .97$, $p < .01$), the residential property tax revenue (in thousand square meters) ($r = .93$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .98$, $p < .01$), the revenue from residential property ($r = .98$, $p < .01$), the number of inhabitants ($r = .98$, $p < .01$) and the Housing Price Index ($r = .87$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.92$, $p < .01$) and the CPI ($r = -.59$, $p < .01$).

The residential property tax (in thousand square meters) has positive correlations with the average cost per square meter ($r = .85$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .92$, $p < .01$), the revenue from residential property ($r = .87$, $p < .01$), the number of inhabitants ($r = .91$, $p < .01$) and the Housing Price Index ($r = .65$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.94$, $p < .01$) and the CPI ($r = -.65$, $p < .01$).

The residential property tax revenue (in thousand NIS) has positive correlations with the average cost per square meter ($r = .99$, $p < .01$), the revenue from residential property ($r = .98$, $p < .01$), the number of inhabitants ($r = .99$, $p < .01$) and the Housing Price Index ($r = .93$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.87$, $p < .01$) and the CPI ($r = -.48$, $p < .05$).

The number of inhabitants has a positive correlation with the average cost per square meter ($r = .98$, $p < .01$) and the Housing Price Index ($r = .89$, $p > .01$); and negative correlations with the Bank of Israel interest rate ($r = -.90$, $p < .01$) and the CPI ($r = -.49$, $p < .05$).

The Bank of Israel interest rate has a positive correlation with the CPI ($r = .71$, $p < .01$) and negative correlations with the average cost per square meter ($r = -.84$, $p < .01$) and the Housing Price Index ($r = -.67$, $p < .01$). The CPI has a negative correlation with the average cost per square meter ($r = -.44$, $p < .01$).

The Housing Price Index has a positive correlation with the average cost per square meter ($r = .93$, $p < .01$).

Table 10. Correlation matrix between the main variables – Tel Aviv

Variables	1	2	3	4	5	6	7	8	9	10
1. Average cost per square meter										
2. Annual average housing price	.97**									
3. Number of transactions (number of housing sold)	.50*	.47*								
4. Residential property tax (in thousand square meters)	.97**	.93**	.43*							
5. Total property tax (in thousand square meters)	.85**	.74**	.39	.93**						
6. Total revenue property tax (in thousand NIS)	.98**	.92**	.53*	.98**	.92**					
7. Revenue from residential property tax (in thousand NIS)	.99**	.97**	.47*	.98**	.87**	.98**				
8. Number of inhabitants	.98**	.94**	.46*	.98**	.91**	.99**	.99**			
9. Bank of Israel interest rate	-.84**	-.76**	-.40	-.93**	-.94**	-.89**	-.87**	-.90**		
10. CPI	-.44*	-.39	-.26	-.59**	-.66**	-.51*	-.48*	-.49*	.71**	
11. Housing Price Index	.93**	.99**	.45*	.87**	.65**	.86**	.93**	.89**	-.67**	-.29

*p < .05

** p < .01

Source: the author's own calculations based on CBS data.

4.4.2. Correlation matrix between variables in Jerusalem

The annual average housing price has positive correlations with the average cost per square meter ($r = .75$, $p < .01$), the number of transactions (number of housing sold) ($r = .58$, $p < .01$), the residential property billing space ($r = .97$, $p < .01$), the residential property tax revenue (in thousand square meters) ($r = .96$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .96$, $p < .01$), the revenue from residential property ($r = .92$, $p < .01$) the number of inhabitants ($r = .97$, $p < .01$) and the Housing Price Index ($r = .96$, $p < .01$); and a negative correlation with the Bank of Israel interest rate ($r = -.81$, $p < .01$).

The number of transactions (number of housing sold) price has positive correlations with the average cost per square meter ($r = .45$, $p < .05$), the residential property billing space ($r = .58$, $p < .01$), the residential property tax revenue (in thousand square meters) ($r = 59$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .52$, $p < .05$), the revenue from residential property ($r = .47$, $p < .05$), the number of inhabitants ($r = .56$, $p < .05$) and the Housing Price Index ($r = .58$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.56$, $p < .01$) and the CPI ($r = -.53$, $p < .01$).

The residential property billing space has positive correlations with the average cost per square meter ($r = .81$, $p < .01$), the residential property tax revenue (in thousand square meters) ($r = .99$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .90$, $p < .01$), the revenue from residential property ($r = .96$, $p < .01$), the number of inhabitants ($r = .99$, $p < .01$) and the Housing Price Index ($r = .91$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.89$, $p < .01$) and the CPI ($r = -.53$, $p < .05$).

The total residential property tax (in thousands per square meters) has positive correlations with the average cost per square meter ($r = .81$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .90$, $p < .01$), the revenue from residential property ($r = .96$, $p < .01$), the number of inhabitants ($r = .99$, $p < .01$) and the Housing Price Index ($r = .90$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.90$, $p < .01$) and the CPI ($r = -.54$, $p < .05$).

The total residential property tax revenue (in thousand NIS) has positive correlations with the average cost per square meter ($r = .97$, $p < .01$), the revenue from residential property ($r = .96$, $p < .01$), the number of inhabitants ($r = .91$, $p < .01$) and the Housing Price Index

($r = .72$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.88$, $p < .01$) and the CPI ($r = -.51$, $p < .05$)**.**

The revenue from residential property has a positive correlation with the average cost per square meter ($r = .91$, $p < .01$), the number of inhabitants ($r = .96$, $p < .01$) and the Housing Price Index ($r = .81$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.89$, $p < .01$) and the CPI ($r = -.52$, $p < .05$)**.**

The Number of inhabitants has positive correlations with the average cost per square meter ($r = .82$, $p < .01$) and the Housing Price Index ($r = .89$, $p > .01$); and negative correlations with the Bank of Israel interest rate ($r = -.90$, $p < .01$) and the CPI ($r = -.52$, $p < .05$).

The Bank of Israel interest rate has a positive correlation with the CPI ($r = .71$, $p < .01$) and a negative correlation with the average cost per square meter ($r = -.54$, $p < .01$).The Housing Price Index shows differences in the socioeconomic cluster with the annual average housing price, residential property tax revenue (in thousand per square meters), residential property tax revenue (in thousand NIS), CPI and Housing Price Index. It has a positive correlation with the average cost per square meter ($r = .57$, $p < .01$).

Table 11. Correlation matrix between the main variables – Jerusalem

Variables	1	2	3	4	5	6	7	8	9	10
1. Average cost per square meter										
2. Annual average housing price	.75**									
3. Number of transactions (number of housing sold)	.45*	.58**								
4. Residential property tax (in thousand square meters)	.81**	.97**	.58**							
5. Total property tax (in thousand square meters)	.81**	.96**	.59**	.99**						
6. Total revenue property tax (in thousand NIS)	.97**	.86**	.52*	.90**	.90**					
7. Revenue from residential property tax (in thousand NIS)	.91**	.92**	.47*	.96**	.96**	.96**				
8. Number of inhabitants	.82**	.97**	.56**	.99**	.99**	.91**	.96**			
9. Bank of Israel interest rate	-.86**	-.81**	-.56**	-.89**	-.90**	-.88**	-.89**	-.90**		
10. CPI	-.54*	-.41	-.53*	-.53*	-.55*	-.51*	-.52*	-.52*	.71**	
11. Housing Price Index	.57**	.96**	.58**	.91**	.90**	.72**	.81**	.89**	-.67**	-.29

*p < .05

** p < .01

Source: the author's own calculations based on CBS data.

