REAL ESTATE AT EXPOSURE
NEW CHALLENGES, OLD PROBLEMS

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Table of Contents

III — FUNCTIONING OF THE REAL ESTATE MARKET AND THE FINANCIAL SECTOR

IV.4

Jörg J. Dötsch

Housing Wealth in Hungary: From Subsidized Stability to Inherited Tensions? **299**

Introduction

Real estate, and especially land are probably the basic and oldest assets and consumer goods at the same time. Their importance and development in the past took place along with demographic development and advances in communication technology, which enabled the expansion and civilization of new areas. Their significance meant that they became a symbol of prestige and power and their tool, as well as an indicator of wealth. At the same time, next to land, building, industrial and infrastructural real estate also gradually gained in importance.

The rapid development of owner occupied type residential properties in the 20th century along with the necessary financial system was associated with their extensive promotion by the state, as it provided social peace and a strong motivation to work efficiently. The contemporary development of real estate, especially residential and commercial, in developed countries is more associated with the development of a post-industrial society, which is based mostly on the development of services, including those provided by real estate. This is associated with accelerating the development of large agglomerations in which globalization processes have triggered the strongest synergies.

While service, office or industrial real estate is becoming the subject of technical progress and, as in the case of skyscrapers, more and more sophisticated technologies, the dominant, in terms of value, residential real estate is produced very traditionally. Despite this, the end of the 20th century and the beginning of the 21st are a period of unprecedented growth in economic and social significance of real estate, in both the positive and negative sense of the word.

The modern building real estate sector (residential and commercial real estate) has a high economic burden and, as a consequence, problems with its functioning are spreading to the entire economy. The value of the real estate stock accounts to about 50% of national wealth and 2–3 times of GDP, which is the sum of the society's annual income. The services produced by real estate are a dozen or so percent of GDP, while the capital expenditure on development and maintenance of the stock is another several percent. The microeconomic significance of real estate is equally important. Housing expenses, depending on what we consider in them, can reach up to 40% of household budgets. Because residential real estate transactions are based on bank

loans, their servicing takes usually 20 or even 30 or more percent of household budgets, and loan portfolios can exceed 50% of GDP. Consequently, the real estate sector has a strong influence on the financial sector. At the end of the 20th century and at the beginning of the 21st century, this relationship deepened, leading to the real estate or housing crises. This phenomenon is favored by the susceptibility of the real estate market to speculation and cyclical fluctuations and the myopia of economic actors, including regulators. An additional factor is the difficulty of obtaining reliable information about this market, including basic price indices. However, significant progress has been made in this field.

The social role of housing has not changed, it still meets basic housing needs, and the basic forms are owners occupied housing and various forms of state-supported social housing. The social role of housing is in some contradiction with private housing bought for a housing loan and this contradiction was and is the cause of social conflicts, mitigated by the housing policy of the state.

In the twentieth century those so-called classical sector problems were joined by new ones, related to the globalization process. The increased role of global financial institutions as a consequence of the opening of international financial markets has resulted in accelerated sectoral flows, increased speculation and subsequent crises. It is also a period of rapid development of the sector and accelerating development of large agglomerations.

A relatively new problem is the emerging ecological threat associated with excessive consumption, especially of energy. Real estate is highly energy consuming, both in the construction process and in operation. At the same time, the increase in the population and income triggers strong demand for housing. It is also the result of migration pressure from the poorest to highly developed countries, which is influenced by climate change, a significant and growing stimulus of migration processes. Those problems can generate deep social and technological changes in the housing market. Looking at the currently observed problems these changes can be of negative nature, meaning that living conditions will deteriorate.

Another factor, whose significance will grow in the coming years, and which has so far been considered only theoretically, is the progressing automation, the inevitable consequence of computerization and technical progress. As historical experience shows, this phenomenon can lead to major social problems that will affect the housing sector and other real estate. However, it is difficult to anticipate new housing policy tools. Everything has already been tested here many times. What can change is the scale of the problem and the housing policy response.

Finally, it should be pointed out that the chapters were written just before the COVID-19 pandemic broke out. They should be now read with some caution, as the

pandemic has a significant impact on the whole economy. However, the pandemic is still not over, while its impact on the economy not fully known. Therefore, it would not be wise to try to implement it into the articles.

Part I: Old problems and new challenges in housing

The phenomena discussed briefly are reflected in the contents of the presented book. It is opened by two studies of a more general nature. The first of them, by **Kasprzak** discusses issues related to the so-called the fourth industrial revolution and its impact on the real estate sector. The so-called fourth revolution is not precisely defined in the literature, but it is widely believed that it concerns processes triggered by the progressive IT revolution, such as the automation of production processes, the platformization of the distribution of goods and services, the implementation of artificial intelligence. Its impact will go far beyond the real estate sector, where it will have a particularly strong impact on office, commercial and retail properties.

The second chapter is a study on municipal housing by **Kofner**. It goes in its scope beyond the set topic, *de facto* discussing the theoretical basis and experience of local housing policy from the position of various concepts of economic organization of society (liberalism, social democracy, etc.). Housing policy always has a local dimension and reminding of these issues is particularly important in the face of anticipated problems.

The remaining studies focus on traditional sector issues. For the convenience of the reader, they have been grouped into three main parts: II / measuring real estate prices, III / functioning of the real estate market and the financial sector and IV / social and institutional issues of the sector. The chapters present new approaches to known issues or interesting problems.

Part II: Measuring real estate prices

Price dynamics research and the analysis of supply and demand factors have been classic topics of sector analyzes for several decades. The hedonic theory proposed by Rosen and later the development of econometrics, including spatial autoregression analysis, have set a new level in the real estate market analysis, opening and discovering new research fields and problems.

The chapter by **Łaszek et al.** is, in fact, a critical analysis of spectral filters used to analyze real estate cycles. The authors analyze the usefulness and effects obtained using the commonly known Hedrick-Prescott and Christiano-Fitzgerald filters for cycle analyzes on the housing market in Poland and Warsaw, where there is also extensive data available for indicator and structural analyzes, but at the same time

the quarterly price series only start in 2006. They also verify the filters on the house prices for Ireland and Spain, i.e., where strong housing cycles have occurred and the time series start in 1970.

The chapter by **Bárcena et al.** concerns the problem of attributing price factor dynamics in hedonic house price indexes. The problem of shadow price dynamics is an old problem, usually solved by a rolling window of subsequent years added to the data being the basis for estimating shadow prices or by non-parametric methods, including using spline functions. This chapter proposes another elegant non-parametric method and shows the results of practical estimations.

Łaszek and Waszczuk raise another classic topic of the interaction between the influence of the planner and the market for development land. Nowadays, nobody denies the need to maintain the disciplinary effect of the market on the city space and the complementary impact of planning that corrects known market failures. Planning without a market ultimately leads to a wasteful and wrong use of city space, similar problems arise in a pure market lead market, where regulations are absent. The authors analyze the relationship between urban rent, building intensity and allocation of land from a historical perspective. They try to illustrate how long it takes to correct space misallocations from the times of the centrally planned (socialist) economy through market mechanisms in contemporary Poland.

Zakaria and Fatine present a chapter which deals with the interesting and developing housing market in Morocco, but it should be considered a starting point for further discussion. The authors propose a Hedonic Brownian Motion Index for three major cities of the capital region of Morocco (RABAT Region) in order to simulate house prices, because they only have data for a single year. They apply the Brownion motion analysis which is known in the financial market to predict the evolution of house prices. The discount parameter and the other parameters are calculated with the help of the parameters obtained in the hedonic regression. It requires further research to verify if such an approach can be applied also to the house prices in other countries.

Part III: Functioning of the real estate market and the financial sector

The chapter by **Ryczkowski** presents a relatively new tool, which is the wavelet analysis for the study of causal relationships in the real estate market. The question, whether bank credits or house prices move first, is investigated on the example of Poland. The discussion about the causality in the course of events: an increase in loan disbursements, an increase in prices, etc. has a long history and sometimes resembles the question about the beginning and end of a circle. After the crisis in 2006–2008 in the US, it took on a more political character when the ones guilty for generating

bubbles and the subsequent crises were sought in this market. The answer to the question raised at the beginning will not be unambiguous and will largely depend on the research assumptions made, including those regarding a delayed response. Institutional analysis can also help. Classic causality measures, such as the Granger test, do not give good results here, but the wavelet analysis turns out to be promising.

On the other hand, the problem of price bubbles on the European market is very practical, especially for bodies such as ESRB responsible for macroeconomic stability. **Voigtländer and Schuster** propose measuring bubbles on commercial real estate markets based on the indicator of the full cost of the user and the effective rent. Traditionally, these indicators have been used for a similar purpose with owner occupied housing, however there are no contraindications to their use in the commercial sector. The authors, using the proposed tool, also measure the tensions in the largest European markets.

The real estate sector consists of stocks and flows. **Ahmed** analyzes sector flows based on the well-known Leontiev input-output matrix model. In addition, links with the financial sector are analyzed. The aim of the study is to answer the question of the importance of the real estate sector in the economy. The results of the survey may be helpful in anticipating the consequences of sectoral shocks.

Arhelger and Kim analyze the changes in the value of German real estate after the financial crisis. For the purposes of their calculations, the authors use traditional hedonic indices based on hedonic regression. Since market valuations are based on the official methodology of the German Association of Property Valuers, the authors use a terminology that deviates from the traditionally used one in econometrics, which is also interesting to see the difference between the econometric hedonic regression approach and its regulatory formulation.

Rybacki tackles the problem of the credibility of the monetary policy pursued by the ECB. Proper monetary policy is particularly important from the real estate perspective, which is very sensitive to changes in interest rates. Low interest rates, even when they comply with the Taylor rule, often lead to excessive property appreciation and tensions in this market, which requires special attention of the macro-prudential supervision. The author, using econometric tools, attempts to estimate to what extent the ECB, BOE and FED policies were in line with the Taylor rule and to what extent they had an impact on the resulting price bubbles.

In the last article in this chapter, **Matysiak et al.** raise issues surrounding the modeling of the development of local housing construction markets in the largest cities in Poland. When aggregate housing demand is considered as a potential explanatory variable when analyzing individual markets jointly, the panel regression results are weak. The explanation is the impact of local (city) factors, including unobserved

factors, which play a major role. The authors propose that the drivers of construction should be analyzed in terms of 'city clubs', where house prices converge within each club. Their results show that construction starts react differently to various economic variables in the different clubs, and show that construction starts have a local nature. Construction starts in different cities can be analyzed jointly if the cities are grouped in an economically meaningful way.

Part IV: Social and institutional issues of the sector

This part of the book contains interesting case studies on housing policy, social and rental housing from various countries. **Łaszek et al.** describe the development of the private rental market for housing in Poland. During the socialist period, the rental market was considered as capitalistic, abandoned and prohibited and replaced by state-owned and cooperative housing. Despite the change in the political system after 1989, pre-WWII and communist regulations remained virtually unchanged, blocking the development of a properly functioning private rental market. These regulations were lifted in 2015 contributing to the housing boom, which was to a large part generated by rental housing.

The case study by **Głusińska and Przybylska** is, in turn, a description of an interesting initiative that is a social rental agency. It acts as an intermediary between private tenants from higher risk groups and landlords, disciplining tenants and guaranteeing repayment of rent to the owner. This example shows that an effective housing policy does not need to be a large and expensive project, but can be also effectively realized on a local scale.

The third chapter by **Schaefer** is a case study of French development of rental housing at moderate rates. Just as Americans have an extensive experience in mortgage lending and the liquid owner occupied housing market, the French experience with state-supported social housing is a classic example in the history of housing policy.

Dötsch investigates the recent situation of the Hungarian residential property market, covering economic, urban and social factors as well as housing policies, especially subsidies and taxation. He starts with the key findings of an international research project financed by the European Commission concerning the question of how residential property can be used to ensure liquidity in old age by means of "equity release schemes", which covered Germany, Hungary, Ireland, Italy, the Netherlands and the UK. Taking these results into account, the chapter discusses the results of a short survey of the prospective shift in ownership structure due to demographic change, regional disparities on the one hand and expectable social tensions on the other in Hungary.

I

OLD PROBLEMS AND NEW CHALLENGES IN HOUSING

1.1

The Fourth Industrial Revolution and the Real Estate

Piotr Kasprzak[1]

Introduction

Machines and automation are changing the job market

The fourth industrial revolution is taking place right now, changing every sector of the economy. **Labor markets are going through major transformations**. Recent technological developments, like: big data technology, internet of things, artificial intelligence, high bandwidth mobile internet and cloud computing **redefine jobs** attributed to human and machine workforce. **Changes of geography of production** are observed, as employers prefer the availability of skilled local workforce rather than proximity of industry or raw materials.

In the nearest future, the global digital ecosystem will not only induce **high integration of production and services** (along with sales and research) but will constantly be influencing and **changing the social system**. This will lead to a **development of the post-industrial society** of imminent change and lifetime learning. Expectations of consumers, surrounded by the digital revolution, will have essential impact on residential and commercial real estate, and will put pressure on the sector to innovate.

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[1] Equity analyst and strategy adviser in international M&As. Permanent associate with the SGH Warsaw School of Economics, Collegium of Business Administration, Department of Innovative City

Within the theoretical framework of the diffusion of innovations (see: Rogers, 2003), facing the platformization of the economy, this paper is taking a closer look at the current stage of the fourth revolution in the real estate sector and drafts predominating trends and practical implications explicit to this transition. Key findings indicate that characteristics of real estate (see: Kasprzak, 2015) will be redefined, and technology will play a key role in the process. The depth of innovation will dramatically increase, leading to enlarged competition and market polarization. But understanding of technological innovations in the real estate sector is not enough, because the fourth revolution is not only changing what and how people do things, but also reinvents the society and its internal relations and needs.

An industrial revolution takes place when two new technologies appear and affect each other at the same time: a new method of use of a new energy source, and a new way of collecting and transmitting information. As defined by Rifkin (2011): *this coexistence of appearances is due to the fact, that new energy regimes facilitate new economic activities and enhanced commercial exchange, thus unwinding social relationships, which require new communication, to organize and manage this new dynamics.*

The steam power of the first industrial revolution, not only started mechanization of production, but also allowed mass printing press. Later, the electric power permitted telephone, and then radio and television. Computerization led to the internet, giving ground to completely different ways and channels of communication. But this time, the development of new technology and new media caused much deeper consequences. They allowed, unseen before, **junction of personal liberation** (being subject to economic and political manipulation, originated by big data collection) **with automation** of all kinds of processes, within the economy and the society. As in the twentieth century, computers and internet meant an unlimited access to free information and decentralization of opinion and creation, social media have introduced **free and unlimited sharing of opinions and calls for action**. These actions may represent not only individual (but strongly promoted by crowds or institutions) rhetoric, but also real actions, like for example: crowdfunding operations backed by real money.

Today's technological revolution is foremost reflected in this new, automated approach to collection and use of data. It is changing the way the market and its participants gather and exchange information, both internally and externally (regardless of the economic sector). Machines are learning not only how to process data, but also how to conclude and learn from all processes that can be observed and analyzed.

Most importantly for the course of events, these **groundbreaking inventions appeared in the decade of the last global crisis aftermath**. This was particularly visible in relation to the real estate sector. Heavy stimuli investments in infrastructure (as a response to the turmoil), nationalization of assets (both financial and real) and

sound social housing policy programs were implemented worldwide. Banks, which acquired large property portfolios, came out intertwined with a long position to the sector, and have developed active approach to manage the new risk. At the same time technology allowed new kinds of income flows and thus their securitization. This has led to a huge number of machine and block chain based proptech innovations, solutions and startups, originated not only in traditionally world's strongest technology centers, but worldwide. Using artificial intelligence algorithms (to standardize unstructured data into exchangeable units of information) has facilitated an unprecedented increase in productivity and timing of operations, translating into higher cost efficiency and returns.

Throughout world's history, advancing **automation** has reshaped the economy many times. While agricultural automatization gave ground to rural-to-city migration, industrial automation has been forcing factory workers to move into the service sector, which currently is subject to automation as well. The difference of the today's industrial revolution is, that historically, machines substituted people mostly in their muscle skills, while cognitive abilities, like: analyzing, learning and creating, were reserved for the human race. Understanding of complex behavioral aspects of *homo sapiens* nature in particular, was unachievable for algorithms and computers. Nowadays it is different. Machines not only play chess better than humans, but also drive cars, invest on the capital market, and recognize other people's future behavior[2]. Assuming that further developments in neuroscience (and decision making algorithms) are unlimited, this process will deepen and practically none of human professions will be safe in the future. Furthermore, automatization[3] and artificial intelligence operate in networks more effectively than humans, allowing fast communication and adoption of new behavioral patterns.

Undoubtedly, these factors are changing the job market. New jobs are created, but they require high qualifications and the ability of constant learning. In the industry 4.0 a human is no longer a worker, but an intelligent machine expert. Simple occupations of today's low-qualified employees will not find a replacement[4] in the nearest future. This is an unprecedented redistribution of jobs, talented population, and wealth.

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[2]   Although the informational conformism in human decisions has been well documented since Salomon Asch's experiments, big data and artificial intelligence are changing this picture. As the recent research show, people trust automated algorithms more than advice from other humans (for more details see: Logg et al., 2018).

[3]   For example: even though full automatization of the construction industry is still a melody of the future, a fusion of machine and human intelligence is already a fact. Small and light weight wireless sensors are installed on hardhats and belts of construction workers and track their movements. This allows to interpret relationships between man-hours, cost overruns, time delays, safety incidents, etc. High accuracy predictions are also delivered, providing early warning signals to various project risks.

[4]   According to the World Economic Forum, half of jobs existing today will be eliminated by technology by the year 2025, while automation and machines will constitute more than half of all labor (see: WEF, 2019b).

Remarkably, the distribution of modern jobs is uneven in the geographical sense as well. This progress concentrates on cities, which are becoming clusters of new innovations, with whole ecosystems of funding, education and the strong service sector flourishing around them.

Automation creates productivity boost and a decrease in the relative cost of goods, helping profits. At the same time, it forces migration of excess resources into new directions. These two tendencies are causing a disruption in the distribution of wealth, because incomes of workers rolled out by automation are under distress, despite of growing company profits. In effect, the economy finally might face stagnation, as automation pushes the production output far more than the demand, due to growing productivity and falling incomes of masses. Such a collision of automation, inequality and demographics (like for example: ageing of the population), leading to substantial deceleration in labor force growth in OECD countries could result in USD 5.4 trillion GDP shortfall already by the year 2030; for details see: Harris et al. (2018).

In consequence, one can distinguish several constraints and negative feedbacks of the observed industrial revolution, which are even more visible due to its dynamism and profoundness:

1. Huge augmentation of new jobs, but insufficient creation of new working places, is creating so called **skills gap** (see: WEF, 2019b) or the talent gap. Monopolization by elites, of understanding of the occurring processes is harming adoption of new technologies, and therefore affecting the business and the economy itself[5]. This syndrome puts more pressure on the middle class, additionally creating further volatility of markets.
2. Progressing automation can cause **large scale migrations** of not only the talented people, but also of entire advanced industries, from cheap labor countries to better developed and expensive regions, thus **dramatically changing fundamentals of globalization** and trade.
3. An institutionalized **resistance** against such a transition, due to emancipation of masses, can give more ground to sound popular concepts, which can slow this process down, i.e., to populism and protectionism.

Depending on the fourth revolution's degree of progress in different countries and economic sectors, the negative impact of automation will depend on their particular socio-economical structures. Based on the theoretical framework of the concept of diffusion of innovations (see: Rogers, 2003), this essay draws upon the revolution's aspects, which are particularly affecting the real estate sector. These are:

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5   This observation refers to all sectors of employment, with a special attention to politics, thus politicians and policy makers.

- the emergence of the post-industrial society,
- the influence of the platform economy and the big data analysis on the society,
- progressing urbanization and agglomeration.

This external desk study of contemporary literature of the subject, analysis of financial information and the secondary market research, is intended to be a footstep in the discussion about consequences of this ongoing transition.

1. The emergence of the post-industrial society

The term "the post-industrial society" is not new. It has been popularized by the American sociologist Daniel Bell, several decades ago, who has defined **the post-industrial society as one, where knowledge and technology are the major social powers and sources of dynamism of societies**. The educated and technical class is dominating such a society, and service industries are contributing to the economy more than manufacturing.

Not only a shift in preferences from property to knowledge (as a base of the new power) can be observed, but also in the character of knowledge itself. People start to live by innovation and development with theoretical thinking as their "matrix". Even though, transformations initiated by them generate tensions, "the bitterness of one generation is often the banality of another" (see: Bell, 1973). Social changes are never as dashing in their effects as their advocates wish, and their results are hardly as damaging as their opponents dread. Essential reforms, once heavily discussed, are indisputable now[6]. The society is facing a never-ending, hardly controlled, process of imminent change, where dominant values simply obtain a new shape. Just like an emergence of the market system of Western economies was not an effect of any coercive power. It was due to a coexistence of its contribution to growing efficiency, productivity and increasing output of capital and material goods, and the fact that these changes were consistent with dominating consumer values of the society of that time. The nature of the market society is then a consequence of this organization around the concept of disperse responsibility and demand driven decisions of scattered consumers.

Daniel Bell's observations are striking with accuracy[7] to today's industrial revolution. Moreover, a hypothesis can be proposed, that: **the coexistence of the internet and**

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[6] The concept of worker's minimum compensation and its introduction and adoption to a contemporary standard are a good example of such a process.

[7] However, Bell has underestimated the process of privatization of knowledge and education, thus overweighting the real impact of the third sector (the non-profit area outside business and government) and the so-called "sociologization", i.e., social justice, inclusion and responsibility. Nevertheless, he has aptly

social media with automation and artificial intelligence is leading to substantial societal changes, and thus the emergence of the post-industrial society is imminent.

A mechanism of this transition can be described within concepts of **cultural diffusion**[8] and **diffusion of innovations**; introduced by the sociologist and the theorist of communication Everett Rogers.

The contemporary theory on diffusion of innovations explores how ideas and behaviors spread within and between different societies, populations, communities, organizations, or even states[9].

There are four key variables in the diffusion process of an innovative idea, concept, practice or technology into a social system (see: Rogers, 2003):

1. the **innovation** itself,
2. **time** of exposition to the innovation,
3. **channels** through which it is communicated,
4. **characteristics** of a particular social system.

Ad. 1. **The innovation** is an idea, practice or object, perceived as new to a social system. As innovation is usually used as a synonym with technology, which normally has two aspects: i.e., hardware (the tool) and the software (the way to use it), the term **diffusion of technology** is also relevant without any harm to the very concept.

New technology causes uncertainty of consequences of its use, which is reduced by individuals by seeking for information and its adoption. More complex information requires an adopter to develop new skills and thus is adopted more slowly. Additionally, compatibility with the adopter's needs, and relative advantage of the innovation to his preferences, have essential impact on its rate of adoption.

Ad. 2. Basically, adoption (or rejection) of an innovation is a function of **time**[10]. The time of adoption depends on other elements of the diffusion of innovation. And the time of reaction (either positive or negative) should be shorter as other elements improve.

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observed the society's abiding internal issues, like: the compatibility of the idea of autonomy of science with the call for its inferiority to national goals; communication patterns within knowledge structures (problems of information retrieval, formal and informal networks of communication) and the revolutionary nature of the new intellectual technology using concepts specific to his era: "the role of simulation, systems engineering, and the like linked to the computer".

8   This key, measurable tool in the sociological analysis of any social change, is based on an observation that two different cultures mutually adopt elements of their systems when they interact.

9   This concept can as well be applied to political science, and explains policy diffusion or policy transfers, to develop, spread and execute different ideas, policies, etc. There already exist wide evidence confirming the importance of central policies affecting market incentives (OECD, 2015).

10 As another pioneer of mathematical models of innovation Frank M. Bass stated "The probability of adopting by those who have not yet adopted is a linear function of those who had previously adopted" (for details see: bassbasement.org).

The s-curve graph below represents the fraction of a population that has adopted an innovation at a point in time. Its shape depends on various factors (individual, societal, technological and economic, e.g. cost of the technology, etc.) and characteristics of transmission mechanisms, including communication channels.

Figure 1. Diffusion of innovation
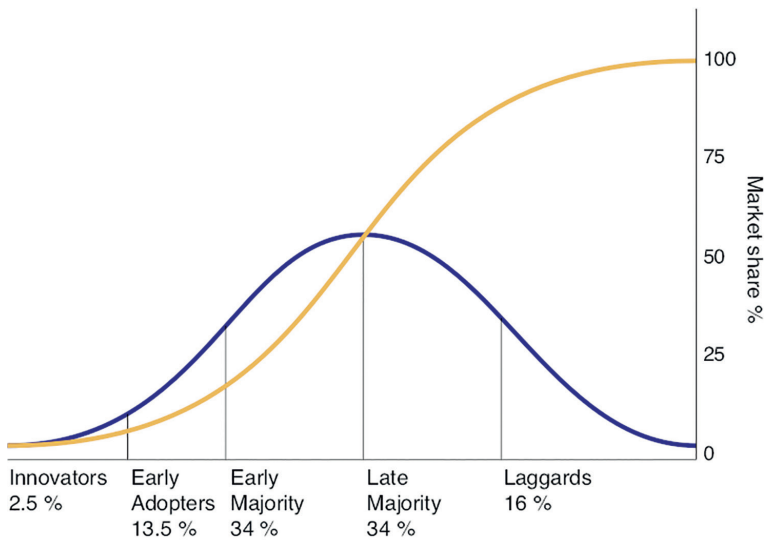
Source: https://commons.wikimedia.org/wiki/File:Diffusion_of_ideas.svg (Access date: 20.12.2020).

Ad. 3. **Communication channels** refer to physical or logical connections through which information about a new technology reaches from one individual to another[11]. Historically, mass media used to be the most rapid channels to get an audience of many receivers, but interpersonal channels (involving face to face exchange) were proven to be the most effective, as diffusion of innovation is a social process in particular.

Nowadays, social media have joined these aspects together and they are not only the most effective conductors of change and diffusion of information ever, but also contribute to recreation of communities and the social capital (for details see: Putnam, 2000), thus influencing the social system. According to evidence, the social capital of the American society has diminished in the last two decades of the twentieth century, as people disconnected from local communities, neighbors, families and democratic structures. The emergence of social media have filled this gap with new content and

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[11]　Contemporary social network research growingly covers and combines all aspects, structures and functions of human connections: not only social or economic, but also physical and biological.

transmission mechanisms, as they are providing a variety of alternatives for interaction (see: Rasmussen, 2014). So, even if people today are bowling less in neighborhood leagues, they can find more personal benefits and energy through membership in internet networks beyond limits.

Ad. 4. All other elements, creating space for diffusion of innovations, constitute the **characteristics of a particular social system**.

The social system can be defined as a set of interrelated units (individuals, informal groups, institutions, etc.) that are engaged in joint problem-solving to accomplish a common goal, which is binding the system together; as described by Rogers (2003). Such a system has a structure, even though its units and their behavior are not all identical, which gives a regularity, a stability and thus a predictability to the system.

This structure has a certain hierarchy and patterned social relationships. It is a complex network of formal and informal relations, linking the system members, determining communication patterns and flows of information. Such a communication structure influences behaviors of individual members of the social system, and their susceptibility to adoption of innovations. Obviously, the structure of a social system can facilitate or hamper the diffusion process.

Additionally, hard-to-define causality of changes of the very social system is further perplexing the process, especially while appearing *in chorus*, as subject and cause in the society under transition, smudged by new and unpredictable communication patterns.

Furthermore, new behavioral patterns which are created in the contemporary society, and spread throughout new communication channels, are difficult to explain only by economic and fundamental reasons. This is an observable trend, not only in the most developed cities and the high-tech areas. For example: according to a research report on homeownership of millennials (subjects aged 25 to 34), it is at least 8 points lower than in the case of baby boomers and the generation x in the same age group (see: Choi et al., 2018). Millennials have different characteristic than the earlier generations, i.e., are more ethnically diverse and better educated. While 15% less of minority households own houses, the rate for the higher educated group is also lower by 5 points, compared with the past. Millennials delay marriage and household formation and are more apt to live with their parents, with the marriage rate among young adults down to 38% in 2015, from 52% in 1990. It is interesting to note that millennials prefer living in high-cost cities in more urban countries, where real estate prices had a higher relative increase, and that the shift in geographic preference is mostly noted among highly educated group[12].

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[12]   What is more, the homeownership rate, also for white, married, high-income households with children, is 2 to 3 percentage points lower than in the previous generations examined.

Within a city, highly educated millennials prefer to live in districts with a more urban environment. This leads to a cumulated increase in real estate prices, due to limited and inelastic housing supply is these areas. The diminishing availability of affordable housing is then also due to changing preferences of young people.

Nevertheless, another survey of 56,000 youths (15–35 years old) from six countries in the region of South-East Asia (for details see: WEF, 2019a) reveals that they are highly aware of potential disruption and challenges being brought to labor markets by the Fourth Industrial Revolution, and that they show a strong commitment to lifelong learning and the growth mindset. Another hypothesis might be formed that **instability and inequity have been accepted by technically advanced societies as universal elements of the real life, which are reinforcing the necessity of constant self-development of young people**. The question remains: how the ongoing social transition will be adopted by more traditional societies of the rest of the world, as there could arise a collision of demographics, the fourth revolution and the value system. Especially, considering not only the described transition of the social tissue, but the change of the very philosophy of its functioning – emerging with a phenomenon of the platformization of the economy.

2. The self-reinforcing platformization of the economy and the big data shift

The term "platform" has appeared already at the early stage of the internet's big bang, and was primarily referring to websites where people, information and different types of goods and services met (retail, auction, music exchange, news platforms, etc.). By offering low-cost and unlimited access to almost everything traded on traditional markets, platforms were growing with time, and due to consolidation of different elaborated strategies, they have undermined the role of traditional organizations. This has led to an evolution of the user-participation-in-creation-of-content approach into the groundbreaking concept of monetization of what platforms can extract from user personal data, which they have unlimited access to. Low transaction costs and the highest possible market reach are not their major concern anymore, as they are already globally recognized[13]. Nowadays, their growth does not depend any more on a product or service, but on **stimulating user participation** (i.e., creating a new form

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[13] Facebook accounts for almost 2.5 billion users and is the largest social network. Google notices 250 million of unique visitors per month; the highest number in the history, and all the time growing.

of inconspicuous digital labor, for example necessary to initial training of the artificial intelligence[14] involved in the process).

