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ANALYSIS OF INVESTMENTS' ATTRACTIVENESS OF LOCAL REAL ESTATE MARKETS

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Introduction

The purpose of this thesis is to analyze the real estate markets examples in order to provide an unequivocal evaluation of attractiveness of given real estate markets examples.

To do so the thesis will present a short analysis of the market as a part of the whole economy and the role of supply, demand, and price on the real estate markets. Further considerations will concern real estate itself, its characteristics and also types and functions of real estate. Further parts will present the issues of the meaning of the real estate for the economy and its particular character. There will be presented possible definitions of the real estate market, which is expressed in many forms that depend from the point of view. Later on, we will analyze real estate market as a system and subsystem that are possible to distinguish. The first chapter ending will regard financial investments in the property market and reveal the difference between them and material investments in the same type of markets.

The second chapter will focus on the methodology of investments' measuring on the real estate markets. In this purpose, the taxonomic method will be presented. There will be considered the aim of application of the method and its application in multidimensional analyses. At the end of the first part of chapter 2, there will be presented the taxonomic measure of the attractiveness of housing markets. The measure will be used to synthetize information about each real estate market examples which are expressed in the values of parameters that describe each selected property market. Further analysis in the mentioned chapter will focus on the description of the real estate market's indicators.

The indicators concern different real estate markets features, as affordability, profitability of renting and also describes the impact of the whole state economy and social features, like society demographic condition, on the housing market.

The third chapter will present the application of the previously created measure and its results which will allow providing an unequivocal evaluation of the attractiveness of each housing market among the set.

1. Characteristics of real estate markets

1.1 Real estate market as a part of the market economy

The biggest part (about 2/3) of the national property is real estate. Therefore, we can consider them as an important part of a market economy. It is impossible to imagine the market and even society functioning without a real estate, especially buildings. Real estate market is subordinated to:

- limitations and particular regulations that result from characteristic properties of real estate, especially from their permanent localization;
- economics rules of the market function at all.

The property market may be considered as much complex than other markets. Of course, each market has its own particularities but it is proper to underline the particularities of real estate that have a significant impact on the way of the functioning of the market. The term real estate refers not only to the buildings but also to the lands. Localization of both of them is always permanent, in contrast to the other goods that can be moved from one to another geographical market. Property market always refers to a specific good located in the stable point in the space. That means that on the real estate market is not the good that is delivered to the buyer, but the buyer has to move himself to reach the good that is a real estate. Another implication of the real estate properties on the market is that we do not treat about the acquisition of a building or a land but we treat about an acquisition of the rights to the real estate.

Another particularity of the real estate that should be mentioned is the possibility to divide for many years the property right and the right to use the real estate. Therefore, it is possible to purchase not only the property right to a real estate but also a right to use it. That allows the owner to benefit for many years from the property without losing it. With time on the real estate market increases the number of available areas, the growth of supply, and the value of the properties. Moreover, the growth of supply on that type of the market requires a huge quantity of time and capital. Despite the risk and other threats, still not exhausted demand and will of gaining the profit causes the constant increase in the number of dwellings.

1.2.1 Supply on the real estate market

The market mechanism expresses the relationships between his three elements: supply, demand, and price. Each change in one of the elements changes other ones. The mechanism is unchangeable but may be disturbed by the artificial regulations from outside actors e. g. the government. If we consider the supply as the number of offered goods on the market[1] than on each market growing prices, on the one hand, encourage the producers to increase the production, on the other hand, mean progressive decrease of the number of potential buyers. That means that the demand is overtaken by the supply and the market will regulate itself by the decrease in the prices. That means that the part of the producers will find themselves below the level of profitability and will bankrupt. It is the way how the market eliminates the worst producers (the least effective).

On the real estate market, the basic subject of supply is the property right and in the polish case also perpetual usufruct. There are other goods offered on the market, as a right of use that refers to the dwellings and to the lands. However, in these two cases, there is no change of the owner. It is possible to say that it is a kind of service provided by the owner, that is inside the conception of using the property.

The time-consuming production process that is required to construct a new dwelling is the particularity of the market that causes that to speed up the production and to slow it down there is required a good deal of time, usually a dozen months or even a few years.

1.2.2 Demand on the real estate market

When the price is rising demand gets lower, so when the price lowers demand rises because the good becomes achievable for a bigger number of buyers, that encourage producers to produce more and the market goes on, even if the production cycle on this market is so long. Of course, that is only a theoretical description that works as we can observe, but in practice, the relation between buyers and sellers is

[1] M.Nasiłowski: *System rynkowy. Podstawy mikro- i markoekonomii, KeyText, Warszawa 2000,* p. 63.

never completely determined by the situation on the market. The relations are always manipulated, even unconsciously, by the actors of a transaction.

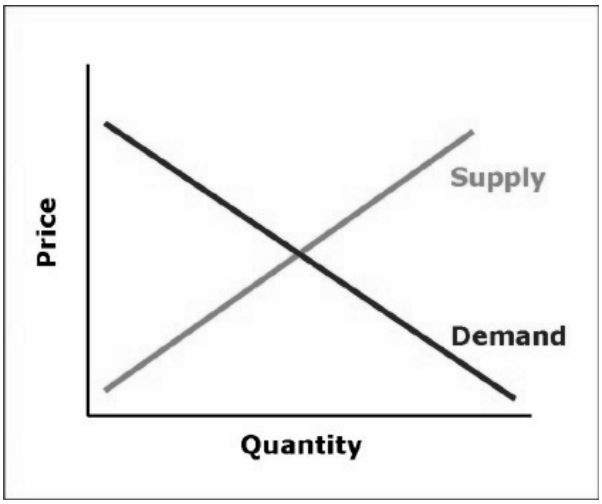
In Poland, before 2007 we had got an unnatural growth of demand because of the off-market factor that was the expected rising of the VAT for the real estate from 0 to 22%, at the and the new law set up the tax level on 7%. Anyway, the situation motivated possible buyers and the growth of demand was recognizable on the market. Another situation of that kind was the opinion shared by some of the market actors that after the polish access to EU the prices will rapidly get higher.

1.2.3 Price on the real estate market

Previously described relationships can be presented on the graph. The point of crossing the lines of supply and demand is called equilibrium price. It indicates the level of the price on which there will be the balance between supply and demand. That means that all the products will be bought by the consumers at the price on this level. In reality, on the extremely huge, still more global market, the situation is very dynamic, so also the point of crossing changes very dynamically. The balanced market is always an exceptional and temporary case.[2] However, even that unstable and sensitive to many influences market tends to balance itself. Nevertheless, it is almost impossible to indicate the point of balance in the current market's situation (on the other markets it is impossible, but on the real estate market, because of its characteristics, we can imagine one fine attempt). That occurs because of the huge number of influences under which the market is and because of the manipulations of the actors, between which the buyer is the weaker one. A client represents his personal demand for the goods, together the clients represent the global demand. It is also important to mention that it is very difficult to measure the size of the demand on the real estate market because it does not depend only on current capital but also of expected future earnings. They determine the credit rating of a client, which is as much important to the seller as the quantity of cash collected by the buyer.

2 D. Begg., S. Fischer, R. Dornbusch: Makroekonomia, wyd. 2, PWE, Warszawa 1999, p. 56.

Figure 1.1: Price Equilibrium



Source: own elaboration

1.3.1 Definition of the real estate

The concept of the real estate is connected strictly with the property right. The most important characteristics is the stability of the occupied place in the space. As a part of a ground – the land – cannot be canceled, even if it is possible to destroy all the buildings. So, the basic ingredient of the concept of the real estate is being one determinate part of the earth surface. That borders and land's shape have to be indicated clearly. Here the antic Roman law rule, that is present also in today's law systems all around the world, should be mentioned: "superficies solo cedit"[3], it expresses the idea that the buildings and the land cannot be separated. Even in the cases of the property of the apartments, located in the same building, the owner of each one is also the proprietor of the part (in this case not indicated) of the ground that is placed under the building. Nowadays there are real estate not connected with the ground but they exist as exceptions from the general law rule. Therefore, the general rule implies that everything that is stably associated with the land is its part, and the owner of the land is the owner of these items.

This old economic category appeared on the level of the social development when there was a need to recognize the owner of the real estate, who was embracing his

3 http://penelope.uchicago.edu/Thayer/E/Roman/Texts/secondary/SMIGRA/Superficies.html, [access: 11.05.2018 19:46].*

property right, that was accepted and recognized by the society. The acceptance of the property right not always meant the recognition of the right of somebody to the real estate. Always there was someone that wanted to overtake the property and the property right to it. Nevertheless, the recognition of the existence of the right (that exists independently from the way of its acquisition) was the important development factor, not only for the real estate market but essentially for the whole world economics.

1.3.2 Characteristics of the real estate

- The first quality is the essence of itself, as the part of the land cannot be moved. It is possible to divide a real estate into a few smaller ones or to connect a few smaller ones into a big one. The localization is always unchangeable.;
- The second particularity is the possibility of increasing the value of the property by constructing new structures and buildings attached to the parcel. It happens because of the improved functionality of a real estate;
- The third feature is that each real estate always has an owner. Sometimes there may happen a trouble to find you who is it, but it is impossible to do not find it.
- The fourth quality is the necessity of registration of all legal events that concerns the real estate into the perpetual book;
- The fifth attribute is the special way of conducting the transaction of a property that requires the assistance of a notary. It allows to keep the perpetual book correct and up to date.
- The sixth feature is the diversity of real estate. There is no two the same real estate. Each one has a different localization, shape or size. Also, buildings differ one from another. Even if we consider two terraced houses they are never the same.;
- The seventh particularity is the difficulty with dividing a build-up real estate. It is a complex action because of technical limitations of buildings. However, these days to meet the requirements of the market, we are able to manage it.

As we can observe each real estate is unique, it has a unique localization, is a good very easy to pledge. Investments on the property have a long-term character. The number of transactions that concerns an immobility, because of its characteristics, is

limited, therefore it is very difficult to estimate its accurate price. We should not forget also about the strong psychological impact that always takes part in the real estate transactions.[4]

1.3.3 Types of real estate

There are some approaches to the typology of real estate, according to one of them, that follows the polish law approach, which comes from previously mentioned definition and specification, we can distinguish following types of real estate:

- Lands,
- Developed immobility,
- Building immobility,
- Apartment and retail real estate.

In the field of the typology land real estate is a determined part of a ground space which is exactly determined by social economics designation of the land. That means that the property actually limits are above and below the ground.

Developed real estate is also a determined part of the ground space on which the investment process was conducted and there are the dwellings as effects of that. So, developed real estate is the part of the land with the buildings with which they create this type of real estate.

The division unit does not concern building immobility that is the part of a building that is the subject of different separated property law; the building and the land are subject to two different property rights. It concerns especially the case when there is the building that is the subject of one property right and the land that is the subject of another property right especially perpetual usufruct.

Apartment and retail real estate have to be a group of rooms divided from other immobilities by stable walls that fulfill accommodation or commercial needs of the user. The real estate may be connected to also other rooms like an attic or a garage. The law requires also an own perpetual book for the immobility, even if physically it is a part of another building. The question of the common propriety of the land under the

4 M. Hoesli, B. Macgregor: Property Investment. Principle and Practice of Portfolio Management, Pearson Educational Limited. 2000, p. 19-23.

building in which are located the apartment are retail real estate should be mentioned. The owners of each property right have also a partial, non-indicated, right to the land on which the building stands.

Other English ("National Land Use Database" issued by the Office of the Deputy Prime Minister) classification divides the real estate market for 8 types of property:

- agricultural,
- woodland,
- unimproved grassland and heathland,
- water and wetland,
- rock and coastal land,
- minerals and landfill,
- recreation,
- transport,
- residential,
- community buildings,
- industrial and commercial,
- vacant land and buildings,
- defense land and buildings.[5]

The objective was to evolve a new way of thinking that allows land use and land cover to be recognized and ordered independently. Harmonization that facilitates widespread was the scope of the classification. The division into the concepts was also consulted and tested.

Each classification has his own purpose, that was different from previously mentioned. Both of them includes every type of a real estate. And it is possible to find the equivalents of concepts between both of classification easily.

5 Office of the Deputy Prime Minister: National Land Use Database: Land Use and Land Cover Classification, version 4.4, LandInform Ltd, London February 2006.

1.3.4 Functions of the real estate

Functions of the real estate come directly from its useable value that can be independently measured by the number of usable surface of the flat, of the office or by a number of parking places. The valuation is made by the subject that is interested in the values of the real estate. The value at the end has also a subjective character because of the personal approach to the possible use of the property.

The features of a specific real estate are objective. Cubature, surface, architecture, shape, localization, neighborhood and color of the elevation are features that can be objectively determined. Changes of some of them are possible whereas some of them are unchangeable, like localization.

An immobility, thanks to its useable value, is a merchandise that can be a subject of the market turnover. However, the owner can usufruct the real estate by himself, then it is not a subject of the market turnover. In this case, the immobility does not lose his merchandise character, because it still has its value and, in every moment, can be placed on the market.

On the market, the subject of turnover can be the right of property of the immobility or the right of use of the whole immobility or its part. There is the requirement of the written form for every market action that concerns and immobility and the requirement of the notarial deed for the actions concerning transfers of the propriety right.

Placing on the market of the real estate is possible because of that that each one of them fulfills some demand for housing, retail, industrial or agricultural needs thanks to its useable value.

Generally the high value of a real estate and its durability cause that, except the most important and basic function coming directly from its core that is fulfilling the demand or the need for a surface, real estate fulfills also other functions[6], as:

a) pledge,
b) profit-making,
c) hoarding,
d) speculative,
e) fiscal.

6 E. Kucharska-Stasiak: Nieruchomość a rynek, PWN, Warszawa 1999, p.24.

Ad a)

Real estate is very good and traditional loan collateral.[7] Thanks to the existence of the perpetual book, where the obligation burden is written. As a result, the future acquirer has the full awareness about the debt in case of the acquisition.

Ad b)

As each thing, a real estate can bring benefits to its owner.[8] We can divide them for: natural, e.g. agricultural and civil, that it brings because of obligation causes. Nowadays the second one usually is expressed in money. Generally, we can talk about them as benefits of subjective right. All benefits fall on that one that is entitled to take them. Always the nature of the obligation decides who it is.

Ad c)

For the reason of multiannual tendency of the increase of the value of the real estate, very often they are considerate as a good investment for financial resources. The investment is relatively stable and safe, and it is especially demanded during inflation time. It attractiveness rise if simultaneously the real estate brings benefits to the owner.