4.4.3. Correlation matrix between variables in Haifa

The annual average housing price has positive correlations with the number of transactions (number of housing sold) ($r = .60$, $p < .01$), the residential property billing space ($r = .73$, $p < .01$), the total residential property tax revenue (in thousand square meters) ($r = .61$, $p < .01$), the total residential property tax revenue (in thousand NIS) ($r = .81$, $p < .01$), the revenue from residential property ($r = .80$, $p < .01$), the number of inhabitants ($r = .95$, $p < .01$) and the Housing Price Index ($r = .96$, $p < .01$); and a negative correlation with the Bank of Israel interest rate ($r = -.60$, $p < .01$).

The number of transactions (number of housing sold) price has positive correlations with the number of inhabitants ($r = .66$, $p < .01$) and the Housing Price Index ($r = .48$, $p < .05$).

The residential property by area has positive correlations with the residential property tax revenue (in thousand square meters) ($r = .91$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .97$, $p < .01$), the revenue from residential property ($r = .99$, $p < .01$), the number of inhabitants ($r = .67$, $p < .01$) and the Housing Price Index ($r = .81$, $p < .01$); and a negative correlation with the Bank of Israel interest rate ($r = -.95$, $p < .01$) and the CPI ($r = -.63$, $p < .01$).

The residential property tax-(in thousand square meters) has positive correlations with the average cost per square meter ($r = .87$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .90$, $p < .01$), the revenue from residential property ($r = .89$, $p < .01$), the number of inhabitants ($r = .49$, $p < .05$) and the Housing Price Index ($r = .72$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.88$, $p < .01$) and the CPI ($r = -.45$, $p < .05$).

The residential property tax revenue (in thousand NIS) has positive correlations with the revenue from residential property ($r = .98$, $p < .01$), the number of inhabitants ($r = .72$, $p < .01$) and the Housing Price Index ($r = .88$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.90$, $p < .01$) and the CPI ($r = -.54$, $p < .05$).

The revenue from residential property has positive correlations with the number of inhabitants ($r = .99$, $p < .01$) and the Housing Price Index ($r = .93$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.87$, $p < .01$) and the CPI ($r = -.48$, $p < .05$).

The number of inhabitants has a positive correlation with the Housing Price Index ($r = .88$, $p > .01$), and a negative correlation with the Bank of Israel interest rate ($r = -.57$, $p < .01$).

The Bank of Israel interest rate has a positive correlation with the CPI ($r = .71$, $p < .01$) and negative correlations with the Housing Price Index ($r = -.67$, $p < .01$) and the average cost per square meter ($r = -.93$, $p < .01$). The CPI has a negative correlation with the Average cost per square meter ($r = -.63$, $p < .01$). The Housing Price Index has a positive correlation with the average cost per square meter ($r = .85$, $p < .01$).

Table 12. Correlation matrix between the main variables – Haifa

Variables	1	2	3	4	5	6	7	8	9	10
1. Average cost per square meter										
2. Annual average housing price	.79**									
3. Number of transactions (number of housing sold)	.17	.60**								
4. Residential property tax (in thousand square meters)	.98**	.73**	.08							
5. Total property tax (in thousand square meters)	.87**	.61**	-.07	.91**						
6. Total revenue property tax (in thousand NIS)	.98**	.81**	.15	.97**	.90**					
7. Revenue from residential property tax (in thousand NIS)	.99**	.80**	.17	.99**	.89**	.98**				
8. Number of inhabitants	.74**	.95**	.66**	.67**	.50*	.72**	.74**			
9. Bank of Israel interest rate	-.93**	-.60**	.01	-.95**	-.88**	-.90**	-.93**	-.57**		
10. CPI	-.63**	-.34	-.06	-.63**	-.45*	-.54*	-.61**	-.43	.71**	
11. Housing Price Index	.85**	.96**	.48*	.81**	.72**	.88**	.86**	.88**	-.67**	-.29

*p < .05

** p < .01

Source: the author's own calculations based on CBS data**.**

4.4.4. Correlation matrix between variables in Beersheba

The annual average housing price has positive correlations with the average cost per square meter ($r = .93$, $p < .01$), the residential property billing space ($r = .89$, $p < .01$), the total residential property tax revenue (in thousand square meters) ($r = .94$, $p < .01$), the total residential property tax revenue (in thousand NIS) ($r = .96$, $p < .01$), the revenue from residential property ($r = .97$, $p < .01$), the number of inhabitants ($r = .98$, $p < .01$) and the Housing Price Index ($r = .84$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.93$, $p < .01$) and the CPI ($r = -.57$, $p < .01$).

The residential property tax (in thousand square meters) has positive correlations with the average cost per square meter ($r = .92$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .98$, $p < .01$), the revenue from residential property ($r = .94$, $p < .01$), the number of inhabitants ($r = .92$, $p < .01$) and the Housing Price Index ($r = .92$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.84$, $p < .01$) and the CPI ($r = -.50$, $p < .05$).

The residential property tax revenue (in thousand NIS) has positive correlations with the average cost per square meter ($r = .97$, $p < .01$), the revenue from residential property ($r = .98$, $p < .01$), the number of inhabitants ($r = .92$, $p < .01$) and the Housing Price Index ($r = .94$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.83$, $p < .01$) and the CPI ($r = -.44$, $p < .05$).

The revenue from residential property has positive correlations with the average cost per square meter ($r = .99$, $p < .01$), the number of inhabitants ($r = .92$, $p < .01$) and the Housing Price Index ($r = .90$, $p < .01$); and a negative correlation with the Bank of Israel interest rate ($r = -.84$, $p < .01$).

The number of inhabitants has negative correlations with the average cost per square meter ($r = .88$, $p < .01$), the Bank of Israel interest rate ($r = -.95$, $p < .01$) and the PCI ($r = -.66$, $p < .01$); and a positive correlation with the Housing Price Index ($r = .81$, $p < .01$).

The Bank of Israel interest rate has a positive correlation with the CPI ($r = .71$, $p < .01$) and negative correlations with the Housing Price Index ($r = -.67$, $p < .01$) and the average cost per square meter ($r = -.80$, $p < .01$). The Housing Price Index has a positive correlation with the average cost per square meter ($r = .89$, $p < .01$).

Table 13. Correlation matrix between the main variables – Beersheba

Variables	1	2	3	4	5	6	7	8	9	10
1. Average cost per square meter										
2. Annual average housing price	.93**									
3. Number of transactions (number of housing sold)	-.63**	-.40								
4. Residential property tax (in thousand square meters)	.95**	.89**	-.69**							
5. Total property tax (in thousand square meters)	.92**	.94**	-.53**	.94**						
6. Total revenue property tax (in thousand NIS)	.97**	.97**	-.55**	.96**	.98**					
7. Revenue from residential property tax (in thousand NIS)	.99**	.95**	-.63*	.97**	.95**	.98**				
8. Number of inhabitants	.88**	.86**	-.66*	.98**	.92**	.92**	.92**			
9. Bank of Israel interest rate	-.80**	-.74**	-.69**	-.93**	-.84**	-.83**	-.84**	-.95**		
10. CPI	-.37	-.32	-.39	-.57**	-.51*	-.44*	-.42	-.66**	.71**	
11. Housing Price Index	.89**	.99**	-.30	.83**	.92**	.94**	.90**	.81**	-.67**	-.29

*p < .05,

** p < .01

Source: the author's own calculations based on CBS data.

4.4.5. Correlation matrix between the main variables based on the cities' average

In this study, to gain deeper insights into the data gathered, the correlations have been computed with the annual average housing price.

The annual average housing price has positive correlations with the average cost per square meter ($r = .43$, $p < .01$), the residential property billing space ($r = .79$, $p < .01$), the residential property tax revenue (in thousand square meters) ($r = .70$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .88$, $p < .01$), the revenue from residential property ($r = .71$, $p < .01$) the number of inhabitants ($r = .47$, $p < .01$) and the Housing Price Index ($r = .67$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.52$, $p < .01$) and the CPI ($r = -.26$, $p < .05$).