Mining and monetizing their giant data resources, these businesses are driven by network effects rather than by their products, because those depend on creativity of platform users and customers. It is a very interesting process, leading to the business concept inversion, where **value is created by customers and users rather than by the business itself**. Creating the right ecosystem for them, is then the most important task.

This is a paradigm shift, from the product-oriented business philosophy to the customer-oriented. The big unknown for platforms remains what else customers might do with their ecosystems. This completely alters the investment perspective and valuation techniques, thus further complicating the picture. In a simple product business model, value was created by developing products based on recognition of specific customer needs. In the platform business model, value is created by charging for access to the platform, while its attractiveness mainly depends on the network effect of connecting its users and third parties, and growing number of interactions. Such an approach promotes virtual integration, in hope for its future value realized by creative customers. Products generate a single revenue stream, while platforms through user integration and creativity can produce many. It means creating a new marketplace for wider capitalization of company's already existing assets (which might be audience, technology, banking license, etc.) and allowing different use of those assets, not necessarily related to its core activity[15] (if any). This process is called platformization of business, and is present across different sectors and industries.

Currently, the top four most valuable companies worldwide are platform companies (see table below). Seven out of the largest ten companies ever, have joined market capitalization of 5.2 trillion dollars, i.e., 80% of the ten's total value of 6,6 trillion dollars.

Banks can be a good example of the unbearable pressure of the platform economy. These traditionally big and hard to change institutions, in the face of growing competition of innovative financial solutions, were forced to turn to the platform model. Nowadays, they are offering to their clients access to other fintech products, compounding the potential innovation available, thus enhancing their customer experience and creating a more open and competitive environment.

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[14]   reCAPTCHA test (the Turing test to distinguish humans from bots) is a good example of how platforms use people to train artificial intelligence. Google, after buying this solution, has made its users to decipher two words in order to check if they were humans. One of them was taken from an old book, where a computer scanner has failed to read it. This is how users unknowingly helped Google to digitalize books (see: Burling, 2012).

[15]   Google was a search engine, Amazon a retailer, and now they offer almost all services; from business oriented to entertainment.

Table 1. Ten largest companies in the world, by market cap.; October 2019 (USD bln)

No.	Company	Market cap (USD bln)
1.	Apple	961
2.	Microsoft	947
3.	Amazon	916
4.	Alphabet (Google)	863
5.	Berkshire	516
6.	Facebook	512
7.	Alibaba	481
8.	Tencent	472
9.	JPMorgan Chase	369
10.	Johnson&Johnson	366

Source: www.statista.com (Access date: 20.10.2019).

It is essential to this concept that platforms provide data sharing, technology and software solutions, at the price reach of individuals and smaller organizations, unavailable for them before. Cloud based solutions allow them to integrate their processes with all positive effects, like: time and cost reduction, easy access to latest market innovations, etc. Furthermore, all of these are drafted to their needs, at extremely low cost, but in return for their data. This mutual sharing of information allows all stakeholders to design and invent new solutions and products, further up and down the value chain. In this model R&D is actually done by platform users.

At the same time platform implications for other business concept, like marketing for example, are seditious. Marketers lose the big-designer stance and are forced to fast and efficient identification and response to opinions of their platform users. The new reality is that platformization is becoming more important than business processes alone, because user experience for clients, suppliers, customers, etc. is of the most importance and is easily appraised, compared and spread (on platforms, off course). So, finding a new, better solution for enhanced user experience is the contemporary necessary way to success. This means a constant need for innovation.

As platforms rely on fast and easy integration of data, it is justified to assume that in the nearest future, the high-speed mobile internet (5G), allowing gargantuan expansion of data flow, will enable and strengthen further automation and autonomization of various platform services. Additionally, already existing augmented and virtual reality features will be reborn, further redefining media and entertainment.

Big data innovation in technology is then unstoppable. This means that customer relation tools will further integrate, organize and analyze massive information at

dimensions far beyond current consumer habits and opinions. As they are already capable to process almost all physical and digital connections between people, brands and potential audiences, this blossom of Artificial Intelligence is and will be fueled by the need to expand markets, and will be directed from consumers to enterprises. Mass consumers have got the real power then.

Finally, one should underline the implied political nature of platforms (see: Casilli and Posada, 2019). In platform corporations there is no universal independent algorithm of functioning, but somebody's decision of what information circulates, who gets the biggest share of value which they control, and whose rights are guaranteed. The reflexive nature of this platform-user relation should be taken into consideration. Especially in economic sectors and markets sensitive to behavioral aspects of the human nature, like the real estate.

3. Ambiguous urbanization and agglomeration

The technological development is concentrated in cities[16]. Even though reports confirm the expanding economic power[17] of world's largest cities, they also reveal significant variation in growth. While many large cities are over-performing their surrounding regions, others are diminishing their significance.

Nevertheless, all of them are shaping global economic and societal trends, as they are transforming into agglomerations, not only in the traditional understanding (as the last stage of geographical development of metropoles). They agglomerate and boost all kinds of economic and social phenomena in a given area. The most important feature of urban agglomeration is then not a simple clustering of similar administrative units, but "an emerging of urban spatial form, that is driven by concentrated industries and populations, a highly connected transportation network, an enhanced central city and favorable regional incentive policies, (…) able to participate in global socioeconomic activities and to possess, process, and allocate capital and information" (see: Fang and Yu, 2017). Such a definition of this phenomenon allows to capture the most important elements of future urban development, not only as a spacial form, but as an integrated, strategically managed, multi-level complex organism.

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[16]   Already, the major part of the global population, and in a growing proportion, lives in urban areas (55% in 2018). The share is predicted to rise to 60% by the year 2030. The largest 300 metropolitan economies accounted for 67% of the global GDP growth, and 36% of the global employment growth between years 2014 and 2016 (GMM, 2018).

[17]   This expansion takes place across all sizes of cities, and the number of megacities, already hosting 13% of global population, is predicted to increase from 33 to 41; mostly in Asia and Africa.

Changes in the dynamics of urbanization and agglomeration are determined by many factors, including: local demographics, differences between characteristics of rural and urban population, rural-to-urban resettlement and international migration. Albeit the shared opinion that higher urban concentration means economic development, there are several other aspects of currently observed urban expansion, which must be taken into consideration:

- Urban areas investing in education, culture, environment and innovation, play the key role in technological development and the fourth revolution, and have comparative advantage over others[18]. Because of **high concentration of stakeholders** involved in enhanced interactions, knowledge exchange and creativity, they are the real drivers of innovation. This attracts and allows creation of interpersonal networks, which strengthens the very process[19]. For example, 19% of the world's foreign born population (which is perceived as the most mobile and active) already lives in the so-called global cities, and these cities are leading the industrial revolution (for details see: MDP, 2019). It is also worth noticing, that the global performance city index[20] (GPCI, 2020) evaluates cities in 6 urban functions, using 70 indicators (in order to create the function-specific rankings and the total score). Despite of economic characteristics, these functions include: **livability** (working environment, cost of living, security and safety, well-being and ease of living), and **environmental issues** (sustainability, air quality, etc.), which disqualifies cities with these kind of problems.

- An important part of today's migration still takes place within national boundaries, and has a rural-to-urban, economic character. Due to this fact, megacities grow through an enlargement of slumps, with all negative consequences of congestion, pollution, inequality, political and social conflicts.
  Not only developing countries, but also developed economies, face increasing levels of **the economic migration**, due to refugee crises in different areas of the world. This is a remarkable process, which is already recognized by the international community (see: Duncan and Popp, 2017), and will be intensifying in the future, but its course will not be easily sustainable and difficult to predict.

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[18] After a national campaign to find the second headquarter of Amazon, which attracted more than 300 cities in the US, it was anyway finally founded in New York.

[19] Cities also offer wide options of affordable travel, what allows sharing and efficient international cooperation between them.

[20] London holds the first overall position in the ranking for eight consecutive years, occupying a top five position in twelve of sixteen Cultural Interaction indicators. The second best; New York maintains a top position in Economy and Research & Development by obtaining results with high scores in GDP, Stock Market Capitalization, and Startup Environment. The third; Tokyo is scored as the most balanced city of the ranking.

- The economic recovery from the last financial turmoil has an unequal urban distribution, unseen in the history of business cycles. This causes diminished opportunities for local populations, and causes further inequalities, lower job mobility, etc. The recent economic expansion in the US, pushing down unemployment data to the lowest-ever levels, has mainly concentrated in the largest metropolitan areas. As payrolls have been growing throughout the last decade, the national housing market followed surpassing by 13% its pre-recession level (50% increase from the 2012's bottom). But this expansion was disproportionately lower for smaller markets, where rates of job creation and housing prices underperformed the average (Manhertz, 2019). For example: the population of Seattle grew by 14.2% while Detroit's fell[21] by 4.1% in years 2012–2017. The economy of Seattle is recovering with a huge impact of technological advance, as it holds headquarters of Microsoft, Amazon and Providence (plus Boeing, JBLM and Walmart), while Detroit still suffers from troubled infrastructure and demographics of the fallen automotive industry. The hierarchy of economic performance of these cities is obvious.

  A growing number of cities around the world experience a decrease in population also due to low fertility rates and dramatic changes in their economic attractiveness or even political or environmental situation. This surely will be an important factor to follow in future, as predicted changes in the geography of production are meaningful.

  It is important to notice, that this **dynamics is cumulative and self-reinforcing**. Expanding cities spur demand for more and better services, education, entertainment, etc. This not only strengthens local finances, but attracts more people employed in high value-added industries, who look for better living conditions, in a powerful loop. It reminds the winner-takes-it-all economic reality, with no place for weaker competitors.

- The most noticeable technological change is happening in Asia, and particularly in China, which specifically has succeeded on liberalization of trade, the global economic growth and huge foreign investments of the twentieth century. This country already has R&D spending almost as same as the US (nearly 450 billion USD in 2017). For example: it plans to turn the famous Greater Bay Area[22] into a tech megalopolis of Silicon Valley's importance. To reach this goal and to close the talent gap to the US, Beijing has established three pivotal for the plan institutions

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21 Detroit is a good example of a critical crisis due to its automotive industry collapse.
22 The Chinese megalopolis, consisting of 9 cities and 2 special administrative zones (incl. Guangzhou, Shenzhen, Dongguan, Hong Kong and Macau) considered as the world's largest urban area, both in size and population (57 million), and one of China's richest economic regions.

there: a technical university offering students a specially drafted incubation system, a research institute of advanced technologies, and an innovation hub (offering workspace and mentoring for alumni, to commercialize their research ideas). Such a development causes the highest necessity for China to drain talents from other regions. Even if the current course of action in the communist-party-run society (hard to accept for elites born in democracies worldwide) is hurting the process, possible political loosening there, would impact the whole world.

- There exists an important observed trend of **growing subnational urban governance**. For example: urban areas are increasingly playing the crucial role in climate action[23], as goals of national politics may differ from objectives of cities, which are disproportionately subject to pollution, heat and waste, and have the essential interest to build sustainable local societies. Subnational and non-state entities (cities, regions, companies) already significantly contribute to a reduction of greenhouse gasses emissions (see: Kuramochi et al., 2019)[24].

  Furthermore, around sound environmental issues various citizen initiatives[25] build their recognition, creating local awareness and the need for action, and thus impacting the reality and giving more dynamics to the societal transition. These processes will further expand, also focusing on the most challenging problem of modern cities, which is available and affordable housing.

- Last but not least, new technology and **privately initiated innovations enter the field of urban planning and management**. Given historically low quality, and difficult accessibility to complex migration data before, this development offers exciting opportunities to understand and follow the urban footprint. The use of big data (e.g. analysis of cellphone signals) can put new light on human mobility and allow better urban planning.

Conclusions

Enhanced user experience has been changing the society irreversibly since google algorithms began to analyze and define trends of how people want to live, work and entertain. Because of its reflexive nature, it has led to emancipation of masses increasingly aware of their causative power.

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[23] California, sparring with Trump administration over transportation, energy and environmental issues is a good example.

[24] Local governments making commitments covered by the report represent higher population than that of the world's two largest countries.

[25] The polishsmogalert.org is a good example of an activist initiative, which gave ground to a social movement addressing problem of air pollution in Poland.

Considering the projected evolution of the society into the post-industrial direction, and thus reorientation of production markets, increased economic migration of people and businesses is imminent, and might meet deepening limitations and problems in the future.

Applying assumptions to these considerations that economic fundamentals do not explain most of short term variations of prices on the real estate market (see: Quigley, 2002) and that behavioral and reflexive features prevail their nature, and of the market bubbles in particular (for details see: Kasprzak, 2018), **this discerned transition might be affecting economic fundamentals and the real estate economic cycle**.

This intertwined cycle underlines the importance of the real estate sector in the fourth revolution discussion, and puts pressure on higher inclusion of the sociological implications into the real estate strategy.

These are the most important elements to consider for such a strategy:

I.   **A necessary redefinition of the real estate's tissue.** The forthcoming reinvention of real estate and reorganization of space is imminent, and will impact all kinds of property, in the direction of highly clustered urban centers, vertically connecting to agglomeration of co-working, co-living, health and entertainment spaces, etc. It means a continuity of space and flexible and fast handling of all other aspect of the real estate business. This requires flexible planning and inventive thinking and financing.

In corporate approach it will be far more challenging, than for the residential property. Companies should consider investing not only in business solutions, but also in bricks, because the economic world will be changing increasingly faster, and the prime-shelter space shall be more reluctant to rapidly changing and platform driven demand of their post-industrial customers.

II. **Real estate carries political values for emancipated crowds in the platform-driven economy.** The compelling forces of the fourth industrial revolution will essentially impact the future well-being of societies, and their susceptibility to manipulation. They are already causing an urgent call for delivery of **understandable and reliable ideas**, which would provide to unprivileged masses a sense of security in the times of change. The concept of **homeownership** could play an essential role here, as it already is evident, that it positively correlates with social and political participation, local community engagement and other aspects of the democratic society[26] (see: McCabe, 2013). Further research on awareness and the local social

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[26]   Homeowners most probably participate more in the political life, because they care about protecting value of their residence by electing particular politicians.

capital in the context of platformization, using urban living labs[27] could be a good starting point.

III. **The issue of urbanization and intercity migrations needs to be addressed**, as the 4.0 transition will tend to continue mainly in large cities. This requires national governments to support local and metropolitan communities, and to include their representation into policy making and strategic decisions. Economic and refugee migration cannot effectively be stopped, and it would be irresponsible to base strategic thinking contrariwise.

Implications of these observations rise important questions for policymakers of rapidly growing economies, whether to promote urbanization, or to stimulate growth outside of the main urban areas? Or, how to change already existing centers of population, avoiding observable mistakes of the unbalanced growth. This brief discussion of the subject postulates more responsible and strategic approach, especially on the central level, with urbanization as one of the real estate research priorities.

IV. **Medium size cities and local communities require more attention.** Even though they are shaded by their larger counterparts, attracting talents and capital, their citizens can essentially influence the ongoing processes[28] by turning to populism and opposing necessary changes.

The postulated distributed development should smooth the 4.0 transition by supporting a network of vibrant cities rather than one or few centers. A financial incentive for the whole economy seems clear. Proximity to vigorous cities supports development of rural areas, creates investments in transportation networks, enlarged housing supply, etc. Taking into consideration, that developed countries already have much less concentrated urban structure, and that a pace and other characteristics of urbanization differ in particular regions, one should assume that there is no clear relationship between high urban concentration and the national economic growth[29]. Further research is necessary.

V. **The real estate market must be the focus point of future socio-economic development plans.** Developed countries with a better urban infrastructure, and economies already under the 4.0 transition, will be strongly benefiting from further

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27 Urban living lab (ULL) is a modern concept of private-public initiative that involves stakeholders in research, innovation and development of urban areas meeting new challenges of information and communication technology.

28 The 2016 presidential elections in the US revealed a huge opinion gap between diverse metropolitan America and homogeneous small town middle states (likewise several recent elections in Poland).

29 Available information on mechanisms of urban concentration is limited, and differences in its impact on the economic growth between developed and developing countries can be noted (for details see: Frick and Rodríguez-Pose, 2018).

agglomeration, attracting global talents. While China and other Asian countries are leading this process, one should consider that, due to their centralized and opulent potential, the economic theory of this transformation might be biased with their experience and expectations. Considering forthcoming titanic shifts in the geopolitical order, redefining future global economic relations, there is an urgent need of reinforcement of country-based research. This should be immune to political indoctrination, and should allow setting up policies, which might foster and make the best use of the local economic potential of existing cities, and future urban agglomerations.

Facing social tensions, governments will play growingly important roles in the economic system. One should consider then, long term consequences of political decisions based on doubtful assumptions, tampering with one of the most important aspects of human life: a shelter that guarantees not only today's security but also the development of future generations. Governments are not only responsible for labor markets, but for urbanization and development of the adequate infrastructure for innovation, as well. Multi-stakeholder partnerships of governments, academia and employers are necessary to research and invest in all aspects of the new economy. In this context, major plans like the Polish Mieszkanie Plus must meet these postulates.

Finally, it is worth noticing that the fourth industrial revolution does not have national borders, and its appearance does not depend on political decisions. Due to unlimited, and relatively cheap ability to move talents within the democratic world, some urban areas will develop faster. This will create inefficiencies and competitive disadvantages between countries, or even regions within countries, depending on the characteristics of their economic, social and political systems. Masses frightened by the fourth revolution, but emancipated with their causative power and turning to populism, or governments acting irresponsibly to protect loosing economies, can be hazardous to Western values of individual rights, the right to individualism and privacy, social and economic freedom, and the very fundaments of the market economy.

This paper is calling for such a discussion, because the world will not be the same when the 4.0 revolution is over, as it is shaping not only the lives of generations to come but, due to the fast dynamics of changes, our own as well.

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I.2

Outlines of a Communitarian Housing and Urban Development Policy

Stefan Kofner[1]

Introduction

Communitarianism is a social and political philosophy that values the importance of communities for the functioning of political life and for the understanding of human identity. In contrast to liberal and libertarian philosophers and economists, who emphasize personal autonomy, individual rights and opportunities for individual development as well as the happiness of the individual, communitarians accentuate the common good more strongly and demand a kind of co-responsibility that is entirely in line with the famous Kennedy's quote:

> "And therefore, my fellow Americans, do not ask what your country can do for you; ask what you can do for your country"[2].

Communitarians therefore place at least as much emphasis on the social obligations of the individual as on his individual possibilities of development (Etzioni, 2013). Hence, communitarism is about more than the passive acceptance of the limitation of one's own freedom by the individual freedom rights of others. Communitarians demand active actions for the common good from individuals. In this sense one can speak of a "*binding freedom*", which must also be oriented towards the interests of others and towards the overriding common good. Neither the sentence "One's own

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good is everything, the other's good is nothing" applies exclusively, nor "The good of the other is all, my good is nothing". Rather, it is a question of balancing these two ethically equal principles (Wilk, 2011, p. 80 et seq.).

From the communitarian point of view, the life of the individual human being gets value and meaning primarily through integration into overarching and inherently earlier or historically predetermined communities. In this sense, communitarianism is a reaction to the excessive individualism (Bellah, 1985) which, according to the communitarians, alienates people from their roots and social references and leads them to become more and more selfish. They want to counteract this by reviving old and creating new forms of community in order to restore a "good society" in which the community forms a counterweight to individualism (Vorländer, 2001, p. 19).

The starting point of a communitarian philosophy was the critical examination of the individualistic approach to justice developed by John Rawls in 1971 in his "Theory of Justice" (Reese-Schäfer, 2001, pp. 15–24). Rawls had constructed a hypothetical "original position" in which society chooses principles of justice without the person knowing his individual position in a society. This idea of an unbound or free-floating self ("unencumbered self") is at the center of communitarian criticism. According to Sandel, "the liberal conception of the person is not self-sufficient, but parasitic on the notion of community it officially rejects" (Sandel, 1992).

Sandel (1998) and Taylor (1989) have argued that liberalism presupposes an idea of the individual as existing outside society, rather than acknowledging that individual identity is largely constituted by culture and social relations. In this sense, there are no generic individuals, but only Germans or Russians, Berliners or Muscovites or members of another particular community. According to Hegel in his Phenomenology of Spirit from 1807, no one can become truly a 'self' in isolation, but only in mutual and reciprocal association with others. Hegel's view can be summed up as follows: "The self exists only insofar as it is in relation to other selves, or a community of selves" (Slater, 2012). There is therefore no coherent possibility of formulating individual rights or interests independently of social contexts (Etzioni, 2013).

Communitarians share a view of community as a culturally cohesive totality (Delanty, 1998) bound by social virtues and basic settled values. They understand all kinds of human communities, from the family to sports, music, social, cultural, recreational or social clubs, self-help groups and voluntary fire brigades to citizens' initiatives and building communities, as potentially creating meaning and identity. This also includes space-related social networks and identity communities such as the house community in an apartment building, the neighborhood, the quarter, the village community, the home town or home village, the home region and the "home country" (Saxony, Bavaria, Westphalia, Germany etc.) and possibly even cross-

national communities like the European Union if they contain common purposes and values. Moreover, non-geographic communities such as professional or work-based communities may be considered as communities in the sense defined above.

These communities are regarded as constitutive for the exploitation of man's natural potential. According to Hegel the individual's self-realization cannot be achieved in isolation from the community. Self-realization of individuals in the community is the result of authentic interaction in dynamic relationship networks. The various forms of community are deemed to have a stabilizing role in a liberal-democratic society – the proverbial "social cement" (Bartlett and Burton, 2003, p. 110).

1. Market failure, merit and communitarian goods

In the following, an attempt will be made to formulate principles of a housing and urban development policy that promote lasting and fulfilling social ties among residents in the communitarian sense. Such a communitarian program would differ in certain essential aspects from alternative programs for housing and urban development policy resulting from competing political philosophies. As compared to a liberal-market, social-democratic or socialist policy formulation the communitarian concept raises awareness of certain additional deficits in the market-based self-control of housing and land markets that appear irrelevant or less relevant from the perspective of the competing political philosophies. And it recognizes these additional market failures as further reasons for political intervention.

1.1. Liberal market housing policy and classical market failure theory

A *liberal market housing policy* is characterized by an elementary confidence in the self-regulatory capacity of housing and land markets[3]. Housing and urban development policy interventions are perceived critically in most cases. In particular, interventions in the free price formation on the land, real estate and rental markets are considered unnecessary and counterproductive because they impair price functions, i.e., the equilibrating, signaling, selection, allocative and rationing function of free prices. Price controlling not only prevents the balancing of supply and demand, but also impairs the efficient allocation and use of scarce economic resources and in particular of land, real estate and investment capital. From a liberal market perspective, supply side subsidies also impair economic efficiency. Social housing promotion is therefore

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[3]   See for example Wissenschaftlicher Beirat beim Bundesminister für Wirtschaft (1982).

either rejected outright or to be limited to narrowly defined target groups. Transfers in cash in the form of housing benefits are given preference over object-related subsidies.

However, even liberal economists do not claim that the market economy left to its own devices can always guarantee an optimal market result. *Market failures* like externalities, public goods, restrictions of competition, or asymmetric information may occur, and thus government intervention appears necessary to correct the market imperfections and restore the optimal conditions of economic efficiency. To be sure, the housing and land markets are far removed from the conditions of a "perfect market". However, housing and land are not public goods (the criteria of non-excludability and non-rivalry in consumption are not met). They are private goods with varying degrees of *externalities* in time and space (Kofner, 2010).

External effects ("spillovers") are the consequence of the economic activities of an economic entity for the production or consumption possibilities of other economic entities – insofar as they are not taken into account by the originator when drawing up his business or consumption plans and are not assessed and communicated via markets (Just et al., 1982; Rossi-Hansberg and Sarte, 2012, p. 47). Negative externalities ("external diseconomies"), which burden other economic subjects, occur particularly in the environmental sector. Basic research is regarded as an example of a production with positive externalities ("external economies"). External effects are a case of market failure which, in principle, can provide a justification for government intervention with the aim of internalizing them. In the case of negative external effects, more is produced by the polluter than can be socially desirable. The opposite is true for external benefits. From a societal point of view, this leads to underproduction. External effects also occur in various forms on the housing and land markets:

- Neighborhood externalities, e.g. external diseconomies from structural designs that do not blend into the environment, external economies from maintenance and modernization investments (Rossi-Hansberg and Sarte, 2012; Eekhoff, 1987, pp. 30–42), or from fire protection investment.
- Land use externalities: positive or negative externalities due to compatibility or incompatibility of land uses, e.g. between housing and commercial facilities (Yang et al., 2016, pp. 431–432): positive impact of easy access to commercial services on residential environments and property values by promoting convenience and reducing travel costs ('proximity effects') versus negative effects, such as noise, litter, and congestion ('disamenity effects').
- Macroeconomic externalities, e.g. economic productivity losses due to social segregation.
- Environmental externalities: impairment of natural soil functions, e.g. as a water reservoir or as a water purifier via land designation as a settlement or traffic area,

contribution to global warming due to greenhouse gas emissions resulting from the construction or operation of buildings.

However, liberal economists tend to regard market failures caused by external effects on the housing and land markets as selective and not too serious.

Apart from external effects, *restrictions of competition* may also affect the allocation of resources. A high local market share of an individual housing company or contract-specific investments by tenants (removal costs, tenant fixtures (Matauschek, 2010, p. 59), social and psychological adaptation to the surrounding built and social living environment) open up monopolistic leeway for the landlord in terms of price and product policy.

However, the extent of this leeway depends on the scarcity situation on the respective regional housing market. In an excess supply situation competition forces the landlord to keep and attract renters by low rents and attractive offers. On the other hand, if there is an excess of demand over supply, there are little competitive pressures on landlords to improve conditions or contain rents, because there will always be another renter who needs a home.

Another form of market failure is *asymmetric information* in favor of one market side. Such an information gap exists, for example, between a tenant and the landlord of a vacant apartment with regard to solvency and willingness to pay or between the seller and the buyer of a listed villa with a considerable maintenance backlog (Ambrose and Diop, 2018). Sellers will typically have more accurate information about the condition of the property itself. For example, they may be aware of possible deficiencies in the structure. Moreover, they are likely to possess superior information about current local market conditions relating to the economic, social, environmental and regulatory dynamics that may affect property values in the neighborhood (Garmaise and Moskowitz, 2004, p. 409).

Having dealt with classical market failure theory, there are, however, other deficits in the free housing and land markets that can provide additional justification for government intervention in these markets. Alongside stability deficits, the basic need and merit good character of housing have to be addressed.

1.2. Stability deficits

Stability deficits can result from frictions in pricing on real estate and rental markets. In the short to medium term, the supply and demand curves on housing markets are determined by pronounced rigidity, so that unforeseen market events such as unexpected immigration into a region initially lead to hefty price and low volume reactions. The supply of housing reacts only with great delays to these price changes. It is more elastic only in the long run. The reason for this is the 'development time lag':

Investors and private home builders need considerable amounts of time for planning, building permit proceedings, construction and marketing of their projects[4]. Thus, the effect of their investment decisions on the market in the form of new housing units will only materialize with a considerable time lag.

Economists use the so-called 'cobweb model' (Kaldor, 1934) to explain the dynamic consequences of supply-side adaption delays. After an initial shock event there is a risk of so-called "pig cycles" in the housing markets: "For housing it's the cycle that is persistent. Once the cycle starts, it keeps on going. Like a pebble thrown into a smooth pond of water" (Leamer, 2007, p. 3).

And furthermore housing construction plays an important role as a cyclical amplifier in Kuznets' approach to business cycle theory. The Kuznets cycles are long-term (15–25 year) transport and building cycles (Jadevicius and Sloan, 2010, p. 3). They are caused by demographical factors which shape investment expenditure on housing and other fixed structures.

Debt and speculation can also play a major role in the business cycle. Debt can feed speculation when lenders are willing to lend more on rising asset prices. This role has been investigated by Irving Fisher (1933), Hyman Minsky (1986), and others. More recently, Cantor and Wenninger (1993) analyzed how the credit cycle leads to a "credit crunch", and how finance and economic activities interact. We thus need to take into account the possibility of credit-driven housing cycles triggered by fluctuating access to mortgage credit and interest rate cycles.

1.3. Housing as an essential public service

A serious argument for state intervention arises from the existential character of housing: housing is a service with basic needs characteristics. Services of public interest include ensuring general and non-discriminatory access to existential goods and services, including their provision according to the needs of citizens and on the basis of defined qualitative and quantitative standards[5]. There is no doubt about the existential character of housing, because the exclusion from this service clearly is a threat to existence. Also, safe, affordable, nontransient housing is a key for the access to meeting other basic needs (Mulroy and Ewalt, 1996). The State's responsibility for services of public interest generally comprises two aspects: the responsibility for the provision of the service and the responsibility to maintain or implement the necessary infrastructures for the service provision.

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[4]   The reaction time can get even longer if government regulation causes development bottlenecks, e.g. a scarcity of housing land.
[5]   Definition of Gabler Wirtschaftslexikon (2019).

The tasks are to be performed by one or more levels of government to be defined by law. This does not mean, however, that the state must also provide the service itself (guarantee responsibility). It may also entrust the provision of the public services to private enterprises.

With regard to the need for housing, the state in principle has a guarantee responsibility towards all citizens, but the majority of them can easily obtain adequate housing on the free housing market. It is therefore only a question here – measured against a need norm to be defined socially (quantitatively and qualitatively) – of households with no dwelling at all or households that are undersupplied as a result of:

▪ an income not allowing the independent fulfilment of appropriate housing conditions,

▪ access problems due to discrimination (Makinde, 2014, p. 67),

▪ a tight regional housing market with high rents and property prices,

▪ or a combination of these factors.

The starting point for the intervention justification are those households whose existence is threatened because they are not able to gain access to the housing market without support. Their provision with housing as a public service must be based on a defined need norm specifying the standard at which the housing needs of all people are to be guaranteed. It is essential to establish such a minimum standard of accommodation so that no one is favored and state resources can be used in a planned manner, but above all because it gives concrete expression to the social idea of a human existence. The definition of such a standard is a subjective concept and one which is likely to vary through time and place (Barnett and Lowe, 1990, p. 185).