Ad d)

The purchase of the real estate quite often has only a speculative character. In this case, it has to be preceded with speculative knowledge about the future increase of useful value and as a consequence, the price of the immobility. Good examples of the speculative acquisitions were the cases of real estate acquisitions in Berlin before the changing of the German capital city in the early nineties of the previous century.[9] Speculations in real estate require a huge capital and a long time period.

Ad e)

The immobilities make part of the assets of natural persons and private individuals. Therefore, they are used by many countries as the basis for calculating the property tax, that usually makes part of the income of local councils.

The name of the tax varies from country to country, but the charge is still based on the quantity of property[10], which impossible-to-move physical part is the immobility. The

7 E Siemińska: Bankowe normy ostrożnościowe w kontekście kredytu hipotecznego, „Finanse, Bankowość, Ubezpieczenia" 2002, nr 3.
8 A. Doliwa: Prawo rzeczowe, Wydawnictwo C. H. Beck, Warszawa 2004, p. 17.
9 http://www.ijurr.org/virtual-issues/berlin-capital-contradictions/ , access: 11.05.2018 20:52.
10 M. Pietrowicz: Polityka fiskalna, Poltext, Warszawa 1998, p. 43.

tax is an obligatory fee that is not related to the ability-to-pay, so even the owners who live in their own real estate have to pay the tax, so also in the cases when the property does not bring a return. In various countries, the way of calculating the amount of the property tax is different,
like in the polish case the rate of the tax may be limited.

1.3.5 Meaning of the real estate in the economy

As it was mentioned before real estate makes an important part of the whole economy. It is also obvious that social and economic development depends on the number of immobilities possessed by the society. So, without the real estate, the economics could not proceed. For the good prosperity, the property requires also good working infrastructure (water pipes, sewerage). The spending on the real estate is also a significant part of each year investment spending in the country scale. It is also worth to mention the value of GDP created in the sector of real estate services.

Previously indicated facts, confirm indirectly that the state cannot be indifferent to the problem of investment and production in the real estate market. The scope of the state intervention should be creating the law that allows for as much profit and as much durability of an existing resource, regardless of who the owner is. The friendly regulations should be, most of all, stable. It allows the market to be less variable that is very important for the long-time expenses and investments.

1.4.1 Particular character of the real estate market

To the specific features of the real estate, it is obvious that we should classify these which make the real estate market particular. Thanks to them the real estate market is:

- always local, limited[11], so different than the market of mass goods (for instance snacks or clothes). That means that it is impossible to move one property to another market where the prices are higher. The character of the globalization on

11 S. Belniak: Rozwój rynku nieruchomości w Polsce na tle krajów wysoko rozwiniętych, wyd. AE w Krakowie, Kraków 2001, p. 42.

the property market is particular. If the globalization of the market is *"economic globalization is a process of liquidation of economic barriers for the market's activity, which consequence is the process of integration of world's economy"*[12] as says W. Szymański, therefore it does not concern the real estate markets, which are local because of their territorial limitation. So an English investment fund can move the right to a real estate located in Szczecin to another entity located in another place, but the immobility will remain at the local market in Szczecin;

- financial globalization of the real estate market allows business entities to achieve their objectives, but does not change the character of the demand for immobilities. Even if there is an international capital behind the investment on the Warsaw's hotel market, the investment is always made on the local Warsaw real estate market. In the same time the investment makes also a part of the international (global) market of rights to the property;
- meaning of the decision, on that market, has a significant importance, because the price of an immobility is relatively high and the period of exploitation is unusually long. Therefore the purchase or the investment decisions are more deliberate;
- the individuality of a real estate feeds the subjectivity of evaluations. Basically, each immobility is unique. The most important part of each real estate for investors are buildings. The objects created for the special individual orders meet the requirements of the orderer, for that reason, the custom building is more expensive and also the costs of maintenance are higher. In this case, the selling process is longer because there is required more time to find the purchaser that has the similar requirements to the orderer. Hence, non-individual mass investments have some facilities in their turnover.

Other authors[13] mention different characteristic features of the real estate market. One of them is the imperfection of the market. Because even if there is a certain freedom in shaping demand and supply, the mechanism of shaping the price equilibrium cannot work correctly, for the reasons mentioned before (changelessness of the

12 W. Szymański: Interesy i sprzeczności globalizacji, Difin, Warszawa 2004, p.37 .
13 L. Kałkowski i inni: Rynek nieruchomości w Polsce, Twigger, Warszawa 2003, p. 11-19; H. Henzel i inni: Inwestycje na rynku nieruchomości, Wyd. AE w Katowicach, Katowice 2004, p. 57.

localization; long and expensive production's realization cycle; difficulties with divisibility).

Another characteristic that can be mentioned is the uniqueness of each real estate market. It is unique because can be also described as the sum of all properties in one place, that are dedicated for sale and rent.

The feature which mares the property market so special is its low flexibility. It is possible to describe one market as flexible when there is on it an unlimited supply of one good. There is no such characteristic of the real estate market because the number of immobilities considered as fragments of earth's surface is limited. Therefore the market is sometimes described as relatively stable, slowly changing.

In this sector, state interventions are quite frequent. First of all, because of the state's role in creating the rules on the market. Another comparable market, from the point of view of the frequency of the state interventions, is the stock market. The state often intervenes to increase supply or to transform social needs into demand. The financial commitment of the state on the market is also noticeable.

On the market, it is also possible to observe a relatively significant share of the shadow economy. The necessity of informing, in the notarial deed, about the value of the transaction that is the basis of the transaction's taxation. This situation creates a will to hide from the authorities the actual value of the price. Moreover, sometimes money from unknown sources is used in real estate transactions.

The characteristics mentioned before do not raise doubts. Whereas, there are three characteristics of the real estate market that are mentioned only by some part of the researchers:

- the lack of reliable data for the interference,
- informal character,
- the requirement of professional service.

Some of the researchers maintain that the lack of reliable data for the interference is one of the characteristics of the real estate market, but it is no longer appropriate for the dynamic and globalized markets. Informal character, so the lack of a place where transactions occur and the lack of an institution responsible for their realization, nowadays are the characteristics of each one market, except a few of them, e.g. the stock market. For this reason, the informal character is not a special feature of the real

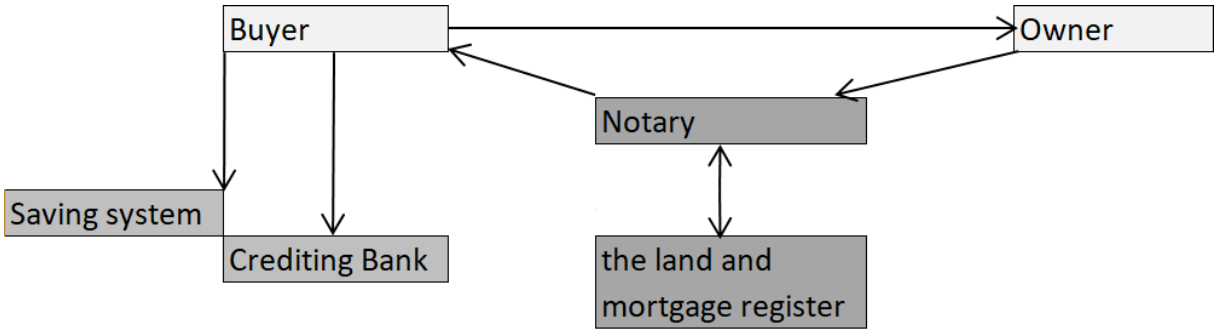
estate market. The requirement of professional service also today concerns the greater number of different markets. The issue that varies is the type of professional knowledge that is needed in each market.

1.4.2 Definition of the real estate market

Average participant of the real estate market that is an average citizen, who wants to buy a flat, sees the real estate market from their transaction's perspective, as they and the seller or the buyer were the only actors of. The transaction is very important to the market, but it does not finish the issue of a buying transaction on the property market.

The buyer uses the capital gathered before and usually adds also the money from a bank loan. Regardless of the origin of the capital, it is passed to the seller as a payment for merchandise, which is a real property. It is more frequent that the buyer arrives directly to the developer's office if we consider the situation in a primary real estate market. A different situation occurs in the secondary real estate market, where the transaction mostly occurs with the participation of real estate agencies. In both of cases, it is requested to sign the notarial deed. Later on, the notary has to contact the land and mortgage register. Frequently the process of selling is also anticipated by signing a preliminary contract.

Figure 1.2: The Selling Process



Source: own elaboration

There are many possible points of view, therefore also many definitions of the real estate market. One of them, the old one, refers it as a place where occurs the transaction and the people who participate in it. The definition includes a broad spectrum of the market participants as agents, brokers, commissioners, bankers, auctioneers, attorneys, and insurers.[14] Another way to define the market is to consider it *as a generic term that describes thousands of smaller markets operating in different areas, dealing with different types of properties, and involving different groups of market participants. It is a heterogeneous, multi-commodity market and segmented by a number of elements such as geographic areas, property types, and demographic characteristics.*[15]

We could observe many submarkets inside the housing market:

- the submarket of the turnover of rights to immobilities, nevertheless who is the buyer, who is the seller and what is the object of the transaction (skyscraper or a land property),
- the submarket of the turnover of finance which concerns housing, that means financial, leasing and insurance products, which concern directly real estate market,
- the submarket of increasing a value of immobilities may be also called the submarket of real estate investments, this submarket increase the supply on the whole housing market,
- the submarket of the turnover of services which are concerning the real estate, in details mostly agents and administrators services,
- the submarket of the turnover of other rights to properties.

[14] *Abdul Hamid Mar Iman: Basic Aspects of Property Market Research, Penerbit, Johor, 2006, p.65.*
15 Idem, p.65.

1.4.3 Real estate market as a system

During last years we can observe the popularity of expressions which considers the market as a system, for instance, "the market system" or "the market as a system". Concepts regard the whole economic system or only parts of it.

One polish researcher[16] in his analysis divides the market, considered as a system, in 5 subsystems: merchandise, financial, capital, currency, and labor submarket. The author also says that it is very important for each economist to be aware of that that there are no monocausal events in the market economy.[17]

The same issue emphasizes E. Doyle. The author says that from this observation arises:

1. *"The economic system is a web of interactions between individuals, economic units, and institutions that determine how resources are best used to satisfy competing demands.*
2. *Choices about how resources are used, which goods are produced and in what quantities, are made via the economic system.*
3. *Both macroeconomic and microeconomic concepts, principles and models are used to explain how the features interrelate within the economic system."*[18]

The scientific nomenclature achieved one combined definition of the subject of their consideration. According to it, the system is an isolated collection of elements, which are connected, considered as a whole that has also the same character as its parts.[19] This quite simple definition allows us to present each relationship web by analyzing interrelations of system components. That is why systemic approach due to its undoubted advantages enjoys popularity nowadays.

As we see to define the housing market as a system, it is required to describe parts of the system, parts of the system's environment, important relations between them and important relations between systems parts.

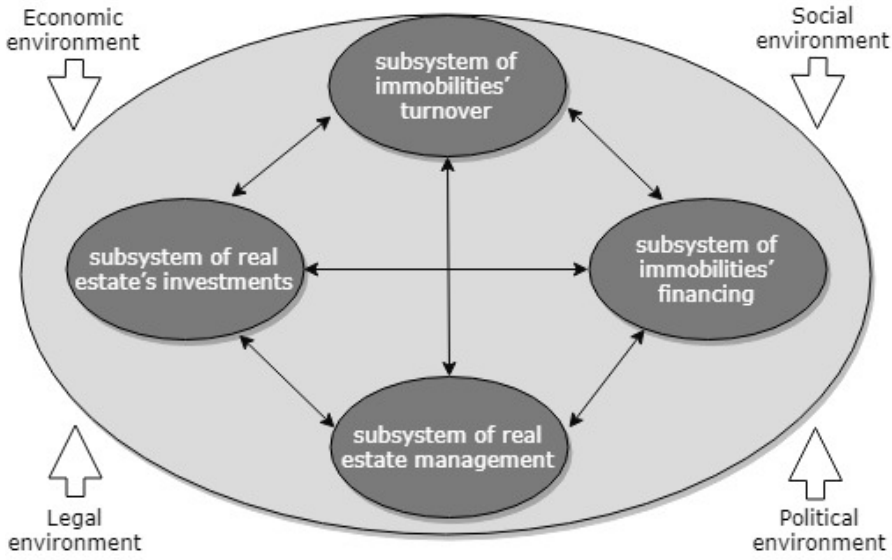
We consider the real estate market as a system, therefore, we can observe also the subsystems, which consist of elements that create subsystems and the market

16 M. Nasiłowski: System rynkowy. Podstawy mikro- i makroekonomii, KeyText, Warszawa, p.14.
17 Idem, p. 14
18 E. Doyle: The Economic System, John Wiley & Sons, Ltd., 2005, p.30.
19 T. Jajuga, K. Jajuga, K. Wrzostek, S. Wrzostek: Elementy teorii systemów i analizy systemowej, Wyd. AE, Wrocław 1993.

environment. Previously mentioned submarkets in the field of the housing market from the point of the view of the market as a whole are strictly connected with the subsystems. Thus we could mention the following submarkets.

- The subsystem of immobilities' turnover, whose objective is to transfer the property right between the market's participants.
- The subsystem of immobilities' financing, whose objective is to provide funding that allows making deals on the real estate market.
- The subsystem of real estate management, whose objective is to provide benefits to the owners and maintenance of the property's value.
- The subsystem of real estate's investments, whose objective is to increase the property's usefulness, so the value as well.

Figure 1.3: Housing Market System



Source: own elaboration

The diagram number 3 shows the housing market as a system. We can observe the parts of the whole system, the relations inside, and also the influences of the external environment. Of course, each diagram should be considered as a simplification, the real-life relations are much more complex because they occur at the same time. We should also observe a significant importance of the external environmental influences. The real

estate market as each market is strongly connected with the whole market. It differs because of its characteristics but always makes its part.

Economic environment, so the economic system, without immobilities cannot function. As we mentioned before, the property makes its part of GDP and two-thirds of the national estate. It is also impossible to imagine any industry or services without real estate. Each entity, association, and also family needs an own limited space, where it may realize its functions. A part of the economic system makes also its tax rules. In some countries, we may observe special taxes for immobilities. Whereas two mostly paid are CIT and PIT.

Relatively huge value of immobility is the issue which concerns the social environment of the real estate market. Society to fulfill its needs requires also housing resources. It is the reason for many state interventions in the property market.