The number of transactions (number of housing sold) price has positive correlations the residential property billing space ($r = .46$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .42$, $p < .01$), the revenue from residential property ($r = .30$, $p < .01$) and the number of inhabitants ($r = .40$, $p < .01$).

The residential property billing space has positive correlations with the average cost per square meter ($r = .51$, $p < .01$), the residential property tax revenue (in thousand square meters) ($r = .83$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .92$, $p < .01$), the revenue from residential property ($r = .86$, $p < .01$), the number of inhabitants ($r = .81$, $p < .01$) and the Housing Price Index ($r = .29$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.30$ $p < .01$).

The residential property tax revenue (in thousand square meters) has positive correlations with the average cost per square meter ($r = .62$, $p < .01$), the residential property tax revenue (in thousand NIS) ($r = .89$, $p < .01$), the revenue from residential property ($r = .74$, $p < .01$), the number of inhabitants ($r = .50$, $p < .01$) and the Housing Price Index ($r = .32$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.37$, $p < .01$) and the CPI ($r = -.22$, $p < .05$).

The residential property tax revenue (in thousand NIS) has positive correlations with the average cost per square meter ($r = .54$, $p < .01$), the revenue from residential property ($r = .80$, $p < .01$), the number of inhabitants ($r = .57$, $p < .01$) and the Housing Price Index

($r = .41$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.44$, $p < .01$) and the CPI ($r = -.25$, $p < .05$).

The revenue from residential property has positive correlations with the average cost per square meter ($r = .82$, $p < .01$), the number of inhabitants ($r = .84$, $p < .01$) and the Housing Price Index ($r = .47$, $p < .01$); and negative correlations with the Bank of Israel interest rate ($r = -.48$, $p < .01$) and the CPI ($r = -.28$, $p < .01$).

The number of inhabitants has a positive correlation with the average cost per square meter ($r = .56$, $p < .01$). The Bank of Israel interest rate has a positive correlation with the CPI ($r = .71$, $p < .01$) and negative correlations with the Housing Price Index ($r = -.67$, $p < .01$) and the Average cost per square meter ($r = -.56$, $p < .01$).

The CPI has negative correlations with the average cost per square meter ($r = -.32$, $p < .01$), and the Housing Price Index has a positive correlation with the Average cost per square meter ($r = .50$, $p < .01$).

Table 14. Correlation matrix between the main variables – the cities' average

Variables	1	2	3	4	5	6	7	8	9	10
The average cost per square meter										
Annual average housing price	.43**									
Number of transactions (number of housing sold)	-.08	.47**								
Residential property billing space	.51**	.79**	.46**							
Residential property tax revenue (in thousand square meters)	.62**	.70**	.18	.83**						
Residential property tax revenue (in thousand NIS)	.54**	.88**	.42**	.91**	.89**					
Revenue from residential property	.82**	.71**	.30**	.86**	.74**	.80**				
Number of inhabitants	.56**	.47**	.40**	.81**	.50**	.57**	.84**			
Bank of Israel interest rate	-.56**	-.52**	.04	-.30**	-.37**	-.44**	-.48**	-.13		
CPI	-.32**	-.26*	-.01	-.19	-.22*	-.25*	-.28**	-.07	.71**	
Housing Price Index	.50**	.67**	.14	.29**	.32**	.41**	.47**	.13	-.67**	-.29**

*p < .05

** p < .01

Source: the author's own calculations based on CBS data.

4.5. Multiple linear regression analysis

A multiple linear regression analysis has been performed, and the independent variables are the revenue-residential property tax (in thousand NIS)**,** the residential property tax (thousand meters), the average cost per square meter for residential property and the population (in thousand).

4.5.1. Multiple linear regression based on the Tel Aviv dataset

The regression model that predicted the average new housing price in ownership showed that the independent variables accounted for approximately 96% of the total variance in the average new housing price in ownership ($F(4,15) = 167.41$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average new housing price (Beta = 0.524, $p < .01$). In addition, positive correlations have also been found between the residential property tax (Beta =0.283, $p < .05$) and the average cost per square meter for residential property (Beta = 0.127, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average new housing price in ownership. The hypothesis has been confirmed.

Table 15. Standardised and unstandardised coefficients to predict the average new housing price in ownership (in thousand NIS) – Tel Aviv

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	0.122	0.005	0.524	4.235	0.001
Residential property tax (in thousand meters)	0.624	0.218	0.283	2.869	0.012
Average cost per square meter for residential property	234.491	102.083	0.127	2.297	0.036
Population (in thousand)	6.173	8.438	0.283	0.732	0.476

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B,

Beta = Standardised regression coefficient,

t = significant test of B,

p = level of significance.

Source: the author's own calculations based on CBS data.

The regression model that predicted the average number of transactions of new housing in ownership showed that the independent variables accounted for approximately 82% of the total variance in the average number of transactions of new housing in ownership ($F(4,15) = 197.14$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average number of transactions (Beta = 0.765, $p < .01$). In addition, positive correlations have also been found between the residential property tax (Beta =0.388, $p < .05$) and the average cost per square meter for residential property (Beta = 0.500, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average number of transactions. The hypothesis has been confirmed.

Table 16. Standardised and unstandardised coefficients to predict the average number of transactions of new housing in ownership – Tel Aviv

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	0.321	0.011	0.765	2.863	0.012
Residential property tax (in thousand meters)	0.985	0.482	0.388	0.177	0.032
Average cost per square meter for residential property	500.517	125.899	0.500	2.216	0.013
Population (in thousand)	3.427	18.673	0.349	0.184	0.857

Note: **B** = Unstandardised regression coefficient,

Std. Error = Standard deviation of B,

Beta = Standardised regression coefficient,

t = significant test of B,

p = level of significance.

Source: the author's own calculations based on CBS data.

4.5.2. Multiple linear regression based on the Jerusalem dataset

The regression model that predicted the average new housing price in ownership showed that the independent variables accounted for approximately 89% of the total variance in the average new housing price in ownership ($F(4,16) = 142.31$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average new housing price

(Beta = 0.462, p < .01). In addition, positive correlations have also been found between the residential property tax (Beta =0.483, p < .05) and the average cost per square meter for residential property (Beta = 0.210, p < .05). To conclude, the higher revenue-residential property tax is related to the higher average new housing price in ownership. The hypothesis has been confirmed.

Table 17. Standardised and unstandardised coefficients to predict the average new housing price in ownership (in thousand NIS) – Jerusalem

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	0.321	0.010	0.462	3.135	0.001
Residential property tax (in thousand meters)	0.524	0.018	0.483	3.129	0.011
Average cost per square meter for residential property	24.52	10.02	0.210	1.997	0.012
Population (in thousand)	5.133	5.238	0.183	0.532	0.433

Note: **B** = Unstandardised regression coefficient,

Std. Error = Standard deviation of B,

Beta = Standardised regression coefficient,

t = significant test of B,

p = level of significance.

Source: the author's own calculations based on CBS data.

The regression model that predicted the average number of transactions of new housing in ownership showed that the independent variables accounted for approximately 88% of the total variance in the average number of transactions of new housing in ownership (F (4,16) = 152.34, p < .001). Specifically, the revenue-residential property tax has positively correlated with the average number of transactions (Beta = 0.618, p < .01). In addition, positive correlations have also been found between the residential property tax (Beta =0.421, p < .05) and the average cost per square meter for residential property (Beta = 0.351, p < .05). To conclude, the higher revenue-residential property tax is related to the higher average number of transactions. The hypothesis has been confirmed.