Housing need is a multidimensional concept and its measurement is likely to involve a wide range of indicators to be chosen either by social decision makers or according to revealed consumer preferences such as absence of overcrowding, equipment with basic amenities, or privacy and independence (Barnett and Lowe, 1990, pp. 187–188).

Furthermore, since housing and its location are jointly supplied the question must be answered as to whether the definition of qualitative undersupply shall include aspects of the neighborhood, for example, the right to housing without segregation[6] or other minimum requirements relating to the residential location and its surroundings, e.g. no concentration of substandard housing, or sufficient play facilities. The location and environment of the home can make access to desirable goods and services, jobs, education, health, care (Barnett and Lowe, 1990, p. 188), sought-after positions, social contacts and fulfilling relationship networks considerably easier or more difficult. In

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[6] A one-sided social mix in a neighborhood with an accumulation of disadvantaged people, objectively impairs the life chances of its inhabitants through its exclusionary effect ("ghetto without walls", Hess and Mechler, 1973).

this respect, it is also a question of "equivalent living conditions" in space. Theoretically, one can even take the view that housing conditions should be the same for everyone. The socialist societies followed this principle, according to which the norm of need should at the same time be a norm of maximum need.

The obligations for the State arising from the basic need and public service nature of housing are complex:

- The government must take preventive measures to ensure a sufficient supply of housing nationwide and regionally via appropriate housing promotion, so that market tensions either do not arise in the first place or are at least alleviated as far as possible.
- It must ensure that adequate housing (or access to it) is affordable even for lower-income households as well as for households with no market income at all.
- It must provide adequate housing for households which are unable to do so on their own because of discrimination or market tension (UNHABITAT, 2009, pp. 29–34).

1.4. Housing as a merit good

Housing can also be regarded as *merit good* (Oxley and Smith, 1996, p. 11). Merit goods are actually private goods, but for certain reasons the result of their market-based provision is not readily accepted. There is too little demand for these goods (e.g. vaccinations, cultural goods) because consumers do not recognize the "true benefits" of merit goods. One could argue that households underestimate the role of homeownership in sustainable wealth accumulation (with the consequence of widespread wealth poverty due to a too low rate of homeownership) or that they misjudge the importance of housing location and housing conditions in general for their life chances and those of their children. However, the argumentation for a merit good character of housing is generally not accepted by market liberals, because it is not compatible with the research guiding idea of methodological individualism, according to which the basic components of the social world are individuals, so that social processes and institutions must always be explained with reference to theoretical statements about individual behavior or action.

1.5. Housing market deficits: synopsis

In principle, the following characteristics / deficits of the housing and land market can therefore be considered as reasons for state intervention in the market:

- External effects on the housing and land markets (neighborhood, land use, macroeconomic and environmental externalities),

- Restrictions on competition,
- Asymmetric information distribution,
- Stability deficits,
- The basic need and public service character of housing,
- The merit good character of housing.

These special traits of the housing and land markets provide ample arguments for special framework conditions in these markets (e.g. protection against dismissal, rent control, supply and demand side subsidies, restrictions of building code, social milieu protection statutes) in order to correct the socially undesirable results of a free market housing environment.

The difference between liberal, social democratic and socialist housing policy approaches lies in the evaluation and weighting of the various deficits of housing markets. The definition of a minimum need standard offers the greatest scope for deviating views for all. In essence, the definition of the need norm for adequate housing is concerned with the question of how much inequality in terms of housing conditions can still be regarded as acceptable in a society.

1.6. Communitarian goods and housing policy

What is the difference between a *communitarian housing and urban development policy* and liberal, social democratic and socialist policy concepts? A communitarian policy concept in this field would emphasize stable and resilient local social networks and local human communities as well as strong spatial collective identities. From an individual perspective a communitarian housing and urban development policy is fostering social wellbeing – "the degree to which we feel a sense of belonging, or how connected we feel to others and to our community" (Happy Homes Report, 2017, p. 1) and thus positive social connectedness. The Happy Homes Report summarizes the research and industry practice that links on-site design, tenure, resident involvement, and identity with social wellbeing in multi-family housing in 10 main principles:

1. **Doing things together**: Residents who have opportunities to do meaningful or enjoyable things together are more likely to develop a sense of trust and connection (common spaces, recreational and social opportunities that foster healthy interactions).

2. **Exposure**: People who live in spaces that give them a greater sense of control over their exposure to others are more likely to build positive social connections (clearly delineated private, semi-private and public spaces, housing design promoting feelings of privacy).

3. **Tenure**: The longer people can stay in their community, the greater the bonds of trust and local social connection (design and mix of dwellings meeting residents' current and anticipated needs over time, security of tenure).

4. **Social group size**: Social group size has a direct influence on the quality and intensity of trusting relationships that people develop (gathering of homes into clusters and sub-clusters that foster social relationships at various levels of intensity, from intimate to casual, regular, close contact with no more than several dozen people in semi-private spaces).

5. **Feeling of safety**. People are more likely to build trusting and meaningful relationships in environments that feel safe (accessible places and spaces that give a feeling of security, that help people intuitively way-find and interact with their environment, collective approaches that allow neighbors to protect and take care of the community together).

6. **Participation**: Residents who are involved in project design and site management are more likely to develop a sense of belonging and contribute to their community (adequate places for meetings, gatherings and co-creation, meaningful engagement activities for every resident during all design stages and in the ongoing preservation and maintenance of the area).

7. **Walkability**: Mixed-use neighborhoods with accessible spaces and connections that encourage walking, biking and positive social encounters and a strong sense of community, shops and services within easy walking distance on a safe, comfortable route.

8. **Nature**: Access to nature is strongly linked to positive neighborhood relationships and trust among community members (interior and exterior spaces offering residents sensual experiences with nature, joint improvement and care of green spaces).

9. **Comfort**: People are more likely to engage with others in environments that feel pleasant and comfortable (allow common spaces for everyone).

10. **Culture and values**: People feel a stronger sense of belonging and attachment to places that reflect their culture, values and sense of self (differentiation of housing units and creation of a unique visual identity for each, opportunities and spaces for creativity, cultural and community expression, places that help people experience culture and history).

Since free housing and land markets do not necessarily promote good conditions for social wellbeing, we have to add further specific communitarian deficits to the already long list of deficit characteristics of the housing and land markets. The complexity and degree of conflicts of objectives of housing policy are thus tending to increase.

To be sure, the architectural requirements included in the 10 principles (common spaces for meetings, gatherings, recreational and social opportunities, environments that feel pleasant and comfortable) require additional space in the buildings and their environment and cause additional costs. The question is whether there is any demand at all among tenants and owner-occupiers for the corresponding features. Doesn't our housing system have a primary focus on the individual satisfaction of housing needs? It is presumably a question of new paradigms in architecture and urban development and pioneering projects in promoting social and spiritual wellbeing.

From the communitarian point of view, the emergence, intensification and expansion of spatially bound communities should be promoted. From this perspective, one of the biggest deficits of the free housing market is that it does not adequately protect longstanding milieus and neighborhoods from excessive pressure of displacement (principle No. 3). Economic constraints and territorial inequality result in excessive demands for the spatial mobility of people, and also have a negative impact on spatially bound social networks and communities.

The protection of longstanding social networks can be done, for example, via tenancy law regulations, limits to the split of multi-family buildings into condominiums and social milieu protection statutes. The idea is to limit incentives for mobility and reward sedentariness. The (utopian) goal is actually that no one should be forced to change his place of residence for purely economic reasons.

We can call the corresponding jointly produced and non-tradable goods such as longstanding supportive, participative, comfortable and accessible neighborhoods or the fulfilling community experience from living together in in a jointly planned housing project *communitarian goods*. They foster individual wellbeing, but also create a 'sense of community' in the sense of a common spiritual good with spillover effects for society.

This requires not only security of tenure, but also architectural and urban design solutions that meet communitarian ideas. A "new urbanism" (Fulton, 1996) is necessary in order to improve the conditions for the emergence of fulfilling social networks, spatial communities and collective identities. Urban development policy should thus facilitate personal encounters and communication and it should prefer incremental organic changes since social wellbeing is not least about stability and reliability of the built and social living environment.

However, current urban development policy too often thinks in terms of large dimensions, large-scale projects (Huning and Peters, 2003; Simons, 2003) and separate functions and tends to neglect the negative effects of excessive urban mobility (Bertolini, 2012). This kind of urban planning mentality threatens grown neighborhoods and urban identity anchors.

2. Place of residence and social living environment

The experienced housing conditions influence the values and attitudes of people and vice versa. This also applies to the appreciation of social bonds and the preferences for different forms of community. Anyone who grew up in an old-style kibbutz or a grassroots democratic rural commune is certainly very differently shaped by this experience than a person who spent his youth in a homestead in the suburbs or a social rental apartment in a large housing estate at the outskirts of the city. Dependent on their own individual housing experience they all have developed their own independent perspective on the connection between housing and community.

The individual place of residence of a person is usually the spatial center of his *social network*, i.e., where he enters into interactive relationships with other people who have their place of residence or business close to his place of residence. These relationships realize in the form of communication and non-pecuniary mutual service relationships. We can call such residentially bound social networks a *social living environment* (in contrast to the built environment). A distinction must be made between space-bound social networks and space-open networks such as Facebook.

Figure 1. Concentric ring array of the social living environment
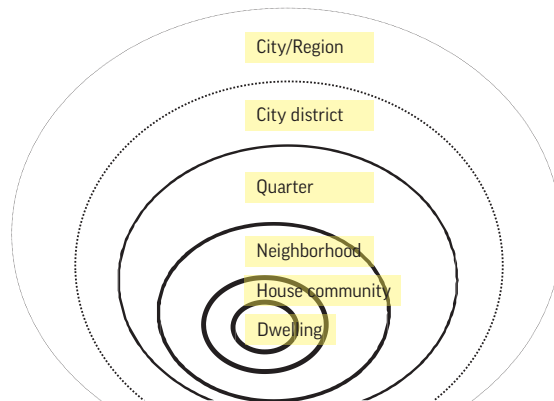
Source: following Weichhart (1999, p. 2).

The social living environment is concentrically divided into house communities, neighborhoods, quarters, districts and cities/regions[7]. The city can be understood as an

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[7]   The following explanations of the various levels of the social living environment refer in part to Kompetenznetzwerk-Wohnen.

organism consisting of interdependent neighborhoods, quarters and districts, with the neighborhood being regarded as the fundamental urban unit.

For the members of a *house community* in an apartment building, the atmosphere between the parties and the willingness to help, the informal help and small mutual services can form an important basis for their quality of life.

The term "*neighborhood*" refers to the entanglement of social networks and local identities of the resident population in a delimitable area (Schwirian, 1983, p. 84; Crow and Allan, 1994, p. 178 f.). This area encompasses more than just the directly adjacent properties but less than the quarter, which always consists of several streets.

In contrast to the "district" or "urban district", the term "*quarter*" *does* not designate an administrative unit, but a "manageable residential environment" (Kremer-Preiß and Stolarz, 2005). Also, a certain familiarity of all inhabitants among each other and an emotional connection to the quarter resonate with this term. The size of a quarter can vary considerably. The quarter is an important reference point for community work and social planning. For older people, the quarter should offer all the essential facilities and services of normal everyday life.

The housing market-related definition of *districts or urban districts* is based on a certain homogeneity of real estate values and building structures. These are therefore geographic submarkets of the city's residential real estate market (Falke, 1987, p. 180). In large cities, districts are often at least decentralized administrative units with limited planning and social administration competences of their own. Depending on the size of the city, urban districts can comprise several thousand or several tens of thousands of inhabitants, in megacities even several hundred thousand. Due to their size, they lack the dimension of closeness and familiarity. At this level, people's spatial ties are thus rather of an identitary nature: "Urban district identity develops through the recognition of a residential area as a public space in which fundamental interests and problems can be articulated" (Falke, 1987, p. 181). These problems at the district level are mostly the result of fundamental processes in the housing markets such as decline and revitalization.

Descriptive categories of the social living environment may include the size and density of the network, its objectives or functions and the quality of the relationships. According to Granovetter (1973), the quality of social relationships ranges from "weak ties" to "strong ties". He cites the amount of time spent together, the degree of mutual trust and the amount of services exchanged, as quality assessment indicators.

Another way to describe the intensity, quality and stability of social networks is to use the term "*social capital*". Social capital can be defined as a bundle of actual or potential resources arising from attachment to a permanent social network based on social virtues and consisting of more or less institutionalized relationships based on

mutual acquaintance, recognition, credibility and trust between individuals and groups and benefiting all group members through direct interaction in the form of knowledge or help (Bourdieu, 1986; Coleman, 1988; Schneider, 2004; Bloze and Skak, 2015).

Thus, a space-bound "*community*" is a local social network with a large stock of social capital. But the concept of community means something more. In sociology and ethnology, the term "community" refers to a manageable social group that is clearly separated from other groups (e.g. a family, a local community, a clan or a clique) and whose members are connected by a more or less pronounced homogeneity, social virtues and a "sense of community"[8] (McMillan, 1996) over longer periods of time. Also, the concept of community "involves the recognition of the value of the person as a social being" (Delanty, 1998). Mostly, communities have common goals and share common cultural values.

Communities are therefore particularly dense, cohesive and long-lasting social networks among a distinct, relatively homogenous and manageable group of people with strong ties and a sense of community based on familiarity and common values, and a lot of accumulated social capital.

Communities do not necessarily have to be spatial, but spatial proximity promotes interaction and strengthens the bonds of group members with one another. Communitarians are concerned with strengthening and promoting communities.

The quality and stability of a social living environment and thus the individual experience of community and collective identity depend on the various factors embodied in the 10 main principles cited in section 1.6 (inter alia tenure, architectural and urban design, feeling of safety and comfort), but also on the local mix of residents, on the mentality of the neighborhood's residents as well as on locally relevant narratives and historical path dependencies. Also important are the opportunities for social engagement. This refers to the availability of associations, initiatives and groups which, in connection with their specific purposes, also offer community experiences or whose main purpose is even the community experience, in the vicinity of the home.

Under favorable conditions with regard to these factors, spatial communities as defined above will probably emerge as part of the social living environment. Over the course of time, these overlapping communities can create a strong neighborhood or quarter identity shared by the majority of residents. Beyond the neighborhood and quarter level, relationships with other people are increasingly anonymous. Identity ties in the form of district identities or urban identities, regional or national identities take the place of personal communities there.

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[8]   The sense of community can be defined as solidarity among the group members in the sense of a feeling of togetherness, a feeling of collectivity and mutual attachments (Delanty, 1998).

3. Community and urban development

Urban development policy influences the intensity, quality and stability of social ties in neighborhoods, quarters and beyond, by shaping communication, neighborhood and community experiences of people. The urban planning paradigm that particularly emphasizes these aspects is called "New Urbanism" (Katz, 1993; New Urbanism: *Principles of Urbanism*).

The basic aim of this neo-traditionalist urban development movement is to influence the coexistence of city dwellers by supporting the development of sustainable and livable neighborhoods as best as possible. This goal is to be achieved by reactivating or preserving the urban (i.e., densely built-up) form of the city with the advantages of mixed-use development, short distances and intensive neighborhood experience. The conservative model of the movement consists in the historically grown urban structures of old towns, in the U.S. also the traditional American small town. The counterpart to this vision are the typical suburbs in the U.S. which are characterized by homeownership, single-family housing and car commuting rates far above metro average. On top of that, there is the one-sided predominance of residential use and a corresponding lack of work and supply infrastructure.

Neither does New Urbanism have anything in common with the ideas of the Athens Charter. In contrast to the Athens Charter, the essential design principles of New Urbanism are functional mix and block edge construction with its semi-public interior areas. Large, "inanimate" free spaces between the buildings, as known from the large housing estates of social housing construction, are to be avoided.

Communitarianism demands from urban planning that it does not tear apart longstanding social networks and collective identity constructions by designing large-scale projects. Even the construction of a separating traffic axis can potentially destroy social networks and promote social segregation. The urban planning nightmare of a communitarian are the "area redevelopments" in historically grown city districts such as those carried out in West Germany in the 1960 s or in modern China. The communitarian focus on the traditional lines of development requires a decentralized, incremental and identity-preserving development of the city "from below" in the sense of an evolutionary urban development based on many small construction projects (Marshall, 2008). Buildings that represent urban identity anchors must be particularly protected and preserved or, if necessary, rebuilt.

The mixture of uses requires an urban diversity, i.e., variety instead of monotony in the sense of dogmatically executed design principles. So we need not just density but also a mix of land uses within neighborhoods. This is often known as 'density

plus diversity' and includes the small-scale mixing of trade, crafts and art with a wide range of housing alternatives according to location, quality and price. The aim is to create places that enrich life and inspire the spirit[9]. Some medium-sized Dutch cities like Groningen, Maastricht or Delft may be regarded as embodiment of this urban design dogma.

New Urbanism is also about opportunities for encounters in urban space (city as "meeting space"). Very important in this context are common spaces and places for meetings, gatherings, recreational and social opportunities such as pubs, cafés, bookshops, restaurants, bakeries, snack bars, cultural institutions, sports facilities or public places that invite people to linger. An increase in the frequency, duration and quality of stays in the neighborhood outside one's own dwelling can be achieved via decentralization and functional mixing within a city of short distances, environments that feel pleasant and comfortable and via the pedestrian-friendly design of streets and squares. The city becomes walkable and city dwellers can reach most daily needed urban functions like workplaces, schools, doctors and daily desired utilities, leisure and recreation facilities in the vicinity of their place of residence by slow and active means of transport including walking, bicycling and public transport. The concept of "walkability" is currently correspondingly high on the agenda in urban planning.

By slowing down, the city becomes authentic again for its inhabitants and is not any longer experienced predominantly as transit space. The "alienation" between the modern city and its inhabitants can thus be diminished.

In relation to architecture, New Urbanism demands an orientation towards regional building traditions and materials (Bodenschatz, 2000). In addition, emphasis is placed on interaction-promoting design elements such as front porches and well-defined streets, which are defined by the position of the buildings.

In Poland, the Warsaw district of Miasteczko Wilanów is considered an example of the implementation of New Urbanism ideas.

4. Community and housing tenure

The intensity, quality and stability of social ties in neighborhoods as well as in society as a whole is influenced not least by the mix of tenures, as the various tenures differ considerably in their community orientation. For example, the construction form of a homestead per se has little community orientation. Cohousing, on the other hand, is characterized by generously proportioned common areas and common facilities,

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9   "Create places that enrich, uplift, and inspire the human spirit" (New Urbanism: *Principles of Urbanism*).

as well as by active resident participation and joint project planning with the aim of achieving a particularly lasting and intensive community experience.

Which criteria are decisive for a comparison of the various housing tenures from a communitarian perspective? The community orientation of the different tenures is certainly at the top of the list. It is not only a question of their institutionally unifying effect (opportunities and incentives for participation), but also of their respective suitability for the application of community-friendly design principles in architecture and urban development. The second, equally important criterion for the comparison is the ontological security that is associated with the different tenures.

A dominant assumption in the literature is that ontological security is inherently linked to homeownership, whereas private renting is characterized by persistent precarity (Saunders, 1990). An important aspect of housing precarity is insecurity. Housing insecurity is defined as residents' limited capacity to determine how long they may remain in their home. Their security position thus depends on protection against landlord-induced 'forced moves'. There may be a difference between de jure insecurity and de facto insecurity, however. Tenants may feel secure despite a low level of legal protection if they have a benevolent landlord and ample resources or vice versa[10].

From a communitarian perspective not only the actual duration of residence counts, but also the sense of security. *Ontological security* includes permanency, stability and continuity, as well as the ability to make changes contributing to a sense of control and creating a 'comfortable' home environment. A high level of de jure security is presumably a prerequisite for ontological security (Morris et al., 2017, p. 656; Hulse and Milligan, 2014, p. 640).

Security is thus a subjective concept. It depends not only upon regulation, but also upon individual economic and social capital and also on the scarcity situation at the regional housing market.

4.1. Private renting

From a communitarian point of view, tenants must be protected from the effects of local displacement processes if this exerts considerable pressure on them to leave their place of living. First and foremost, their spatial and economic position is endangered by economically motivated dismissals and rising rents due to high immigration of higher-

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[10]   A survey of Australian long term renters (Morris et al., 2017) has shown the renters who found the de jure insecurity of private renting most challenging and stressful were single parents in low-rent areas dependent on government benefits. Their paucity of economic and social capital meant that finding viable affordable alternative accommodation if required to vacate, was extremely difficult.

income groups (gentrification, Lees et al., 2013) as well as due to costly modernizations (Voigtländer, 2018) or splits into condominiums (Handschuh and Cohen, 1974).

However, a corresponding tenancy policy is not possible without considerable social costs. It goes hand in hand with a split in the housing market between insiders and outsiders and other negative side effects such as incomplete market clearance, high search and information costs and insufficient choice for housing seekers, poor matching between housing needs and consumption, wasteful use of the housing stock, impairment of incentives to maintain, renew and expand the housing stock and misallocation of scarce investment capital. There are such clear conflicts of objectives with other housing policy objectives that policy alternatives should be considered.

The current tenancy laws in Germany offer comparatively good – if not perfect – protection against displacement[11]. The tenants are quite well protected from arbitrary, motiveless dismissals, conversion of their apartment into a condominium, as well as from surprising rent increases. Where necessary, the federal government's socially oriented housing codification can be supplemented locally by social milieu protection statutes with more far-reaching intervention options. The enactment of such a statute can contribute to maintaining the existing composition of the resident population and to preventing the expulsion of long-established parts of the local population from their ancestral quarters. In the areas designated by the municipality, the dismantling, alteration or change of use of buildings requires a permit. The split of buildings into condominiums can also be subject to approval.

Despite these possibilities for intervention private renting is not an ideal tenure from a communitarian perspective, because it lacks the binding power and resilience associated with owning a home. In addition, it is very costly to create a legal framework that effectively protects tenants from crowding out tendencies and at the same time keep the undesirable side effects of the regulation at a minimum. Furthermore, the participation and involvement of tenants are difficult to organize and it will hardly be possible to activate all tenants. As a rule only social landlords like housing associations engage in such activities.

From the perspective of urban development policy the tenure of private renting has the advantage that it permits a sufficiently high level of building density, especially in the form of apartment buildings. This is a prerequisite for urban quarters characterized by dense and heterogeneous development in the sense of New Urbanism. The desired heterogeneity is certainly encouraged by fragmented ownership structures as a result of the dominance of small private landlords in a quarter.

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[11]   For details about the legal hurdles against gentrification of neighborhoods in Germany see Kofner (2009).

On the other hand larger residential development complexes provide the opportunity to include common spaces, recreational and social opportunities in built environments that feel pleasant and comfortable. But here, too, the question arises as to whether there is a corresponding demand and willingness to pay on the part of tenants. It seems unlikely that private investors would be willing to make the additional investments in multi-family buildings and their built environment, since they consider that additional public or common areas would reduce the profitability of their project.

4.2. Classic homestead

From a communitarian point of view, living in one's own home is a double-edged sword. On the one hand, a homestead is associated with a high degree of *spatial cohesion and economic resilience*. In almost every study that has included tenure as an explanatory factor of residential mobility, homeowners were found to be much less likely to move than renters (Rossi, 1955; Speare et al., 1975; Clark and Dieleman, 1996; Leuvensteijn and Koning, 2000; Dieleman, 2001).

In terms of economic resilience and economic resources, homeowners are much better positioned than tenants. In the Euro area, the median net wealth of all households is EUR 104,100. However, there are significant differences between homeowners and tenants: the median of net assets of the group of mortgage-free owner-occupier households amounts to EUR 226,700 (encumbered residential property EUR 144,300), but the group of tenants has only a median of net wealth of EUR 8,900 (ECB, 2016, p. 118). The figures are similar in Germany. In the U.S., according to the Federal Reserve Survey of Consumer Finances, the net assets of homeowners in 2013 were \$195,400, while those of tenants were only \$5,400.

Property ownership is the cornerstone of private wealth everywhere in the Euro zone and also in Germany. There is also a very striking correlation between the level of homeownership and the evenness of the wealth distribution. Obviously, a large proportion of tenants do not have sufficient economic resources that could provide them a sense of security despite the legal uncertainty of their current tenure.

The comparatively high degree of spatial cohesion and economic resilience of homeownership is all the more true in a regulative environment where rental housing is only associated with limited tenant protection. Living in one's own house then offers a long-term perspective that cannot even remotely be achieved with a rented apartment. And the prospect of a long time of residence at the current location without the risk of being displaced is seen as a prerequisite for people investing considerable time in building social networks in their residential environment. This

argument, however, depends on the lower fluctuation rate of homeowners, which varies considerably by international and interregional comparisons and over time (Mulder and van Ham, 2004). Differences in the transaction costs, access to mortgage credit, the homeownership rate, and the individual equity position as a consequence of the housing cycle, among other things, are presumably responsible for this (Caldera Sánchez and Andrews, 2011).

On the other hand, one reason for deciding to live in a detached single-family home is, in many cases, the increased need for privacy, for spatial and social separation, which reduces the possibility of spontaneous encounters and frees one from the obligation to show too much consideration for neighbors in the personal lifestyle. *Thus, the "ideal" tenure would have to combine long-term ontological security with architectural and urban planning designs that promote community building.*

As a construction form, the classic homestead has only a limited community orientation. The isolation of the inhabitants / families associated with a homestead can be alleviated to a certain extent by community-promoting architectural elements (e.g. terraced houses in block edge buildings) and a built environment with places for meetings and communication. However, in this respect condominium ownership is a more suitable tenure, since it also takes into account the quality of the built environment in common ownership.

Apart from these design aspects it is often argued that homeownership per se promotes the development of social capital. Bloze and Skak (2015) have constructed two indices on the basis of data from a Danish survey on living conditions conducted in 2000 (sample size 7,602 persons, response rate 66 percent): a "total social capital index" and an "index of local social capital". The total index includes the following 11 indicators:

Going to meetings in your spare time   Participation in public hearings
Do charity work in one's spare time   Participation in demonstrations
Political party membership   Participation in non-partisan political meetings
Membership in a youth organization   Contact with politicians
Membership in a cultural association   Contact with the media
Policy support

The index of local social capital, on the other hand, is based on the variables, such as neighbor as a friend, borrowing items from a neighbor, member of a school board, member of the parents' council, member of a kindergarten and participation in local elections.

Homeownership was not statistically significant for the total social capital index. In contrast, the influence of this tenure on the local social capital index was clearly

positive. The authors argue that owners invest more in social capital that complements the value of their assets and less in other types of social capital.

Ditkovsky and van Vliet have thereupon examined government initiated mixed developments in Israel where renters and owners have contractually identical privileges and duties. The analysis indicated clearly that owners were more strongly represented both in building and neighborhood committees. The authors concluded that "it is probable that homeownership in and of itself is a factor which independently contributes to a greater concern with and involvement in the residential environment" (Ditkovsky and van Vliet, 1984, p. 347).

A methodological problem with these and other studies is that the distinction between only two tenures is rough and does not take into account the type of construction and the built environment.

4.3. Condominium ownership

Condominiums essentially involve individual ownership of a specified unit in a housing project and common ownership of certain ancillary spaces, facilities and services. Each condominium owner holds a legal title to a specific housing unit including a proportionate share of the common area. The control and management by the Home Owners Association is primarily confined to the common areas (Mittelbach and Ebin, 1975, p. 170).

A condominium project can comprise a project of attached single family homes on their own lots clustered together and surrounded by commonly owned open spaces, walkways and other facilities. Alternatively, many condominium projects are in multi-storied structures akin to apartment houses with individual ownership of the separated apartments and common areas including primarily hallways, lobbies, garage space, etc. (Mittelbach and Ebin, 1975, p. 171).

Condominium ownership is a tenure that forces individual condominium owners to cooperate and also provides a legal framework for this. This inevitably leads to a network of formalized relations that also include a democratic element. The functions performed by the Home Owners Associations in condominiums are not unique but are analogous to other community and neighborhood organizations. In principle, they are a form of local micro-governance of commonly owned areas in private housing developments (Mittelbach and Ebin, 1975, p. 171). Under ideal conditions ownership and management of common areas in condominium housing can be an opportunity for self-government on a small scale. It also offers a possibility of developing fulfilling relationships among the participants and potential social benefits (Mittelbach and Ebin, 1975, p. 179). Some of the potential social benefits of condominiums would be

derived from the working methods which are more likely "personal, contractual and based on democratic organizational forms which stimulate trust and the development of personal and group resources" (Turner and Fichter, 1972, p. 195).

The intensity, quality and stability of the relationships within a condominium owners' association are promoted by a limited group size. The costs of decision making in small projects are lower and voluntary cooperation may be sought in arriving at common area solutions (Mittelbach and Ebin, 1975, p. 177). A positive impact on social relations can also result from the joint planning and development of the residential project (cohousing, see below) as well as from a community-promoting design of the architecture and its built environment. On the other hand, an "off the peg" condominium complex developed without the participation of the future residents, with 50 or 100 apartments and only a small proportion of communal areas, probably does not provide a good basis for fulfilling social relations and cooperation among the condominium owners.

Also, from a communitarian point of view, the establishment of condominium ownership in existing buildings is a double-edged sword. If tenants are financially unable to buy their apartments, they are threatened with eviction. The spatial and economic position of tenants can thus be endangered by splits into condominiums (Handschuh and Cohen, 1974) and this is especially the case on tight housing markets.

In comparison with individual homeownership, condominiums also have the advantage of spatial cohesion and economic resilience and ontological security on their side. On top of that, they offer better opportunities for democratic and solidarity-based cooperation and the conditions for a community-friendly design of the project and its built environment are also better.

Compared with private renting condominium ownership represents resilience and security to a much higher degree and is also associated with less regulation, red tape and allocative losses. Because of the common ownership the institutional preconditions for lasting and fulfilling social relationships are better. The conditions for a community-oriented project and built environment design are also superior.

4.4. Social housing

Social rental housing construction is the promotion of new residential developments or modernization investments in the existing housing stock reserved for needy target groups via low-interest loans and, sometimes also grants. In return, the investor has to comply with price and occupancy obligations. Social housing allows projects to be tailored to the needs of the target groups.