The legal environment influences the housing market because immobilities are the object of the property law. Each transaction on the market is also the object of the law of obligations. For the very reason of the law, the approach to the immobilities is very particular.

The political environment is the queries of freedom in turnover. The issues like limitations of the access to the property, the seam treatment of the owners wherever they are citizens or foreigners. It is the politics that create the law. The real estate market cannot be free of political influences because it is too important.

The subsystem of immobilities' turnover depends mostly on the size of the financing subsystem. They are mostly bank products, especially cheap and accessible mortgage loan encourages the movement on the financing submarket. The role of the subsystem of investments is providing the objects of the turnover. The relation with the subsystem of management is quite obvious. It is much easier to lend or sell a flat which is professionally managed.

The subsystem of immobilities' financing depends strongly on the subsystem of the immobilities' turnover. Crediting is the main activity of the banks on both primary and secondary market. The financing subsystem power also the investment subsystem. Developers that build a wide range of constructions, also take benefits from financial products. The subsystem of management is connected to the described system, by managing loans payments schedules. There are also many new relations that appear on

the market at the crossing of these two subsystems as leasing for instance. The financial issues of the property market are a very wide topic, but it is beyond the main topic of the thesis, therefore they are not going to be considered more precisely.

The subsystem of real estate management is becoming more and more important, thanks to the development of the management of immobilities. Therefore the role of the manager has also its growing importance. The subsystem requires financing to fulfill the subsystem needs. There is also a need for new space to manage, which may be provided by the investment subsystem. Whereas the turnover subsystem provides jobs offered by owners that fulfill their and tenants needs.

The subsystem of real estate investments is also strictly connected with the other ones. The turnover subsystem participates in an investment from its very beginning. The property often comes from one to another hand before the investment process. Even if not at the beginning the real estate after the process is provided from the investment to the turnover subsystem. Another connection is that investors are always interested in financial submarket products. The investment should be simply described as a resignation from current consumption for future benefits. This definition is very general, but for this reason, suits all type of investments. Specification of the definition requires mentioning two basic approaches to investments. It is possible to distinguish between material and financial investments. The first type is the transformation of a capital into the goods. A good example is the creation of the new building as a factory or a house. Only these type investments make part of the property market system.[20] Whereas financial investments do not increase GDP.

Financial investment has as for its objective generation of "*rental income and profits through price appreciation"*.[21] In this sense, these type of investments do not refer only to the real estate market. However, the scope of the thesis is to determine investments' attractiveness on the real estate markets globally on a few examples. For this reason, the research will be limited to financial investments and other theoretical considerations will focus on the financial investments issues.

To sum up, previously mentioned classification of real estate market as a system we should mention that subsystems support themselves in their activities. That allows

20 M. Bryx, Rynek nieruchomości system i funkcjonowanie, POLTEXT, Warszawa 2008, p. 113.
21 Investment Real Estate, https://www.investopedia.com/terms/i/investmentrealestate.asp, [access: 31.05.2018].

introducing new market's instruments. Their impacts inside and outside the housing market system are returnable. Events on the market have influence over the whole environment beyond it. Returnable influences of the market and environment, and between its parts, cause the dynamics on the immobility market's system. The dynamics cause variability, which is the main reason why the market system is developing.

1.5.1 Financial investments in the housing market

In the financial investments are allocated 3.5% assets of pension funds in the United States. The share varies from country to country, and in some developed countries exceeds 10 %.[22] Funds, not only pension ones, use services of investments banks, which specialize in issuing stocks, bonds and investing. The biggest investment banks known around the world are Bank of America Merrill Lynch, Morgan Stanley, Goldman Sachs and JP Morgan.[23] They are examples of huge financial institutions which are active in the investing market. This type of investment activity is not characteristic only for them and other business entities. We should not forget about the whole capital located in real estate and an immense number of individual investors, who sometimes, even without awareness, participate in it.

Size of the global commercial real estate market is unmeasurable. It is estimated at the level of 8 - 22 trillion dollars.[24] There are also plenty of ways - direct and indirect - to invest in the property by private activities, activities of legal persons, funds, REITs, mortgage-backed securities. This list is not closed. It is impossible to count every idea for an investment. Nowadays one of the ideas may be also offering hospitality services on the online marketplace. The most typical are[25]:

- keeping land for long period in order to gain benefits from the raise of its value;
- keeping land without any particular intentions, that is found as an investment to gain on its raised value;

22 M. Hoesli, C. Lizieri: Real Estate in the investment portfolio, a report prepared for the Investment Strategy Council of the Royal Ministry of Finance, London 2007, p. i.
23 Bank inwestycyjny, https://www.nbportal.pl/slownik/pozycje-slownika/bank-inwestycyjny, [access: 31.05.2018].
24 M. Hoesli, C. Lizieri: Real Estate in the investment …, London 2007, p. i.
25 Karol Klimczak, Determinants of Real Estate Investment, Economics & Sociology, Vol. 3, No 2, 2010, p. 58-66.

- keeping a building by the legal body or incorporated into its assets, on the basis of financial leasing accord, that is let to another entity, for the purpose of gaining benefits;
- keeping a property for long period in order to gain benefits from the raise of its value, and to obtain benefits from a rent;

We could conclude that investments are these purchases, where the buyer has a will to gain a financial benefit from the acquirement. As it was mentioned before investments may be considered mainly as increasing the value of the property to gain economic benefits from it, by using it or to let it to another entity or person and gain benefits in this way.

Last years, it is possible to observe that the countries' economies have become closer. It is because of the growing number of connections between them what cause the growth of a number of transactions between them. We should not think only about goods and services. Even the respect to investments' actors has risen.[26] The barriers, which existed before, as communications' cost are not problems anymore. The main aim of investing abroad is to lower the risk, by diversification of investments locations. It is important for investors to consider the location's environmental queries, for instance, political or cultural, to do not increase the risk, which should be lowered, by the diversification. The process is going on, thanks to globalization the investors may look at new markets, and destinations like Hong Kong, Singapore or East Europe will become less popular.

It is important which local property market investor chooses. Main issues that should be taken into account is expected growth and country risk, which is a wide issue. The impact of rent on the investment is bigger in more developed markets. It is also important to consider other factors in the future investments' state like population condition. Decreasing populations, for instance in Germany, is a significant negative factor, which may cause the decline of the demand on the market. The legal system in a country in which the investor would like to invest is also not indifferent. This system could encourage possible investors or may a threat. A good example may be the

26 M. Salem, A. Ross, K. Saci, R. Kirkham, R. Abdulai: Exploring the Attractiveness of GCC Real Estate Markets to Global Real Estate Investors, Liverpool John Moores University, Peter Jost Enterprise Centre, Liverpool 2009, p. 1.

Chinese one. The property law expires after 70 years.[27] Other state regulations, like rent regulations, in case of abroad investments, should be examined carefully because of the whole investment risk and profitability. Each market should be examined carefully, from the point of view of its economy and its perspective. The future issues should be the most important, because of the non-short term characteristics of investments in the real estate market.

The fundamental issue for an investment in the real estate is timing, because of real estate cycles. It is a crucial issue to recognize in which phase of the cycle a market is. It is also the most difficult case on which depends investments' attractiveness. The estimation is needed to know if the market going to grow or decline, it allows to estimate if the rate of return is going to grow or decline. In the work, we will analyze the data for the past and we will be able to answer what investors should have done.

We should be aware of the importance of the rent's impact on the investments' rate of return. Because of the real estate market cycles, it also varies in time. An oversupplied market will react by reducing the rent's amount and conversely. Thus, the investor should take into account both investment and tenant markets.

We could observe also another important issue in the real estate investments like risk analysis. However, we will focus on analyzing attractiveness using previously mentioned methods.

We have to mention what it means that an investment is attractive in the consideration of the thesis. There will be presented a set of indicators which describe a market in a static way for the purpose of conducting the taxonomic method in order to classify and synthetize a significant amount of information. The measure that will be created will allow providing an unequivocal evaluation of attractiveness of given real estate markets examples. The set of examples have been established regarding the scope of presenting and analyzing markets from different continents. Chosen real estate markets differ significantly one from another, however, they can be measured by the same indicators. Some markets from the set of Kraków, Berlin, Turin, London, Singapore, Hong Kong, Dubai and New York housing markets are known as good places for property investments. The scope of the thesis is to find out what is the real

[27] Fauna: Chinese Land-Use Rights: What happens after 70 years? https://www.forbes.com/sites/sarahsu/2017/03/21/good-news-for-chinese-homeowners-premier-li-offers-some-clarity-on-land-leases/#5bece3037b4a [access: 03.06.2018].

attractiveness level of these real estate markets. Instruments used to measure investments' attractiveness will be analyzed closer in the second chapter of the thesis.

2. The methodology of investments' measuring on the real estate markets

The purpose of the chapter is to present the methods of the classification of multivariate objects and real estate market indicators, in order to provide a synthesis of information, which is gained from the market. In the times of information overload, it is necessary to apply methods reducing the size of the observation matrix. This is one of the tasks of taxonomic methods.

The form of the expression of indicators varies. They may be presented in numbers, percentages or in a descriptive way. However, these expressed in a descriptive way will not be taken into consideration, because of the difficulties of converting the values in a way that may be comparable to the other real estate market parameters.

The indicators which values are comparable will be standardized in order of comparison according to the taxonomic method. The method will be presented in the following chapter.

2.1 Taxonomic method

2.1.1 The aim of application of the taxonomic method

Nowadays, the methods related to data mining are becoming more and more important. The amount of information that receives market actors means that without the right approach to the collection of information from the data point relevant to the user, it is not possible to increase the level of knowledge about these markets and the regularities which occur on them. This characteristic fits also to the real estate market.[28] Usually involving significant capital should be preceded by reliable analyzes. Often, there is a need to synthesize information, which is gained from the market. In order to do it, we will precede reduction of dimensions variables' spaces to receive synthetic

[28] *Christian Lis, Monika Woźniak: Wykorzystanie Metod Taksonomicznych W Ocenie Atrakcyjności Mieszkaniowej Osiedli Szczecina, Uniwersytet Szczeciński, p.2]*

variables. These values provide an additional quantum of information about examined markets. Reduction of the matrix dimension observation is one of the tasks of taxonomic methods. The method will be used in the thesis with the aim of creating a synthetic measure which allows unequivocal evaluation of the attractiveness of the presented housing market examples. By the term attractiveness we should considered as the quality which is determined by the set of given indicators as: price to income ratio, mortgage as percentage of income, loan affordability index, price to rent ratio (city centre), price to rent ratio (outside of Centre), gross rental yield (City Centre), gross rental yield (Outside of Centre), GDP Growth Rate, population growth rate and inflation. The set of indicators represents the real estate market from the point of view of its residents, therefore will find out which population's housing market is the most attractive for their investments.

2.1.2 Taxonomic methods in multidimensional analyses

A wide group of methods applicable to multidimensional comparative analyzes are taxonomic methods. They serve to compare multidimensional objects, whereby a multidimensional object should be understood as a statistical unit, for instance, an economy, an enterprise, a house, a household, a property, a housing estate and so forth. Statistical unit is also often called a spatial unit, defined by the set of values variables which describe its realization in respective units in time or space.

The term taxonomy comes from two Greek words: taxis (set, order) and nomos (law, principle). Nowadays, taxonomy is treated as a study on the principles of organizing and classifying multidimensional homogeneous and heterogeneous objects. Taxonomy, however, has not always been regarded as a traditional science and has not always been so-called. It has been emphasized especially by Zdzisław Hellwig in the article "Taxonomy, its achievements, tasks, and goals".

"The field of knowledge that in Poland carries a traditional name taxonomy, it also has other names, such as multidimensional analysis or comparative analysis, data analysis

methods, cluster analysis, methods of the automatic classification (classification theory) or the theory of grouping multi-feature objects"[29]

As we could observe the study is known under many names, especially in Poland the terminology is very broad, the term "taxonosometry" or "numeric taxonomy" has become popular. Zdzisław Hellwig noted that taxonomy is not an independent field of knowledge or science but a set of methods which are useful for presenting and comparing multi-feature objects with a high degree of complexity. In his opinion taxonomy is a field of knowledge that deals with measurement, quantitative description, and analysis of structural dependencies occurring among the elements of the multidimensional objects.[30]

Perhaps, due to the dynamic development of theories and methods of ordering and classifying multi-feature (multidimensional) objects, which took place in the second half of the 20th century, many authors tend to treat taxonomy as a science with the rules of classification.[31] It worth to mention that taxonomic methods have been successfully used on real estate markets analyses, for instance, by Lis for the aim of reducing the set of exogenous variables in econometric models[32] or Anarnowski for evaluation of comparative and profitable approach.[33]

Variables describing multidimensional objects can be expressed in different measuring scales. The variables can be additionally expressed in different units of measure, can be characterized by different ranges of variability and expressed in

[29] *Hellwig Z.: Taksonomia, jej osiągnięcia, zadania i cele, w: Taksonomia – teoria i jej zastosowania, Materiały z konferencji naukowej zorganizowanej przez Akademię Ekonomiczną w Krakowie oraz Polskie Towarzystwo Statystyczne, Mogilany 27 – 28.09.1989, red. J. Pociecha, Wydawnictwo Akademii Ekonomicznej w Krakowie, Kraków 1990, p. 7].*

[30] *Hellwig Z. (1990), Taksonomia, jej osiągnięcia ... Kraków 1990, p. 8-9.*

[31] *Borys T., Strahl D., Walesiak M., Wkład ośrodka wrocławskiego w rozwój teorii i zastosowań metod taksonomicznych, w: Taksonomia – teoria i jej zastosowania, Materiały z konferencji naukowej zorganizowanej przez Akademię Ekonomiczną w Krakowie oraz Polskie Towarzystwo Statystyczne, Mogilany 27–28.09.1989, red. J. Pociecha, Wydawnictwo Akademii Ekonomicznej w Krakowie, Kraków 1990, p. 12.*

[32] *Lis Ch.: Wykorzystanie metod ekonometryczno-statystycznych w procesie masowejwyceny lokali mieszkalnych, maszynopis rozprawy doktorskiej, Archiwum Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego, Szczecin 2003, p. 213-219.*

[33] *Aranowski A.: Analiza efektywności metod statystycznych w badaniu podobieństwa obiektów na rynku nieruchomości, maszynopis rozprawy doktorskiej, Archiwum Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego, Szczecin 2010, p. 445-453.*

unwanted values, for instance, negative values.[34] Borys postulates that normalized values should not be negative, because it may significantly obstruct their direct aggregation. Therefore proceeding basic arithmetic operations in order to provide an unequivocal evaluation of multidimensional objects' similarity.