Table 18. Standardised and unstandardised coefficients to predict the average number of transactions of new housing in ownership – Jerusalem

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	0.622	0.035	0.618	2.215	0.023
Residential property tax (in thousand meters)	1.285	0.346	0.421	0.277	0.012
Average cost per square meter for residential property	43.52	12.32	0.351	2.122	0.011
Population (in thousand)	1.227	25.33	0.149	0.484	0.257

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance

Source: the author's own calculations based on CBS data.

4.5.3. Multiple linear regression based on the Haifa dataset

The regression model that predicted the average new housing price in ownership showed that the independent variables accounted for approximately 94% of the total variance in the average new housing price in ownership ($F(4,15) = 234.53$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average new housing price (Beta = 0.381, $p < .05$). In addition, positive correlations have also been found between the residential property tax (Beta =0.412, $p < .05$) and the average cost per square meter for residential property (Beta = 0.350, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average new housing price in ownership. The hypothesis has been confirmed.

Table 19. Standardised and unstandardised coefficients to predict the average new housing price in ownership (in thousand NIS) – Haifa

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	0.452	0.042	0.381	3.226	0.02
Residential property tax (in thousand meters)	1.324	0.359	0.412	2.842	0.023
Average cost per square meter for residential property	21.52	11.17	0.350	2.183	0.002
Population (in thousand)	6.287	2.163	0.083	0.232	0.833

Note: **B** = Unstandardised regression coefficient,

Std. Error = Standard deviation of B,

Beta = Standardised regression coefficient,

t = significant test of B,

p = level of significance.

Source: the author's own calculations based on CBS data.

The regression model that predicted the average number of transactions of new housing in ownership showed that the independent variables accounted for approximately 85% of the total variance in the average number of transactions of new housing in ownership ($F(4,15) = 111.64$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average number of transactions (Beta = 0.532, $p < .01$). In addition, positive correlations have also been found between the residential property tax (Beta =0.480, $p < .05$) and the average cost per square meter for residential property (Beta = 0.267, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average number of transactions. The hypothesis has been confirmed.

Table 20. Standardised and unstandardised coefficients to predict the average number of transactions of new housing in ownership – Haifa

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	1.347	0.081	0.532	2.187	0.010
Residential property tax (in thousand meters)	1.325	0.426	0.480	1.977	0.012
Average cost per square meter for residential property	43.52	12.32	0.267	2.122	0.011
Population (in thousand)	0.975	1.53	0.109	0.424	0.202

Note: **B** = Unstandardised regression coefficient,

Std. Error = Standard deviation of B,

Beta = Standardised regression coefficient,

t = significant test of B,

p = level of significance.

Source: the author's own calculations based on CBS data.

4.5.4. Multiple linear regression based on the Beersheba dataset

The regression model that predicted the average new housing price in ownership showed that the independent variables accounted for approximately 91% of the total variance in the average new housing price in ownership ($F(4,15) = 155.52$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average new housing price (Beta = 0.452, $p < .05$). In addition, positive correlations have also been found between the residential property tax (Beta =0.405, $p < .05$) and the average cost per square meter for residential property (Beta = 0.316, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average new housing price in ownership. The hypothesis has been confirmed.

Table 21. Standardised and unstandardised coefficients to predict the average new housing price in ownership (in thousand NIS) – Beersheba

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	2.002	0.328	0.452	3.182	0.002
Residential property tax (in thousand meters)	1.267	0.242	0.405	2.142	0.002
Average cost per square meter for residential property	18.33	10.20	0.316	1.993	0.012
Population (in thousand)	4.823	3.261	0.054	0.627	0.781

Note: **B** = Unstandardised regression coefficient,

Std. Error = Standard deviation of B,

Beta = Standardised regression coefficient,

t = significant test of B,

p = level of significance.

Source: the author's own calculations based on CBS data.

The regression model that predicted the average number of transactions of new housing in ownership showed that the independent variables accounted for approximately 91% of the total variance in the average number of transactions of new housing in ownership ($F(4,15) = 167.22$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average number of transactions (Beta = 0.489, $p < .01$). In addition, positive correlations have also been found between the residential property tax (Beta =0.355, $p < .01$) and the average cost per square meter for residential property (Beta = 0.314, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average number of transactions. The hypothesis has been confirmed.

Table 22. Standardized and unstandardized coefficients to predict the average number of transactions of new housing in ownership – Beersheba

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	1.6775	0.102	0.489	2.245	0.002
Residential property tax (in thousand meters)	2.421	0.353	0.355	2.102	0.002
Average cost per square meter for residential property	23.67	11.53	0.314	2.235	0.015
Population (in thousand)	0.822	1.23	0.119	0.351	0.350

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

4.5.5. Multiple linear regression based on all cities' average

The regression model that predicted the average new housing price in ownership showed that the independent variables accounted for approximately 91% of the total variance in the average new housing price in ownership ($F(4,79) = 136.12$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average new housing price (Beta = 0.403, $p < .05$). In addition, positive correlations have also been found between the residential property tax (Beta =0.378, $p < .05$) and the average cost per square meter for residential property (Beta = 0.289, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average new housing price in ownership. The hypothesis has been confirmed.

Table 23. Standardised and unstandardised coefficients to predict the average new housing price in ownership (in thousand NIS) – all cities

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	3.533	0.455	0.403	2.892	0.031
Residential property tax (in thousand meters)	4.467	0.882	0.378	2.033	0.020
Average cost per square meter for residential property	21.24	11.32	0.289	1.823	0.012
Population (in thousand)	5.241	3.161	0.044	0.327	0.881

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The regression model that predicted the average number of transactions of new housing in ownership showed that the independent variables accounted for approximately 90% of the total variance in the average number of transactions of new housing in ownership ($F(4,79) = 139.93$, $p < .001$). Specifically, the revenue-residential property tax has positively correlated with the average number of transactions (Beta = 0.377, $p < .01$). Also, positive correlations have been found between the residential property tax (Beta =0.405, $p < .01$) and the average cost per square meter for residential property (Beta = 0.327, $p < .05$). To conclude, the higher revenue-residential property tax is related to the higher average number of transactions. The hypothesis has been confirmed.

Table 24. Standardised and unstandardised coefficients to predict the average number of transactions of new housing in ownership – all cities

Independent variables	B	Std. Error	Beta	t	p
Revenue-residential property tax (in thousand NIS)	1.673	0.254	0.377	2.316	0.001
Residential property tax (in thousand meters)	3.622	0.322	0.405	2.211	0.032
Average cost per square meter for residential property	45.67	18.53	0.327	2.265	0.011
Population (in thousand)	1.832	2.231	0.109	0.252	0.650

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

4.6. Linear regression analysis

4.6.1. Residential property tax revenue as an independent variable

A linear regression analysis has been performed, with the independent variable being the residential property tax revenue (in thousand NIS) to predict the annual average housing prices. The regression estimates have been used to explain the relationship between a dependent variable and independent variables. The formula defines the simplest form of the regression equation with one dependent and one independent variable:

$$y = c + b*x$$

where:

y = estimated dependent variable score,

c = constant,

b = regression coefficient,

x = score on the independent variable.

4.6.1.1. The Tel Aviv dataset

The regression model showed that the independent variable accounted for approximately 94% of the total variance in the annual average housing price in Tel Aviv ($F(1,20) = 328.63$, $p < .01$). The results of the regression are presented in the following table.

Table 25. Standardised and unstandardised coefficients to predict the annual average housing price – Tel Aviv

Variable	B	Std. Error	Beta	t	p
Residential property tax revenue (in thousand NIS)	2.36	0.13	0.97	18.12	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the residential property tax revenue (in thousand NIS) has a significant positive contribution to the model. It means that as the residential property tax revenue increases, so does the annual average housing price (Beta = 0.97, $p < .01$).

4.6.1.2. The Jerusalem dataset

The regression model showed that the independent variable accounted for approximately 84% of the total variance in the annual average housing price in Jerusalem ($F(1,20) = 105.63$, $p < .01$). The results of the regression are presented in the following table.