The degree of security is relatively high for social tenants in terms of dismissal protection and protection against sudden rent increases. In many German states

there is not even a rent surcharge if the household has grown beyond the applicable income limits.

However, since the element of joint planning, development and construction is lacking, the achievable community orientation in social rental housing construction is limited. It may be possible, however, to try to involve the future social tenants in the project planning process and thus create community-, purpose- and inhabitant oriented-social housing projects.

With regard to participation social housing providers often unfold much more activities than private landlords. Tenant involvement may include tenant representation in boards, committees and panels like excellence committees or complaints panels, collaboration in area panels or tenant (and residents) associations, focus groups like disability forum, equality, or high rise living forums, participation in tenant conferences, etc. The participation and involvement of tenants are somewhat easier to organize in social housing than in private renting. As a rule only social landlords like housing associations engage in such activities. The social tenant, however, remains in a passive role of the person being cared for whereas from a communitarian point of view an active commitment to the community is required.

Social rental housing permits for a sufficiently high level of building density, especially in the form of apartment buildings. Since New Urbanism requires a heterogenous mix of land uses in densely-built neighborhoods, large-scale developments of the Athens charter style occupied only by social tenants are clearly inadequate. Instead, social housing should be distributed on a small scale in the urban area. The design should not come off the peg and should also support the heterogeneity of the built environment.

In theory, it should be easier to include pleasant and comfortable common spaces, recreational and social opportunities in the built environment in social housing development complexes since effective demand and profitability do not have such a paramount importance as in private rental developments. Individual architectural elements of community-oriented housing can be promoted with the funding instruments, but it rarely happens in practice. One example is the social housing subsidy in the federal state of Rhineland-Palatinate, which, in the case of subsidized housing projects, provides the possibility, under certain conditions, that one of the subsidized apartments may be intended for communal use by the house community. Here, social housing promotion offers fine-tuning possibilities that do not exist in private renting developments.

A possible alternative to social rental housing would be the promotion of property measures via social housing subsidies. In certain federal states of Germany, far more ownership measures are promoted than rental dwellings. The focus of funding could be

shifted away from single-family homes towards manageable condominium complexes built according to community-oriented design principles – if possible in conjunction with elements of joint planning and development by future residents according to the model of cohousing.

All in all, social rental housing has the advantage of a high level of security in itself. In principle, it also offers the possibility of implementing community-friendly design and participation and involvement of the residents. However, the practice of social housing leaves much to be desired. In particular, far too little is done to free social tenants from their passive role in the system. Also, social housing is not a suitable tenure for broad strata of the population.

4.5. Cooperative housing

Collaborative housing (CH) is an umbrella term to encompass a wide variety of housing forms with different degrees of collective self-organization including cooperatives and cohousing communities (Czischke et al., 2020, pp. 3, 6). The term suggests that collaboration among residents as well as between a community of residents and external stakeholders in housing provision represents one core aspect of all different models (Vestbro, 2010; Fromm, 2012). In this sense, the term collaboration stands for coordinated action towards a common purpose. Common attributes include a high degree of social contact between the residents and the presence, to different extents, of shared goals and motives in relation to the housing project (Czischke et al., 2020, p. 7).

In cooperative housing, the residents own a share in the project with the right to occupy a designated unit. A housing cooperative is a business and value community that benefits its members. The benefit for the members is not a high capital dividend, but a lifelong right of residence at a fair rent. The cooperative idea unites the idea of self-help with that of solidarity in the group. Moreover, an assumption is that other goals would be met through cooperative housing including: decreased dependencies; increased economic, social and personal development and self-determination; dismantlement of paternalistic and oppressive structures; and so on (Turner and Fichter, 1972, p. 195).

Housing cooperatives have the presumption on their side to promote the sense of community, neighborhood cohesion, cooperation and stability of milieus, because they are designed for long periods of residence and participatory co-determination. A number of studies from different countries support this thesis[12]. Compared to other

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[12]   See the overview of relevant studies at Crabtree et al. (2019, p. 17).

tenures, cooperatives provide stronger social networks and support as well as better relations among neighbors.

A study conducted in Canada in 2003 found that residents of cooperatives reported a higher level of social support than residents of other forms of community housing (Canada Mortgage and Housing Corporation, 2003).

A study of nearly 500 buildings in New York that were transferred by the city to different legal forms compared the results in the buildings transferred to cooperatives with those transferred to other legal forms (community groups, private landlords and local housing authorities). The result was that the residents in the newly formed cooperatives were more satisfied in several fields than those in the other three forms. In the field of social capital, this was the case with regard to participation, the willingness to assume responsibility and the strength of and commitment to prosocial norms (Saegert and Winkel, 1998).

Members of housing cooperatives in the U.S. feel they have greater social capital and stronger support networks, while in Norway cooperative members use a community app to help each other with tasks such as picking up mail and running dogs. Residents of rental housing cooperatives in Australia and Canada report a strong sense of community and a sense of home, security and neighborhood (Crabtree et al., 2019, p. 11).

The advantages of cooperative housing are probably best achieved in small, manageable cooperatives in which the members of the cooperative live together as neighbors. Furthermore, cooperative housing is an ideal tenure in terms of ontological security and participation, because the comrades have a permanent right of residence, they can democratically co-determine according to the principle of one man one vote and also the cooperative bodies such as the board of directors and the supervisory board are filled with cooperative members.

The community orientation in cooperative housing is further strengthened if the residential properties are planned, developed and built together and the architecture and the built environment are designed to promote community. In this respect, the housing cooperative is a suitable final legal form for co-housing projects.

4.6. Co-housing (Baugemeinschaften)

Co-housing is defined as a specific collaborative housing model, implying stronger links between people. This concept is in line with the original Danish Bofaelleskab concept, which puts emphasis on "sharing common areas, making decisions in non-hierarchical processes, living and interacting socially, and doing things together" (Falkenstjerne Beck, 2020, p. 4). Cohousing initiatives are context-dependent, but they share four fundamental common principles:

- a dimension of visions and values (sharing common ideas on how to live),
- an organizational dimension,
- a social-relational dimension (importance given to the social architecture) and
- a spatial dimension (the physical layout of the building is designed for social interaction).

Therefore, according to Falkenstjerne Beck, cohousing is different from other "established" types of housing provision because it is considered by the author, citing Jarvis (2015, p. 102), as "a living arrangement", which "represents more than simply an alternative system of housing: the social dimensions reveal a setting and system that cultivates an intentional negotiated ethos of sharing".

In concrete terms, cohousing is a grouping of people who are willing to plan, develop and build their housing project together for individual and at the same time community-oriented self-use. A co-housing project aims at a communal, self-managed and participative form of housing with the aim of permanently promoting interactions among the members of the community and developing a strong sense of community. The architecture is designed to promote social relations. A co-housing settlement consists of individually used private residential units and common facilities (e.g. common kitchen, common room, common garden, guest room, laundry room, day care center, library, workshop, fitness room).

The residential project Casa Nostra with 12 condominiums in a central location in the city of Schwerte, which has been awarded by the Association of German Architects, is an example of a corresponding manifestation of the community idea in co-housing:

"We want to expand our current way of life in a joint housing project. We find different characters, talents, attitudes and lifestyles exciting. We have fun in lively community, without wanting to limit the right to individuality of others" (from the exposé of the assembly).

The architecture of the object includes space for community life as well as for the privacy of the individual. The entrance area and the gallery developments arranged around the central residential courtyard offer a variety of opportunities to stay and meet. A common room is available to all residents for group meetings, parties or the accommodation of guests[13].

The legal form of a co-housing project depends on the project's implementation phase. After completion of the apartments, the property is either cooperative or individual condominium ownership. This means that co-housing as a tenure provides for a high degree of security.

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[13]   See: *Casa Nostra – Ein Schwerter Wohnprojekt*. Postwelters Partner.

From a participatory perspective, with these decentralized small communities, initiative and cooperation among the members are promoted at the same time. The community experience refers to joint planning, building and living together in a manageable community of like-minded people. At the same time, the development of social capital associated with such building communities can extend beyond the community itself (Ruiu, 2015).

People create their own homes together. Therefore the co-housing community can be regarded as an ideal communitarian form of living. In this respect, it is the model by which the other tenures should be measured.

4.7. Apartment-sharing community

An *apartment-sharing community* ("Wohngemeinschaft" or "WG" in German) is a joint tenure in which several independent persons, who are usually not related to each other, live together in one dwelling without having a common household. As a rule, each member of the community has their own room and central rooms such as the bathroom, kitchen and, if necessary, the living room are shared. This type of residential community is not explicitly regulated in the German Civil Code. Therefore, different rental contract designs are possible:

- A main tenant and subtenants,
- Several main tenants in one rental agreement,
- Individual rental agreements with each resident.

A distinction is made between purpose WGs and non-purpose WGs, which are a conscious decision for this form of living and way of life among partners who often already know each other.

As a tenure an apartment-sharing community is particularly important for younger people, e.g. students, trainees and young professionals. In addition, there are WGs of single parents who support each other in childcare, multi-generation flats, senior citizens' WGs and "Plus WGs" for people aged 50 and over who do not need external help to live. With these WGs, cost savings are less in the foreground of the motivation to join or establish them. More important motives are often the prevention of loneliness in old age and premature institutional care as well as the possibility of mutual support.

Today, the apartment-sharing community is still predominantly a transitional tenure with an emphasis on the first phase of the residential life cycle. As a tenure, the WG has the advantage of cost sharing on its side. This is offset by a considerable loss of privacy and seclusion. However, this can also be seen as an advantage and can even be the decisive factor for joining a WG. The apartment-sharing community offers

the opportunity to continue to practice social behavior and tolerance after leaving the parental home. Both are important key qualifications for working life and living together in a family.

4.8. Co-living

The so-called "*Co-Living*" is a special form of shared housing with self-contained, furnished apartments and individual tenancy agreements for each resident (Davies, 2015). The number of members is significantly larger than in a traditional apartment-sharing community. In addition, the co-living properties are usually equipped with various communal facilities such as fitness areas, gardens, pools, roof terraces, laundry rooms, yoga rooms, libraries and often work spaces. If the objects also contain common work spaces, they are hybrid living and working communities. The tenure of co-living is primarily aimed at younger, mobile urban target groups such as exchange students, interns, students, start-up employees or freelancers. It is designed for flexibility and comfort, and the average duration of residence is comparatively short. Nevertheless, the community aspect is very important in this tenure:

> "Residents of a co-living house… are open-minded and interested in meeting and working with other creative people and their visions. It is important for residents of co-living communities to support and motivate each other. At best, they share common interests. Another advantage of co-living is that the creative young residents, although they like to work a lot, are never alone. Co-Living is a modern and successful way of living together. The aim of Co-Living is to develop a worldwide network so that young people who want to work creatively can feel at home everywhere"[14].

4.9. Community and housing tenure synopsis

We can arrange the different tenures according to their respective security and community orientation in a two-dimensional portfolio. While apartment-sharing communities and co-living combine a high level of community orientation with a low level of security orientation, the opposite is true for traditional owner-occupied homes.

From a communitarian point of view, tenures like Cooperative housing and Co-housing that combine long-term security and community orientation at the same time are ideal. Ontological security supports the long-term nature and stability of social relations. If such *hybrid forms of housing* are widespread in a neighborhood,

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[14]   See: *Co-Living: Die zeitgemäße Wohngemeinschaft.*

then the social relations within this neighborhood may also stabilize (Ruiu, 2015) and a balanced neighborhood identity may develop.

Figure 2. Security and community orientation of different tenures
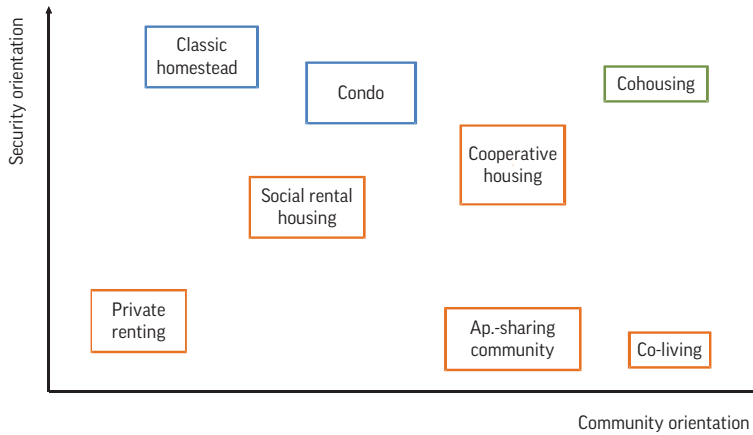
Source: own illustration.

Conclusions

This paper attempted to examine the viability of communitarianism as an overarching housing and urban development paradigm that can compete on an equal footing with other paradigms such as liberalism or socialism in terms of practical and feasible policy recommendations. It is open for debate, whether such overarching paradigms are necessary at all. The alternative would be to examine individual problems without an overarching political-philosophical context. This would lead to inconsistent recommendations and an inconsistent policy that would also be difficult to communicate.

Admittedly, the theoretical and empirical basis for the recommendations given here to housing and urban development policy is still relatively weak. There is still a considerable need for research with regard to the links between different tenures, features of buildings and the built environment and the development of social capital. Some of the relevant studies only deal with individual tenures or the differentiation between the tenures considered is too rough. Apart from that, there is a need for interdisciplinary research. It is not entirely clear how the architectural and urban development characteristics of buildings and neighborhoods will impact local communities when combined with different tenures.

A communitarian housing policy with the aim of promoting social cohesion should presumably create considerably more new residential developments as cooperative or co-housing projects (e.g. by awarding concepts, giving preferential treatment to co-housing when awarding urban plots of land, offering advice). Accordingly, the focus of homeownership formation would shift away from individual ownership towards condominium or cooperative ownership.

An attempt could also be made to give more weight to community-oriented tenures in the housing stock. This could be done, for example, by spinning off cooperatives from existing public or private housing companies or by other group privatization models.

Social housing promotion should favor community-oriented home ownership over individual ownership. The promotion of social rental housing should, as far as possible, be made more participatory and community-oriented.

Where are the intersections and contradictions between the competing political philosophies? The fundamental differences of a communitarian versus a liberal housing policy are obvious. The communitarian approach requires intervention in free pricing, additional regulation and intervention, as well as targeted subsidies. The difference between a communitarian and a social democratic policy, on the other hand, lies in the different emphasis of the relationship between property ownership and security. Social democrats generally try to ensure collective security through high collective tenant protection standards and many social housing schemes. Their concept of community focuses on large relatively equal social collectives, while communitarians are much more concerned with small and local communities, especially in their diversity. Accordingly, security of housing in manageable communities must be ensured at this level.

From an urban planning point of view, it would be most important to strengthen the urbanity of cities where it has been lost. Our cities and neighborhoods must be revived as local multifunctional places of encounter, communication and cooperation.

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II

MEASURING REAL ESTATE PRICES

II.1

A Critical Approach to the Analysis of House Price Cycles

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This article presents the opinions of its authors and not necessarily the official position of the Narodowy Bank Polski

Introduction

The housing market is very important for the economy, and house price cycles can be used to determine market's position. Particularly, house prices allow us to see whether the housing market is overheating, which may result in a financial and economic crisis. The housing sector in developed economies has a strong and multi-channel impact on the economy. There is also a reverse relation – the economy strongly affects this sector. At the same time, it is difficult to find a general and universal model for these relationships, as the EU and global housing sectors show a structural diversity, which results from a strong dependence on institutional factors. The role of fiscal and monetary policy as well as supervisory regulations (micro prudential regulations related to financial instruments) should be emphasized. The interaction is usually direct and indirect and, as experience shows, in the case of shocks there may be a non-linear reaction which increases the risk associated with this sector. The strong, structural cyclicality of the housing sector poses a problem for the economy. Especially the risk that the normal real estate cycle will speed up and transform into a real estate crisis.

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The risk-increasing factor is the policy of low interest rates and the associated high level of property prices, indebtedness secured by real estate or an excessive real estate stock. Therefore, monitoring of the sector and the tensions arising in it, is becoming an important factor in contemporary macroprudential policy.

The literature has been discussing for around 30 years what entities and what market segments should be monitored. It seems that it is difficult to make an unambiguous and simple diagnosis here. Because real estate crises have historically been most often associated with the capital market and the banking sector, indicators and models analyzing these sectors dominate. However, in many cases, processes in the entire economy also had a significant impact on the real estate market.

The residential and commercial real estate market is also heterogeneous. In the case of housing, we can talk about the market of objects and space as well as the primary and secondary market. In principle, the transaction market and the rental market should be related, but the institutional structure and behavior of entities cause that it is often partial and time-shifted. In some countries (Poland, Canada, some Asian countries), next to the market of finished housing, there is also a market for pre-sale developer contracts for the construction of housing. An additional complication is the fact that the process of building an apartments is time consuming and their production is characterized by large volumes of work in progress. This complicates the choice of what we should consider as the basic measure of the production and the market cycle, which in the case of economic cycles is usually the current production. More on that problem can be found in Matysiak et al. (2020).

Since the basic problem of this market are usually demand shocks under a short-term rigid supply, thus the idea that transaction prices should be a good indicator of market tensions and adjustments.

The conclusion is that the analysis of the real estate market requires in most cases a detailed analysis of a specific sector through indicator and model analysis of individual markets and entities operating on them, including the analysis of the surrounding economic policy and institutions. Such an analysis usually provides answers to the questions asked, but requires detailed analytical data and long time series.

The paper is organized in the following way: we present a discussion on the measures of the housing cycle and explain why we choose to focus on house prices. We present the two most often used filters, namely the Hodrick-Prescott and the Christiano-Fitzgerald filters in Section 2. We apply those filters to study the house price cycles in Ireland and Spain in Section 3 and in Poland in Section 4. The conclusions can be found in Section 5.

1. Literature review on housing cycles and their measures

The main question when analyzing housing cycles is to determine what should be analyzed. The main candidates are prices and volumes. Leamer (2007) provides a very interesting and novel approach to the analysis of the housing market and states that investment volumes should be analyzed instead of prices. It should be also highlighted that he advocates to include the housing sector in macroeconomic analyses, which has been at the time of his article's publishing largely ignored. We agree to put more emphasis on the housing market in general, because the last global financial crisis was mostly related to mortgages and house prices. Leamer (2007) states that "housing is the business cycle", and advocates to analyze investment or transaction volumes and not prices. His analyses for the U.S. over several decades show that a drop in the volume of housing investment is a very good indicator of an economic crisis. However, we find that Leamer (2007) misses the importance of monetary policy and mortgages completely for the housing market. Smets (2007), who published a direct comment on Leamer (2007), points out that he does not show how the shock is transferred from the housing market to the whole economy. Smets (2007) suggests that it's the interest rate which does the job. Burnham (1972) has already found that interest rates are the main house price drivers in the U.S.. When people earn more they wish to buy better housing. However, it is difficult to pay the whole price at once. For most people the only solution are mortgages, which transform the huge one-time payment for the whole house in tiny bits that can be paid month by month, year by year. The interest rate determines how small the monthly payments are, or put it the other way around, how much housing can be financed with a given monthly payment.

Why do we discuss interest rates if our question is about the use of prices or volumes? Because we want to make a common ground of understanding what drives the housing market. Now we can move on and discuss how the housing cycle should be measured. Housing investment is very important for the economy, as there are significant multiplier effects (Harris and Arku, 2006; 2007). But as financial and economic stability is concerned, it is the prices and mortgages that matter. Agnello and Schuknecht (2011) show that domestic credit and interest rates have a significant impact on the probability of booms and busts occurrence. They also find that international liquidity plays a significant role for the occurrence of housing booms and – in conjunction with banking crises – for busts. Additionally, Tsatsaronis and Zhu (2004) show that house prices are more sensitive to short-term rates where floating rate mortgages are more widely used and that the feedback from property prices to bank credit is strongest in countries with a greater prevalence of variable rate mortgages.

According to research by Duca et al. (2010) and Cesa-Bianchi (2013) the boom bust episodes, which often ended in a crisis, were generated by house price swings. This can be explained in few words, and should also help Leamer (2007) to tie the missing links in his story. Banks issue mortgages because this is profitable, and the higher are house prices, the bigger mortgages are needed. Under such a situation the LTV (loan to value) ratios remain as required by the financial supervisory authorities, thus everything seems to be fine. The problem arises, when people cannot pay the monthly rate, prices drop sharply and the mortgage is under water, or both occur simultaneously, i.e., the mortgage exceeds the value of the collateral.

Lambertini et al. (2013) explore the effectiveness of countercyclical LTV ratios as macro-prudential tools aimed at financial and macroeconomic stabilization. They show that LTV rules face a trade-off between savers' and borrowers' welfare if they respond to GDP or house-price growth in a countercyclical manner.

Rising house prices can make people start to spend more in case the reverse mortgage is available in a given country[5]. Also the wealth effect[6] can add to economic growth. Moreover, house price increases in one city can lead to house price increases in the surrounding cities, which is called the ripple effect.

On the other hand, house prices cannot increase forever and can cause economic problems when they reverse. If problems in the economy emerge, wages decline and some people cannot pay the mortgages. When demand for housing declines, also house prices start to decline, which deteriorates the collateral of the mortgage portfolio. Banks become worried and curb lending in general, which only adds to the ongoing economic slowdown or even recession.

Putting the abovementioned information together, we prefer to focus on prices, a housing market indicator which is collected and analyzed by most of the important financial institutions, like the ECB, Eurostat, BIS, etc. House prices can be, with some effort, measured and compared internationally. Contrary, data on transaction volumes are often unavailable, while data on housing investment volumes cover not only the construction of new housing, but also a significant refurbishment of housing.

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[5]   The largest reverse mortgage markets in the world include: the United States, Australia (and New Zealand), the United Kingdom, Ireland and Spain. However, the reverse mortgage is not available in Poland.

[6]   A detailed analysis of the effect of house price growth on economic activity and the mechanism behind it can be found in Catte et al. (2004).

Table 1. Overview of empirical analysis on the effect of the housing market on the economy, different measures, methods and the main results

Authors	Analyzed variable	Method	Main results
Iacoviello (2005)	house prices, real	VAR	positive response of real spending to a housing price shock
Iacoviello and Neri (2010)	prices, investment volume	DSGE	housing prices and housing investment are strongly procyclical. House prices impact consumption, also through the wealth effect
Ghent and Owyang (2010)	residential investment using permits, either in units or values	Markov-switching model with time-varying transition probabilities (TVTPs)	They analyze the relationship between housing and the business cycle, declines in house prices are often not followed by declines in that city's employment; they find no consistent statistical relationship suggesting a city's permits or prices influence its business cycle
Igan and Loungani (2012)	house price data	nonparametric estimates, parametric estimates, regressions	house price dynamics are mostly driven by income and demographics but fluctuations in these fundamentals and credit conditions can create deviations from the implied equilibrium path
Bracke (2013)	OECD dataset containing information on real house prices	index, regression, logistic model	This paper analyzes the duration of house price upturns and downturns; both upturns and downturns display duration dependence: they are more likely to end as their duration increases
Cesa-Bianchi (2013)	real house prices, other variables	GVAR model	that real house price returns can be highly correlated across countries: such a synchronization varies significantly over time and can be particularly high during the bust part of the cycle
Funke and Paetz (2013)	house price data	open-economy DSGE model	they identify strong and robust housing wealth effects, and show that property prices are mainly driven by intratemporal preference perturbations rather than by disturbances in financial frictions or price markup shocks
Ciarlone (2015)	time series for house prices	own model	sharply rising house prices in the sample of emerging economies were strongly connected to fundamentals. They tend to reflect a somewhat slow adjustment to shocks to the latter
André, Gupta and Mwamba (2019)	monthly Freddie Mac house price index (FMHPI)	triples test, entropy test	housing prices are asymmetric in the vast majority of cases at the state and MSA level (USA)

Source: authors' own study.

2. Tools to analyze the price cycles – the HP and CF filters

The pure price series can give us a first insight into the situation in the housing market, but in order to analyze the cycle, we need to apply filters. It should be pointed out that whenever we apply filters, we implicitly assume that the underlying economic phenomenon has a regular, repeating character. This however is not always correct, for example there could be structural breaks in the series that we analyze. Having this

in mind we look at the cycles in the housing market, which can be divided into two types: a shorter one, which is very similar to the length of the business cycle (around 2–8 years), and another one, a real estate market cycle, which lasts from 8 to 30 years. For the analysis of the shorter cycle the intuitive tool is the Hodrick-Prescott filter, even though it is criticized by some authors (Cogley and Nason, 1995; Hamilton, 2018). We will come back to this critique, especially since this filter can generate misleading results for the most recent observations. For example if one wants to determine whether the current prices are above or below the trend, the HP filter could be problematic (see Ghent and Owyang, 2010). There are much better tools if one wants to study the current situation in the market. A starting point is the indicator analysis (see for example Łaszek et al., 2018) or we can apply the analytical framework that was proposed by ESRB (2019). The researcher has to choose the appropriate tool for each task. Furthermore, housing markets are local and one needs additional information to obtain a correct picture about the market situation.

The Hodrick-Prescott filter allows us to see how the house prices deviate from the short-term trend (which could be called a "business cycle" in the housing market), see for example Davis and Heathcote (2005). Such information can be used, similarly as the output gap which is calculated with the use of the HP filter, to determine whether the prices are growing too fast over the cycle.

The Christiano-Fitzgerald filter allows us to analyze the cycle not only in the short run (like the HP filter does) but also in the long run, over a horizon in which the housing sector can adjust to the changing environment. Interestingly, we can chose the parameters of the CF filter that lead to very similar results as the HP filter, thus we can also analyze the short cycle[7]. Both methods, and many more filters which we ignore here are implemented in R, and can be quite easily replicated[8]. House price data that we use for our analysis is freely available online, the sources are presented in the respective sections.

2.1. A short description of the filters

The concept of applying filters to economic data is derived from the time series decomposition, which is a very old concept and historically was used by astronomers in the 17th century to calculate planetary orbits. The very basic assumption is that observations are dependent through time, and the dynamics and direction of this dependence is of interest of statisticians and econometricians. The aim of time

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[7]   A detailed discussion on filter characteristics may be found in Beck (2017) and Skrzypczyński (2010).
[8]   See Balcilar (2019).

series decomposition is to receive a set of latent components with different temporal variations. Person who as the first stated the assumptions of unobserved components (1919) saw time series as a time dependent variable which was composed of four different types of fluctuations: a long-term tendency (trend), cyclical movements, seasonal movements and residual variations.

Traditionally, the four components of time series are mutually independent and the relationship is specified in an additive decomposition model (1). This structure of the model is the most appropriate if the magnitude of the trend, cyclical or seasonal variation, does not vary together with the level of the time series.

$$y_t = g_t + c_t + s_t + \varepsilon_t, \tag{1}$$

Y_t is the decomposed time series variable. The time series y_t consists of the following components: g_t – trend, c_t – cyclical, s_t – seasonal, ε_t – random error.

Otherwise, if a mutual dependence among the latent components exists, the relationship between those components is specified by a multiplicative model (2)[9]. It is commonly used if the trend, cyclical or seasonal fluctuations are nearly proportional to the time series levels.

$$y_t = g_t c_t s_t \varepsilon_t, \tag{2}$$

Some components can be present or not in the case of a given time series, which depends on the characteristics of the phenomenon and on the frequency of measurement. Usually in the case of real estate prices time series a seasonal component is not observed.

Hodrick-Prescott Filter (HP)

The Hodrick – Prescott filter is a data-smoothing technique used very often in macroeconomics to remove the short term component fluctuations of a time series and reveal trend component. Hodrick and Prescott (1997) used the Kalman filter as the basis to construct their own Hodrick-Prescott filter (HP filter). They proposed a procedure for decomposing the time series in the smoothed trend variable and the cyclical component:

$$y_t = g_t + c_t, \tag{3}$$

where the trend component is equal to:

$$g_t = 2g_{t-1} - g_{t-2} + \varepsilon_t, \tag{4}$$

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[9]   Mixed additive-multiplicative models also can be used.

Assuming a given, properly selected lambda, to determine the trend component, the following optimization problem should be solved:

$$\min_{\{g_t\}_{t=-1}^{T}}\left\{\sum_{t=1}^{T}(y_t - g_t)^2 + \lambda\sum_{t=1}^{T}[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2\right\}, \quad\quad (5)$$

The first term in the optimalization equation $\sum_{t=1}^{T}(y_t - g_t)^2$ penalizes the variability

of cyclical component. The second component $\lambda\sum_{t=1}^{T}[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2$, which is lambda multiplied by the sum of the squares of the trend component's second differences, penalizes fluctuations in the trend component growth rate. According to the formula, the larger the lambda's value, the higher the penalty and smoother the fitted trend is. For quarterly data Hodrick and Prescott suggested 1,
600 as a lambda value.

The Hodrick-Prescott filter is criticized for some characteristics, which made it imperfect for analyzing most data-generating processes. Hamilton (2018) stated that the filter produces spurious dynamic relations which have no basis in the data-generating process[10]. Moreover, the Hodrick-Prescott methodology assumes that prolonged slumps below the relatively short-term average value cannot happen and they will be interpreted as a decline in a trend[11]. Moreover, in data with permanent shocks or periodically different growth rates the filter may produce trend shifts that actually do not exist. If this state-space structure was the true data-generating process, the estimate of the cyclical component[12] would be random and exhibit no patterns (white noise). But the users of Hodrick-Prescott filter are seeking some patterns in plots of this cyclical component.

Hamilton (2018) also stressed that the filtered values at the end of the time series variable are different from those calculated in the middle, so the best results are when the analysis is being conducted as historical. As a consequence lengthening or shortening the sample and also transformation of variables may cause improper results[13]. While using the Hodrick-Prescott filter the analysis should not be conducted just purely historical but also static. When used dynamically the filter may generate

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[10]   Hamilton (2018) even proposes better alternative – "a regression of the variable at date t+h on the four most recent values as of date t offers a robust approach to detrending that achieves all the objectives sought by users of the Hodrick-Prescott filter with none of its drawbacks".

[11]   It is worth to remember that different time series, especially real estate prices, may have different frequencies than cyclical component interpreted as business cycle.