For this purpose, the variables are transformed using the appropriate standardization formulas. The main goals of this transformation are:

- unification of the nature of variables (postulate of homogeneous preferences),
- carrying different variables to comparable form (postulate of additivity),
- replacement of differential ranges of variability of variables by a fixed range (postulate of the constancy of extreme values),
- elimination of negative values from the calculations (postulate of positivity).[35]

For Boris these goals are "postulates of universal regulation"[36] which are formulated as follows:

1. Normalized values should be bare numbers, regardless of the types of features which values are transformed.
2. Normalized values should be non-negative.
3. The values should belong to finite, universally normed numerical range (constancy of extreme values).
4. In the range of normed values should be kept directionally indiscrete value's preference.

[34] *Borys T.: Metody normowania cech w statystycznych badaniach porównawczych, „Przegląd Statystyczny" nr 2, 1978. p.230.*

[35] *Grabiński T., Wydymus S., Zeliaś A. (1989), Metody taksonomii numerycznej w modelowaniu zjawisk społeczno-gospodarczych, Państwowe Wydawnictwo Naukowe, Warszawa1989, p. 27.*

[36] *Borys T.: Metody normowania cech..., p. 230.*

2.1.3 Taxonomic measure of the attractiveness of housing markets

In the study of the attractiveness of real estate markets on the given markets' examples is adopted as one of the most commonly used standardization procedures – the standardization of diagnostic variables. The standardization formula is as follows:

$$zij = \frac{xij - \bar{x}j}{sj}$$

whereby:

$$\bar{x}\square = \frac{1}{n}\sum_{i=1}^{n} xij$$

$$s\square = \sqrt{\frac{1}{\square}\sum_{\square=1}^{\square}(xij - \bar{x}j)^2}$$

where:

$i = 1, 2, 3, \ldots, n$,

x_{ij} – the value of the j-th variable in the i-th unit

$\bar{x}_j$ – the rithmetic mean of the j-th variable

$i = 1, 2, 3, ..., n$,

S_j - standard deviation of the j-th variable,

z_{ij} - a standardized value of the j-th variable in the i-th unit.

The basic concept used in taxonomic methods is the so-called taxonomic distance that allows you to define the location of each point in relation to other points, thus determine its place in the whole set, so allowing their ordering and classification.

For the aim of evaluating the real estate market's attractiveness Euclidean metric is adopted, which can be expressed as:

$$d\square 0 = \sqrt{\sum_{\square=1}^{\square} (zij - z0j)^2}$$

where:

z_{io} = max z_{ij}, if $j \in I$,

j

z_{io} = max z_{ij}, if $j \in I$ (i = 1, …, n)

r

z_{io} – the desired value of nominants,

I – set of stimulants,

z_{ij} – the standardized value of the j-th variable in the i-th unit.

Obtained Euclidean distances are the basis for determining the synthetic, taxonomic measure of the housing market attractiveness (TMHMA). For the interpretation reasons all presented metrics may be transformed in a way that they will receive the value in a range from 0 to 1 and will be stimulants. The value closer to 1 means a high level of realization of the model pattern.[37] In the field of the classic approach, proposed in 1968 by Z. Hellwig, is adopted following transformation:

$$d_i = 1 - \frac{d_{i0}}{d_0}$$

where:

d_{io} - the distance of the i-th object from the model pattern

$$d_0 = d_{i0} + a \cdot S(d_{i0})$$

[37] *Christian Lis: Wartość dodana brutto i jej znaczenie w procesie akumulacji kapitału w świetle teorii wzrostu i konwergencji Podejście taksonomiczne, Uniwersytet Szczeciński, Szczecin 2013, p. 266.*

$$S_{(d_{io})} = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\left(d_{io} - \bar{d}_o\right)^2}$$

Assuming normal distances distribution from the model pattern and using the law of three sigmas with huge probability we could claim that if the stable value from the d_0 formula will total 3 then d_i will belong to a range from 0 to 1.

2.2 Real estate markets' indicators

This part of the chapter is based on the study of markets' indicators in order to compare markets' attractiveness from the point of view of investors with the assistance of these indicators. The examination that will be presented in the third chapter will be based only on the indicators that may be expressed and measured by numbers. As it is mentioned at the end of the first chapter there are other ways to study the markets' attractiveness, for instance, the query of political stability should be one of the factors of successful analysis of investment on the housing market. However, the study based on the indicators expressed in numbers allows proceeding taxonomic approach analysis.

Therefore the analysis base on the following indicators:

a) Price to Income Ratio
b) Mortgage as Percentage of Income
c) Loan Affordability Index
d) Price to Rent Ratio (City Centre)
e) Price to Rent Ratio (Outside of Centre)
f) Gross Rental Yield (City Centre)
g) Gross Rental Yield (Outside of Centre)

State financial indicators:

a) GDP Growth Rate
b) Population Growth Rate
c) Inflation

For the purpose of further analysis, the indicators mentioned above will be examined thoroughly on the pages of this chapter.

2.2.1 Price to Income Ratio

The relation between the house prices and the amount of rental income is crucial because small rental income is a great indicator of a tense market, it may be even the bubble market. These markets may tend to decrease in price or grow slower. The possible significant profits strongly attract buyers, which consecutively affects the rise of the prices. A good example may by the Indian real estate market which presents it clearly. Banglaore City has a rental profit of 9.7%, the price index for earnings stand at a level of 8.74. The place to possible growth is a very good factor. In 2017, in Mumbai, prices raised by 16.5% and the price to earnings ratio was 17.21.

Basically, the ratio shows the affordability of housing in a given area. Banks and financial institutions while setting the loan conditions, consider the ratio to determine loans affordability to the possible future buyer. The key word of the indicator is attainability.[38] The price-to-income ratio helps to gauge the long-term affordability of the property in a given area. The increase in the ratio informs that real estate is less affordable. Whereas, the decline of the parameter means that the property gets more affordable.

The parameter is calculated basing on the net disposable income of the family, median flat size is set up at the level of 90 square meters and the average price of square meters from both outside and inside the city center. The index is expressed as income years.

$$P/I = \frac{\mathrm{Mp}}{Mi}$$

Where:

Mp – Median property price,

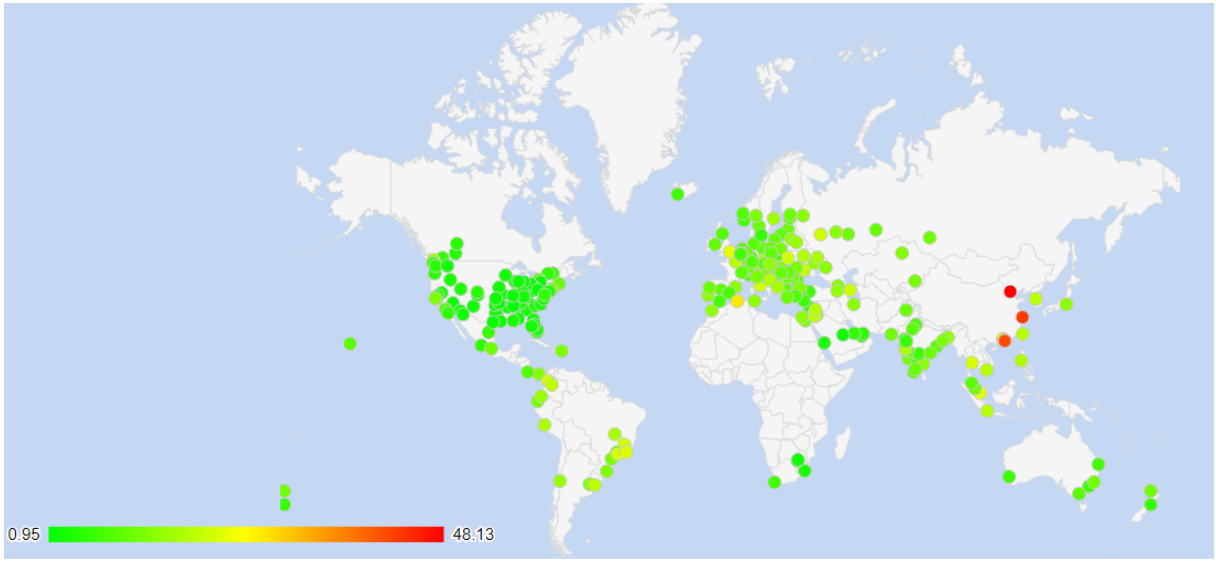
Mi – Median annual net household income (calculated as a 1.5 of a net salary)[39]

[38] https://www.proptiger.com/guide/post/term-of-the-week-price-to-income-ratio [access: 27.06.2018]

[39] 50% is presumed percentage of women on the labour market.

The current index value for some of the real estate markets on the world is presented in the following figure.

Figure 2.1: Price to Income Ratio World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps_rankings.jsp?indexToShow=getHousePriceToIncomeRatio&title=2018 [access:28.06.2018]

2.2.2 Mortgage as Percentage of Income

The indicator is calculated basing on the current monthly cost of the mortgage and net family income.[40] The low value of the indicator is positive information for the investors. The formula assumes that the whole mortgage is paid in 20 years for the 90 square meters flat that value of a square meter is the average price inside and outside the city center. The relationship is presented below.

$$\text{Mortgage as Percentage of Income} = \frac{\text{Actual Monthly Mortgage Cost}}{\text{Household Net Income}}$$

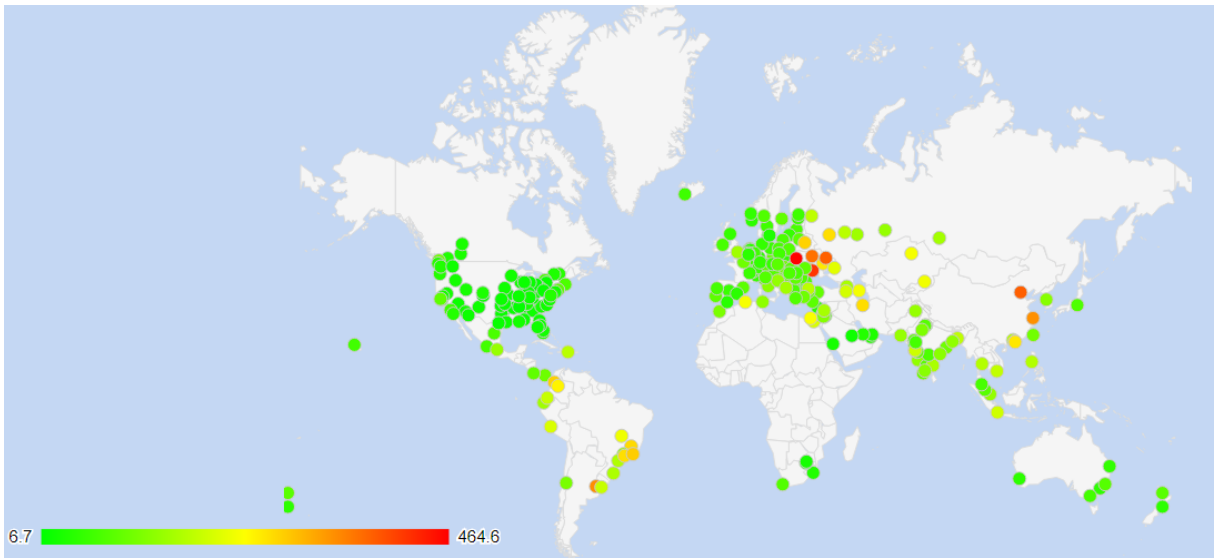
Thanks to the indicator we get to know which part of the net income the mortgage payment makes. Nevertheless the low interests' rates, for first-time buyers,

[40] https://www.numbeo.com/property-investment/indicators_explained.jsp [access: 28.06.2018]

the mortgage spending each month makes still a big part of net income. For average mortgage payer, the spending is not as significant, because they took out a mortgage when property prices were cheaper. The first time buyers' situation is also more difficult because creditors require from them also the deposit payment at the beginning of the investment. The possible increase in interest rates will cause the increase of mortgage payment and first-time buyers' financial problems as well. The increase of the value of the real estate may also cause the decline in the number of mortgages because of its lower affordability.[41]

On the figure below we can observe the high values of the indicator in China and Ukraine that means that the costs of mortgage are usually unaffordable. The value of the index for Ukraine on the example of Lviv is 464.4 points and for China on the example of Beijing is 378.88 points. This situation has an impact on slow real estate market development, because of the lack of capital.

Figure 2.2: Mortgage as Percentage of Income World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps_rankings.jsp?indexToShow=getMortgageAsPercentageOfIncome&title=2018 [access:28.06.2018]

[41] https://www.economicshelp.org/blog/5568/housing/uk-house-price-affordability/ [access: 28.06.2018]

2.2.3 Loan Affordability Index

The parameter is calculated as an inverse of mortgage considered as a percentage of income. The high value of the indicator is positive for the investors. The value of the mortgage which is used to determine the value of the index is a gauge on the basis of the average loan offer of ten banks from the market's cutting edge. The described relation is presented by the formula below.