Table 26. Standardised and unstandardised coefficients to predict the annual average housing price – Jerusalem

Variable	B	Std. Error	Beta	t	p
Residential property tax revenue (in thousand NIS)	0.68	0.06	0.92	10.27	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the residential property tax revenue (in thousand NIS) has a significant positive contribution to the model. It means that as the residential property tax revenue increases, so does the annual average housing price (Beta = 0.92, p < .01).

4.6.1.3. The Haifa dataset

The regression model showed that the independent variable accounted for approximately 64% of the total variance in the annual average housing price in Haifa (F (1,20) = 34.08, p < .01). The results of the regression are presented in the following table.

Table 27. Standardised and unstandardised coefficients to predict the annual average housing price – Haifa

Variable	B	Std. Error	Beta	t	p
Residential property tax revenue (in thousand NIS)	0.82	0.14	0.80	5.83	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the residential property tax revenue (in thousand NIS) has a significant positive contribution to the model. It means that as the residential property tax revenue increases, so does the annual average housing price (Beta = 0.80, p < .01).

4.6.1.4. The Beersheba dataset

The regression model showed that the independent variable accounted for approximately 90% of the total variance in the annual average housing price in Beersheba (F (1,20) = 176.81, p < .01). The results of the regression are presented in the following table:

Table 28. Standardised and unstandardised coefficients to predict the annual average housing price – Beersheba

Variable	B	Std. Error	Beta	t	p
Residential property tax revenue (in thousand NIS)	1.36	0.10	0.95	13.29	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the residential property tax revenue (in thousand NIS) has significant positive contribution to the model. It means that the high residential property tax revenue has positively correlated with the annual average housing price (Beta = 0.95, p < .01).

4.6.1.5. All cities average dataset

The regression model showed that the independent variable accounted for approximately 51% of the total variance in the annual average housing price (F (1, 83) = 86.19, p < .01). The results of the regression are presented in the following table:

Table 29. Standardised and unstandardised coefficients to predict the annual average housing price – Tel Aviv, Jerusalem, Haifa and Beersheba average

Variable	B	Std. Error	Beta	t	p
Residential property tax revenue (in thousand NIS)	0.71	0.07	0.71	9.28	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the residential property tax revenue (in thousand NIS) has a significant positive contribution to the model. It means that as the residential property tax revenue increases, so does the annual average housing price (Beta = 0.71, $p < .01$).

4.6.2. The average cost per square meter for residential property as an independent variable

Another linear regression analysis has been performed, with the independent variable being the average cost per square meter for residential property to predict the annual average housing price.

4.6.2.1. The Tel Aviv dataset

The regression model showed that the independent variable accounted for approximately 94% of the total variance in the annual average housing price in Tel Aviv ($F (1,20) = 330.51$, $p < .01$). The results of the regression are presented in the following table.

Table 30. Standardised and unstandardised coefficients to predict the annual average housing price – Tel Aviv

Variable	B	Std. Error	Beta	t	p
The average cost per square meter for residential property	1.19	0.06	0.97	18.18	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the average cost per square meter for residential property has a significant positive contribution to the model. It means that as the average cost per square meter for residential property goes higher, so does the annual average housing price (Beta = 0.97, $p < .01$).

4.6.2.2. The Jerusalem dataset

The regression model showed that the independent variable accounted for approximately 57% of the total variance in the annual average housing price in Jerusalem ($F(1,20) = 25.21$, $p < .01$). The results of the regression are presented in the following table.

Table 31. Standardised and unstandardised coefficients to predict the annual average housing price – Jerusalem

Variable	B	Std. Error	Beta	t	p
The average cost per square meter for residential property	0.60	0.12	0.75	5.02	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the average cost per square meter for residential property has a significant positive contribution to the model. It means that as the average cost per square meter for residential property goes higher, so does the annual average housing price (Beta = 0.75, p < .01).

4.6.2.3. The Haifa dataset

The regression model showed that the independent variable accounted for approximately 63% of the total variance in the annual average housing price in Haifa (F (1,20) = 33.51, p < .01). The results of the regression are presented in the following table.

Table 32. Standardised and unstandardised coefficients to predict the annual average housing price – Haifa

Variable	B	Std. Error	Beta	t	p
The average cost per square meter for residential property	0.29	0.05	0.79	5.78	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the average cost per square meter for residential property has a significant positive contribution to the model. It means that as the average cost per square meter for residential property goes higher, so does the annual average housing price (Beta = 0.79, p < .01).

4.6.2.4. The Beersheba dataset

The regression model showed that the independent variable accounted for approximately 88% of the total variance in the annual average housing price in Beersheba (F (1,20) = 141.89, p < .01). The results of the regression are presented in the following table.

Table 33. Standardised and unstandardised coefficients to predict the annual average housing price – Beersheba

Variable	B	Std. Error	Beta	t	p
The average cost per square meter for residential property	0.39	0.03	0.93	11.91	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the average cost per square meter for residential property has a significant positive contribution to the model. It means that as the average cost per square meter for residential property goes higher, so does the annual average housing price (Beta = 0.93, $p < .01$).

4.6.2.5. All cities average dataset

The regression model showed that the independent variable accounted for approximately 37% of the total variance in the annual average housing price ($F(1, 83) = 48.56$, $p < .01$). The results of the regression are presented in the following table.

Table 34. Standardised and unstandardised coefficients to predict the annual average housing price – Tel Aviv, Jerusalem, Haifa and Beersheba average

Variable	B	Std. Error	Beta	t	p
The average cost per square meter for residential property	0.62	0.08	0.61	6.96	< .01

Note: **B** = Unstandardised regression coefficient;

Std. Error = Standard deviation of B;

Beta = Standardised regression coefficient;

t = significant test of B;

p = level of significance.

Source: the author's own calculations based on CBS data.

The variable of the average cost per square meter for residential property has a significant positive contribution to the model. It means that as the average cost per square meter for residential property goes, so does the annual average housing price (Beta = 0.61, p < .01).

4.7. Cointegration analysis

The essence of cointegration is that a long-term time-independent path (steady-state) can be established between economic processes, while values outside the steady-state are short-term imbalances that depend on time. Cointegrated processes have a common long-term growth path, and the difference between them is almost constant over time. Non-cointegrated processes, on the other hand, diverge in the long term, and the difference between them changes over time. The two processes X_t and Y_t are integrated of the order d, b if: 1) they are integrated of the same order d, 2) there is a linear combination of these processes $u_t = \alpha_1 X_t + \alpha_2 Y_t$ which is integrated of the order d-b. The vector $[\alpha_1\ \alpha_2]$ is called the cointegrating vector.

In the first stage of the study, the degree of integration was examined for time series such as property tax revenues per 1 m^2, total property tax revenues and prices of new apartments. The Augmented Dickey-Fuller (ADF) test was used in three versions (with the trend and constant, with constant and with no other terms than the lagged operator), together with the Elliot, Rothenberg and Stock (ERS) test. The result is the stationarity for a given order of the integration of processes presented in Table 35.

Table 35. Order of integration

Specifications	Property tax revenues per 1 m^2	Total property tax revenues	Prices of new apartments
Jerusalem	1	1	1
Tel Aviv	2	2	2
Beersheba	1	1	2
Haifa	1	2	1

Source: the author's own calculations.

A two-stage procedure was used in the second stage of the study (Engle and Granger, 1987), which exploited the rest of the regression, yet on condition:

$$Y_t = \alpha_0 + X_t + \varepsilon_1$$

$$X_t = \beta_0 + Y_t + \varepsilon_2$$

$$\varepsilon_1 \neq \varepsilon_2$$

The rest of the regression was then tested for stationarity. For this purpose, Principal Component Analysis and the last component with the lowest variance were used.