[12]   Which may be derived from 3 rd equation. Moreover if the state-space representation was accurate for trend and cycle component distinguishing the selection of λ value would not be necessary but could be estimated from the data.

[13]   The favorable results may be received if the noise is approximately normally distributed.

misleading predictions as according to the algorithm the past state of the time series will change to adjust to the current state.

There are two main ways in which HP filter can be calculated: the two-sided Hodrick-Prescott filter and the one-sided one. The two sided HP trend and cycle have an artificial ability to "predict" the future values as they are by construction a function of future realizations. Filtered values impose patterns, that could not be recognized in real time, because they are not a feature of the data-generating process. Although a one-sided filter would cope with the problem of producing a time series that is able to artificially predict the future values, the dynamics of filtered trend and cycle may be foreseen basing on their own lagged values and this is an artifact of filtering data using HP filter.

However, despite all of these limitations, Hodrick-Prescott filter is still the most commonly used filter in economic analyzes.

Cristiano-Fitzgerald filter (CF)

Christiano-Fitzgerald (2003) created an approximation of an ideal bandpass filter that exhibits both common features of the Baxter-King (1995) filter and Hodrick-Prescott filter.

Christiano and Fitzgerald focused their attention on finding the optimal approximation of the process of random wandering, therefore the time series should be prepared in advance. Let's assume a finite time series y_t, where $t \in \{1,\dots,T\}$, which is I(1) without drift and seasonal fluctuations. Christiano and Fitzgerald assumed that a given stochastic process y_t can be divided into:

$$y_t = y_t^* + y_t^c \tag{6}$$

Then, the estimation of the cyclical component y_t^c has power only in frequencies belonging to the interval $\{(-\bar{\omega}, \underline{\omega}) \cup (\underline{\omega}, \bar{\omega})\} \in (-\pi, \pi)$, where $0 < \underline{\omega} < \bar{\omega} < \pi$[14], y_t^* contains components that are outside that range[15]. The estimator of the component $\hat{y}_t^c$ is given as (Christiano and Fitzgerald, 1998):

$$\hat{y}_t^c = \hat{B}_t(L)\, y_t, \tag{7}$$

where

$$\hat{B}_t(L) = \sum_{j=-(T-t)}^{t-1} \hat{B}_{j,t} L^j \text{ and } t = 1, 2, \dots, T. \tag{8}$$

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[14]   Christiano and Fitzgerald (1998) assumed that the cyclical component of GDP is in the fluctuation band between 1.5 years and 8 years. In the terminology of fluctuation frequency for quarterly data, it can be written that: $\underline{\omega} = \dfrac{2\pi}{32}$ and $\bar{\omega} = \dfrac{2\pi}{6}$.

[15] y_t^c is interpreted as cyclical component (g_t in HP designation) and y_t^* can be interpreted as trend (c_t in HP designation).

Weights $\hat{B}_{j,t}$, as well as the range of summation over j depend on the t index, that is they depend on time.

The filter constructed in this way is asymmetrical, which means that a certain phase shift of the cyclic component may occur in relation to the input time series at the beginning and end of the sample[16].

To obtain a set of weights $\hat{B}_{j,t}$ for a t a given below minimization problem should be solved:

$$\min_{\hat{B}_{j,t}, j=-(T-t),..,t-1} E\left(\left(y_t^c - \hat{y}_t^c\right)^2 | \{y_t\}_{t=1}^T\right) \tag{9}$$

$$t = 1, 2, \ldots, T. \tag{10}$$

Approximation of an "ideal" frequency filter by the CF method is optimal in the sense of minimizing the mean square error between a real component of the input time series and its estimator.

In the frequency domain it can be written as:

$$\min_{\hat{B}_{j,t}, j=-(T-t),\ldots,t-1} \int_{-\pi}^{\pi} \left|B\left(e^{-i\omega}\right) - \hat{B}_t\left(e^{-i\omega}\right)\right|^2 S_y(\omega)d\omega \tag{11}$$

$$t = 1, 2, \ldots, T. \tag{12}$$

where $B\left(e^{-i\omega}\right)$ is an enhancement of the "ideal" bandpass filter, $\hat{B}_t\left(e^{-i\omega}\right)$ is an enhancement of the approximated bandpass filter, while $S_y(\omega)$ is a pseudospectrum of the first order random walking process for which the variance of the white noise process is unitary.

$$S_y(\omega) = (2\pi)^{-1}(2 - 2\cos(\omega))^{-1}, \text{ where } \omega \in [-\pi, \pi] \tag{13}$$

It is also required that the filter enhancement should have a zero value for the frequency ω = 0 for each t, because this filter should remove from the input data a stochastic trend caused by the presence of a unit root that is associated with zero frequency. Thus, the limiting condition for the minimization problem is the requirement that the sum of weights gives 0. This means that the filter eliminates the stochastic trend and as a result cyclical component is stationary.

The CF filter requires specifying the type of data generating process prior to filtration, which means determining whether the decomposed time series is stationary or non-stationary[17]. In the case of non-stationarity, it is also important to determine its type,

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[16]   Only in the case of odd T for the middle of the time series t = (T + 1)/2, there is a symmetrical filter.
[17]   For first-order stationary variables, I(1), the CF filter requires to remove drift. For trend-stationary variables, the CF filter requires the removal of the deterministic trend. In the case of variables integrated in the first stage, the CF filter is called filter I(1), while in the case of stationary variables – filter I(0). Moreover, the CF filter also requires the input time series to be cleared of seasonal fluctuations.

and thus the distinction between difference stationarity (first order stationarity) and trend-stationarity.

The unquestionable advantage of this filter is that it allows to obtain a cyclical component that consists of the same number of observations as the input series. However, it should be remembered that the cyclical component obtained with the CF filter is subject to revisions over time as new observations of the input time series become available. A similar problem relates to the HP filter, which, like the CF filter, is an asymmetrical filter.

Also, the quality of the cyclical component estimation with the CF filter at the end of the sample may be subject to a relatively large error, similar to the HP filter. For these filters, the quality of the estimation of the components at the beginning and end of the sample is definitely worse than in the middle of the sample. Moreover, CF bandpass filters at the end of the sample are characterized by the effect of "leakage" of spectral power accumulated at seasonal frequencies, and thus it confirms that the CF filter should be used for variables that have been cleared of seasonal fluctuations.

3. Empirical analysis of house prices in Ireland and Spain

We start our analysis with two countries which have very long quarterly house price series, which start in 1971. The purpose of this paper is to present a discussion on house price cycles rather than to make macroeconomic conclusions, so we have to admit that the country sample was chosen arbitrary. We have two main objectives that the data should meet. The countries should have a long and interesting history as concerns house prices, and to some extent they should be similar to Poland, or any other country that has observed a strong development of the housing market in the recent time. For Ireland and Spain we use data collected and published by the Bank for International Settlements[18].

3.1. Ireland

The first analyzed country is Ireland, which started as very poor after the WWII, and has gained a lot through a huge inflow of foreign capital. Along the rapid economic improvement people wanted also to improve their living conditions. The demand for new housing made house prices rise, and developers stared to expand their production. Ireland has also observed some economic downturns, which led to an interesting

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[18]   See BIS.

house price patterns. The available price data covers only newly constructed houses. It contained small quarterly deviations, which cannot be explained economically, but could be the result of a rather small sample size in each point in time. The data was therefore smoothed, putting a weight of 50% on the current observation and 25% on the lagged and the leading one.

In Figure 1, the upper panel shows the original series and the trend component that was calculated with the HP and CF filters. The lower panel shows the respective cyclical component. This graphic presentation is kept throughout the paper. The red line is the trend determined with the CF filter, when the bands are chosen to capture the business cycle, i.e., the cycle length is set to last from 2 to 8 years. This trend is very similar to the one which the standard HP filter generates, which is shown in green. The same applies to the cyclical component that is presented in the lower panel. Finally, the long trend, determined with the CF filter bands set to capture cycles that last from 8 to 30 years, is shown in blue.

Figure 1. House price, trend and cycle in Ireland. Real index, log, only new construction
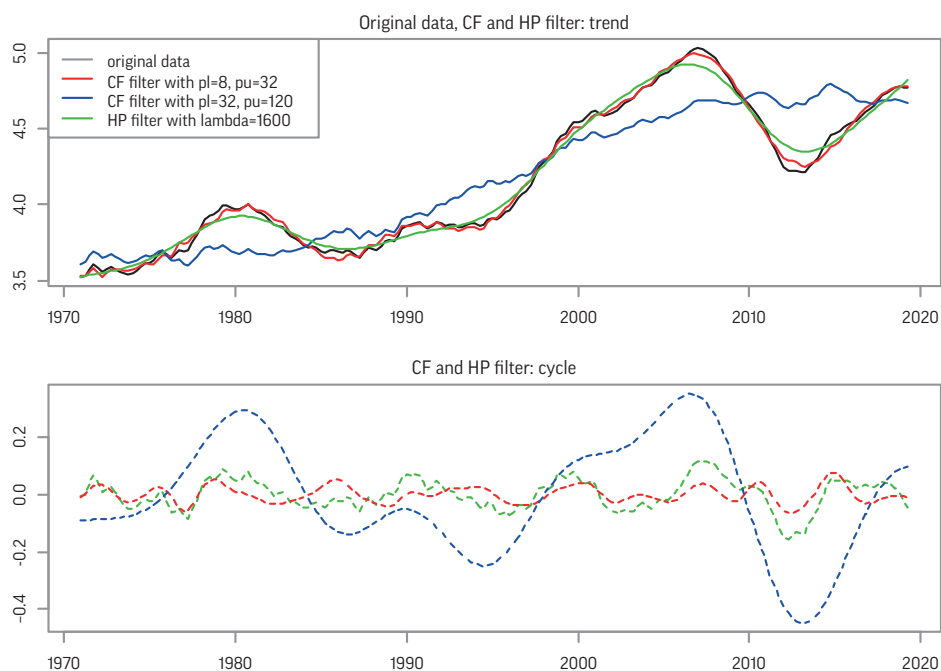
Source: authors' own calculations based on BIS house price data.

It is quite interesting to analyze two types of trends and two types of cycles that are calculated from one time series. We focus on the cyclical component and first look at

the short term fluctuations, which could be the result of the rather short cycle in the housing developer market. Developers react to current conditions and start more or less projects, and as Matysiak et al. (2020) found for Poland, there is a strong fluctuation in construction starts. Once some developers start big projects, they wait with another one until they sell a significant part of the last project. In the short term we find that the trend follows the time series very closely and the cyclical deviations are small. However, if we look at the long cycle, the real estate cycle which lasts from 8 to 30 years, we find that it changes slowly and shows higher amplitudes. The long cycle is very close to the observed data, just without the nearly linear growing trend. In the long run the whole housing market undergoes a transformation. Developers can change their production structures, increase their capital stock and produce much more housing.

In sum we get much information about the evolution of house prices in Ireland from this simple exercise. In sum we get much information about the evolution of house prices in Ireland from this simple exercise. The further research steps could be to focus on the cycles and finding their determinants, nevertheless, this is beyond the scope of this chapter.

Figure 2. House price, trend and cycle in Ireland. Real index, log, only new construction, shortened sample
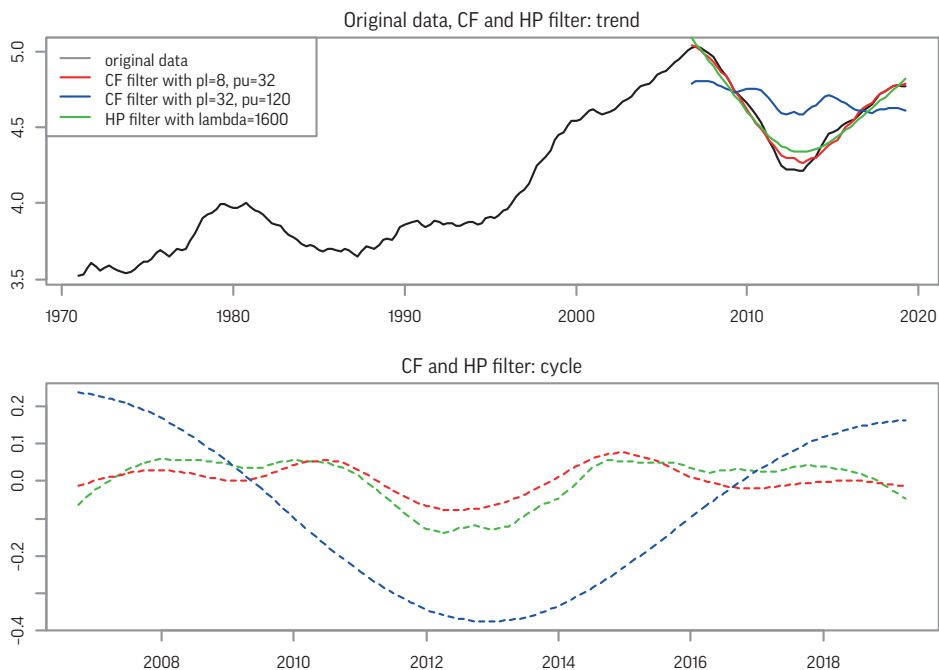
Source: authors' own study.

Our next step is to test how the filters behave if we shorten the time series significantly, for example to an extent that they are as short as in some New Member States of the EU. We analyze Ireland again, and add the analysis of the cycle for a shortened time series, which has the same length as the time series for Poland (see Figure 2). For presentation purposes we show the full available time series, and the cycles of the full and restricted sample, in the restricted window. Only in the beginning of the shortened period a difference between the full and restricted data cycle can be found, both for the HP and the CF filter. One conclusion is that we should be cautious about the first few observations, but besides that the two filters generate cyclical components that are very similar for the short and long time series. To make a stronger conclusion we would need to make a huge amount of windows[19] and test the filter there. Our test window was just chosen to match the length of the data for Poland.

3.2. Spain

While analyzing Spain we make very similar observations as in the case of Ireland. It should be noted that the price series cover both new constructed housing and that from the existing stock. The longer the cycle that we want to determine, the stronger is the amplitude of the cyclical component. Also by shortening the data window to match the length of the house price data for Poland we obtain analogous results as for Ireland.

Figure 3. House price, trend and cycle in Spain. Real index, log, new construction and existing stock

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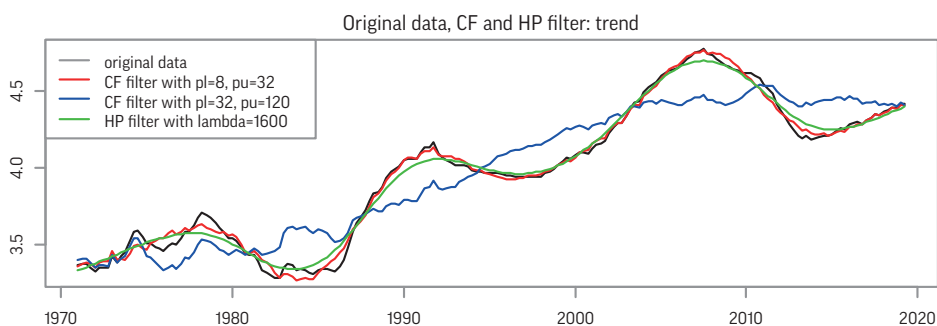
[19]   We should shorten the original time series by one quarter at a time and move that window over the sample.

CF and HP filter: cycle
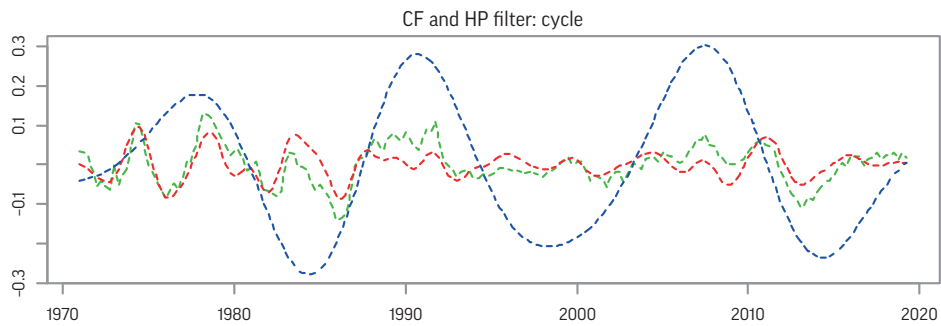
Figure 4. House price, trend and cycle in Spain. Real index, log, new construction and existing stock, shortened sample

Original data, CF and HP filter: trend

CF and HP filter: cycle
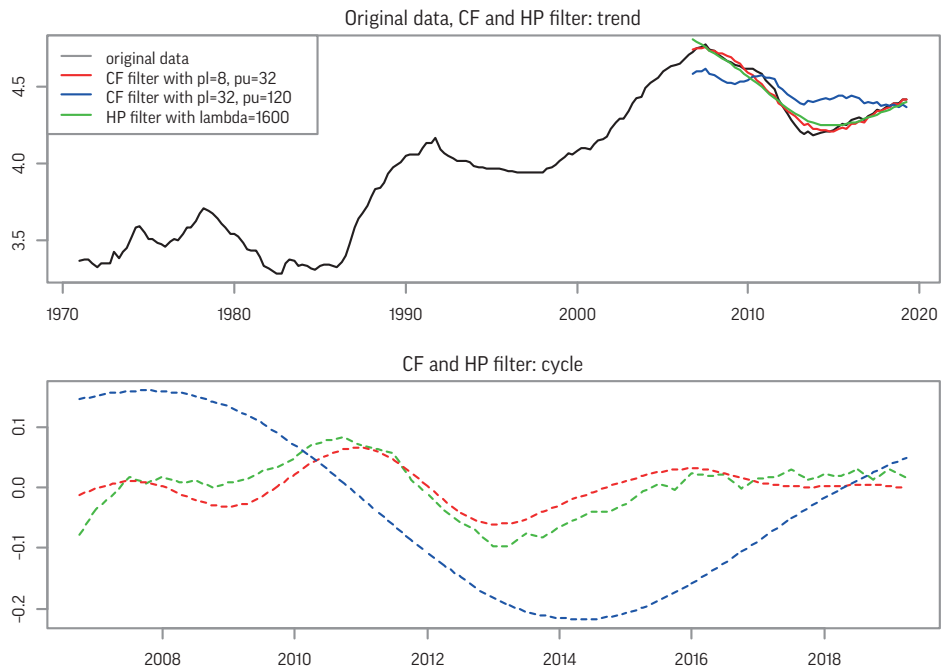
For the short series we observe short term cycles that are related to the business cycle, while we also get a long cycle that represents how the whole housing market in Spain evolved over time. The cycle looks more symmetric than in case of Ireland, i.e., there was a long growth, followed by a long decline. And after that, there was a long growth again. Contrary, the cycle in Ireland first was not that pronounced.

But we should bear in mind that in the case of Spain we analyze the whole market, which has already been functioning for decades. In case of Ireland only prices of newly constructed housing were analyzed.

4. Analysis of the house price cycle in Poland and Warsaw

In case of Poland we analyze the prices for the 16 major cities and also look at house prices in Warsaw, the capital city[20]. The data for those cities starts in 2006, just a few years after Poland joined the EU. House prices were on a rise because there was a structural shortage in housing and growing wages and declining interest rates made housing more available. Just one year later the global financial crisis broke out that has not lead to an economic crisis, but still had a slight negative effect on the housing market. Over the analyzed period wages were rising, but the real house prices declined from around 2007 until 2014. They continue to grow since then, as housing demand, fueled by low interest rates was also augmented by investment purchases by people who wanted to buy a flat to rent it out. The investment demand has increased especially after 2015 (see NBP, 2019). The HP filter, even though all its critique, generates a trend that follows the time series and we see very smooth short run fluctuations in the prices. But the CF filter, maybe because the series are short, generates a counterfactual trend. Maybe it is a technical feature of the filter, that it wants to make a smooth cyclical component. Under the observed price series the trend is nearly an inverse of the factual data over 2012–2017, which is really hard to explain.

Figure 5. House price, trend and cycle in Poland (16 major cities). Real index, log, new construction and existing stock

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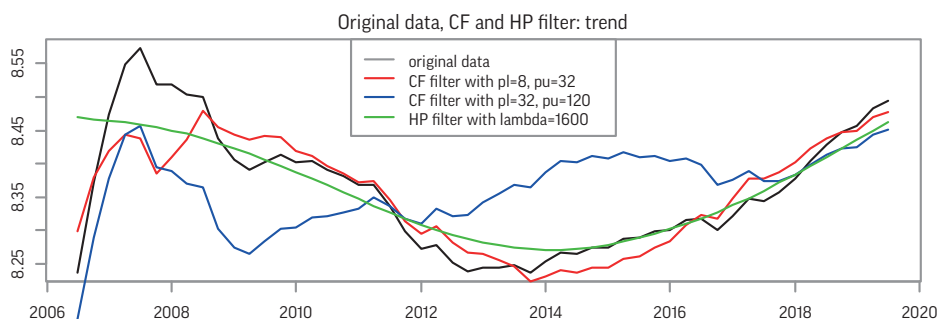
[20]   The data on house prices is obtained from NBP (2020).

CF and HP filter: cycle
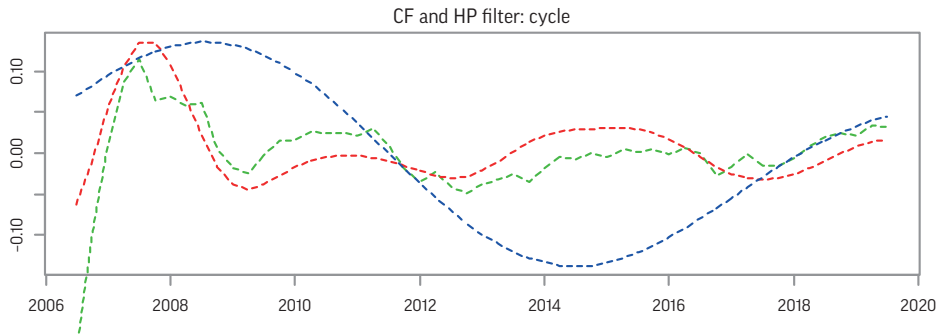
Source: authors' own study.

Figure 6. House price, trend and cycle in Warsaw. Real index, log, new construction and existing stock

Original data, CF and HP filter: trend

CF and HP filter: cycle
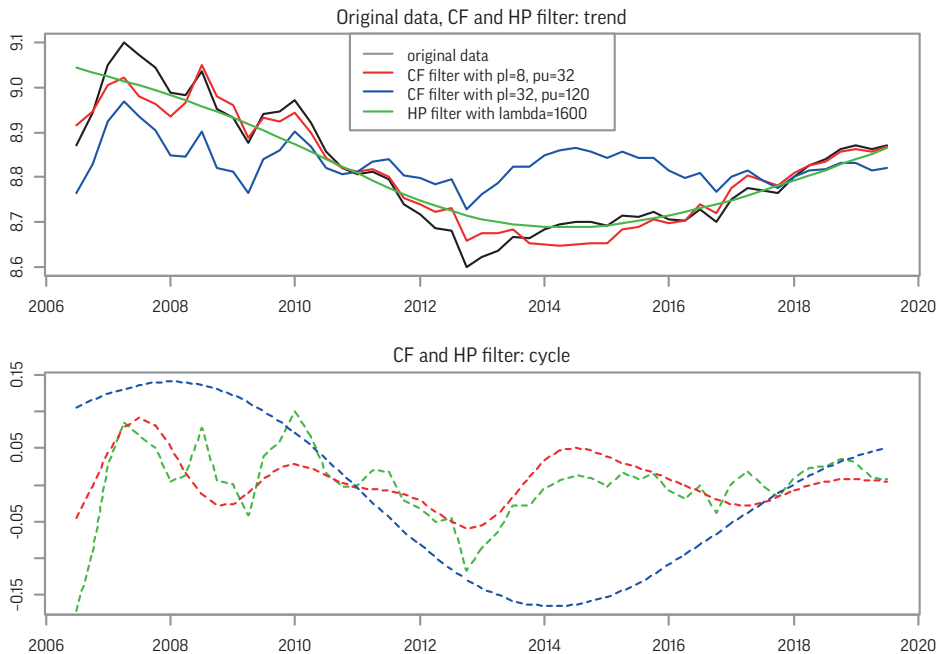
Source: authors' own study.

We have not seen such a behavior for the artificially shortened time series for Ireland or Spain. In case of Poland the cyclical component generated by the two filters has a very similar length, but nearly the inverse peaks and throughs. And we see the same strange pattern when prices for Warsaw alone are analyzed. However, we have a very short sample for Poland which starts with a peak, after which a real price

decline follows. This results in a downward sloping trend, and can have consequences for the cycles that we detect. Therefore, our analysis should be repeated, in case more historical data become available.

Conclusions

We explain how to analyze house price cycles with the use of the Hodrick Prescott and the Christiano-Fitzgerald filter. Our paper has three main takeaways for the reader. First, we discuss whether house prices or investment volumes should be studied, and provide arguments in favor of house prices. Then we show that both medium-run and long-run house price cycles should be analyzed as they carry important, complementary information. And finally, we state that one should be cautious and not use a one-size-fits-all approach. The filters are only tools, the researcher needs to confront the results with his economic knowledge and professional experience.

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II.2

Housing Price Indexes for Small Areas Smoothing in Time and Space

María Jesús Bárcena[1], Cristina González[2], Patricia Menéndez[3], Fernando Tusell[4]

Introduction[5]

This paper presents yet another alternative to estimate house price indexes and their evolution over time and space. The model presented here builds from Bárcena et al. (2011) Bárcena et al. (2013) which made use of a space-varying quality adjustment fitted by geographically weighted regression (GWR) and a smooth time adjustment common to the whole area analyzed. The model presented here is a natural evolution from the aforementioned work and a refinement in the sense that it enables the analyst to estimate different time adjustments for different locations. We put it into practice by showing the different evolution of house prices even in neighboring districts of the Bilbao urban area.

There have been many modeling proposals for housing prices. In one way or another, they all try to account for quality, location and, where transactions from different periods are analyzed, time.

The usual way to model quality is through a hedonic part which valuates different attributes of a house: year of construction, type of construction, surface, equipment and facilities, such as swimming pools, lifts, garages, etc.

Location is of paramount importance in the valuation of properties. To some extent it could be accounted for by attributes such as distance to city center, proximity to public transport, recreation facilities, etc. However, the use of such attributes never exhausts the influence of location, which is usually introduced in the model explicitly. This can be done non-parametrically via smooth functions of geographical coordinates, such as smooth-plate splines, or by letting the coefficients of the hedonic part vary freely over space: geographically weighted regression (GWR) is a popular way of doing so.

The effect of time usually enters models by way of a trend which attempts to account for different prices over time of otherwise identical properties. It can be argued that no property really remains the same over time, if anything else because the environment changes: what used to be an isolated house may in time become the center of a newly developed area, or close to new public transport. Still, the use of trends to account for changes may be a convenient simplification.

The paper is structured as follows: Section 1 describes a model which generalizes our previous work localizing estimated trends in prices. Related work is mentioned in Section 2. Section 3 illustrates its performance on a large data set with over 230,000 observations, extending over the period 2005–2017. Section 4 closes with some comments and conclusions.

1. A semi-parametric model with local trends

Our previous work was concerned with the estimation of price indices for housing. Our raw data consisted of offered prices published by one of the leading property web sites in the country. The specification chosen was:

$$\log(P_{it}) = \sum_{j=1}^{p} \beta_{ij} z_{ij} + s(t) + \varepsilon_{it} \tag{1}$$

In expression (1), P_{it} is the price per square meter at time t of a house located at coordinates[6] (x_i, y_i). The observed value of attribute j for the house at mentioned location is given by z_{ij} which can be qualitative (e.g. existence of central heating) or numeric (e.g. total surface). The hedonic coefficients β_{ij} give the valuation of attribute j at location (x_i, y_i). Finally, $s(t)$ is a smooth function of time capturing the evolution of prices. Since

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[6] As the area we will work with can be well approximated by a flat surface, projected UTM coordinates are used.

we targeted small areas (the city of Bilbao, Spain; see for instance Bárcena et al. (2011; 2013)), it made sense to consider a single trend over the whole area.

It is straightforward to implement a back-fitting estimation routine (cf. Hastie and Tibshirani (1991), §4.4) for the model in (1), once we have routines for the different tasks. These are readily available in, for instance, the R language, R Core Team (2018). A GWR routine (see Harris et al. (2010)) is available in package **spgwr**, Bivand and Yu (2017). A smoothing spline routine (see for instance Eubank (1988); Hastie and Tibshirani (1991)) can be obtained from the **mgcv** package, Wood (2017).

The procedure can be sketched as follows:

Algorithm 1. Global trend with spatially varying attribute effects

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Data: For $i \in I, t \in T$: price of house i at time t, P_{it};
  For $i \in I, j \in J$: attribute j for house i, z_{ij};
  For $i \in I$: coordinates of house i, (x_i, y_i);
  Pre-set tolerance η, GWR bandwidth b_1.

Result: Estimated values of β_{ij} and $s(t)$.

Set $s^{(0)}(t) = 0, k = 1$; 1

while $\max_t \left| s^{(k)}(t) - s^{(k-1)}(t) \right| > \eta \cdot \max_t \left| s^{(k)}(t) \right|$ **do** 2

  Use GWR to fit: $\left[\log(P_{it}) - s^{(k-1)}(t) \right] = \sum_{j=1}^{p} \beta_{ij}^{(k-1)} z_{ij} + \varepsilon_{it}^{(k)}$; 3

  Compute residuals $\hat{\varepsilon}_{it}^{(k)} = \log(P_{it}) - \sum_{j=1}^{p} \hat{\beta}_{ij}^{(k-1)} z_{ij}$; 4

  Smooth residuals $\hat{\varepsilon}_{it}^{(k)}$ over time to compute $s^{(k)}(t)$; 5

  Set $k = k + 1$; 6

end 7

return $\hat{\beta}_{ij}^{(k)}, s^{(k)}(t)$ as final estimates of β_{ij} and $s(t)$. 8

The back-fitting algorithm iterates lines 2 to 7 in Algorithm 1, estimating the parametric in alternation with the non-parametric part until convergence; the loop is exited when two successive estimates of the non-parametric time trend differ by less than a fraction η of the largest value.