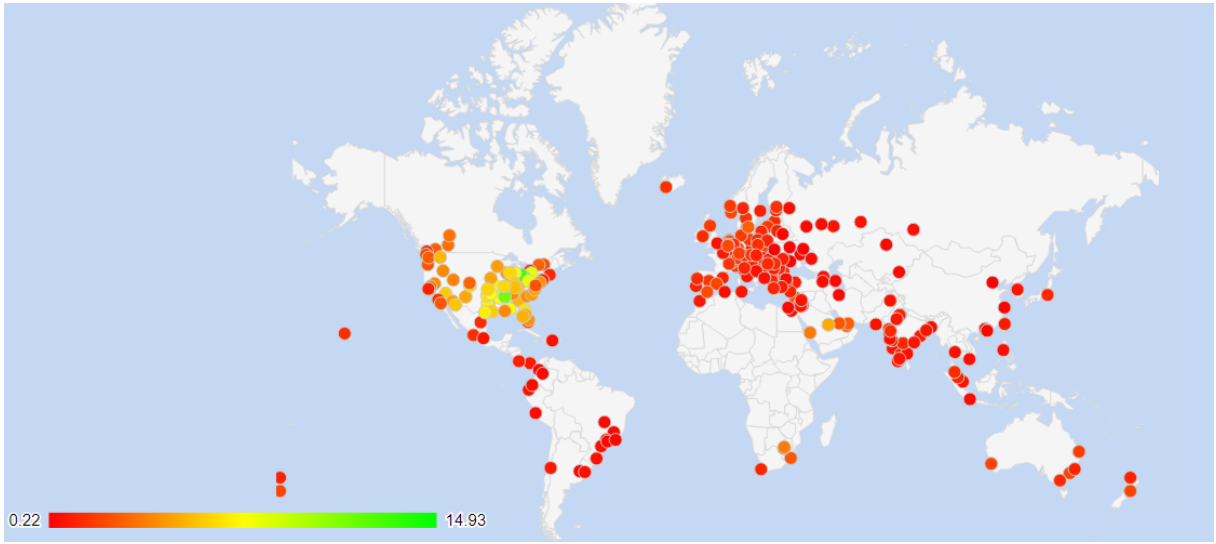
$$Loan\ Affordability\ Index = \frac{100}{Mortgage\ as\ Percentage\ of\ Income}$$

The high level of the parameter indicates that the availability of loans, estimated in relation to income and the level of prices, is still relatively high, but it does not have expressed as a demand for mortgage loans, but only indicates that there is a lot of potential for these products.[42]

On the figure nr 6, presented below we can observe that the worst (the lowest) values of the indicator characterize the United States real estate markets. That means that the average citizen may have problems afford the loan.

[42] Raport AMRON-SARFiN: Ogólnopolski raport o kredytach mieszkaniowych i cenach transakcyjnych nieruchomości, 4/2016, 28 lutego 2017, wersja skrócona, raport nr 30, Związek Banków Polskich, p. 13.

Figure 2.3: Loan Affordability Index World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps_rankings.jsp?indexToShow=getAffordabilityIndex&title=2018 [access: 28.06.2018]

2.2.4 Price to Rent Ratio

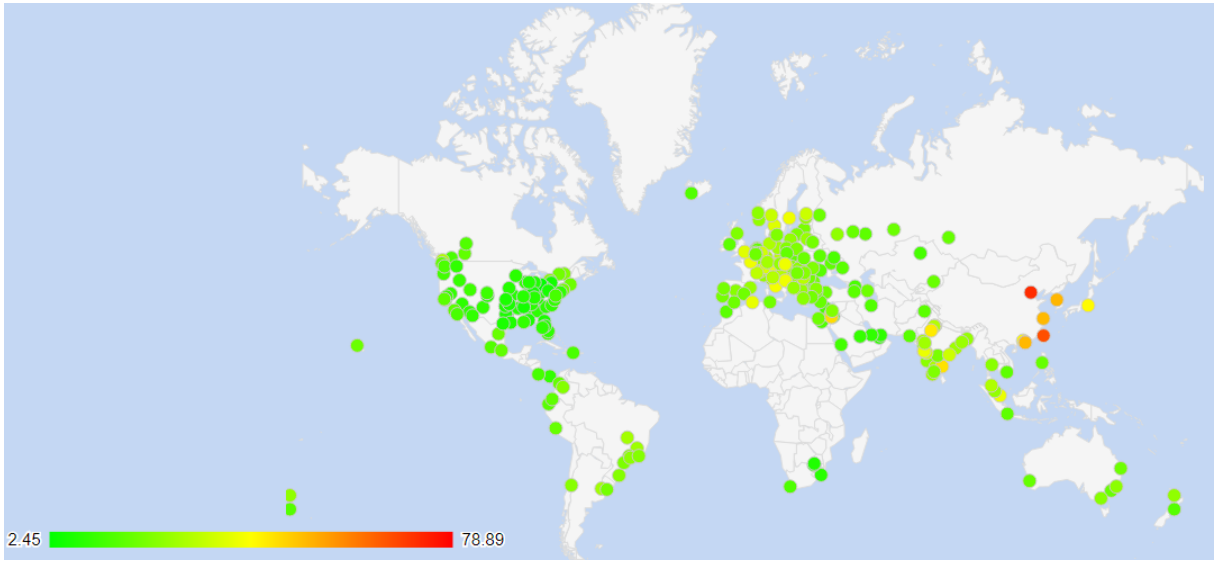
The indicator is calculated basing on the average cost of property which is divided by received income from the rent (if the acquisition was made in order to let) or the estimated value of the rent that would be received if renting. To calculate price-to-rent ratio's impact on the market, both inside and outside the city center conditions were taken into consideration. Therefore, the indicator is presented twice. The low value of the indicator means that it is paying off more to buy than rent, whereas the indicator's high value suggests that it pays off more to rent than buy. The formula does not consider maintenance fees and taxes. The relation is presented by the formula below.

$$Price\ to\ Rent\ Ratio = \frac{\text{Real Estate Price}}{\text{Annual Rent}}$$

More attractive from the investor's point of view is the low value of the indicator because the task of the investor is to buy and earn on the increase of the value of the invested capital. Whereas the low value of the parameter means not the appropriate time for the investors who would like to sell their property.

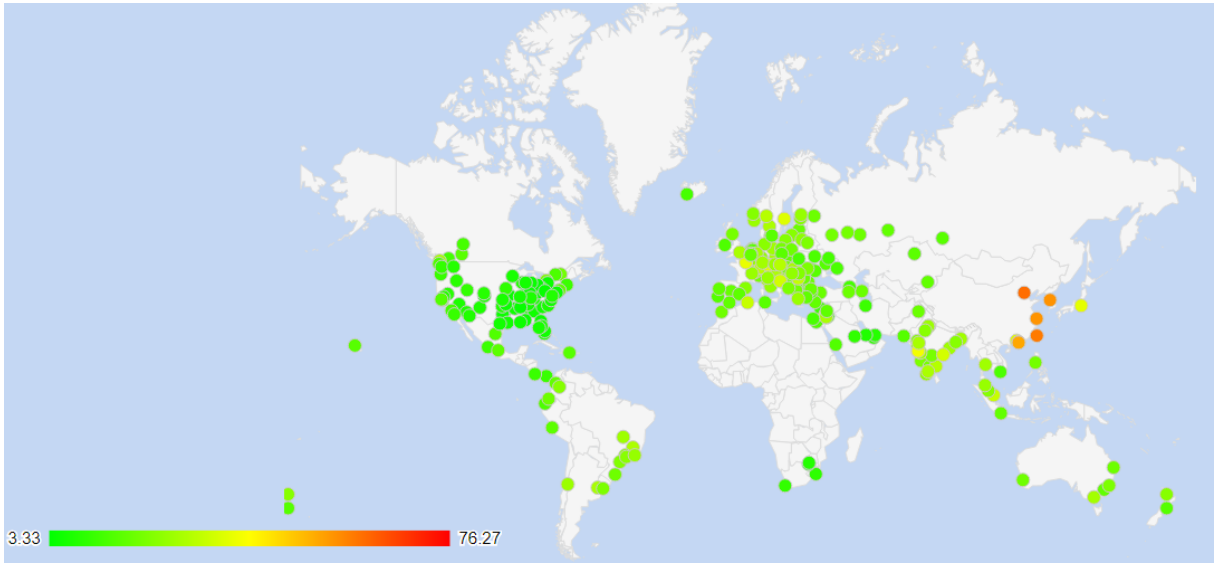
On the figures presented below, it is possible to observe that the value of the ratio is the lowest on Far East's housing market, especially in China. The biggest value of the ratio has the Beijing housing market with the value of 72.34 points for the city center indicator.

Figure 2.4: Price to Rent Ratio City Centers World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps_rankings.jsp?indexToShow=getAffordabilityIndex&title=2018 [access: 28.06.2018]

Figure 2.5: Price to Rent Ratio Outside City Centers World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps_rankings.jsp?indexToShow=getAffordabilityIndex&title=2018 [access: 28.06.2018]

2.2.5 Gross Rental Yield

The parameter is calculated basing on the yearly total gross rent which is divided by the property price. The indicator is expressed in percentages. The relation is presented by the formula below.

$$Gross\ Rental\ Yield = \frac{\text{TotalYearly Gross Rent}}{\text{Property Price}}$$

A high index value means higher attractiveness of the market. Decisions about whether the apartment pays off to buy or not is taken after calculating the profitability. Most often, in order to show the potential profitability of real estate investments is used gross profit value, for instance, the ratio of potential annual income from renting a property to its value. However, it is possible to talk about real income achieved on the basis of the net profit margin, for example, one that includes not only income but all costs like:

- fee for the housing community (if it is not paid by the tenant),
- property tax,
- perpetual usufruct fee,
- rental income tax,
- real estate insurance,
- possible expenses for repairs of the property.

We cannot forget about the assumption of a realistic period in the year through which the property will not generate revenues, because the owner will be looking for a tenant. Depending on the attractiveness of the offer, it is reasonable to presume several months of downtime. The length of presumed downtime should be set up based on the property's location. Taking into account all these elements allows estimating what the real estate owner will actually derive from the rental.

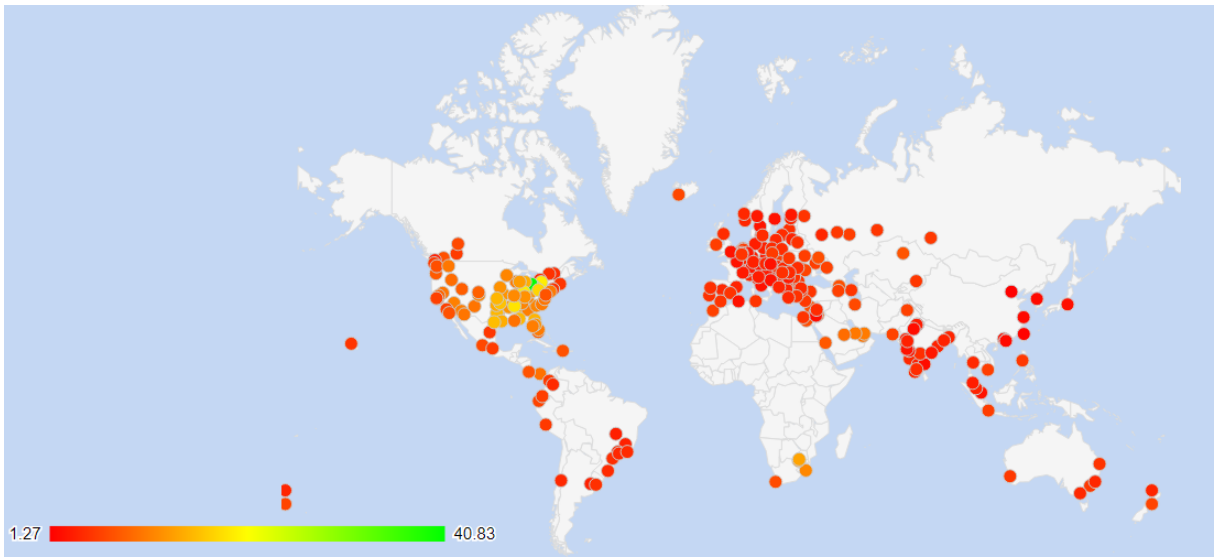
Investors should be aware of that that investment in real estate is a long-term investment and its profitability changes over time in relation to, among other things,

market parameters, such as interest rates on deposits, bonds, mortgage loans or changes in housing prices.[43]

The location has a huge impact on investments' profitability calculations preceding. On the location and standard of the property depends that the property will it be appropriate to rent it seasonally, which generates higher income and/or for the whole year, which ensures a smaller, but more stable income. The owners of real estate in tourist locations may think about this first possibility.

On the figures below are presented indicator's value world widely. In the first case regards gross rental yield in the city centers, in the second outside of centers. As we can observe the index values are the lowest in the USA. Especially on the case of Detroit (which is the only one green point at the figure nr 5) it is possible to see the low index value as the effect of negative market's situation after the world economic crisis and Chrysler factories problems.

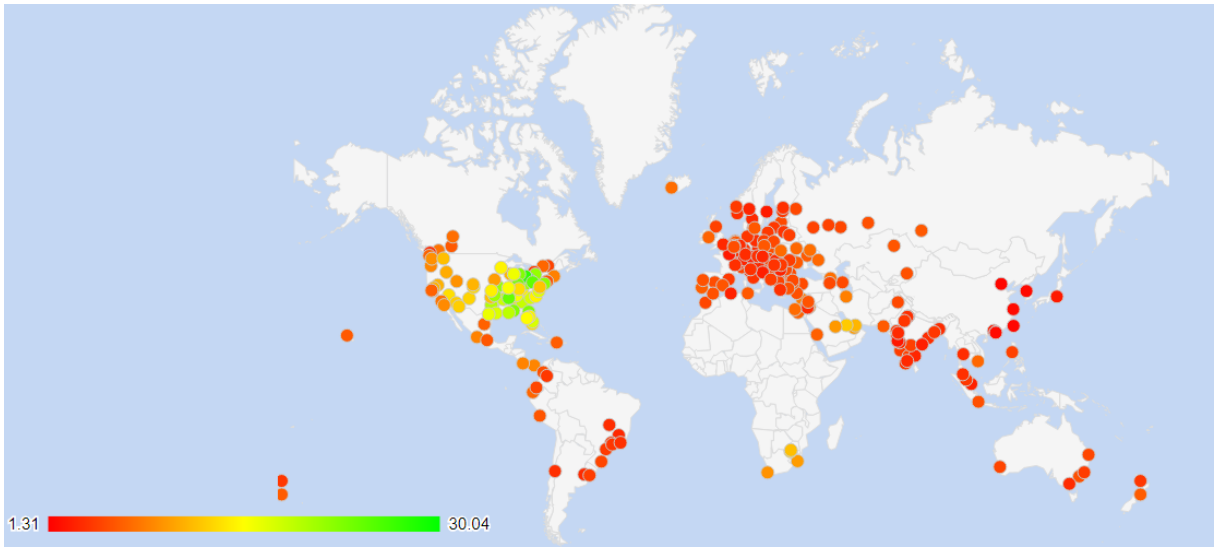
Figure 2.6: Gross Rental Yield of City Centers World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps.jsp?indexToShow=getGrossRentalYieldCityCentre [access: 28.06.2018]

[43] https://biznes.trojmiasto.pl/Inwestycje-w-nieruchomosci-Kupowac-czy-nie-n71882.html [access: 28.06.2018]

Figure 2.7: Gross Rental Yield Outside of City Centers World Widely



Source:https://www.numbeo.com/propertyinvestment/gmaps.jsp?indexToShow=getGrossRentalYieldOutsideOfCentre *[access: 28.06.2018]*