The tests showed that the economic processes for the three variables under examination are co-integrated between the cities:

(a1) For the variable of property tax revenues per 1 m^2

- *Jerusalem ~ Haifa*

  This means that a long-term path of equilibrium independent of time can be established between the property tax revenue per 1 m^2 in Jerusalem and the property tax revenue in Haifa.

- *Jerusalem ~ Beer Sheba*

  This means that a long-term path of equilibrium independent of time can be established between the property tax revenue per 1 m^2 in Jerusalem and the property tax revenue in Beersheba.

- *Haifa ~ Beer Sheba*

  This means that a long-term path of equilibrium independent of time can be established between the property tax revenue per 1 m^2 in Haifa and the property tax revenue in Beersheba.

(b1) For the variable of total property tax revenues

- *Jerusalem ~ Beer Sheba*

  This means that a long-term path of equilibrium independent of time can be established between the total property tax revenue in Jerusalem and the total property tax revenue in Beersheba.

- *Tel Aviv ~ Haifa*

  This means that a long-term path of equilibrium independent of time can be established between the total property tax revenue in Tel Aviv and the total property tax revenue in Haifa.

(c1) For the variable of new apartment prices

- *Jerusalem ~ Haifa*

  This means that a long-term path of equilibrium independent of time can be established between the prices of new apartments in Jerusalem and the prices of new apartments in Haifa.

- *Tel Aviv ~ Beersheba*

  This means that a long-term path of equilibrium independent of time can be established between the prices of new apartments in Tel Aviv and the prices of new apartments in Beersheba.

In addition, the testing has shown that two economic processes within a specific city are being co-integrated.

(a2) For the variables of property tax revenues per 1 m^2 and new apartment prices

- Haifa,
- Tel Aviv (second order of integration).

(b2) For the variables of total property tax revenues and new apartment prices

- Tel Aviv (second order of integration).

4.8. Summary

This chapter summarises an empirical analysis of four central cities in Israel – Tel Aviv, Jerusalem, Haifa and Beersheba. Following the detailed considerations, the cities have been selected and included in the case studies in order to learn about the general trend of the influence of the property tax on the housing price in other cities in Israel.

The empirical analysis encompasses two decades between 1997 and 2017. During those years, there were several significant changes in Israel's financial activity, particularly in terms of the housing prices and property tax rates – the two main variables in this study.

For this purpose, the average income from property tax collection has been selected as a primary independent variable. This income has been derived from the tax rate multiplier in the property area.

Furthermore, two dependent variables are included in the study: (1) The average housing prices in each city (for the two decades). The data was collected from the Central Bureau of Statistics in Israel, and it encompasses only the prices of new dwellings purchased by the owners who themselves live in the new dwellings, and not second-hand dwellings. (2) The average number of housing transactions over the two decades in each city is a number of only new housing transactions purchased by the owners who live in the new dwellings, and not transactions of second-hand housing or housing purchased by investors.

For the empirical analysis, several statistical tests have been conducted on each of the four cities separately and the four cities' averages have been compared. The results of these statistical tests have shown significant differences between the four cities in the sample. For example, as presented in the descriptive statistics, the NIS tax rate per square meter of housing in Jerusalem is 54.69 NIS, which is higher than the 39.53 NIS in Tel-Aviv. This result does not fit because Tel Aviv is ranked in the socioeconomic cluster 8, while Jerusalem is in the socioeconomic cluster 2. A possible explanation for this is that Tel Aviv has invested more in developing business centres where the municipal tax revenue is significantly higher than the residential income. On the other hand, business centres consume fewer services provided by the authority.

With post hoc Tukey tests, ANOVA has been researched to examine differences in the average of eight independent variables between the cities. The procedures showed, as expected, several differences between the cities in the financial measures.

The correlation test has been conducted between the property tax revenue and the other independent variables; Pearson correlations have been conducted on all four cities separately. The results have shown that the correlation coefficients were mostly positive and significant. The Pearson tests have been conducted for the averages of all four cities. A multivariate regression statistical test has been conducted to examine the predictor variable of housing prices and the number of transactions by the predictor variable predicting the property tax.

Next, a simple regression has been used to predict housing prices through the property tax revenue and a second time to predict housing prices using the property tax rate. The statistical analysis has been made for each city separately as well as for the averages.

The variable of the residential property tax revenue (in thousand NIS) has a significant positive contribution to the model. It means that as the residential property tax revenue increases, so does the annual average housing price, as described in this work.

Discussion and conclusions

1. Discussion

Countries collect tax on property through the property tax. Usually, this type of tax is collected at the municipal level. The municipal property tax is unique and essential because it is a tax levied on residential property that simultaneously combines taxation on property and consumption.

On the one hand, residential property is a means of creating residential services, and on the other hand, the property has its value as property. Understanding the housing market is very important because it is one of the engines of the entire economy (Głuszak, 2015; Allen, Dare and Riegel, 2010).

The goals of the current work have been to extend our understanding of housing markets and how property tax systems influence housing prices. The study has examined this question by gathering data on the housing prices in Israel between 1997 and 2017 and assessed the correlations between the property tax and the house price changes.

Several main findings have been obtained from the current work. First, a positive correlation has been found between the property tax and the Housing Price Index; that is, the higher the property tax revenue from housing, the higher the sale price of a house is. Besides, a positive correlation has found between the property tax and the number of transactions on the housing market; that is, a higher property tax revenue from housing in a city. These results indicate that the property tax has a strong association with the most important indices of housing prices (prices and number of transactions) in a municipality. These results could explain why the population with a high socioeconomic status purchase more housing at higher prices, located in municipalities that provide high-quality services. In this study, the correlation between the property tax, housing prices and transactions becomes more robust over the period under analysis (1997-2017), with both indicators rising during this period. These findings are consistent in all the four districts that have been analysed.

From a theoretical aspect, this study is located within the general framework of real estate and has mainly focused on dwellings on which the local authorities ultimately impose a municipal tax to finance their public expenditure. Understanding real estate in general and residential property in particular, and defining it as a heterogeneous product that differs from other products, requires in-depth understanding due to its importance and its enormous influence on many areas of life.

Indeed, housing issues are on the agenda of many governments around the world. The importance of this topic is also rooted in the assistance it gives in anticipating or preventing future economic crises, such as the sub-prime crisis in 2008. Housing is an economic growth engine and has a significant influence on social and economic issues (Bahl et al., 2010; Slack, 2010).

The municipal tax is levied in most states to cover public financing and property tax effects on social and economic life. Although the municipal tax seems unpopular and even irritating among taxpayers, it is a just tax and is considered the most appropriate source of local government revenue for the authorities (Collier, Glaeser, Venables, Manwaring and Blake, 2017; Bordignon, Grembi and Piazza, 2017).

Indeed, it is held that these taxes are like consumption taxes, that all households bear them similarly as a proportion of their consumption. Taxes imposed on the production of rental housing services – taxes paid by landlords – are not borne by home owners (Chambers et al., 2009).

This study is located within the context of essential questions concerning property tax – What is the best method for calculating property tax? Can the municipal tax revenue cover local authorities' expenses, which increase over time, due to both natural and unnatural increases in population? Is property tax fair, equal and effective, and what are its consequences?

In addition, the collection of property tax is also a challenge for many municipalities. There is an inner paradox of property tax imposed on every resident of the local authority, whether they own or only rent the property, on the one hand, and on the other, they also elected the officials who decide on the municipal property tax issues (Moriguchi and Saez, 2008; Renigier -Bilozor, 2017).

In Israel, there are 261 local authorities in which property tax collection is carried out according to the property area. The calculation is made by multiplying the property tax rate on the area of the property. It is paid by the taxpayers holding the property in the local authority area, and the money received from the municipal tax is the majority of the authorities' income for financing public expenses for services provided to the residents. Between 1997 and 2017 there were essential changes in Israel's economic activity and the assimilation of almost one million Jews from the former USSR, leading to significant changes in the local tax rates.