In line 5 of Algorithm 1, a smoothing spline is used; $s^{(k)}(t)$ is estimated as the piecewise cubic polynomial $g(t)$ which minimizes

$$\sum_{i \in I} \left(\hat{\varepsilon}_{it}^{(k)} - g(t) \right)^2 + \lambda \int (g''(t))^2 \, dt \qquad (2)$$

The whole area can of course be divided into smaller regions to apply the previous approach and obtain price trends $s(t)$ for each sub-region. However, a different

strategy is followed that allows for local trends while still borrowing strength from neighboring areas. If we want to estimate a local trend around location (x_l, y_l) we can replace $g(t)$ computed as the minimizer of (2) by the minimizer $g_l(t)$ of

$$\sum_{i\in I} w_{il}\left(\hat{\varepsilon}_{it}^{(k)} - g_l(t)\right)^2 + \lambda \int \left(g_l''(t)\right)^2 dt \tag{3}$$

were w_{il} are coefficients which weight more residuals $\hat{\varepsilon}_{it}^{(k)}$ which are closer to the calibration point $l;$ this produces for each calibration point a different price trend. A common specification of w_{il} is:

$$w_{il} = \varnothing\left(|x_i - x_l|^2 + |y_i - y_l|^2; b_2\right) \tag{4}$$

where $\varnothing$ is a kernel function (Gaussian, triangular, bisquare…) and b_2 is a parameter controlling bandwidth. It should be noted that b_2 need not be coincident with the bandwidth used in the GWR.

Using (3) instead of (2) in line 5 of Algorithm 1 produces a derivative algorithm which yields estimates around the spatial point (x_l, y_l). Data points near the calibration point of coordinates (x_i, y_i) are more heavily weighted, so the estimated spline for location reflects primarily the evolution of prices nearby. Although the differences with Algorithm 1 are conceptually small, we give the detailed description of the modified procedure in Algorithm 2.

Algorithm 2. Both time trend and attribute effects spatially varying

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Data: For $i \in I, t \in T$: price of house i at time t, P_{it};
   For $i \in I, j \in J$: attribute j for house i, z_{ij};
   For $i \in I$: coordinates of house i, (x_i, y_i);
   For $l \in L$: coordinates (x_l, y_l) of locations at which trends are computed;
   Pre-set tolerance η, bandwidths b_1 (GWR) and b_2 (residual smoothing).
Result: Estimates, list of estimated values of β_{ij} and $s(t)$ for each l.
foreach l *in* L **do**   1
   Set $s^{(0)}(t) = 0, k = 1$;   2
   For $i \in I$, compute weights $w_{il} = \varnothing\left(|x_i - x_l|^2 + |y_i - y_l|^2; b_2\right)$;   3
   while $\max_t |s^{(k)}(t) - s^{(k-1)}(t)| > \eta \cdot \max_t |s^{(k)}(t)|$ **do**   4
      Use GWR to fit: $\left[\log(P_{it}) - s^{(k-1)}(t)\right] = \sum_{j=1}^{p} \beta_{ij}^{(k-1)} z_{ij} + \varepsilon_{it}^{(k)}$;   5
      Compute residuals $\hat{\varepsilon}_{it}^{(k)} = \log(P_{it}) - \sum_{j=1}^{p} \hat{\beta}_{ij}^{(k-1)} z_{ij}$;   6
      Smooth residuals $\hat{\varepsilon}_{it}^{(k)}$ over time with weights w_{il} to compute $s^{(k)}(t)$;   7
      Set $k = k + 1$;   8
   end   9

$$\text{Estimates } [l] = \text{list} \left(\hat{\beta}_{ij}^{(k)}, s^{(k)}(t) \right) \qquad \qquad 10$$

end   11

return Estimates.   12

2. Related work

There is a vast literature on spatial-temporal models. For a good, book-length introduction, see Cressie and Wikle (2011). LeSage and Pace (2004) contains also a number of contributions. We cannot undertake a comprehensive review and will only comment on work whose motivation or method is closest to ours.

Alternatives to Algorithm 1 exist. For instance, Brunauer et al. (2012) propose a Generalized Additive Model (GAM) specified as:

$$\eta_i = f_1(z_{i1}) + f_2(z_{i2}) + \ldots + f_q(z_{iq}) + x_i' \gamma \qquad \qquad (5)$$

where $x_i' \gamma$ is the parametric part which is considered global and $f_k(z_{ik})$ are smooth functions of time or spatial indices to accommodate variation in time and/or space. In our model, instead, space variation is accounted for by GWR estimation, and only a smooth function (of time) is used to account for time variation. Many more proposals have been put forward: articles with recent literature reviews include Copiello (2020) and Gargallo et al. (2017).

3. An example of application

3.1. Motivation

Algorithm 1 was successfully used to compute a price index for the city of Bilbao (Spain), Bárcena et al. (2011), Bárcena et al. (2013) and has also been used by other authors, e.g. Widłak et al. (2015; 2017).

It was observed in our previous work that, contrary to our assumption that the trend of prices could be assumed unique for all dwellings within a relatively small area (such as the city of Bilbao), this was not so: some areas appear to have weathered the burst of the housing prices bubble much better than others. In fact, areas in which different price trends exist appear to be often the case with housing markets. For a literature review on housing market segmentation see Helbich et al. (2013).

The obvious answer of fitting a model to each area appearing to display a different price evolution is not always feasible (and often undesirable), as the areas may be small

and the available sample in them insufficient to support the required computation. Algorithm 2 has been conceived instead as a way to fit price trends (and compute indices) for very small areas while still "gathering strength" from information in the vicinity. It extends the estimation of the time trend with the same idea that GWR implements to estimate the attribute effects; spatial weighting, which, unlike in Algorithm 1, is now also applied to the residuals computed in line 6 of Algorithm 2.

3.2. Data

A data set of dwellings' advertised prices has been obtained from one of the leading web portals in Spain. While these are not transacted prices, but rather offered prices, they are still usable for the computation of a price index inasmuch as they have a stable relation with final, transacted prices[7].

The data extends from 2005 to 2017 and covers all the Basque Country, with 237,878 observations after discarding non geocoded or otherwise unusable data. It is thus much more comprehensive (and detailed) than the data set used in our previous work Bárcena et al. (2013; 2014).

However, these observations are very unevenly distributed with the bulk of it in the three largest towns: Bilbao, San Sebastián and Vitoria. For the following example only data from 2011 to 2017 have been used and only for the metropolitan area of Bilbao, as only there data density in time and space supports the use of Algorithm 2. For the illustration presented below, the number of effective observations is just over 30,000.

Figure 1 shows the Greater Bilbao area heat map, a conurbation housing over 1 million people along both banks of the Nervión river. Color coded are smoothed median prices in EUR per square meter in 2012 and 2017. It is apparent that the city of Bilbao itself and the city of Getxo (label Algorta, right bank) are the most highly priced areas. It is also apparent that there has been a general median price drop in the five years period from 2012 to 2017, visible in the fainter tones of red, which in places turn to blue.

When we look in closer detail to each of the two areas, another feature is apparent: the price drop does not appear to have been uniform all over space. In Figure 2 we see a clear shrink of the reddish portion of central Bilbao (or deeper blue tones in the peripheral districts of the city) in 2017 relative to 2012, reflecting the drop of prices between these two dates. However, prime locations in the financial district and newly developed areas have been least affected.

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[7]   For rental prices this assumption has been challenged: see for instance Etxebizitza (2019).

This pattern is even clearer in the case of Getxo, Figure 3. There is a trend towards lower prices per square meter, apparent in fainter red or even a switch from reddish to blue, affecting all but a restricted area at the sea front —a place of very expensive dwellings, seemingly less affected by the price drop. The message both Figures 2 and 3 convey is that price evolution can be quite inhomogeneous even inside a single town; and, in the two cases presented, it seems that prices of the more expensive dwellings have been more resilient to a weak market than the rest.

Figure 1. Metropolitan area of Bilbao: Evolution of median prices in EUR per m^2 between 2012 and 2017
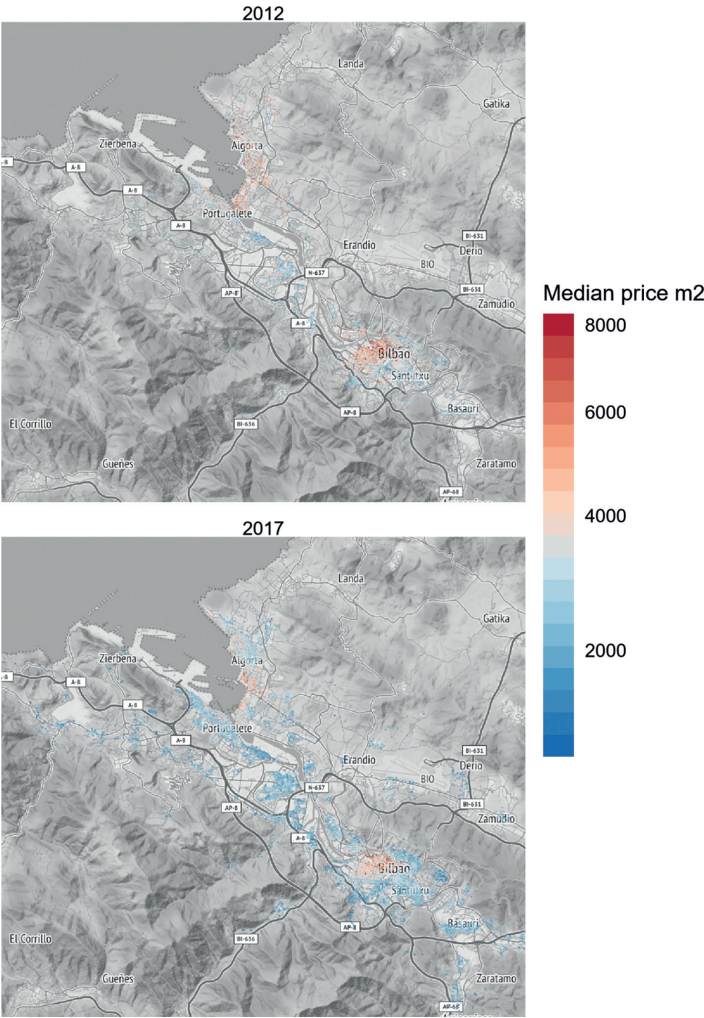
Source: own elaboration, using data and method in text.

Figure 2. City of Bilbao: Evolution of median prices in EUR per m^2 between 2012 and 2017
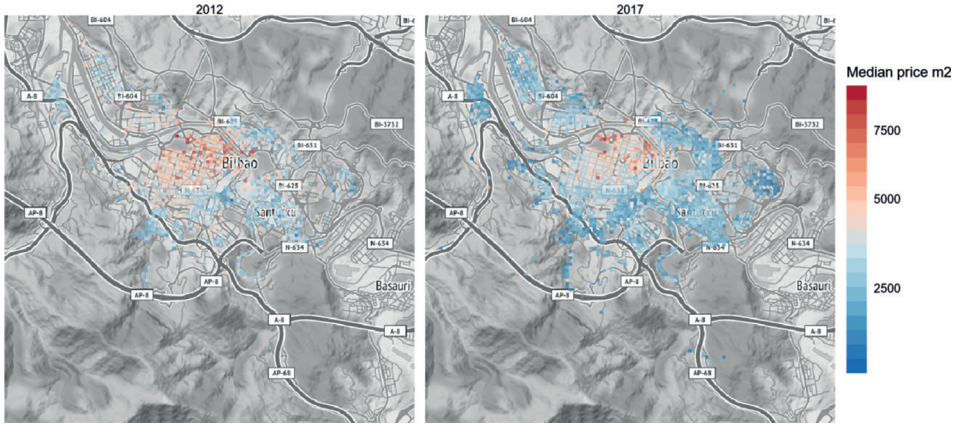
Source: own elaboration, using data and method described in text.

3.3. Computation of local price indices

The computation described in Algorithm 2 has been implemented in an R package[8] of name **ipv**, in function **BackFittingLocal**. All that the user has to provide in addition to what is required to fit a single time trend[9] is:

1. A list of locations at which we want the time trend computed. These locations will likely be the centroids of districts of neighborhoods which we suspect to be different from the rest, either on *a priori* grounds or after looking at heat maps such as Figures 2 and 3.

2. A bandwidth giving the maximum distance at which residuals computed in line 6 of Algorithm 2 will be given a non-zero weight. This bandwidth is unrelated to the one used in the GWR part of the algorithm.

It is important to realize that for each location in 1) a complete back-fitting iteration as described in Algorithm 1 must be run, which is itself a rather heavy computation if the number of observations is large. The computing effort grows linearly with the number of locations selected, and for problems of realistic size such as the example presented it will not be trivial. Thankfully, R package **spgwr**, Bivand and Yu (2017), which we use as a building block in Algorithms 1 and 2, provides for parallel computation. For real size problems, a multi-core machine will be almost mandatory.

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8   Presently not on CRAN, but available from the authors. Notice, though, that we are prevented from distributing the data, so eventual users will not be able to reproduce the vignette and examples shown. Also, documentation (in Spanish) is not yet translated to English.

9   Which is the purpose of function BackFitting in the same package.

Figure 3. City of Getxo: Evolution of median prices in EUR per m2 between 2012 and 2017
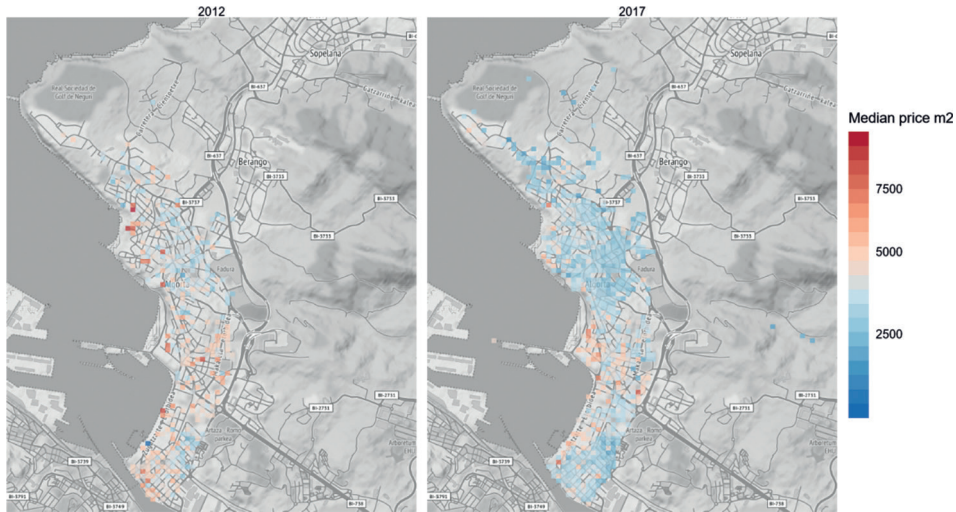
Source: own elaboration, using data and method described in text.

In the interest of brevity, we will only compute two local indices for two areas of Bilbao, where the density of observations is greater. Figure 4 is a blow-up of the central area of Figure 2, giving a detailed view of downtown Bilbao. The two red dots mark two locations (Plaza Ensanche and General Eguía) around which cluster observations that Figure 2 suggests have experienced a different price evolution. The straight line distance between the two points is 1297 meters.

Algorithm 2 has been used to compute local indices at both locations with results that can be seen in Figure 5. The parametric part estimated by means of GWR (line 5 of Algorithm 2) uses variables such as number of rooms, availability of garden, elevator, terraces or parking space. The bandwidth is set at 500 meters and a gaussian kernel is used: this implies that if observations right at the red mark are given a weight of 1, those 500 meters away weight 0.6065 and those away 1000 meters weight only 0.1353[10].

On the other hand, the spatial weights for the spline smoother (w_{il} in line 7 of Algorithm 2) are computed using a bandwidth of 200 meters. We emphasize that both bandwidths may be different. The first may be understood as setting the region within which the valuation of attributes in the hedonic part of the model (the parametric model estimated by GWR) is similar; the second, as setting the region whose price evolution in time is similar. Both bandwidths or either one could theoretically be set by using cross-validation, but the computational effort would be very high. In addition,

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[10]   The weight function **gwr.Gauss** in the R package **spgwr**, Bivand and Yu (2017), is used.

it is usually the case that we are interested in trends for specific areas, which imply the choice of bandwidth. We note however that computationally lighter alternatives have been proposed, Murakami et al. (2019), which make the use of cross-validation feasible.

Figure 4. Central area of Bilbao City. Marked are two locations at which local indices are computed, distant 1297 meters from each other. North East mark is "Plaza Ensanche", central to a high prices area; South West mark is "General Eguía", central to an area more severely hit by price drops

Source: own elaboration.

Regarding the temporal smoothing, we have used 9 equivalent degrees of freedom to compute both local indices. The results can be seen in Figure 5. The base has been set at 31st of December 2010, so the two indices start at the same point. It can be seen that for the first location ("Plaza Ensanche", blue trace) the price drop appears to have ended by late 2013 with some fluctuations afterwards and a clear rebound in 2017. For the second location ("General Eguía", red trace) the price drop continued till early 2016 and the recovery is less marked and leaves the index in mid-2017 clearly below its counterpart for "Plaza Ensanche". Not only this confirms what we could grasp from the heat maps in Figure 2, but also gives additional information on the dynamic of prices.

Figure 5. Local indices for the two different locations marked in Figure 4. GWR bandwidth is 500 meters, bandwidth for spline weighting is 200 meters, kernel is gaussian
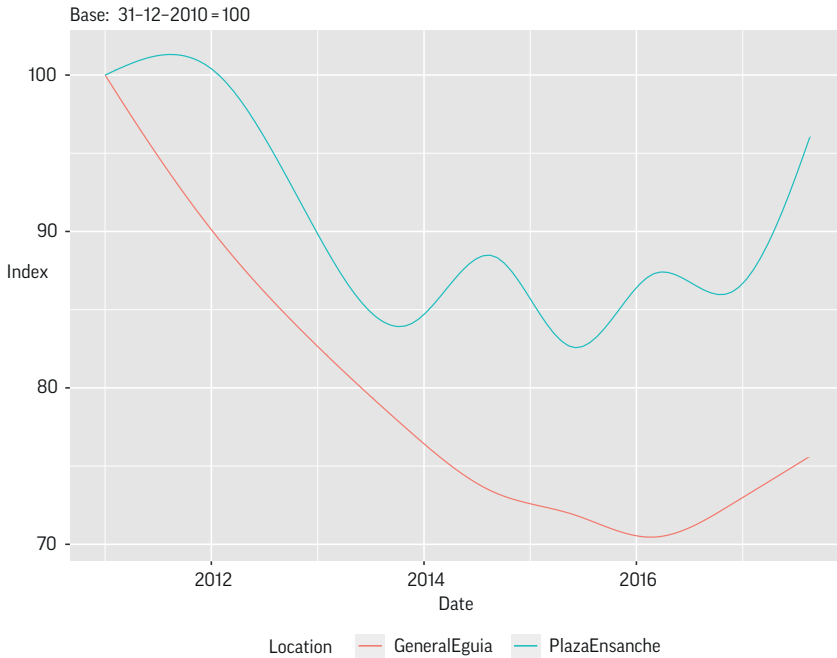
Source: own elaboration, using data and method described in text.

Conclusions

An algorithm for the computation of local house price indices has been introduced, a natural evolution of Algorithm 1, and its performance demonstrated.

Among the strengths, it is relatively simple to implement, produces very detailed information and is easy to understand and interpret.

Among the weaknesses, as we see them, it requires very heavy computation. A multi-core machine can be used, but still the computational burden is important for realistic problems, all the more so if one attempts to set bandwidths by cross-validation: there are two spatial bandwidths rather than one —for the GWR part and for the spline— plus the analyst has to decide on the temporal bandwidth, which is governed by the choice of degrees of freedom in the spline.

When indices for only a restricted area are sought, such as in the example presented, one trick that speeds computations tremendously is to discard all observations which are sufficiently away from the locations of interest: "sufficiently away" can be

something like four times the largest bandwidth. An observation of 4 bandwidths away receives already a weight of only 0.000335 with the gaussian kernel that we used, so all observations beyond can be safely neglected in the local computations.

Aspects that need elaboration, but are not specific to the algorithm presented, concern the anisotropy of the space. This is particularly relevant when dealing with small areas rather than averaging over wide regions. It is often the case that areas with different behavior are limited by administrative boundaries or geographical features, such as rivers: one might want to compute local indices taking into account these facts, which an isotropic kernel such as we have used neglects. One can consider complementing the kernel with qualitative variables (such as "left bank", "right bank", "district x") to further restrict the scope of observations which are used in the computation of local indices, but this is of necessity an ad-hoc solution which needs re-implementing for each particular case.

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II.3

Urban Rent and Building Intensity – Warsaw Case Study

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This article presents the opinions of its authors and not necessarily the official position of the Narodowy Bank Polski

Introduction

Land is a very specific resource from an economic point of view. Among others, it is timeless, limited and generates income for its owner from ownership. As the result of urbanization, land changed its functions with the development of civilization from agricultural production and agricultural rent through industrial rent to urban rent. Increased demand for development land shapes the space, which is used to more adequate functions according to the needs arising from the current level of the socio-economic development. But basically, the land rent depends on the one hand on the supply of a particular type of land, with this type of supply shortage creating monopolistic rents and, on the other hand, on the differences in productivity and / or utility that a particular plot provides, which creates differential rents.

Historically, debates on the land rent have almost always been closely associated with urgent social problems. David Ricardo's theory stems from the corn duty at the beginning of the last century. Henry George's concepts originated from social problems of the late nineteenth century. In modern developed societies, services dominate other branches of the economy and global and local metropolises become the place of their delivery. Therefore, the importance of building capital, including

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housing capital, and urban land rent as a factor shaping its allocation is growing. As a consequence, since the 1960s, the theory of urban land rent has been developed on the basis of agricultural rent theory. Additionally, a sharp rise in land and housing prices in the U.S. inspired a comprehensive analysis of rent theory.

Currently, the urban land rent[3], both definitions and mechanisms of this phenomenon, are largely neglected in social sciences, with the exception of urban economist's models. However, the issue of urban rent is crucial for many important contemporary topics in urban research, such as households' wealth and inequalities, spatial planning of the city, urban infrastructure management, gentrification and many others. Neoclassical rent theories, and to some extent geographical approaches of urban economists, have focused largely on the spatial differences in land prices.

The discussions about the urban land rent were, on the one hand, theoretical about the land rent in urban areas, and on the other, inspired by practical social issues. An important factor hindering the creation of coherent and holistic concepts of land rent theory was the fact that economists often discussed very specific issues – case studies, and dealt with answers to different questions in terms of mechanisms, social relations or roles of rent. Getting acquainted with selected theories that have arisen over the centuries is extremely important, because it allows to become aware of inaccuracies and contentious issues occurring in different approaches. The discussion on the urban rent should be continued to develop the theory, organize existing concepts and finally create a comprehensive theory of the urban rent. The overriding problem requiring land rent theory, however, is to explain the existence of rent in general: why the land is expensive and the largest shares of its value cannot be attributed to labor or interest on capital investments, but it appears that these surpluses come from possessing a scarce good, which is land[4]. The aim of this article is to start a discussion on urban rent and provide the reader with a brief description of the main concepts of urban rent and its impact on building intensity.

The empirical part of the article presents statistical analyzes aimed at presenting how the building intensity, understood as the height of the building, developed historically in Warsaw depending on the location of residential real estate. Moreover, we analyze the correlation of building intensity, location and housing prices (which are determined mainly by land values), which is in line with the theory of the monocentric models explaining the spatial distribution of the population in the city (see Alonso, 1964).

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3   This article presents briefly selected concepts of land rent theory. When we write about land rent, we mean land rent in general, both in the agricultural and urban context, as many mechanisms are similar in both cases.

4   In addition, it is also important who the entities affected by this problem are and what are their behavior patterns and mutual social relations.

1. Land rent theory – literature review

Among the first economists[5] who analyzed the phenomenon of economic land rent were both classics and neoclassicists, including: William Petty (1620–1687), Adam Smith (1723–1790), and David Ricardo (1772–1823), John Stuart Mill (1806–1873), Karl Marx (1818–1883), Alfred Marshall (1842–1924), and Vilfredo Pareto (1848–1923)[6].

William Petty (1769) was the classical economist, who was the first to lay the comprehensive groundwork for the theory of agricultural rent in the 17th century. He analyzed the most important economic categories: money, prices, including land prices and wages. The differential rent in Petty's approach is more dependent on the location of the plot than the varied soil yield. Adam Smith (1954) described the land rent as the highest possible price surplus paid to the owner for the use of the land, taking into account its properties, in particular location and productivity. For Adam Smith, rent for land is a price paid for the value contributed by nature itself. However, stating that the land itself is a source of value is incompatible with the labor theory of value (a value of a good depends on how much work it takes to make the product) that dominated classical political economy. Ricardo (2001 [1821]) adapted the theory of land rent to the labor theory of value using the concept of "differential rent". Ricardo's differential rents result from the advantage that a given plot has over inferior plots, so the rents are determined by the fertility or location of the marginal lands under cultivation – the least profitable usable land, assuming the same amount of labor and capital. Differential rent I consists of component Ia – which is determined by variable land fertility in agriculture and component Ib – resulting from the location of the plot relative to markets. Differential rent II is determined by the possibility of achieving additional profits due to different levels of investment in land, i.e., incurred expenditure on factors of production – capital and labor. Despite shortcomings, associated with the omission of monopolistic and absolute rents and the lack of argument about the motivation of owners to use the worst plot, Ricardo's theory is an important study and is starting point for neoclassical, Marxist and other subsequent approaches to the topic.

Karl Marx (1959 [1984]) defined the land rent as a payment to the landowner for the right to use land, therefore, the basis of his concept is the monopolization of ownership of certain parts of the globe by a class of people demanding payment for its use, so in this sense each rent is an absolute rent. The functioning of the system

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[5] Considerations regarding the concept of land rents have also been conducted earlier. For example, physiocrats considered land rent as a surplus over the necessary payment, which was obtained by the owner of the land. (Światowiec-Szczepańska, 2012).

[6] See Wessel (1967).

based on private land ownership and the existence of a class of owners demanding a certain profit rate determines the land rent. He distinguished two categories of land rent: *differential rent*, in which the landlord demands a surplus of profit resulting from the use of qualitatively different land[7] and *monopoly rents* which are a consequence of the limited supply and barriers that are imposed by the existence of a class of tenants (absolute rent). According to Marx's approach, different forms of rent can occur simultaneously and are empirically indistinguishable and that the value of rent can be calculated as follows: "Ground-rent [..] capitalized constitutes the purchase price or value of the land…".

Despite the discussions about the land rent formation and mechanisms and absolute and relative values, classical economists had convergent views. Ward and Aalbers (2016) summarize the land rent forms created by the classics and give an example of modern and classical examples. It appears, that modern examples of phenomena often observed in urban housing markets can be attributed to a certain form of rent according to the classical theory of land rent. However, some separate mechanisms of formation and factors affecting the agricultural and urban rent led to the distinction between these phenomena.

In urban areas, the land rent is mainly dominated by the impact of the location factor. Marshall (1962) has already stated that the price of development land is equal to the price of agricultural land increased by the capitalized benefits of location. The concept of land value in relation to urban areas had been already used at the beginning of the 20th century by Hurd (1903). Hurd emphasized that the land rent in urban areas is determined mainly by location and to less extend by other physical attributes, which include, among others: land use type and buildings intensity (measured as building height).

While in classical political economy, land was considered as a gift of nature and was seen as a major factor of production requiring a separate theory, marginalists began to question this issue. They also debate on the distinction of classical economists between capital and land (Clark, 1908). Neoclassical economists, which were developing marginalists concepts, also did not distinguish land from capital as a factor of production, and renewed interest in urban land rent was observed in the second half of the twentieth century. The lack of distinction between land and capital as factors in the production process, when analyzing prosperity and wealth in the economy and in national accounting, is a serious conceptual error of economic theory[8].

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[7]   Marx (1959 [1984]) additionally divided differential rent into two categories: extensive rents – differences related to the feature of the land; and intensive rent caused by investments in land.

[8]   Treating land as a form of capital is almost ubiquitous in mainstream economics but is incompatible with capitalist space economy. However, the assumption that land behaves like capital and reacts perfectly

The soaring rise in land and housing prices in the early '70s inspired a lively discussion on rent theory in many countries, such as the United Kingdom (Murray, 1978), the U.S. (Harvey, 1974) and West Germany (Haila, 1990). Marx's theory of rent was researched and developed, while neoclassical economists were criticized for analyzing separately capital and land, and ignoring the issue of rent. Halia (1990) divided the discussion in the 70s and 80s into three phases, namely: consensus (in the 70s), transition (at the turn of the decade) and rupture (in the 80 s). In the Table 1 we summarized the ideas, that were discussed in those phases.

Table 1. Haila's conclusions on urban land rent theory phases in 70s and 80s XX

Phase	Time period	Characteristics	Researchers
Consensus	70s	1. The focus was on absolute, not differential rents. 2. Land rent was seen as a precapitalistic and noncapitalistic element within capitalism. 3. Land rent prevents the flow of capital – it was interpreted as a barrier to the accumulation process. 4. Land rent was considered in terms of social relations.	Emmanuel (1972), Harvey (1974)
Transition	70s/80s	1* The absolute and monopoly rent concept was replaced by a growing focus on differential rent. 2* Land rent was interpreted as an endogenous element in that mode of production. 3* Negative role of land rent (as a barrier to accumulation) was denied. 4* Landed property comprises heterogenous groups of agents.	Ball (1977), Bandyopadhyay (1982)
Rupture	80s	This breakup led to the division into rival lines of thought: • the idiographic line which denies the possibility of a general theory of land rent, analysis of concrete situations, • the nomothetic line which searches for general laws.	Ball (1985), Scott (2013)

Source: own study basing on Haila (1990).

Haila (1990) believed that it is possible to come up with the general theory of land rent and claimed that there is a need of further research on land rent theory as the theory is at the crossroads.