2.2.6 GDP Growth Rate

In the real estate market sector, readjustment is generally evident, because of the constant presence of news that concern the signs of a clear recovery in the sector.[44] So, for the average user, this is an excellent time to think about making interesting real estate investments precisely because the property market closely follows the trend of the real economic reality of the country and, consequently, of the GDP parameter, which is calculated as a difference between present and last year real GDP divided by real GDP in the last year, parameter is expressed in percentage. The relation is presented below.

$$GDP\ Growth\ Rate = \frac{\text{Real GDP 2nd year} - \text{Real GDP 1st year}}{\text{Real GDP 1st year}}\ x\ 100\ \%$$

Therefore, the trend in the value of the real estate market, momentarily, growing in our socio-economic reality is following the times of the economy. In fact, beyond the thousand words, rumors and chatter interested in speculators, one of the important data available for an effective analysis (and necessarily long-term) is that the property

[44] https://www.progedil90.it/blog/il-valore-del-mercato-immobiliare-sul-pil/ [access:30.06.2018]

market follows the trend of the real economy of a country and then the GDP parameter in an approximately equivalent ratio. Therefore, unless the speculative bubbles and fashions created artificially over time and now at more or less regular intervals (generally at the entry into work activities of the new generations of active population) alternating with financial ones to generate acquisition / displacement of money, the trend in property values, growing or decreasing in consolidated socio-economic conditions, follows the times of the economy in long intervals and, above all, in relation to situations of low growth and lack of perspective economic more and more broaden**.**

On the Italian real estate market case we could observe the increase in wealth in relation to GDP has been considerable since the mid-sixties of the last century: for the wealth of the families has gone from a value of about 3 times the GDP in 1964 to a value of about 6 in 2012. As a starting point, it can be considered that during this period the increase in house prices is largely attributable to the increase in the price of land. In general, for this period in Italy, the growth in the value of land is plausibly linked to demographic pressures and urbanization phenomena, occurring in a limited territory and subject to increasingly stringent constraints. The growth of housing in outlying areas, less valuable and more distant from the center, has raised the demand (and therefore the value) of pre-existing dwellings built in the central areas, bringing out significant capital gains. If the analysis is extended at an international level, in Italy over two-thirds of the increase in house prices between 1950 and 2012 is attributable to the change in the price of land, but this share is lower than what is observed in other advanced economies. A sign that the price pressures of the manufacturing areas in the country have nevertheless been less intense than in other economies. [45]

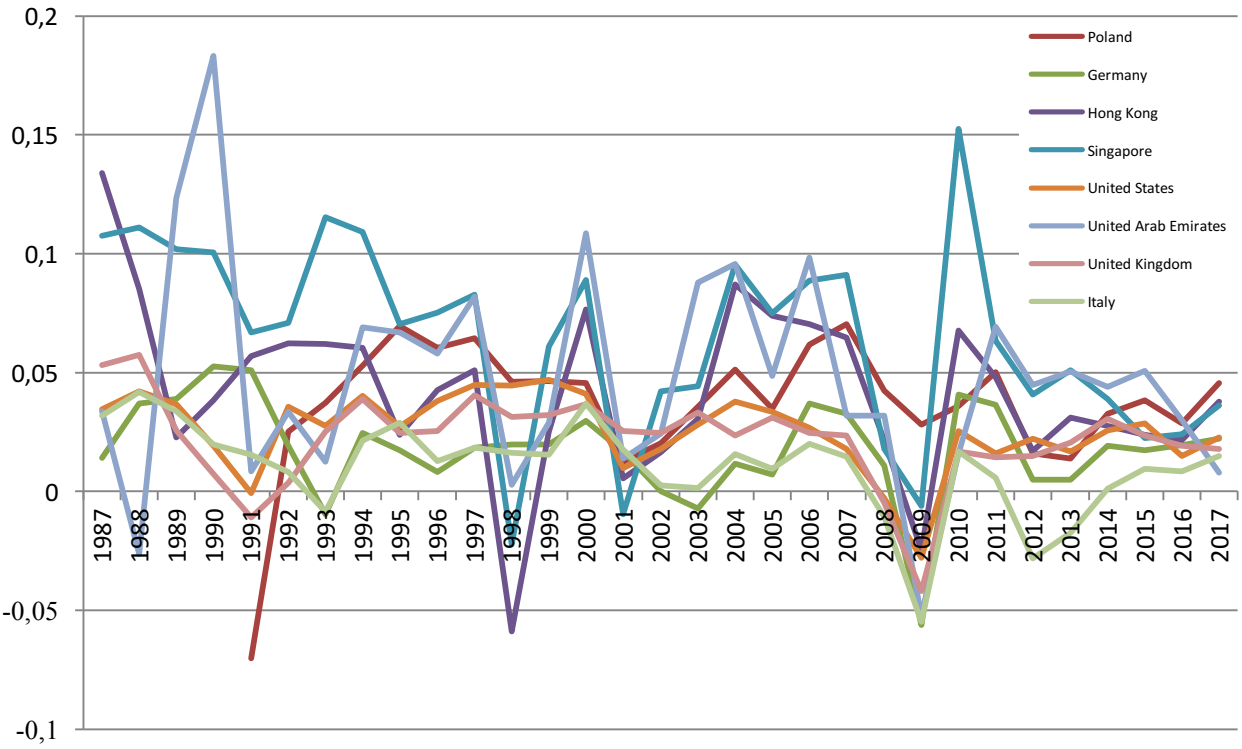
Another element that should be considerate, observing the curve of real values, is that the real estate market is characterized by relatively long cycles, with periods of contraction followed by periods of price increases. The rising phases that last several years may lead some investors to underestimate the risk of a real estate investment: for example, in the residential market at the end of the eighties and in the early 2000s, there were long periods of continuous growth. This type of behavior is reflected, for example, in the belief of many investors, mainly private, that the immediate return of a property represents the "base" return for this investment, which will be further improved by an

[45] https://zedprogetti.it/2018/01/14/pil-parametro-dellandamento-reale-del-mercato-immobiliare/ [access: 29.06.2018]

almost sure gain in the medium-long term period. The cyclicity of the market clearly emerges with periods of high price reduction. The inexperienced investor who perceives a low risk focuses only on the nominal price curve and often considers only two points of the same in which he records certain values (the moment of purchase and the moment of sale): in this way it is difficult to observe erroneously, the real negative returns that are created.

Changes in the GDP growth rate are presented in the figure below. The range of 30 years, from 1987 to 2017, allows proceeding observations from the investments on the real estate market point of view. The same time lasts usually the mortgage loan. The chart shows the data for Poland from 1991, because of the lack of the data for the earlier periods. In the figure, we can easily observe the particularities of variations of the GDP growth on the case of the United Arab Emirates and Singapore. The World economic cycle, like this from 1998 to 2009 and these years economic slowdown are also easily observable.

Figure 2.8 GDP Growth (annual %) World Widely



Source: own elaboration

2.2.7 Population Growth Rate

One of the main factors affecting the shape of the real estate market, especially in the long term, is the demographic factor. Changes in the structure and population may be conducive to the strengthening of demand for real estate. As it was in Poland, in the years 2002 - 2008[46], when the main group of real estate buyers was the generation of the secondary baby boom entering the adult, independent life.

The indicator is based on the difference between population levels in two following years at one place. The calculation considers the number of immigrants and newborns and the number of people who died or emigrated. The value is expressed in the percentage form. The relation is presented by the following formula.

$$Population\ Growth\ Rate = \frac{\text{Population 2nd year} - \text{Population 1st year}}{\text{Population 1st year}}\ x\ 100\ \%$$

Demographic change can stimulate economic growth. Therefore politics should encourage economic growth through the social policy. Demography and real estate market is closely correlated and affects economic growth. Periodicity in the economy can be a tool for making decisions. In the countries without proper policy, demographic future will be dependent on immigration policy to which implementation these states will be forced by economic conditions.[47]

Last years, there has been a noticeable change in the lifestyle of developed countries' societies. Falling fertility and the number of marriages declined, the number of divorces increased. The model of single, double and 2 + 1 (two adults and one child) is becoming more and more popular. In the light of these data, it can be assumed that in the following years small, one or two-room apartments will become popular.

Despite unfavorable demographic projections, we cannot forget about internal migration. Developers are mainly present in large urban centers, where new young people come from year to year in search of work and new perspectives. Thus, not only the population growth rate but also the immigration rate has its impact on the market.

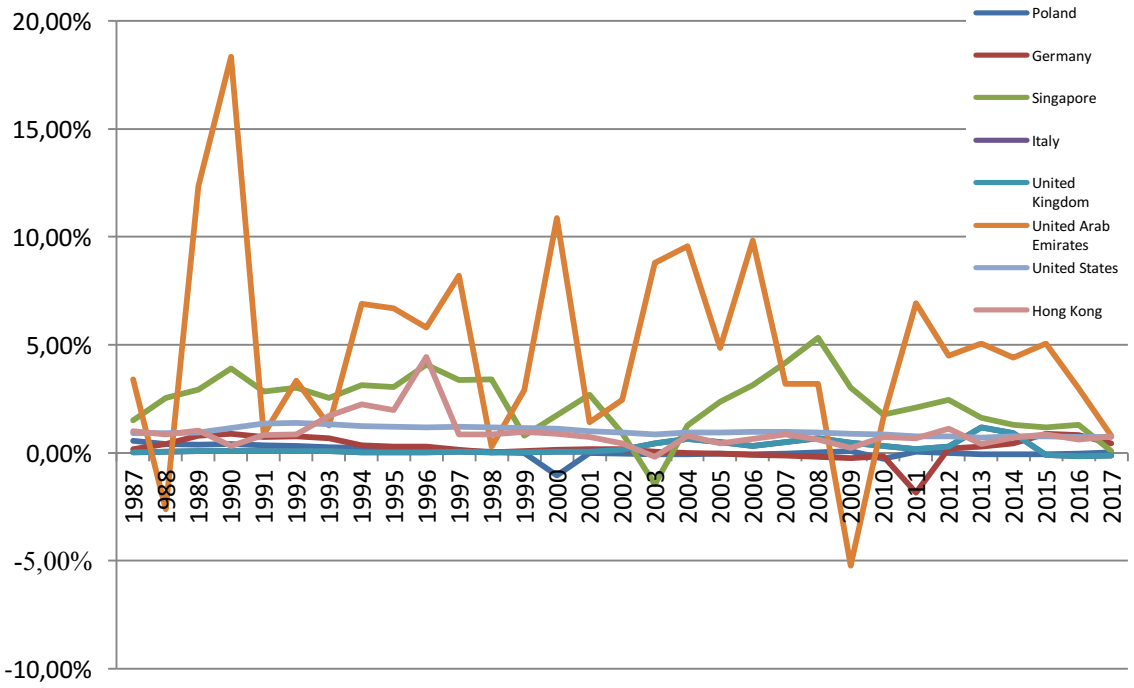
[46] https://alebank.pl/demografia-a-rynek-nieruchomosci/ [access: 29.06.2018]
[47] Robert Zielonka, Demografia a rynek nieruchomości – determinanty wzrostu gospodarczego, „Rocznik Samorządowy" 2014, t. 3, ISSN: 2300-2662, ss. 113-121 [access: 29.06.2018]

All previously mentioned considerations concerning population growth rate as an indicator that directly or indirectly changes the demand for the goods on the real estate market.

According to specialists[48], if we do not observe price bubbles generated by unpredictable phenomena in the economy or on the financial market, there will be no reasons for large price changes. Stable growth of the economy and macroeconomic indicators as well as appropriate adjustments of the developers to the needs of the market in a proportional, moderate and stable way, should cause also the property prices growth.

Changes in the population growth rate are presented in the figure below. The range of 30 years, from 1987 to 2017, allows proceeding observations from the investments on the real estate market point of view. The same time lasts usually the mortgage loan. On the figure, we can easily see the particularities of variations of the population growth on the case of the United Arab Emirates and Singapore. Their rapid pace of population, especially in the United Arab Emirates, differs strongly from other countries' curves.

Figure 2.9 Population Growth (annual %) World Widely



[48] http://serwisy.gazetaprawna.pl/nieruchomosci/artykuly/1010754,deweloperzy-nie-boja-sie-demografii.html [access: 29.06.2018]

Source: own elaboration

2.2.8 Inflation

Basically, it is the average annual growth rate of consumer goods and services prices, expressed in percentage form. The relation is presented by the formula below.

$$Inflation\ Rate = \frac{\text{2nd year prices} - \text{1st year prices}}{\text{2nd year prices}}\ x\ 100\ \%$$

The influence of this factor on the real estate market is significant. It is possible to observe its impact on the examples of the cost of the maintenance of properties or rent growth. Inflation allows increasing the value of the rent, so stable inflation growth is always good news for the investors and a bad news for consumers.

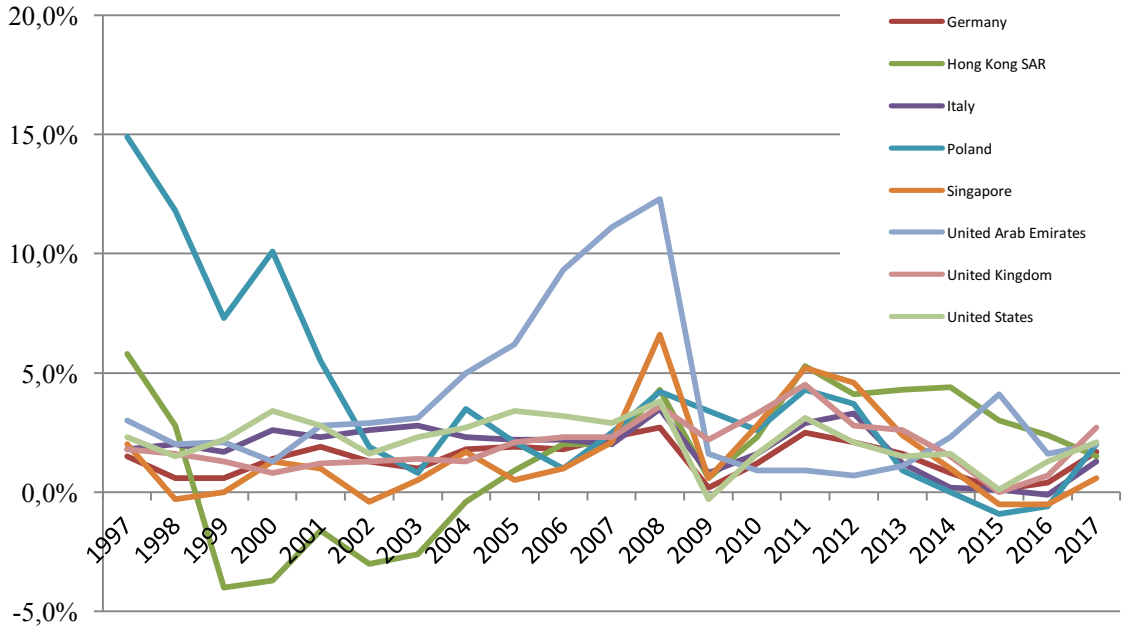
Looking at the real estate market in the long run, investing in real estate has a big advantage over other asset markets. Real estate, in contrast to gold or shares, satisfies the basic need of people. In addition, renting gives relatively regular income, being only one of the two sources of profitability of investing in real estate. The second is the increase in value over time. In developed markets, over the last 20-30 years, real estate prices have been rising at an annual pace by 1-2 percentage points faster than the general price level increase (inflation). What is more, the real (after taking into account inflation) return on property value increase was comparable to that offered by the world's largest indexes.