In Israel, studies have examined the factors that explain the sharp rise in housing prices over long periods; for example, between 2008 and early 2014, house prices rose by 66%. These studies have dealt with issues such as the relationship between interest rates and housing prices (Carpenter and Segal, 2011), the effect of the purchase tax on housing prices (Ben-Tovim, 2016), and the relationship between construction starts and housing prices (Daniel Gat, 2011). However, the influence of the property tax on housing prices has not been examined, and in particular, the burden of property taxes has become more significant. It has become a crucial factor in housing prices as the government has reduced financial assistance to the municipal authorities.

This work has examined the influence of property tax on Israel's housing prices over 20 years between 1997 and 2017. During these two decades, significant progress has been made in Israel's economic activity after years of high inflation. Accurately, the year 1997 was characterised by significant changes in property tax. For the first time, the Knesset passed a necessary and significant amendment to the municipal tax law.

The authorities acted in order to reduce the accumulated deficits and caused a financial crisis in the local authorities. In addition, the year 1997 was also characterised by the onset of an increase in the tax burden on municipal property taxes. During this period, the integration into the economy of about one million new immigrants from a wide range of professions, who had arrived in the early 1990s from the Soviet Union, was also reflected in the economy, creating a high demand for housing, which posed a significant challenge to the Israeli government in finding immediate housing solutions.

It is essential to note that the property tax burden continued to grow significantly over the years as the Israeli government reduced assistance and balancing grants given to the local

authorities, which provided an incentive for the local authorities to neglect residential development and invest in real estate development. On the other hand, an increase in the municipal tax revenues collected by the authorities resulting from this policy created low supply and growing demand for housing from migrants. Simultaneously, housing prices increased dramatically in the authority's areas (Callan, Keane and Walsh, 2010; Collier, Glaeser, Venables, Manwaring and Blake, 2017; Gibler, Tyvimaa and Kananen, 2014).

As part of the study, the distinction has been made between collecting the municipal tax based on territory, which is used in several countries such as Poland, Israel, Romania, Bulgaria and Latvia – mainly in Eastern Europe, as well as in several countries in Asia and Africa, and the property tax collection method based on the value of property used in countries where the real estate market is more developed and established, such as the US, the UK, Japan, France, Canada and Australia.

The study examined the relationship between the central government and the local government, with the municipal tax linking these two bodies, with the central government determining tax rates and collecting the municipal tax. In contrast, the local government collects and applies the policy of the central government.

The results of this thesis should be interpreted in the Israeli context, considering the following emphasis:

The municipal council imposes the general municipal tax for the fiscal year under the municipal tax decree, under the authority conferred on it by the State Economic Arrangements Law (legislative amendments to achieve the budget objectives, 1992), and subject to state economic regulations (local municipal general regulations, 2007). Local tax rates are set by the local authority in the tax decree once a year. However, the authority is subject to the minimum and maximum limits, and the annual municipal rate increases the rates set by the central government.

Within this process, the authority sends the tax assessment to the actual holder of each property (building, agricultural land or occupied land), taking into account three main criteria: the type of property, its area (in square meters) and the area in which the property is located.

The property tax is calculated by multiplying the property area by the tax rate. The property tax assessment contains seven elements: the property's identity, the property area,

the use made of the property, the location of the property, the classification of the property, premises, exemptions and the amount of tax levied.

The property tax is due every two months and can be paid one time once a year. The municipal tax payments bear interest and linkage differences according to section 4 of the Local Authorities Law (Interest and Linkage Differences on Compulsory Payments, 1980).

In Israel, each authority uses a different method. The non-uniformity method has created frictions and led to litigation between residents and the authorities.

Like in other countries, there is a clear distinction between residential property taxes and business property tax in Israel. Hence, the local authorities prefer to invest their resources in business development. Because of the gradual reduction in aid budgets from the central government, the authorities have had to rely on business property taxes and not on housing construction. On the one hand, the population and demand from the authority have increased, and on the other hand, the high financial costs of the service basket have increased for services such as education, infrastructure, welfare and culture.

This preference of the specific authorities to invest in the commercialisation of land and less for residential purposes, on the one hand, has led to the low supply of housing, and on the other hand, increased the demand as the number of residents has increased from natural causes or new residents have caused a rise in house prices.

The local authorities may be and are authorised to give a discount on municipal taxes following the law, where residents have: low income, a disability or the status of a veteran citizen. They may also grant deployment of payments or deletion of municipal tax liabilities accrued to the taxpayer who is unable to pay.

The current study emphasises the significance of the property tax as a tool to control housing prices. It is important to note that because the municipal tax is one of the most important sources of income for any authority, the principles of public financing are broadly concerned with issues arising from the authority's decision-making processes, the structure of the tax, the rate, the nature of the municipal tax and the relationship between the central government and the local government. In a broad sense, this belongs to the field of public finance.

The basic principles of public finance constitute the distinction between the positive theories that discuss public financing decision-making and the normative theories that deal with how local authorities should not finance the services basket they provide to residents within their judicial fields.

One of the fundamental public finance theories was introduced in the US in the 1950s by Musgrave and later by Oates, who argued that a local authority did not work on all issues related to economic stability and looked at the goals allocated to the local government through the municipal tax (Martinez-Vazquez, Lago-Peñas and Sacchi, 2017).

One of the pioneers of positive theory was Tiebout, who built a model whereby the local authorities effectively provide public services to mobile consumers moving to their preferred district (Zodrow and Mieszkowski, 1986). In examining the decision-making process in the local authorities' budget as a statutory body, the annual budget constitutes all the tasks and actions that the authorities wish to implement. Crecine presents a positive model describing the process of allocation of resources via a mathematical algorithm focused on setting a local authorities budget within this topic.

2. Contribution to science

This dissertation has several main contributions. The primary purpose of the current work is to examine the influence of the property tax on housing prices in Israel between 1997 and 2017. This study's results expand on property tax theories and their associations with housing prices and demand from a theoretical aspect. Hence, these results enable us to better understand the property tax as a tool in the municipal authorities' hands to control housing prices. Thus, it could serve, for example, as a tool to balance inequality between citizens.

In this vein, it is essential to note that an ideal tax system should promote fiscal and economic efficiency, according to the researchers in this field. Efficiency is related to the principle of pleasure, whereby the imposition of a tax on the taxpayer enables them to benefit from the public services provided by the authority.

There is a distinction between the efficiency related to tax revenues. It is achieved when administrative costs are a clear and understandable probability for the taxpayer and defined economic efficiency where there is no effect or at least a small tax effect on the taxpayer's

decisions to save and consume. An efficient tax system will fulfil its purpose when it is neutral concerning economic decisions in the private sector.

Besides, this study's results provide additional empirical testing of the methods of calculating the municipal tax – the area-based and value-based methods. Calculation based on the area is very common in countries where the real estate market is not sufficiently developed, such as some countries belonging to the former Soviet bloc, Eastern European countries such as Hungary, Romania, Bulgaria, Poland, and even some countries in Africa and Asia (Głuszak, 2015).

The second method is based on value-based estimation. This method is more common in developed countries such as the UK, France, Germany, Canada, the USA, Japan, Finland and Denmark. For the first time, this study presents up-to-date and reliable data on Israel's property tax. Therefore, the results of this study enable us to compare Israel with other countries in terms of the property tax and its influence on housing prices, alongside other parameters. In this vein, this work is unique in Israel and, in this respect, sheds light and deepens our understanding of the municipal property tax system that relates to many areas of the residents' lives.