Basing on Haila (1990), Kerr (1996), Ward and Aabers (2016), Ryan-Collins et al. (2017) and the literature review mentioned above we extract the most important direction in which modern research should be developed:

▪ **land functions in the modern economy**: accumulative function (having an impact on wealth and inequalities), allocative (of capital) and spatial coordinative function (various land uses and intensities in space);

▪ **land as a financial asset**, which means, that not only new species of conscious calculating owners and real estate professionals have emerged, but also a rent

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to supply and demand pressures has enabled urban economists to construct models of perfect competition and subsequent equilibrium in land markets, as in the Alonso model (1964).

maximizing approach has spread among other landowners. Income from land rent is in practice treated as the financial asset indistinguishable from capital; but for this purpose a complex set of institutional, regulatory, socio-cultural and political practices is needed;

- **capital switching approaches,** which focus on the entry of capital into built-up environments and include institutional approaches developed from a wide range of theoretical perspectives. Real estate has its own internal dynamics related to the financial sector rather than dependent on the dynamics of production (see Aalbers, 2008). The concept that real estate has independent dynamics in relation to production did not cause the exploration of the economic rent category, which differs from the interest from capital;

- **rent gap theory**, which explains the origins, mechanisms and reasons of gentrification (see Smith, 1979). In this approach, the rent and the value of the building are separate components that make up the price of the house.

The theory of land rent and its development – the theory of urban rent, prove to be a very useful concepts to provide an integrated political and economic perspective for the analysis of urban phenomena (Alonso, 1964). Basing on the literature we define land rent as a payment made to landlords for the right to use land, less the rent paid for the fixed assets on the land (buildings and other equipment).

2. Land rent, land value and building intensity

The concept of urban rent, justifying the diversity of urban areas value, was based on the theory of agricultural land rent. However, the mechanism of its creation is different. In the past, according to classical theories, land had primarily agricultural utility, and enriched by labor and capital generated a product of a certain value. Landowners, possessing such a resource, can receive a payment for using land, after rewarding other production factors – capital or labor. Land tenants use capital in order to use the land and make a product or service and some part of the final product/service value are capital gains. In exchange for their work, employees receive remuneration in the form of wages. The part of the revenue (surplus over production costs which include the production factors remuneration and ordinary profits) that can be obtained from land is a land rent and is captured by the landowner. The income obtained from production is, therefore, distributed among entities involved in the production process. Today this chain of value capturing looks quite similar: an employee receives a wage, an owner of capital – interests, a producer – ordinary profits, while the remaining part of the income is the land rent. However, the factors that have an impact on land use and value are

different. Physical features of ground (including soil fertility), and the natural value of the area, are important for agricultural rent. In the case of urban rent, the physical conditions that determine the intensity of building development and land use, and the location of the plot in relation to other elements of space are important.

Understanding the economic value of land in space is extremely important in urban research. A characteristic feature of urban rent in relation to the prices of other factors of production is that in most cases (i.e., where built-up areas dominate) it is not directly observable, and yet it has a key impact on the functioning of the market. The land rent is believed to be based on the estimated value of capitalized rents that will be received in the future. Land rent is related to both the contractual rent paid by tenants and the purchase price of land. To sum up, the price of land is based on the income it generates at the moment and in the future.

As we have already noticed in urban areas, the land rent is mainly dominated by the impact of the location factor. It might seem that technological development has reduced the importance of physical distance, however, competition for the best-located space at a well-connected point in the city is reflected in higher real estate prices for central areas around the world. Location amenities – which often make up a significant part of the property value – are usually capitalized in the value of the land, but not in the physical value of the structure built on the plot (De Groot et al., 2015).

Land rent models, in addition to explaining the mechanism of differentiating the value of land in a city, are also used to determine the spatial allocation of urban functions. The urban space is diversified in terms of the forms of use and the way the land and built property is used is closely related to the function of the given city area. It is necessary to determine the main way of using the plot with the possibility of using a specific part of building for other defined purposes. Usually, the most important functions in most cities are concentrated in central locations, which are characterized by the greatest economic and cultural activity and also are characterized with the highest land values (De Groot et al., 2015). The analysis should take into account building intensity different for each purpose and determine the location of the type of property in accordance with social needs.

3. Urban intensity – the history of planning regulations in Poland

Rational use of urban areas is one of the factors determining the effectiveness of social and economic processes and, as a consequence, it has an impact on the country's economic growth. Accurate assessment of the degree of use and investment opportunities in urban areas is an important element of local planning in shaping the location policy

of facilities in the city. Changes in land use should be taken according to pre-defined guidelines to ensure that urban development is not chaotic and to take into account the needs important from the society's perspective. Developing this issue should contribute to the rational planning of various forms of use in urban areas, so that social and economic processes in the city occur more efficiently, urban areas are used more intensively and the policy in the field of spatial planning is conducted in a structured way.

A good measure of the degree of land use is the intensity, which tells about the degree of use of a given area to perform a given function. Development intensity indicators determine the boundary parameters of the investment project that can be implemented in a given area. This indicator can be expressed quantitatively as:

a)   horizontal intensity – the percentage share of the area performing a given function in the total area of the plot;

b)   vertical intensity – the number of floors occupied by a given function;

c)   mixed intensity – taking into account both above mentioned measures.

Table 2. Legal acts on land use after 1990

The legal act name	Content of the legal act
Act of 7 July 1994 on spatial development (Journal of Laws 1994, No. 89, item 415)	Article 10 of the Act indicated **the possibility** of setting maximum or minimum building intensity indicators in the local spatial development plan. There is no definition of building intensity indicator in this Act.
Act of 27 March 2003 on spatial planning and development (Journal of Laws of 2003, No. 80, item 717)	The Act indicated that the local plan should **mandatory** define the parameters and indicators of building development and land development, including, i.a., building development indicators. As in the case of the 1994 Act, the concept of intensity indicators is not defined in the Act.
Act of 25 June 2010 amending the Act on spatial planning and development, the Act on the State Sanitary Inspection and the Act on the protection of monuments and care over monuments (Journal of Laws 2010, No. 130, item 871)	From October 21, 2010, there is a change introduced by the amendment to the Act on spatial planning and development of June 25, 2010 (Act, 2010). The current regulation obliges to specify the maximum and minimum building intensity as an indicator of the total building area in relation to the building plot area[9]. According to the above, the formula is: $$I = \frac{P_c}{P_d}$$ Where: I – building intensity indicator, P_c – total building area, P_d – building plot area The total area can be written as the sum of the areas of individual floors: $$I = \frac{\sum_i^n P_i}{P_d}$$ Where: P_i – area of i-th floor n – the number of floors

Source: own study.

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9   In addition, the Act regulates: the minimum percentage of the biologically active area in relation to the area of the construction plot, the maximum height of the building, the minimum number of parking spaces and the manner of their implementation as well as the building lines and dimensions of the facilities.

The next part of this chapter presents an analysis of legal acts regarding building intensity and reviews the regulations specifying the restrictions on building height specified in local plans adopted by the local government in Poland. The analysis of the draft regulations allowed the identification of current and future problems.

Currently, one is working to create a coherent concept of spatial policy and amend the act on spatial planning. According to information from the Ministry of Development obtained in mid-2020, the main assumptions of the new Act on spatial development should be presented.

The changes in legal acts may seem insignificant, however, the examples presented in the article touch on two main issues. First, the obligatory use of the indicator. It is important that building intensity indicator regulations are required and applied. Secondly, the regulations have an extremely large impact on: building possibilities and the value of a construction plot.

There are some problems with applying intensity indicators related to:

- **Local plans format.** It is important to prepare a local plan in an electronic form, on a vector map, which will allow easy comparison of decisions regarding new constructions with information on the spatial location of, among others, cadastral plots, buildings and other objects stored in geodetic resources, also in vector form.

- **Data accessibility**. The data from the geodetic resource should be updated on a regular basis and reflect the actual state.

- **Information on building stock.** The intensity of buildings from already existing stock – an inventory of buildings should be prepared, which increases the cost of preparing the plan.

- **Time consuming calculations**. It is worth noting that to conduct analyzes, basic knowledge of GIS (Geographic Information System) is needed. Making even simple calculations is very time-consuming and a spatial database with information about surface of floors and the area of building plots is necessary.

- **Intensity indicator calculations.**
  Sum of total areas of all buildings within the construction plot
  Should the underground levels and outbuildings also be included in the calculation of the indicator in addition to the above-ground floors? The inclusion of underground floors in the calculation of building intensity can effectively prevent many negative phenomena, especially in areas with high investment pressure. Controversy arises during the construction of a large plot area below ground level, which can lead to problems with retention and insufficient absorption of rainwater into the ground. In extreme cases, construction disasters may occur, which is particularly evident in intensively invested areas and downtown areas.

Building plot area

The area of the construction plot is not the same as the cadastral parcel. In the Act on Spatial Planning and Development (Act, 2003) and in the Act on Real Estate Management (Act, 1997), the definitions of construction plots are contradictory. In local plans the definition in the Act on spatial planning and development applies. The building intensity related to the construction plot is an obligatory indicator, however, it is worth considering the possibility of taking into account additional parameters. The reference point can also be functional (elementary) area or other surfaces, freely defined by the designer.

After analyzing the law and specific practical examples, it turns out that the issue of building intensity may concern many institutions, including primarily bodies giving opinions and agreeing, but also checking the compliance of the plan with the law and issuing building permits. Complications in determining and interpreting the intensity indicator may have a negative impact on the planned investments, for example uncertainty may appear during issuing building permits.

Like many other indicators, also the building intensity is not only used to assess the existing conditions, but also allows to study changes over time. The variability of building intensity over time allows to plan the necessary infrastructure investments in advance. This is of great importance in the accessing effectiveness of the city or urban management. Comparative analysis is also important from the point of view of local, regional and national spatial policy. The possibility of comparing intensity indicators, for example, the average for a district, poviat, voivodship and other levels allows to obtain a reference point. Individual values may be differentiated, depending on the function, type of building, size of the town and others. Considering the possible applications of the indicator, it is necessary to emphasize once again the need to establish a uniform definition and the method of its calculation.

In this article, we deal with vertical intensity, because in our opinion, the limits on horizontal intensity should be statutorily defined and in our opinion it has limited impact on urban rent and this impact is similar for every plot. Calculating separate vertical intensity should be required for the entire city and for each type of land use in the city. This should be a conditional measure based on how the land is used. In order to ensure discontinuities, the obtained values should be divided into class ranges. Despite the number of floors, a set of different indicators should be additionally taken int account to ensure that land is used to the maximum benefit for society, i.e., the minimal % of green areas on plot, % of floor areas to total area of the building should be defined, etc.

4. Empirical analysis – Warsaw case study

The empirical analysis consists a case study of the Warsaw residential real estate market. The database on housing buildings and transactions was obtained from the Geodesy and Cadaster Department of the Warsaw County Office[10]. The county of Warsaw is also an administrative territorial unit. Warsaw is the Polish capital city and the largest Polish city, divided into two parts by the Vistula River that flows through the center of Warsaw. As far as space is concerned, over time subsequent neighboring municipalities were connected to the borders of Warsaw. From April 1994, the capital was a municipal association of 11 municipalities: Bemowo, Białołęka, Bielany, Centrum (it included the current areas of the following districts: Mokotów, Ochota, Praga Południe, Praga Północ, Śródmieście, Wola, Żoliborz), Rembertów, Targówek, Ursus, Ursynów, Wawer, Wilanów, Włochy.

Chart 1. Warsaw districts
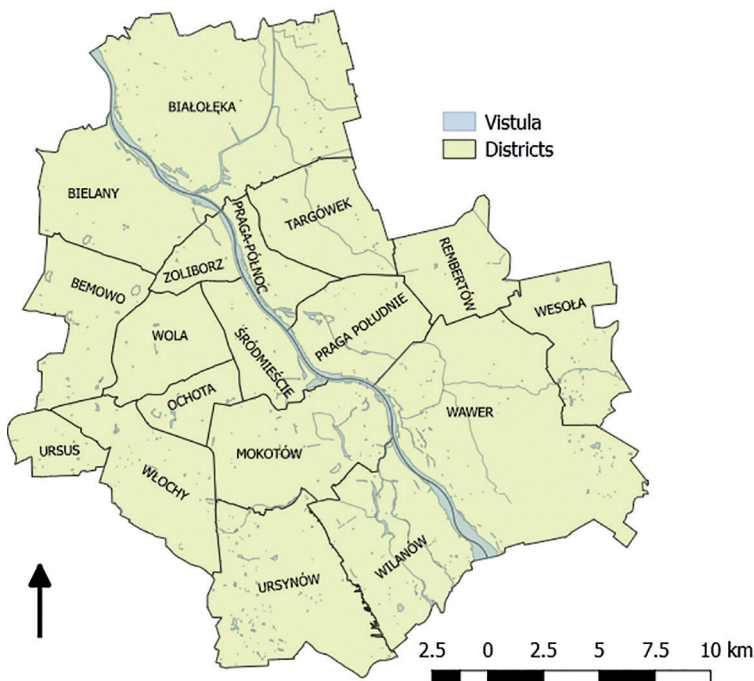
Source: own map basing on EGiB data.

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[10]   RCiWN relates to housing prices in Warsaw, while EGiB data relates to buildings and its characteristics.

As a result of reforms introduced by the so-called the Warsaw Act, since October 27, 2002 Warsaw is only one commune with poviat status – the existing communes have gained the status of districts[11]. Currently, Warsaw is located on an area of 517.2 km², after incorporation in 2002 the youngest – Wesoła. To sum up, the capital city is divided into 18 functional and historical administrative districts.

Currently a large part of Warsaw is covered by agricultural, forestry and green areas. It can be observed that the area of this type of land use decreased from 2005 by 8 p.p. The largest increase in the share was observed in the case of residential areas (6 p.p.), which proves rapid development of the housing market and better meeting the housing needs of the population. The upward trend is also observed in other built-up areas (3 p.p.), which means that the share of commercial buildings also increases. The increase of built-up areas in the city indicates the economic and social development of the city (see Chart 2 and 3)[12].

Chart 2–3. **Summary statistics presenting the share of lands by form of use in Warsaw in 2005 and 2017**
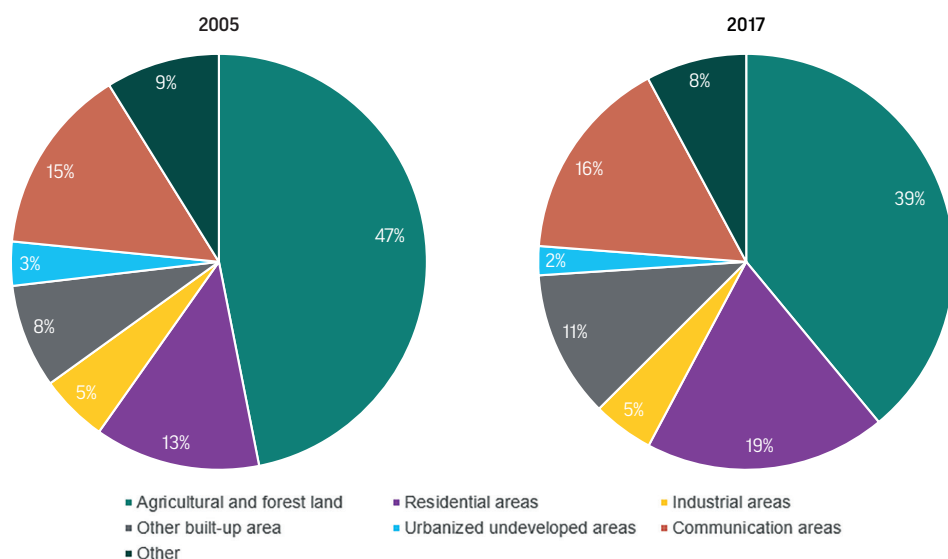
Source: own calculations basing on EGiB data.

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[11]   Source: Wikipedia.
[12]   Other built-up areas include services, trade, administration, cemeteries etc.; urbanized undeveloped areas – undeveloped land, intended for urban development plans for development, excluding areas for agricultural and forestry production; other areas – fossil, recreation and leisure areas, wasteland, land under water, ecological land, etc.

In the next part of our research we analyze the spatial distribution of housing intensity in Warsaw over time to study how Warsaw has been developing, and to draw conclusions about the relationships between the intensity of development, location and the price of real estate, which largely consists of the value of land and hence land rent. While the building intensity indicators contain interesting information about the average height, they ignore information from the economist's point of view about the actual height of completed residential buildings. Assuming that the height of the storey is constant, the number of floors will show the actual building intensity assuming that the spatial planning principles in force in a given period have been preserved and the plot is developed and minimal requirements regarding greenery were ensured.

During 1939–1945 approximately 80–90% of Warsaw's buildings were destroyed, demolished or burned. It can therefore be said that Warsaw was built from scratch after II World War. II World War damages had long-lasting consequences for Warsaw's housing stock. The estimated destruction of housing amounted to about 72% (Ciborowski, 1969). Flats that were not destroyed were often abandoned, and owners of the land, on which a lot of housing units were built, couldn't be sometimes found. Without the consent of each private owner, it was impossible to rebuild the destroyed city, which led to the signing of the Warsaw Decree in October 1945 by the Soviet Union (the so-called Bierut Decree), according to which ownership of real estate within the borders of Warsaw was transferred to the Warsaw commune[13]. The land was nationalized mainly in the city center, while the areas located in the suburbs of Warsaw still remained private property. The introduction of the Bierut Decree immediately after the II World War and the decades of Soviet control over Poland left marks on the morphology of Warsaw and significantly affected the city's housing stock in the long term. Housing in this period had many features common to housing in Soviet societies: small size of flats, limited number of rooms, similar architecture of buildings (mass construction of homogeneous buildings).

In the case of a centrally planned economy the productive forces focused almost exclusively on the industry, transport and agriculture, which limited investment in housing. Moreover, production factors, including land, were not allocated according to market rules, but to decrees. The consequence was a waste of economically valuable areas and high costs of socialist cities functioning. Moskov as the Soviet city is a very interesting example of an administrative-command systems which creates inefficiency in the operation of land markets in terms of location and land use in cities. The vast

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[13] In the theory it was possible for former owners and their legal successors to submit an application for the return of property ownership, but in practice this possibility lasted for a short time, and as much as 98% of formal applications submitted in accordance with the provisions of the Warsaw Decree were rejected (Lawton, 2016).

growth of Moskov took place during the Soviet era (1917–1991) when land was nationalized and administratively allocated. The lack of disciplinary influence of the free market on land development in Poland was noticed even in the literature (Chołaj, 1966). The transformation of the real estate sector, especially housing, to the standards of a developed market economy takes much longer than other sectors of the economy. This is associated with high social costs and natural social resistance, institutional deficiencies, including the financial system, as well as a lack of experience and skills on the part of the public factor in space management. It can be assessed that in Poland the housing sector has been operating under normal market conditions since the 2000, when inflation dropped and the required regulatory changes were introduced.

We can distinguish two phases of meeting housing needs in Warsaw in the Soviet period: 1. falling in the years 1951–1970, 2. falling in the years 1971–1990. As presented on the Chart 5 immediately after the war, the city center (mainly Śródmieście, Mokotów, Wola and Żoliborz) was rebuilt with buildings of medium and high height – mainly with 4–15 floors following the example of a prewar building[14]. In 1971–1990 a lot of housing cooperatives started to build high and medium height blocks of flats away from the city center (Bemowo and Bielany, further located Mokotów and Ursynów, Targówek). This may be seen as three clusters of orange dots on the Chart 6. These results are also shown in Tables 3 and 4.

Table 3. Share of buildings with a given number of floors built in individual districts (construction years 1951–1970)

District	Number of floors																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bemowo	3%	4%	3%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%
Białołęka	15%	6%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bielany	5%	4%	4%	10%	13%	4%	2%	1%	6%	6%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Mokotów	5%	12%	39%	18%	20%	23%	11%	19%	21%	5%	28%	12%	32%	13%	0%	13%	28%	0%	50%	0%
Ochota	0%	0%	0%	7%	12%	8%	14%	18%	16%	6%	10%	5%	29%	13%	33%	0%	0%	0%	0%	0%
Praga-Południe	0%	0%	2%	12%	7%	5%	6%	5%	3%	4%	3%	5%	0%	0%	0%	0%	0%	0%	0%	0%
Praga-Północ	0%	0%	0%	4%	3%	5%	11%	6%	2%	0%	3%	19%	0%	0%	0%	0%	0%	0%	0%	0%
Rembertów	5%	6%	6%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Śródmieście	0%	0%	2%	13%	12%	31%	41%	29%	27%	32%	7%	22%	11%	13%	67%	88%	22%	0%	0%	0%
Targówek	9%	5%	5%	1%	3%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ursus	4%	8%	6%	7%	9%	0%	0%	0%	4%	0%	2%	9%	0%	0%	0%	0%	0%	0%	0%	0%
Ursynów	3%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wawer	34%	36%	12%	1%	1%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wesoła	4%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wilanów	4%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Włochy	7%	7%	7%	4%	2%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wola	1%	1%	2%	20%	11%	21%	14%	19%	18%	37%	15%	28%	18%	0%	0%	0%	44%	0%	0%	0%
Żoliborz	0%	3%	6%	2%	6%	2%	1%	3%	2%	9%	5%	0%	11%	50%	0%	0%	6%	100%	50%	100%

Source: own calculations basing on EGiB data.

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[14]   According to Table 3 there is a high share of buildings higher than 10 floors, but the total number of that buildings is relatively low.

Table 4. Share of buildings with a given number of floors built in individual districts (construction years 1971–1990)

District	Number of floors																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bemowo	9%	10%	10%	15%	3%	4%	18%	27%	34%	43%	12%	34%	13%	15%	0%	0%	0%	0%	0%	0%
Białołęka	12%	9%	4%	6%	1%	4%	2%	1%	2%	5%	2%	9%	9%	0%	0%	0%	0%	0%	0%	0%
Bielany	4%	4%	5%	8%	11%	7%	22%	3%	5%	5%	9%	8%	19%	2%	30%	48%	0%	0%	0%	0%
Mokotów	1%	5%	16%	8%	22%	20%	17%	6%	4%	5%	20%	16%	4%	39%	0%	38%	20%	50%	0%	0%
Ochota	0%	0%	0%	1%	2%	2%	3%	0%	0%	1%	2%	0%	2%	0%	10%	0%	0%	0%	0%	0%
Praga-Południe	0%	0%	0%	2%	4%	13%	3%	3%	14%	5%	2%	2%	9%	7%	0%	0%	20%	0%	0%	100%
Praga-Północ	0%	0%	0%	0%	1%	9%	5%	1%	0%	2%	2%	2%	0%	0%	0%	0%	10%	0%	50%	0%
Rembertów	3%	3%	5%	3%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Śródmieście	0%	0%	0%	1%	1%	9%	5%	4%	8%	4%	0%	1%	0%	0%	0%	0%	20%	0%	50%	0%
Targówek	7%	9%	14%	9%	12%	0%	2%	4%	5%	15%	18%	11%	20%	22%	40%	0%	0%	50%	0%	0%
Ursus	1%	3%	4%	3%	2%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%
Ursynów	11%	7%	8%	24%	24%	7%	3%	48%	23%	6%	19%	7%	20%	0%	0%	8%	0%	0%	0%	0%
Wawer	27%	25%	13%	4%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wesoła	10%	8%	5%	6%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wilanów	4%	5%	5%	6%	1%	2%	7%	0%	1%	0%	1%	0%	1%	13%	0%	0%	0%	0%	0%	0%
Włochy	10%	11%	9%	3%	5%	0%	0%	0%	0%	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wola	1%	1%	1%	1%	1%	13%	3%	1%	2%	5%	7%	5%	3%	0%	0%	6%	30%	0%	0%	0%
Żoliborz	0%	1%	1%	0%	3%	9%	10%	0%	0%	2%	3%	0%	1%	2%	20%	0%	0%	0%	0%	0%

Source: own calculations basing on EGiB data.

After the collapse of the Soviet Union, during the economic and social transformation in Poland, the housing market has also been modified. Private housing stock grew rapidly, in particular due to the implementation of a mass privatization policy for municipal apartments. Also the features of new flats that were built have changed – the flats were more spacious and blocks of flats differed from each other. According to Łaszek and Widłak (2016) the beginnings of a real estate market with a well-functioning developer and banking sector that offered mortgage loans can be dated to 2000. According to the capitalist city structure, tall buildings are being built in the center, because the price of land is high due to the limited supply, and as the city borders get closer, the buildings are getting lower (see Chart 7 and 8).

There are also some exceptions – higher building and land values are also recorded where the transportation system is more developed (areas near to metro stations). In recent years, Warsaw has recorded a low demographic growth (the city increased by approx. 102 thousand inhabitants in 2002–2019), as well as a rapid increase in housing construction. In the same period, approximately 280 thousand flats were built in the Polish capital, i.e., on average around 15.5 thousand flats a year, and as many as 89% of flats built in 2002–2019 were completed by private investors[15].

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[15] Central Statistical Office.

Charts 4-8. Distribution of residential buildings with a given number of floors built in given periods

Chart 4. Construction year <=1950
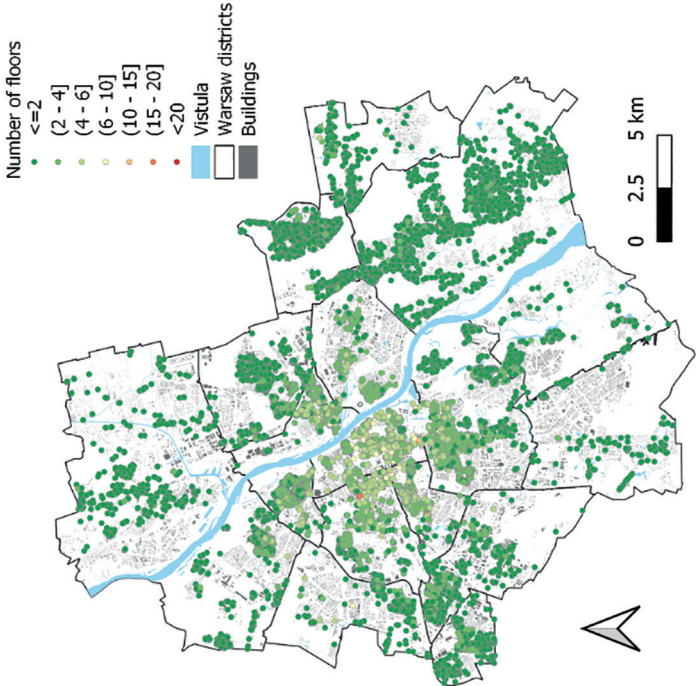
Chart 5. Construction year: 1951–1970

Chart 7. Construction year: 1991–2004
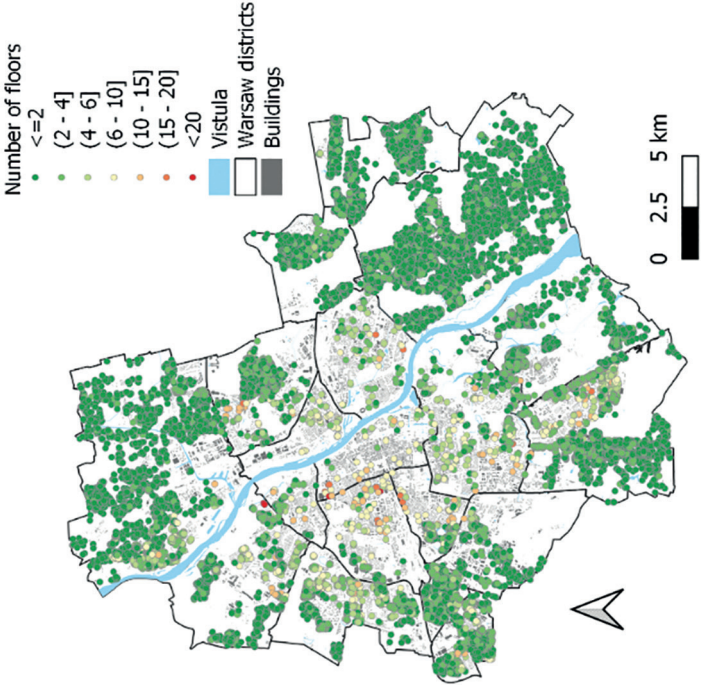
Chart 6. Construction year: 1971–1990

Chart 8. Construction year > 2004
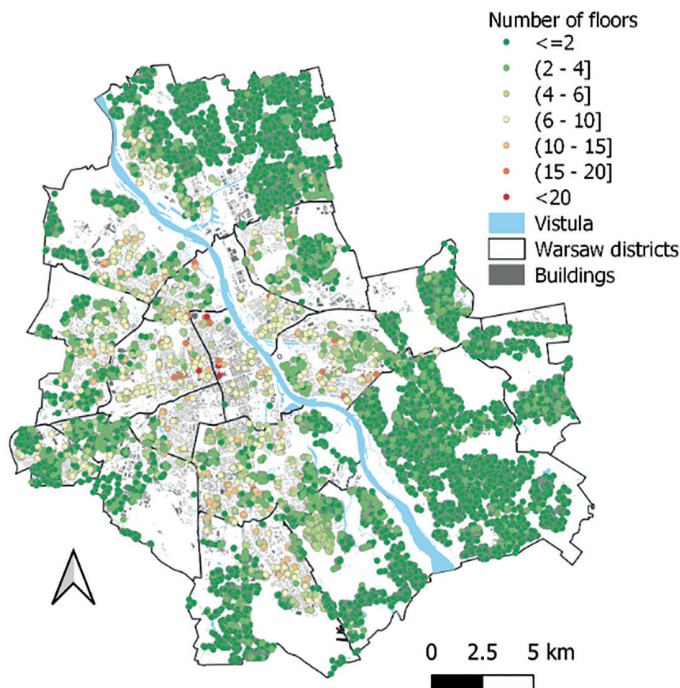
Source: own map basing on EGiB data.

Assessing the relationship between the intensity, the value of land and distance from the center in communist and capitalist economies is difficult due to the lack of historical data. We have reliable transaction price data for Poland since 2006, which is presented in the Chart 9. We can observe a sharp increase in housing prices and slow decrease till 2013. After 2013 housing prices began to gain momentum.