In general, real estate gains in value in the inflation environment. Under normal conditions, in the long-term real estate value also grows in real terms, and not only in nominal terms. In the case of higher inflation, it is possible to expect that the loans would be expensive enough to drastically reduce the demand for real estate. Therefore, a correction of real estate prices should be expected. However, if we are dealing with hyperinflation, it can be expected that real estate value would also increase rapidly, being a safe location for investing capital.

The costs of property maintenance are a component of inflation. As in the case of the basket of goods used to measure inflation, the maintenance of real estate includes, for example, operating costs, energy and water. Based on the rate of price increase, you can estimate how much the cost of maintaining a property is.

Changes in the inflation values are presented in the following figure. For the reason of readability of the figure, there is presented a data from 1997 to 2017, because the values of inflation for Poland at the level of 585.5%[49] would make the chart unreadable. The period of 20 years is also long enough to be appropriate for the inflation's observation from the point of view of investments in the housing market.

Figure 2.10 Inflation (annual) World Widely



Source: own elaboration

[49] *http://www.imf.org/external/datamapper/PCPIPCH@WEO/HKG/ITA/ARE/GBR/USA/POL/SGP/DEU [access: 27.06.2018]*

3. Study on real estate markets' attractiveness

The objective of the chapter is to present collected data on given real estate markets examples in order to conduct an application of the taxonomic method to measure their attractiveness. Thanks to that we will find out which one among the set of markets is the most attractive to investors. As it was mentioned before, because of the selection of parameters, we will examine markets from the internal investor point of view. That will provide an answer to the question - which market in the set is the most attractive for the possible investors for which the same property market provides also housing services? The applied method analyzes the data from the static point of view.

It will be possible to provide information about how attractive the market is in relation to another real estate market introduced in the work. Therefore we will find out are the investments in Far East real estate market as profitable as their reputation says or is the information only an old false rumor and they are not attractive no more. At the beginning of the XXIth century, investments in central-east Europe housing markets were very profitable. We will find out how the situation stands today. The evaluation will provide information also about the interesting issue of investments in the Middle East housing market on the example of Dubai housing market.

3.1 Application of the taxonomic method

The first step in the aim of preceding the calculations is the presentation of indicators' values for the set of real estate markets.

Table 3.1 Real estate markets indicators values (part 1)

City	Price to Income Ratio	Mortgage as Percentage of Income	Loan Affordability Index
1. Kraków	12,05	87,19%	1,15
2. Hong Kong	45,64	285,90%	0,35
3. London	20,62	139,20%	0,72
4. Turin	8,42	53,94%	1,85
5. Berlin	10,45	63,10%	1,58
6. Dubai	3,51	25,01%	4,00
7. Singapore	21,22	130,74%	0,76
8. New York	11,57	84,69%	1,18

Source: own elaboration

Table 3.2 Real estate markets indicators values (part 2)

City	Price to Rent Ratio - City Center	Price to Rent Ratio - Outside of Center	Gross Rental Yield (City Center)
1. Kraków	21,59	19,62	4,63%
2. Hong Kong	54,15	53,07	1,85%
3. London	36,32	28,52	2,75%
4. Turin	26,51	19,21	3,77%
5. Berlin	28,55	27,08	3,50%
6. Dubai	7,92	8,76	12,63%
7. Singapore	39,72	31,51	2,52%
8. New York	18,93	15,35	5,28%

Source: own elaboration

Table 3.3 Real estate markets indicators values (part 3)

City	Gross Rental Yield (Outside of Center)	GDP Growth Rate	Population Growth Rate	Inflation
1. Kraków	5,10%	4,55%	0,02%	2,0%
2. Hong Kong	1,88%	3,79%	0,42%	1,5%
3. London	3,51%	1,79%	0,09%	2,7%
4. Turin	5,21%	1,50%	-0,13%	1,3%
5. Berlin	3,69%	2,22%	-0,13%	1,7%
6. Dubai	11,41%	0,79%	0,79%	2,0%
7. Singapore	3,17%	3,62%	0,71%	0,6%
8. New York	6,51%	2,27%	0,75%	2,1%

Source: own elaboration

Conduction of the method requires application of the formula, previously mentioned in chapter 2, in order to standardize diagnostic variables, which is as follows:

$$zij = \frac{xij - \bar{x}j}{sj}$$

To receive the standardization results for the values of the set of parameters which describes given real estate markets we have to conduct calculations of each indicator set's mean and standard deviation. The results are presented in table 3.4.

$$\bar{x}\square = \frac{1}{n}\sum_{i=1}^{n} xij$$

$$s\square = \sqrt{\frac{1}{\square}\sum_{\square=1}^{\square}(xij - \bar{x}j)^2}$$

Table 3.4 Mean and standard deviation values

	Price to Income Ratio	Mortgage as Percentage of Income	Loan Affordability Index	Price to Rent Ratio - City Center	Price to Rent Ratio - Outside of Center
mean	16,685	1,0872125	1,44875	29,21125	25,39
standard deviation	12,26200942	0,75776845	1,064265445	13,26531326	12,57544035
	Gross Rental Yield (City Center)	Gross Rental Yield (Outside of Cente	GDP Growth Rate	Population Growth Rate	Inflation
mean	0,0461625	0,0506	0,0256625	0,00315	0,017375
standard deviation	0,032045356	0,02748022	0,012065129	0,0037343	0,005851015

Source: own elaboration

The results of the standardization procedure are presented in table 3.5.

Table 3.5 Standardization of the parameters' values

standardization										
1. Kraków	-0,377996774	-0,284140228	-0,280710044	-0,574524691	-0,458830851	0,004290793	0,014555924	1,644201201	-0,789973925	0,448640118
2. Hong Kong	2,361358486	2,338164779	-1,032402212	1,879997065	2,201115764	-0,863229604	-1,157195969	1,014286689	0,281177160	-0,405912488
3. London	0,320909882	0,402217195	-0,684744585	0,535890096	0,248897845	-0,582377677	-0,564042060	-0,64338308	-0,602522485	1,645013765
4. Turin	-0,674033082	-0,722928620	0,377020603	-0,203632583	-0,491434083	-0,264078826	0,054584716	-0,88374520	-1,191655582	-0,747733530
5. Berlin	-0,508481097	-0,602047367	0,123324496	-0,049848050	0,134388932	-0,348334404	-0,498540402	-0,28698408	-1,191655582	-0,064091445
6. Dubai	-1,074456849	-1,104707513	2,397193305	-1,605031828	-1,322418900	2,500752368	2,310752957	-1,47221796	1,271991913	0,448640118
7. Singapore	0,369841504	0,290573592	-0,647159976	0,792197651	0,486662879	-0,654150947	-0,687767416	0,873384759	1,057761696	-1,944107177
8. New York	-0,417142071	-0,317131836	-0,252521588	-0,775047660	-0,798381585	0,207128296	0,527652250	-0,245542334	1,164876805	0,619550639

Source: own elaboration

Next part of the procedure is calculating the so-called taxonomic distance which allows defining the location of each point in relation to other points. In order to do it we ought to conduct Euclidean space calculations according to the formula:

$$d\square 0 = \sqrt{\sum_{\square=1}^{\square} (zij - z0j)^2}$$

It is very important to determine correctly the value of $z0j$ that can be the minimum or maximum value among the set of standardized values for each parameter. It depends on the characteristics of the indicator and the aim of analysis. Thus, according to the description of the parameters provided in chapter 2 from the point of view of investments attractiveness. Maximum values of price to income ratio, loan affordability index, gross rental yield (city center), gross rental yield (outside city center), GDP growth rate and population growth rate indicators are considered as positive to the investors, so the maximum standardized value of the set of these parameters are considered in the calculations as a model ones (marked with red color in table 3.6). Whereas mortgage as a percentage of income, price to rent ratio – city center, price to rent ratio – outside of the center and inflation indicators' minimum standardized value are considered in the calculations as a model one (marked with yellow color in table 3.6). We should add that low value of inflation parameter is positive from the investors' point of view, however, inflation values below zero are not considered as a positive one.

Table 3.6 $z0j$ values

	Price to Income Ratio	Mortgage as Percentage of Income	Loan Affordability Index	Price to Rent Ratio - City Center	Price to Rent Ratio - Outside of Center
zoj	2,361358486182	-1,104707513438	2,397193305389	-1,605031828467	-1,322418900409
	Gross Rental Yield (City Center)	Gross Rental Yield (Outside of Cente	GDP Growth Rate	Population Growth Rate	Inflation
zoj	2,500752367963	2,310752957292	1,644201201136	1,271991913399	-1,944107176998

Source: own elaboration

Table 3.7 Euclidean metric results

	di0 (euklidean space)
1. Kraków	5,736971141
2. Hong Kong	8,538019009
3. London	7,035777148
4. Turin	6,425696000
5. Berlin	6,633888124
6.Dubai	4,638630770
7. Singapore	6,617032125
8. New York	5,324244775

Source: own elaboration

Obtained Euclidean distances are the basis for determining the synthetic, taxonomic measure of the housings market attractiveness, which results are presented in table 3.8. In order to do so we will apply the following transformation:

$$d_i = 1 - \frac{d_{i0}}{d_0}$$

To do so, we have to calculate d_0 value according to the following formula:

$$d_0 = d_{i0} + a \cdot S(d_{i0})$$

The result of the calculation is equal to 9,912863551.

Table 3.8 The taxonomic measure of the housing market attractiveness results

housing market	taxonomic measure of the housing market attractiveness
Hong Kong	0,138692976
London	0,290237668
Berlin	0,330779841
Singapore	0,332480257
Turin	0,351782059
Kraków	0,421259951
New York	0,462895384
Dubai	0,532059455

Source: own elaboration

Table 3.8 presents the classification of real estate markets' attractiveness on the basis of synthetic measure TMHMA presented in chapter 2.1.3 in order from the less attractive to the most attractive.

3.2 Results of application of the taxonomic measure TMHMA

Price to income ratio, mortgage as percentage of income and loan affordability parameters creates the first group of indicators which describes, in general, the affordability of housing in a given area.

The second group which makes price to rent ratio at the city center, price to rent ratio outside the city center and gross rental yield at the city center and gross rental yield outside the city center describes the profitability of letting the property which in long-term investments makes a significant part of investments' profit.

The last group of indicators, which is made by GDP and population growth rate and inflation rate, express the condition of the whole countries' economies which has an important impact on the real estate markets. The population growth rate indicator describes rather the social condition of a country, so also the indirect impact on the whole economy condition. The demographic condition of the society expresses itself by creating the demand on the real estate market.

The results of the application reveal Dubai real estate market as the most attractive for investors among given examples. This example of the real estate market realized the pattern of a model example at the level of 53.2%. The less attractive market on the field of TMHMA is Hong Kong real estate market with the realization of the patter at the level about 13.9 %. Behind the result of the leader (Dubai real estate market), we could observe the realization of the model pattern over the level of 42 % in case of Kraków real estate market at the level about 42.1% and in case of New York housing market at the level about 46.3%. Between the fourth and seventh the most attractive markets it is possible to recognize the difference of 6.2 percentage points in the level of realization of the model pattern. Therefore it is possible to say that there is not a significant difference in the realization of the model pattern, so also in the attractiveness of London, Berlin, Singapore and Turin real estate markets.

There are different indicators values that decide about the attractiveness of the given real estate market. In case of Dubai, we could observe that the best indicators' values of first and second group parameters, which respectively describe the affordability of housing and the profitability of letting the property, have decided about the biggest market attractiveness among the examples. Even the low values of general real estate indicators were not low enough to diminish the impact of previously mentioned indicators and as a result the final score. The market is characterized also by good general economic indices, especially its population growth rate value is the second biggest, after the Dubai one.

As the second most attractive property market presents the New York housing market. The reasons for this high standing position are good indicators' values of the second and third group. On the position of this real estate market, the highest influence have had beneficial values which describe the profitability of letting the property, the values of New York indices are the second best after the Dubai housing market.

The third most attractive property market among given examples is Kraków one. The market does not characterize a significant affordability of housing. In the field of these type indicators, its values are mediocre. Whereas, it is possible to observe the beneficial values of the second group parameters, which are usually the third best scores after Dubai and New York. This polish property market is characterized also by the most positive GDP growth rate indicator's value with the growth at the level of 4.55%.

The biggest disadvantage of the market is a low value of population growth rate parameter.

The fourth most attractive real estate market is the Turin one. This Italian market has the profitable values of the first group indices, especially mortgage as a percentage of income and loan affordability (the second biggest value) parameters that means that housing is affordable form the internal investors. The values of the second group indicators are not very beneficial. When the third group parameters indicate quite weak condition of this property market, especially the lowest level of population growth rate (together with Berlin real estate market). This indicator value may foreshadow a decline of the demand on the market.

The fifth real estate market from the point of view of investment attractiveness is the Singapore property market. The market is characterized by the most positive value of price to income ratio. However other affordability indices present rather weak affordability of housing in the area. Also, the indicators which describe the profitability of letting the property do not show positive parameters' values. The third set of indices, which express the condition of the country economies

Very similar to the previous real estate example market overall result has the sixth, Berlin property market. The biggest threat to the market's development is the low value of the population growth rate, which may cause a decline in the demand on the market. This German market is described also by non-beneficial values of second group indicators, especially low values of both gross rental yield indicators. Investors are not going to look positively at the values of the third group (general economics) parameters.