This work contributes to our understanding of the property tax system as a dual tax – on the one hand, a tax on property, and on the other hand, as a taxpayers' payment for receiving municipal services.

Hence, the study contributes to our understanding and differentiation between the standard methods of measuring property tax. The two methods of imposing the tax on the property's value or measuring the property area are flawed. In the author's opinion, however, the Israeli government should implement the property tax calculation method according to the value of the property with calculations that fit with the Israeli reality.

This study extends the understanding and enriches the knowledge of the standard methods of measurement of the property tax, which have either been calculated as the area multiplied by the tax rate or the property's value multiplied by the tax rate.

Understanding the relationship between the local authorities and the central government in determining the property tax policy and its influence on housing prices shows the need for the Israeli government to participate more than before in addressing housing issues with the

local authorities, which is an essential link in the residential neighbourhood planning chain and increasing housing supply in their area.

The government's cooperation can be reflected in financial assistance and incentives for the local authorities to develop and invest in residential housing, expeditious land 'thawing' procedures and reducing the disputes over the property tax burden. In this context, this study can add to our understanding and development of policy interventions among professionals in both government and local authorities dealing with issues of care and coping with rising housing prices.

Alongside the theoretical contribution, this study also has significant practical contributions by helping municipalities to better implement the methods of tax calculation and collection in order to optimise the influence on the housing prices.

Furthermore, this study sheds light on the multiple and indirect influence of the property tax on housing prices in Israel, which explains why contractors, when selling the housing they build, do not inform buyers about the expected cost of property taxes.

For the empirical analysis, several statistical tests were conducted in the study on each of the four cities separately and compared to the results of the other cities. The results of these statistical tests showed significant differences between the four cities. For example, as presented in the descriptive statistics, the NIS tax rate per square meter of housing in Jerusalem is 54.69 NIS, which is higher than 39.53 NIS in Tel-Aviv. This result does not fit because Tel Aviv is ranked in the socioeconomic cluster 8, while Jerusalem is in the socioeconomic cluster 2. An explanation for this finding is that Tel Aviv has invested more in developing business centres where the municipal tax revenue is significantly higher than the residential income. On the other hand, business centres consume fewer services provided by the authorities.

The lack of uniformity of the above measurement methods creates tax distortions, making it challenging to compare Israeli cities, as distinguished on the basis of the four selected cities in this study: Tel Aviv, Jerusalem, Haifa and Beersheba. The Israeli government shall consider this point and conduct a fundamental reform in the property tax system.

3. Limitations of the research

The findings of the current research have confirmed the hypothesis. However, there are several limitations, and thus the results of this work should be interpreted cautiously. First, the data presented in this work relies on data derived from the Central Bureau of Statistics for four main cities in Israel. Second, the housing prices used in the study include only new housing and do not consider second-hand markets and housing for investment.

However, the housing prices taken from the Israeli Central Bureau of Statistics do not include black market transactions or those reported for real estate taxes when buying or selling according to undervalued property valuations.

Third, calculating property tax is not homogenous for all municipalities in Israel since there is no formal law binding the municipalities. In this vein, the variance between the municipalities limits our ability to generalise and apply the results to all municipalities.

Fourth, the data gathered in this study relates to the cities in Israel. However, there are also municipalities in rural areas in Israel that have not been represented in this work.

4. Future research directions

In order to expand the results of the current study, it has suggested that future studies elaborate upon this line of research in the following directions:

First, this work has focused on residential housing prices. Future research should expand these results to business real estate. This examination might lead to different results since the business real estate market differs in many respects.

Second, future studies should continue to track the relationship between the property tax system and housing prices in the upcoming years due to possible changes in the regulations regarding the housing market and specific property tax changes.

Third, the current study may be used for testing the horizontal and vertical inequity in the property tax system based on area measurement.

5. Final conclusions

Main hypothesis [H1]

Although property tax in Israel is based on the area, it is strongly related to housing prices.

[H2]

Despite the four methods of calculating floor space in Israel between 1997 and 2017, the property tax rate in cities with a lower socioeconomic status was higher than in cities with a higher socioeconomic status.

According to this research, the results are consistent with the hypothesis. Therefore, the hypothesis has been confirmed.

To conclude, the current study has found a positive relationship between property tax and housing prices. This finding partly explains the dramatic rise in housing prices in Israel in the years under analyses, and why the local authorities have made a significant contribution to raising housing prices through the municipal tax.

Based on the statistical methods used, the hypothesis that there is no relation between property tax and housing prices was rejected in favour of accepting the hypothesis H1 that such a relation exists.

The study also finds that local governments have adopted incentives and policies for investment in real estate development for businesses to increase revenues, and neglected investment in residential development, resulting in low supply and high demand for housing. This has contributed to a significant rise in local housing prices.

Besides, the results of this thesis stress that the Israeli government's policy, which has been dealing with the rise in housing prices without providing more housing, and significantly the local authorities' policy, has hampered the handling of housing prices.

This understanding will foster closer cooperation in the relationship between the central government and local governments in all matters related to addressing housing issues at both the national and local levels. Hence, the Israeli government must create incentives and encourage financial assistance and land ‘defrosting’ so that the local authorities increase the supply of housing in their areas.

Abstract

The main aim of this dissertation is to explain the relations between property tax based on area and housing prices in Israel. Specific objectives have been formulated to achieve the main aim: 1) to clarify the functioning of the housing markets and the factors determining housing prices; 2) to examine the differences in the design and characteristics of the two types of property tax, i.e. based on the value of the property and based on the area, using a comparative analysis; 3) to examine four different methods of measuring surface area in property tax in four Israeli cities with a numerical analysis of tax revenues and housing prices; 4) to evaluate the interactions between property tax revenues and housing prices.

The dissertation seeks to verify main research hypothesis, according to which: 1) although property tax in Israel is based on surface area, it is strongly related to housing prices, and an additional hypothesis stating that 2) despite using four methods of calculating surface area in the property tax system in Israel between 1997 and 2017, the tax burden on residents in less developed cities was higher than in more developed cities.

Different research methods are used in the study. A comparative method of selected countries with different property tax systems is used, i.e. Ireland and Japan (value-based tax), as well as Poland and Latvia (area-based tax), to explore the strengths and weaknesses of property tax systems. Furthermore, in the case study method four cities in Israel – Beersheba, Haifa, Jerusalem and Tel Aviv are evaluated for the years 1997-2017. These analyses are supported by statistical and econometric tools such as the ANOVA variance analysis, Pearson correlation, regression models and cointegration analysis. The data for the analysis of individual cities were collected manually directly from the archives of the Central Statistical Office of Israel. It should be stressed that these were raw data, in an analogue version, available only in the Office.

In the first stage of the study, the determinants of housing prices, the economic models of the functioning of housing markets formulated by DiPasquale and Wheaton, as well as

Miles, and possible relations between the property tax and the price of housing are explained. In the second stage, the differences between a property tax based on area and a property tax based value are discussed with the use of efficiency and equity criteria based on a comparative analysis for four countries: Ireland and Japan, as well as Poland and Latvia. In the third stage of the study, the author explained four methods of measuring space for property tax in Israel and characterised the differences in property tax and housing prices in four selected cities: Beersheba, Haifa, Jerusalem and Tel Aviv. In the last stage, the relationship between property tax revenues and housing prices is estimated using the ANOVA variance analysis, Pearson correlation, linear regressions and cointegration.

Property tax revenues and housing prices had a common long-term steady state equilibrium, independent of time and statistically significant in Haifa and Tel Aviv. Moreover, property tax revenues influence the price levels of housing. Four methods of calculating the area for property tax in Israel have caused serious distortions in the functioning of property markets. As a result, Jerusalem, a relatively underdeveloped city in terms of its socio-economic status, was more heavily burdened with property tax than Tel Aviv, a very well-developed city.

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