London real estate market is presented as the seventh most attractive or the second less attractive among given examples. The first group indicators present the market as weakly affordable, because of the second worst score of the mortgage as percentage of income and the third worst value of loan affordability index. While both price to rent ratio inside and outside the city center values are close to the average, the gross rental yield (inside and outside city center) presents quite weak profitability of letting the property (the third worst value). The third group parameters also are below the set's average. Especially inflation rate characterize the market as the less profitable from the point of view of this indicator.

Even if the Hong Kong housing market may be found attractive from different (for example not internal) point of view, surely from the point of view of internal investors it is not. One of the cases of this valuation is the worst indicators' values of the first and second group, with the exception of price to income ratio. That means high cost of capital and weak affordability of the market and also relatively small profitability of letting the property. Good results of the third group parameters (the second biggest GDP growth rate value and the third population growth rate value) do not have a strong impact on the overall market's attractiveness.

All in all, based on the created synthetic taxonomic measure of the housing market attractiveness (TMHMA) it is possible to classify given markets as follows. Dubai real estate market as a very attractive, as attractive can be described examples of New York and Kraków housing markets. Turin, Singapore, Berlin and London real estate markets may be characterized as mediocrely attractive. So the case of the Hong Kong property market as weak.

Summary

Theoretical considerations presented in the chapter one has permitted a better understanding of the real estate market. Presentation and conducting of the application of the taxonomic method allowed proceeding the examination of the set of given housing markets examples basing on the given and described real estate market indicators.

Described actions have given the result – the results of the application of the synthetic taxonomic measure of the housing market attractiveness (TMHMA), which allowed classifying markets examples from the less to the most attractive. Among the set of Kraków, Hong Kong, London, Turin, Berlin, Dubai, Singapore and New York housing markets, as the most attractive was classified Dubai real estate market. As attractive were found New York and Kraków real estate markets. The less attractive in the field of considerations of the thesis was found Hong Kong property market. Other markets were classified as mediocrely attractive.

Reasoning on the work's results permits to tell that the Far East markets are not as attractive as they were or as they are reputed, what was shown on the examples of Hong Kong and Singapore property markets. As it was previously mentioned at the beginning of the XXIth century, Europe housing markets were very profitable. The results of conducted deductions reveal Kraków real estate market as still attractive. Whereas, New York property market was presented as slightly more attractive than the Kraków one. Also, the information about the high attractiveness of GCC (Gulf Cooperation Council) real estate markets[50], on the example of Dubai housing market was confirmed.

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Appendix 1. GDP Growth Rate Data (1987-2001)

Year	Poland	Germany	Hong Kong	Singapore	United States	United Arab Emirates	United Kingdom	Italy
1987		1,40%	13,40%	10,76%	3,46%	3,38%	5,31%	3,19%
1988		3,71%	8,51%	11,12%	4,20%	-2,62%	5,75%	4,19%
1989		3,90%	2,28%	10,18%	3,68%	12,34%	2,57%	3,39%
1990		5,26%	3,83%	10,04%	1,92%	18,33%	0,73%	1,99%
1991	-7,02%	5,11%	5,70%	6,69%	-0,07%	0,86%	-1,09%	1,54%
1992	2,51%	1,92%	6,23%	7,09%	3,56%	3,34%	0,37%	0,83%
1993	3,74%	-0,96%	6,20%	11,54%	2,75%	1,26%	2,53%	-0,85%
1994	5,29%	2,46%	6,04%	10,93%	4,04%	6,90%	3,88%	2,15%
1995	6,95%	1,74%	2,37%	7,03%	2,72%	6,69%	2,47%	2,89%
1996	6,06%	0,82%	4,26%	7,53%	3,80%	5,80%	2,54%	1,29%
1997	6,46%	1,85%	5,10%	8,29%	4,49%	8,19%	4,04%	1,84%
1998	4,61%	1,98%	-5,88%	-2,23%	4,45%	0,29%	3,14%	1,62%
1999	4,64%	1,99%	2,51%	6,10%	4,69%	2,90%	3,22%	1,56%
2000	4,56%	2,96%	7,66%	8,90%	4,09%	10,85%	3,66%	3,71%
2001	1,25%	1,70%	0,56%	-0,95%	0,98%	1,40%	2,54%	1,77%

Source: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=SG-HK-PL-DE-IT-AE-GB-USAppendix 2. Population Growth Rate Data [access:15.06.2018]

Appendix 2. GDP Growth Rate Data (2002-2017)

Year	Poland	Germany	Hong Kong	Singapore	United States	United Arab Emirates	United Kingdom	Italy
2002	2,04%	0,00%	1,66%	4,21%	1,79%	2,43%	2,46%	0,25%
2003	3,56%	-0,71%	3,06%	4,44%	2,81%	8,80%	3,33%	0,15%
2004	5,14%	1,17%	8,70%	9,55%	3,79%	9,57%	2,36%	1,58%
2005	3,49%	0,71%	7,39%	7,49%	3,35%	4,86%	3,10%	0,95%
2006	6,18%	3,70%	7,03%	8,86%	2,67%	9,84%	2,46%	2,01%
2007	7,03%	3,26%	6,46%	9,11%	1,78%	3,18%	2,36%	1,47%
2008	4,25%	1,08%	2,13%	1,79%	-0,29%	3,19%	-0,47%	-1,05%
2009	2,82%	-5,62%	-2,46%	-0,60%	-2,78%	-5,24%	-4,19%	-5,48%
2010	3,61%	4,08%	6,77%	15,24%	2,53%	1,60%	1,69%	1,69%
2011	5,02%	3,66%	4,81%	6,35%	1,60%	6,93%	1,45%	0,58%
2012	1,61%	0,49%	1,70%	4,08%	2,22%	4,48%	1,48%	-2,82%
2013	1,39%	0,49%	3,10%	5,11%	1,68%	5,05%	2,05%	-1,73%
2014	3,28%	1,93%	2,76%	3,88%	2,57%	4,40%	3,05%	0,11%
2015	3,84%	1,74%	2,39%	2,24%	2,86%	5,06%	2,35%	0,95%
2016	2,86%	1,94%	2,16%	2,40%	1,49%	2,99%	1,94%	0,86%
2017	4,55%	2,22%	3,79%	3,62%	2,27%	0,79%	1,79%	1,50%

Source: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=SG-HK-PL-DE-IT-AE-GB-USAppendix 2. Population Growth Rate Data [access:15.06.2018]

Appendix 3. Population Growth Rate Data (1987-2001)

Year	Poland	Germany	Hong Kong	Singapore	United States	United Arab Emirates	United Kingdom	Italy
1987	0,56%	0,15%	1,01%	1,50%	0,01%	3,38%	0,89%	0,01%
1988	0,41%	0,39%	0,84%	2,54%	0,05%	-2,62%	0,91%	0,05%
1989	0,36%	0,77%	1,04%	2,94%	0,08%	12,34%	0,94%	0,08%
1990	0,39%	0,86%	0,32%	3,89%	0,08%	18,33%	1,13%	0,08%
1991	0,35%	0,73%	0,83%	2,85%	0,07%	0,86%	1,34%	0,07%
1992	0,31%	0,76%	0,84%	3,00%	0,07%	3,34%	1,39%	0,07%
1993	0,25%	0,66%	1,72%	2,53%	0,06%	1,26%	1,32%	0,06%
1994	0,21%	0,35%	2,25%	3,14%	0,02%	6,90%	1,23%	0,02%
1995	0,14%	0,29%	1,98%	3,04%	0,00%	6,69%	1,19%	0,00%
1996	0,08%	0,29%	4,44%	4,06%	0,03%	5,80%	1,16%	0,03%
1997	0,07%	0,15%	0,83%	3,36%	0,05%	8,19%	1,20%	0,05%
1998	0,04%	0,02%	0,83%	3,40%	0,03%	0,29%	1,17%	0,03%
1999	-0,01%	0,06%	0,96%	0,80%	0,02%	2,90%	1,15%	0,02%
2000	-1,04%	0,14%	0,88%	1,73%	0,05%	10,85%	1,11%	0,05%
2001	-0,03%	0,17%	0,74%	2,70%	0,06%	1,40%	0,99%	0,06%

Source: https://data.worldbank.org/indicator/SP.POP.GROW?end=2017&locations=DE-PL-AE-GB-US-IT-HK-SG&start=1980 [access: 15.06.2018]

Appendix 4. Population Growth Rate Data (2002 - 2017)

Year	Poland	Germany	Hong Kong	Singapore	United States	United Arab Emirates	United Kingdom	Italy
2002	-0,05%	0,17%	0,44%	0,91%	0,15%	2,43%	0,93%	0,15%
2003	-0,07%	0,06%	-0,20%	-1,47%	0,44%	8,80%	0,86%	0,44%
2004	-0,06%	-0,02%	0,78%	1,25%	0,65%	9,57%	0,93%	0,65%
2005	-0,04%	-0,06%	0,44%	2,35%	0,49%	4,86%	0,92%	0,49%
2006	-0,06%	-0,11%	0,64%	3,13%	0,30%	9,84%	0,96%	0,30%
2007	-0,05%	-0,13%	0,86%	4,17%	0,50%	3,18%	0,95%	0,50%
2008	0,01%	-0,19%	0,60%	5,32%	0,66%	3,19%	0,95%	0,66%
2009	0,07%	-0,25%	0,22%	3,02%	0,46%	-5,24%	0,88%	0,46%
2010	-0,29%	-0,15%	0,73%	1,77%	0,31%	1,60%	0,83%	0,31%
2011	0,05%	-1,85%	0,67%	2,08%	0,17%	6,93%	0,74%	0,17%
2012	0,00%	0,19%	1,10%	2,45%	0,27%	4,48%	0,75%	0,27%
2013	-0,06%	0,27%	0,40%	1,62%	1,16%	5,05%	0,71%	1,16%
2014	-0,07%	0,42%	0,70%	1,30%	0,92%	4,40%	0,75%	0,92%
2015	-0,07%	0,87%	0,85%	1,19%	-0,10%	5,06%	0,76%	-0,10%
2016	-0,04%	0,81%	0,62%	1,30%	-0,17%	2,99%	0,73%	-0,17%
2017	0,02%	0,42%	0,75%	0,09%	-0,13%	0,79%	0,71%	-0,13%

Source: https://data.worldbank.org/indicator/SP.POP.GROW?end=2017&locations=DE-PL-AE-GB-US-IT-HK-SG&start=1980 [access: 15.06.2018]

Appendix 5. Inflation Data (1987-2001)

Year	Poland	Germany	Hong Kong	Singapore	United States	United Arab Emirates	United Kingdom	Italy
1987	25,2%	0,2%	5,7%	0,5%	3,6%	5,5%	4,1%	4,7%
1988	60,2%	1,3%	7,8%	1,5%	4,1%	5,0%	4,6%	5,1%
1989	251,1%	2,8%	10,2%	2,3%	4,8%	2,8%	5,2%	6,2%
1990	585,8%	2,7%	10,3%	3,4%	5,4%	0,6%	7,0%	6,4%
1991	70,3%	3,5%	11,2%	3,4%	4,2%	3,4%	7,5%	6,2%
1992	43,0%	5,0%	9,6%	2,2%	3,0%	6,4%	4,3%	5,0%
1993	35,3%	4,5%	8,8%	2,3%	3,0%	5,3%	2,5%	4,5%
1994	32,2%	2,7%	8,8%	3,1%	2,6%	5,7%	1,9%	4,2%
1995	27,9%	1,7%	9,0%	1,7%	2,8%	4,3%	2,7%	5,4%
1996	19,9%	1,3%	6,3%	1,4%	2,9%	3,0%	2,5%	4,0%
1997	14,9%	1,5%	5,8%	2,0%	2,3%	3,0%	1,8%	1,8%
1998	11,8%	0,6%	2,8%	-0,3%	1,5%	2,0%	1,6%	2,0%
1999	7,3%	0,6%	-4,0%	0,0%	2,2%	2,1%	1,3%	1,7%
2000	10,1%	1,4%	-3,7%	1,3%	3,4%	1,3%	0,8%	2,6%
2001	5,5%	1,9%	-1,6%	1,0%	2,8%	2,8%	1,2%	2,3%

http://www.imf.org/external/datamapper/PCPIPCH@WEO/HKG/ITA/ARE/GBR/USA/POL/SGP/DEU [access: 15.06.2018]

Appendix 6. Inflation Data (2002 - 2017)

Year	Poland	Germany	Hong Kong	Singapore	United States	United Arab Emirates	United Kingdom	Italy
2002	1,9%	1,3%	-3,0%	-0,4%	1,6%	2,9%	1,3%	2,6%
2003	0,8%	1,0%	-2,6%	0,5%	2,3%	3,1%	1,4%	2,8%
2004	3,5%	1,8%	-0,4%	1,7%	2,7%	5,0%	1,3%	2,3%
2005	2,1%	1,9%	0,9%	0,5%	3,4%	6,2%	2,1%	2,2%
2006	1,0%	1,8%	2,0%	1,0%	3,2%	9,3%	2,3%	2,2%
2007	2,5%	2,3%	2,0%	2,1%	2,9%	11,1%	2,3%	2,0%
2008	4,2%	2,7%	4,3%	6,6%	3,8%	12,3%	3,6%	3,5%
2009	3,4%	0,2%	0,6%	0,6%	-0,3%	1,6%	2,2%	0,8%
2010	2,6%	1,2%	2,3%	2,8%	1,6%	0,9%	3,3%	1,6%
2011	4,3%	2,5%	5,3%	5,2%	3,1%	0,9%	4,5%	2,9%
2012	3,7%	2,1%	4,1%	4,6%	2,1%	0,7%	2,8%	3,3%
2013	0,9%	1,6%	4,3%	2,4%	1,5%	1,1%	2,6%	1,2%
2014	0,0%	0,8%	4,4%	1,0%	1,6%	2,3%	1,5%	0,2%
2015	-0,9%	0,1%	3,0%	-0,5%	0,1%	4,1%	0,0%	0,1%
2016	-0,6%	0,4%	2,4%	-0,5%	1,3%	1,6%	0,7%	-0,1%
2017	2,0%	1,7%	1,5%	0,6%	2,1%	2,0%	2,7%	1,3%

Source:

http://www.imf.org/external/datamapper/PCPIPCH@WEO/HKG/ITA/ARE/GBR/USA/POL/SGP/DEU [access: 15.06.2018]