The gradient of housing prices, which mainly stands for land value is getting steeper over time (see Chart 10). We do not have data from earlier periods, but according to Bertaud, and Renaud (1995), land price gradient seems to rotate rapidly during the transition of a market, as the location started to be capitalized into the property value. This can be explained by the large shortages of residential real estate in the post-Soviet times and the high current demand, which influenced the rise in property prices. In Poland, the mechanism of urban land rents started functioning after 1990. The current development of the city and the valuation of land rent can therefore be treated as fully marketable, as evidenced by prices of residential real estate which mainly stand for land values. The chart below presents the relationship between the height of the apartment, the price and the distance from the Warsaw city center (see Chart 11).

Chart 9. Housing prices in Warsaw (2006–2016)

Source: own calculations basing on RCiWN data.

Chart 10. The relations between distance and housing prices in 2006 and 2016
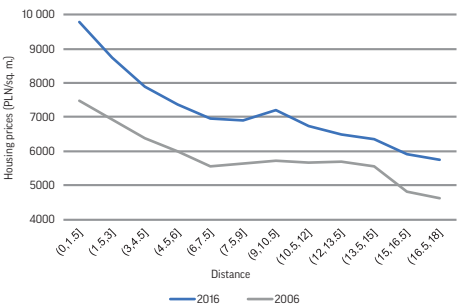
Source: own calculations basing on RCiWN data.

Chart 11. The relations between distance, number of floors and housing prices (2016)
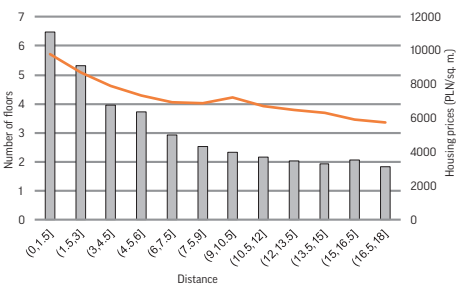
Source: own calculations basing on RCiWN data.

Comparison of building intensity, which is a proxy for population density, and property price, which largely consists of land value, indicates many similarities in the spatial distribution of these two features and indicates a significant correlation with the distance from the city center. This is in line with the theory of the city's monocentric models, which aim to explain the spatial distribution of the population in the city (see Alonso, 1964). The Charts 12 and 13 show that housing prices fall with distance from the center, while the population density decreases with distance. We can see that in areas with higher building intensity, the prices are also higher. We can also notice some derogations from the monocentric theory. Ursynów is an example, where blocks of flats were built mainly during 1971–1990.

Chart 12. Interpolated housing prices in 2016
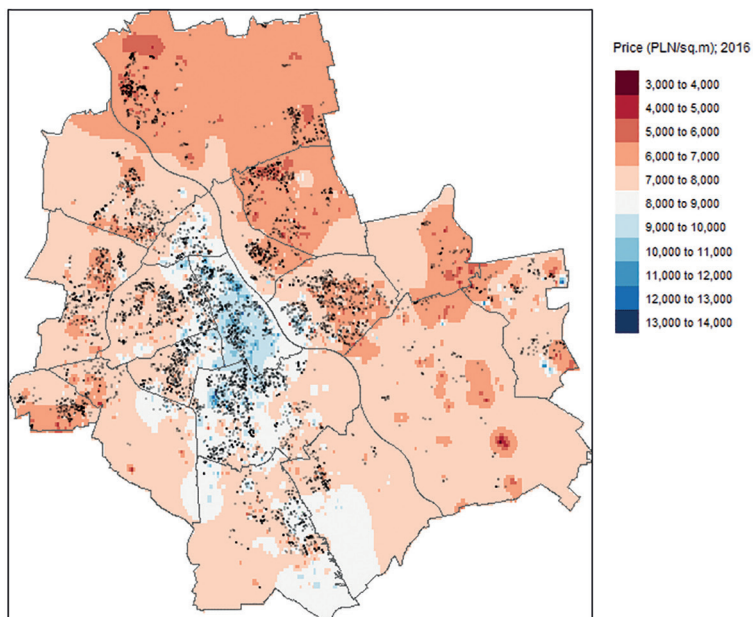
Source: own calculations, RCiWN data.

Chart 13. Housing intensity (interpolated number of housing building's floors) in Warsaw
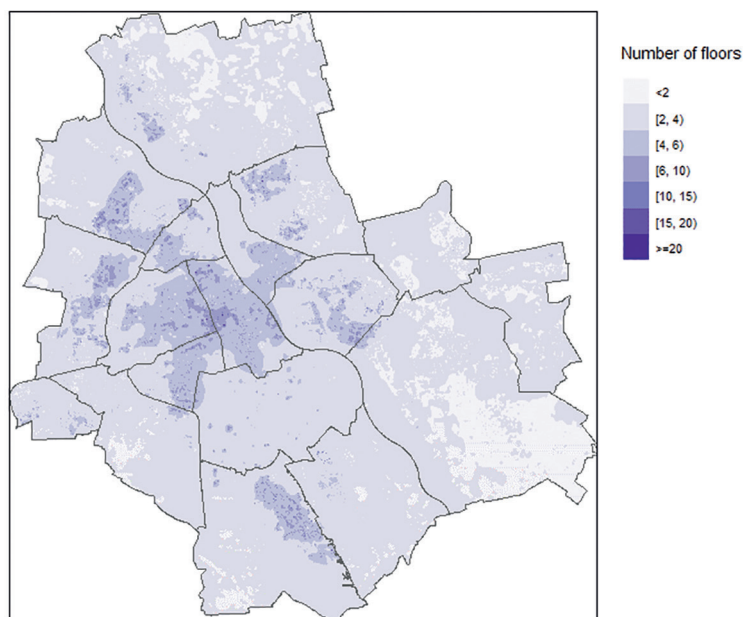
Source: own calculations, BDOT data.

The prices over there are higher than in the surrounding areas and also the intensity is higher. One explanation is that according to plans the metro line was built in that neighborhood, which then was capitalized in the price.

Conclusions

After II World War housing stock in Warsaw was destroyed, therefore we can say that it was built from scratch. The reconstruction of Warsaw came at the time when Poland was under Soviet influence, and productive forces focused almost exclusively on other branches, which limited investment in housing. Moreover, land, was not allowed for market allocation. Warsaw was rebuilt hastily to meet the housing needs of the population, which sometimes wasted economically valuable areas.

The later transformation of the real estate sector, especially housing, was proceeded slowly to the standards of a developed market economy. In Poland the housing sector has been operating as a market since about 2000, when inflation dropped and the required regulatory changes were introduced. The current development of the city and the valuation of land rent can therefore be treated as fully marketable, as evidenced by prices of residential real estate which mainly stand for land values. According to the monocentric city theory housing prices fall with distance from the center, while the population density decreases with the distance. There is a positive spatial correlation between building intensity and housing prices.

Some derogations from the monocentric city theory, which usually arose during the Soviet era in Poland, created inefficiency and caused misallocation that can be reduced by appropriate development of a transportation system. The location, measured with the distance from the city center is definitely the most important factor determining land values. As neighborhood effects matter and are capitalized in the value of the property, zoning also has an impact on housing prices and the future neighborhood. The very important issue is also to regulate the land use properly in spatial plans, which impacts the intensity of buildings and indirectly affects the value of the land.

Future research should focus on more detailed analysis of city development in various directions and districts. It is also very important to take into account transportation system as a very important factor, which has a very big impact on city development and land prices.

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II.4

Predicting a Real Estate Price Index: Combining the Hedonic Approach with a Stochastic Process

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Introduction

Today the real estate sector in Morocco is one of the most important sectors for the development of the country. The desire to promote and develop this sector since the end of the 1990s has been decisive in increasing the property supply to meet the demand already in place. However, the lessons from the 2008 financial and economic crisis made it possible to re-read what could result from the weak regulation of this sector.

The formation of real estate prices responds to the same logic as that of financial assets where speculation is a common behavior. Indeed, demographic growth and also the urbanization policy suggest euphoria in property prices in most Moroccan regions.

In Morocco, two phases characterize the evolution of the real estate market. The first phase is the one before the 2000 s, when real estate prices were stagnating with real estate supply significantly exceeding the needs of the population. From the 2000 s and precisely during the year 2003, the real estate sector benefited from several tax and regulatory advantages that boosted the real estate market. In addition, the banking sector has found in this sector an opportunity to increase the use of banking by the population by facilitating bank loans to the real estate sector (also the profit rate of

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the sector becomes attractive to investors). For example, bank credit statistics for 2006 and 2008 show a two-digit increase in the growth rate of loans to real estate.

This observation and this choice to promote the real estate sector, the durability of which depends on the country's overall strategy, requires the establishment of regulatory mechanisms to avoid any likely slippage in this sector. In this perspective, the Central Bank of Morocco (BKAM) launched during this period a major project to develop a real estate price index. Beyond its usefulness in the formulation of the monetary policy and the financial stability, this index aims to allow a continuous and advised follow-up of the evolution of the prices in the Moroccan real estate market. The objective being twofold, at first glance, it is a matter of following the potential concordance between supply and demand on the market, by examining the tensions in prices. Secondly, this index will help prevent risks that may be unbeknown to this sector. Moreover, macro prudential policy requires the existence of such an index for better financial regulation.

The method adopted in the property price index by the Central Bank of Morocco for Morocco is that of repeat sales. The index based on this approach consists of selecting all the properties that, during the period considered, gave rise to two or more transactions. The difference in price of a building between its purchase and its resale determines the growth of the price of this property during the period. Thus, the index of repeated sales over a period requires observing the goods that are trading during a given time interval. This market-based approach is sound in the sense that it captures all transactions made on the asset in question. However, it neglects the economic aspects and the factors that favor the realization of the sale and the purchase.

To this end, we propose in this paper a new approach to the development of a real estate index. This is indeed the hedonic approach whose design is based on theoretical considerations about the determinants of real estate prices. The hedonic index is based on a simplified idea of the world where the value of a property is determined by intrinsic factors. The usefulness of this approach lies in the identification of the factors that explain the prices on the Moroccan market. These determinants will have a double role, firstly they will make it possible to understand how the prices are formed and secondly they will allow to build an index better describing the evolution of the real prices in Morocco.

In the context of housing, this set of characteristics may include attributes relating to both the structure of buildings and the location of the real estate. There is no market for the characteristics since they cannot be sold separately and, as a result, their prices are not observed independently. The demand and the supply of goods implicitly determine the marginal contributions of their characteristics to their price.

These marginal contributions or virtual prices can be estimated using regression techniques. The hedonic method can in particular make it possible to estimate the capacity to pay the price of the different characteristics or the marginal cost of the production thereof.

Hedonic price models have been used in housing studies since (Lancaster, 1976; Rosen, 1974) to explore the determinants of housing prices. In the last three decades, this form of modeling has been used to evaluate the value of real estate worldwide. In this design, the choice of housing confers not only the consumption of the property and the structural characteristics of the dwelling, but the consumption of all the characteristics of the property's location such as proximity to environmental benefits and utilities.

The hedonic price model (HPM) breaks down the price into attributes (Lancaster, 1976; Rosen, 1974). In the real estate field, the hedonic price model typically uses regression analysis to estimate the effects of various attributes or characteristics of housing; including structural, accessibility and neighborhood (Wilhelmsson, 2002). This approach has been largely adopted for real estate valuations in real estate markets around the world to measure the contribution of property attributes, as well as other external factors that could affect the value of a property (Jim and Chen, 2006; Selim, 2008). HPM analysis (Lentz and Wang, 1998) can be used to analyze the property transaction data of a partial market, therefore, the utility of each of these variables in relation to the price indicated by the buyer of the property (Malpezzi, 2001). The general form of HPM supports the value of real estate to the sum of internal and external characteristics (Chau and Chin, 2002; Sirmans et al., 2005). Thus, the hedonic method recognizes that heterogeneous goods can be described by their attributes or characteristics, that is, a good is essentially a set of characteristics.

This paper aims to model the determinants of real estate prices in Morocco based on the characteristics of goods sold and bought on the Moroccan market. In addition, the paper also proposes to develop the hedonic index by referring to an approach borrowed from stochastic finance where real estate prices are supposed to follow a geometric Brownian movement.

The article is structured as follows: in a first part, we present an empirical literature review on the issue. Then, a presentation of the methodology and the data used allows understanding the nature of the variables retained and the technique used for the development of the new index. Finally, the last part of the article focuses on the presentation of the results and possible interpretations of the new index.

1. Literature review

Early work applying the hedonic modeling approach to real estate prices started in the early 1920s, despite the fact that there is no consensus as to the actual date of their introduction.

For example, Colwell and Dilmore (1999) reported that Haas' work in 1922 is the pioneering study to evaluate farmland in Minnesota (USA). Similarly, Bruce and Sundell (1977) have argued that this technique was used in real estate valuation research in 1924. In addition, Wallace (1926) adopted the HPM technique in U.S. cropland. Ridker and Henning (1967) used HPM for the evaluation of air quality and air quality's impact on the residential property values.

However, researchers often refer to Court (1939) as a pioneer of the hedonic approach. He developed a hedonic price index for cars where the demand for automobiles can be explained by the many variables that include the wheels, the weight and the horsepower of the car. Then other works (for example, Muth, 1966; Wallace, 1969) adopted it for the real estate sector. Later, Rosen (1974) developed the theoretical underpinning of this approach for the real estate sector.

Studies focus more on the hedonic approach (see Hill, 2013). Wallace and Meese (1997) estimate house price indexes for Oakland and Fremont, California, from 1968 to 1990. They suggest that the hedonic model provides a better valuation than the repeat sales method. Hill's recent survey (2013) also concludes that the hedonic index appears to dominate the current literature. Meese (1997) uses estimates of repeat sales that may be a modified version of the hedonic model in which it is assumed that: (i) homes that are sold are twice present on the market and (ii) virtual prices of attributes are constant over time, so they cannot influence the price index. The results reject the claims for 50,000 homes in the cities of Oakland and Fremont. In addition, the results suggest that repeated sales index tend to be more volatile. Clapp (2002) has obtained similar results.

Zheng, Kahn, and Liu (2010) use hedonic models to examine the relationship between house prices, investment, wages, and pollution and found that Chinese cities under go a transition from 'producer cities' cities of euphoria. Hou (2010) analyzed housing market prices in Beijing and Shanghai and concluded that the housing price bubble seems to have appeared in Beijing from 2005 to 2008 and in Shanghai from 2003 to 2004. Although the theory of hedonic models prices has been widely applied to analyze housing prices in countries like the U.S. (Sander and Polasky, 2009), France (Gouriéroux and Laferrére, 2009), Norway (Osland, 2010), Japan (Shimizu et al., 2010),

Austria (Helbich et al., 2013), and the Netherlands (Ozyurt, 2014), studies in developing countries are almost non-existent.

A review and a detailed theoretical development of the HPM approach is presented by Chin and Chau (2002) and Malpezzi (2001). In addition, Sirmans et al. (2005) conducted a meta-analysis of articles that adopted the hedonic approach, to extract the variables that determine the values of a property. They have, in fact, analyzed 125 articles published in the United States between 1995 and 2004 to establish the research tools. A total of 360 independent variables were identified and can be classified into eight categories, including the building structure, internal features of the house, home amenities, external environment, neighbourhood and location, utility, marketing, occupancy and capacity of sales.

Other studies have tried to explain the time required to sell a house and the reasons for this decision. Indeed, two approaches have been adopted namely: duration models and linear regression models. The use of duration models is justified by the significance of time in determining selling prices in the real estate market. The basic assumption is that the more the good is in the market, the more its value increases. Sirmans et al. (2005) found that most studies use the hedonic approach and verified the relevance of the temporal variable.

The physical characteristics of a property affect not only its composite price, but also the likelihood of selling it. Haurin (1988) uses a duration model to explore the impact of asset heterogeneity in sales time. The results obtained by the author assert that the uncertainty related to the value of a good impacts the possibility of its resale. Thus, it will take even longer to sell an atypical property than a normal good. In addition, whether a property is vacant or occupied will have a significant impact on the price. Zuehlke (1987) examines the impact of this factor on real estate prices. Thus, an empty property will have a higher price. He finds that while empty goods are weakly sold at the beginning, they are more in demand. In addition, the risk is higher for occupied property.

Other factors have been cited in empirical studies, such as the choice of a current price and the choice of involving a broker. Belkin et al. (1976) were among the first. They segmented housing data and found a negative relationship between the selling price and the current price. In other words, the more there is a gap between the price and the good take time to sell. Kang and Gardner (1989) found the same result. Yavas and Yang (1995) examined this relationship with a two-step regression model. Their results were ambiguous, but managed to confirm the results reported by Belkin (1976). Empirical work has also confirmed the predominant role brokers play in reducing resale time due to their intense networks (Haurin, 1988; Forgey et al., 1996; Knight, 2002; Yavas and Yang, 1995).

Due to the price dependence of negotiations between buyers and sellers, the use of the hedonic approach does not allow this element to be taken into account. Harding et al. (2003) estimated the effects of trading by including in the hedonic equation a vector of buyer and seller characteristics. Turnbull and Dombrow (2006) study the spatial situation of real estate to describe the impact of the neighborhood on the price of housing. Their results show that the spatial effect dominates and depends on the market trend. To account for the spatial phenomenon, many authors have begun to apply the hedonic model to spatial factors. Dubin (1998) uses the geostatistical method to evaluate the covariance structure of the model. Can (1990) proposes to use models with spatial delay.

In addition, other works have indicated the impact of the season of the year on the real estate prices. For example, prices are often higher during the summer periods because of better household availability and the possibility of hiding property failures during this season (Haurin, 1988; Forgey et al., 1996; Knight, 2002; Harding et al., 2003).

Lu (2000) uses Lazear's (1986) theory as the basis for a price revision strategy for the real estate seller. He uses numerical analysis to describe how salespeople learn from the rate of customer arrivals about the market value of their properties and then incorporate that information with changes in reservation prices.

Merlo and Ortalo-Magne (2004) have not only data on current price changes, but also data reflecting the number of views by potential buyers, and all proposals made on a property between the list and the sale. They find that the size of the price reduction is related to the period the house has been on the market. Regarding the bids received on a property, they find that the supply is lower and a house has been long on the market, a fact consistent with Taylor's theories (2003). Their data also provides evidence that the recorded transaction price is typically not the same as the first bid was, although properties are typically sold to the first potential buyer making a bid. These points to a weakness in existing trading models of complete information that take the price as something fixed.

Although the early work on the hedonic approach was linear in form, Rosen (1974) emphasized that this relationship may be non-linear, and even more so, the actual relationship between the attributes and the price on the market is unknown. Goodman et al. (1995) proposed a non-linear form to capture the complex effects of price attributes. Moreover, Box and Cox (1964) propose a generalization that makes it possible to compare several forms of functions and to determine the most appropriate one. Halstead et al. (1997) use this approach.

Indeed, despite the power of the Box and Cox's approach, several authors have detected some limitations of the approach: the difficulty of interpreting coefficients due to functional transformations (see: Maurer et al., 2004). In addition, it has been

found that Box and Cox's regression cannot be applied when the variables are binary or multinomial (see: Linneman, 1980). Thus, several other specifications have been proposed in literature, namely: linear, semi-logarithmic and logarithmic (Dube et al., 2011).

The decision on the functional form can be made based on a nested specification and a likelihood ratio test, or with other relevant statistics (Akaike, 1974). The first family of tests was based on the predictive abilities of the functional forms adopted. One of the most common tests is that of Ramsey (1969) relating to the stability of the adopted form. Similarly, the use of the coefficient of determination makes it possible to validate the adopted specifications. In addition, predictive performance methods are commonly used, namely the in and out of samples predictions based on the mean squared error. On the other hand, authors suggest the use of residue tests to verify the existence of heteroscedasticity phenomena (White, 1980) and spatial autocorrelation (Moran, 1950). Thus, the use of a functional form is justified by the intrinsic validation of the econometric prerequisites. In their comparison work, Jean Dube et al. (2011) state that the log-linear form is superior to the other alternatives offered by linear and semi-logarithmic forms.

The theory of stochastic finance dates back to the year 1973 and the works of Black and Scholes which revolutionized modern financial theory. These authors assert that the formation of the prices of financial assets is of a stochastic movement character in the form of a Wiener movement. The definition of these prices through stochastic differential equations leads to the development of the whole theory of options. In our work, we borrow the approach of Black et al. (1971) to express the price of real estate assets in a stochastic form, which allows us to make predictions. Indeed, work on the relationship between real estate asset prices and Brownian motion modeling is a very rare approach. However, some work has been developed. The idea in this work is to model derivatives on real estate assets, and in our approach we draw on this approach by considering that real estate prices can follow a geometric stochastic process, but with a view to predicting their evolution. Buttimer and Ott (2007) used a bivariate binomial model to price derivatives based on a real estate index and an interest rate. Based on the same model, Björk and Clapham (2002) proved that the theoretical price is zero in a no-arbitrage framework. Of course, these models ignored the fact that the real estate index is non-negotiable. Taking into account the non-negotiable character of the real estate index, Geltner and Fisher (2008) used an equilibrium model to price real estate futures contracts. Cao and Wei (2015) proposed and implemented an equilibrium valuation framework to analyze the valuation of real estate index derivatives traded on the Chicago Mercantile Exchange (CME). Van Bragt et al. (2010) developed a risk-neutral valuation procedure for real estate derivatives by modeling the observed real estate index using an autoregressive model, and derived

closed-form pricing solutions for European futures, swaps, call and put options. Fabozzi et al. (2011) proposed a pricing framework for real estate derivatives that captures the econometric properties of real estate indices and complements the real estate market with real estate futures. Assuming that the market price of the risk is known, closed-form solutions can be obtained for the main real estate derivatives, such as forwards, European options and total return swaps. All this works considered that real estate prices follow a stochastic process, which makes it possible to use the same approach in a given forecasting framework. It should be also mentioned that some authors criticize this approach, for example Tunaru (2017, p. 220) states that the geometric Brownian motion does not capture the serial correlation of property price returns and that it has a variance which increases forever. Due to its continuous nature it also cannot predict market crashes. Still, the author points out that this method is used in reverse mortgage models, mostly for convenience. Having this critique in mind, we move on to construct the hedonic model and to estimate the parameters needed for the simulations. In our case it is the only feasible tool to predict house prices over a longer horizon, and as will be shown the results are similar to those of the central bank's repeated sales index.

2. Data and methodology

This paper analyzes the formation of real estate prices in the Rabat-Témara area, which is an important area in Morocco's real estate heritage. In addition to its nomination as capital of the country, the Rabat region is the cultural center of the Kingdom. All the communes of the Rabat region were analyzed, only those of Kenitra were not included in the analysis because of the unavailability of the data. We have taken into account all the real estate belonging to this area, be it bare land, apartments, villas and other types of derived habitats.

The graph below shows the geographic distribution of the dwellings used in this research. For reasons of precision, only urban areas were analyzed, rural areas (blank in the graph) were not considered due to the unavailability of data for this type of habitat.

According to the graph, housing in urban areas in the Rabat region has different prices. The Hay Riad-Agdal area is the most expensive area in the capital. In the other areas, the prices do not differ much, except for the Harhoura area and downtown Rabat.

Moroccan official land register "Agence de Conservation Foncière" supplies the real estate data. It holds all the information on the characteristics of the goods and the sales and purchases transactions. We were able to access their 2014 database for

the Rabat region. Indeed, our analysis focuses on the central regions of the capital, Témara and Hay Riad-Agdal. These three zones constitute the most important regions in the greater region of the capital of Morocco.

Figure 1. Value of Real Assets of Rabat Region (data 2014)
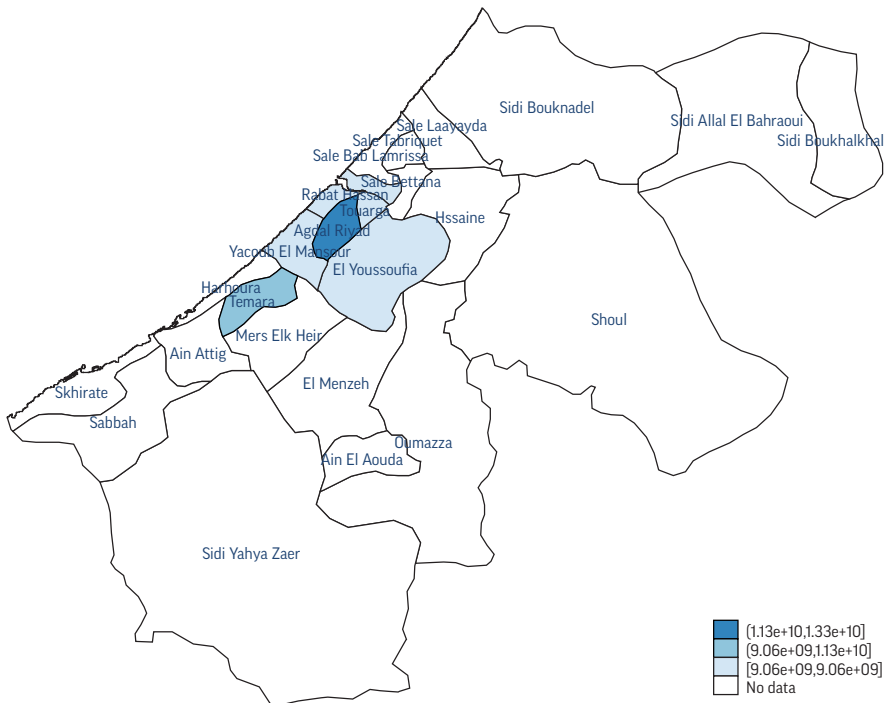
Source: own study.

The database consists all types of property, including independent houses, villas, land, apartments, etc. Data from the urban area of central Rabat (Annex Table 1), which constitutes the heart of the capital, are dominated by apartments (11,124 units) in the first place, followed by built-up land (931 units). There are only few second hand houses in this base (423 units). For apartments in the center of Rabat, the total value of the housing stock is 6.4 billion dirhams or about 0.6% of Morocco's GDP. On average, the price of the apartment is around 530,000 MAD.

The majority of real estate properties registered in the Hay Riad area are luxury apartments (Table 2 in annex). This area is considered one of the most prestigious areas of the Rabat region. This explains why the value of the properties is quite high compared to that of the other zones studied.

With regard to the Témara area (Annex Table 3), also the apartments constitute the majority of the properties in the area. However, prices on average are much lower than in the other two areas in the region. The city of Temara is considered a popular area apart from a few neighborhoods that are classified as standing.

A hedonic price index is established through the estimation of the hedonic function. A hedonic function is an econometric relation between the price of a dwelling and the quantities of the characteristics of a dwelling. In general, the establishment of a hedonic function consists in estimating a statistical model in the form:

$$\ln\left(p_j\right) = \alpha + \sum_{i=1}^{n}\beta_n . X_{n,j} + \varepsilon_j$$

'Pj' is the price of dwelling j and 'X' is the quantity of characteristic n of dwelling j. In the empirical literature, the endogenous variable is either the price of the whole house or its price per square meter. The exogenous variables should describe the price in the hedonic model, the often included ones are: the geographical location, the size and type of housing, age or various housing facilities or amenities in the surrounding area.

However, in practice, the availability of data strongly limits the possibilities of modeling. Moreover, it is often a question of finding a compromise between a statistically valid functional form and a model that retains a reasonable economic interpretation. In a log-linear model, for example, the coefficients are interpreted as the percentage change in the price for the incrimination of an additional unit of the characteristic, all else being equal.

The estimation of the hedonic model according to the specificities of the data facilitates the transition to the hedonic index that explains the evolution of real estate prices in the Moroccan regions. Theoretically, this passage can be carried out according to two approaches: One approach is the time dummy method where we add temporal indicators to the model. Another approach is based on a fixed reference stock over time, the index is the result of the comparison of the prices of the current sample with the valuation of the initial sample (Diewert et al., 2008).

Because of the particularities of the data for Morocco at our disposal, in which prices and housing characteristics are observed only for a single year, neither the first nor the second method is applicable. To tackle this problem, we propose a new approach based on the idea that real estate prices can follow a Brownian geometric movement, similar to other asset prices. Drawing on the model of Black et al. (1971), we assume that real estate prices follow a stochastic process, which enables predicting their future trajectory. With the introduction of this approach we can set up a real estate price index for the studied region. We start elementarily with the price of a reference stock (here the year of the database, i.e., 2014). To set up the index, we need to have

prices for each year that we want to include in the index. But we do not have such data and need to simulate it. The real estate price index can be calculated according to the following formula:

$$IPHB^3 = \frac{Current\ value}{Initial\ value}$$

Due to the absence of real estate prices data for future years, we assume that house prices, similarly to asset prices, follow a geometric Brownian motion, where:

$$\ln(S_t) = \ln(S_0) + \left(\mu - \frac{1}{2}\sigma^2\right) + \sigma W_t$$

S_t is the value at time t, S_0 is the price in the reference year, μ is the mean return and σ is the volatility. The real estate's index is:

$$IPHB = \frac{S1}{S_0} = \frac{\ln(S_0) + \left(\mu - \frac{1}{2}\sigma^2\right) + \sigma W_t}{\ln(S_{0)}}$$

To simulate the index, it is necessary to estimate the three main parameters: the price according to the hedonic model (fundamental value of house), the average of the returns and their volatility. The estimation of the two parameters, profitability and volatility is carried out according to the following approach: the coefficients estimated at the level of hedonic modeling are considered by assumption equal to the sum of the discounting factors (this assumption is valid when the fundamental value is equal to the price observed on the market). In order to determine the value of real estate price returns, we have resorted to the theory of prices in the financial markets, including real estate markets. We know that property prices are determined by their intrinsic value (location, quality, etc.), so are the economic determinants of price that can explain its evolution, and according to Euler's equation we can write that:

$$P_t = \delta\left(E_t P_{t+1} + ED_{t+1}\right)$$

Where $\delta = 1/(1+x)$ is the discount factor and x is the discount rate and D is the intrinsic value, which we determine with the hedonic regression.

If one adopts the fundamental design of the Muth's (1961) rationalized asset price evaluation, and accepts that the transversality condition is satisfied, then the fundamental value is considered the only solution to the valuation problem of asset prices:

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3   IPHB: Brownian hedonic price index.

$$S_0^* = \sum_{i=1}^{n} \delta^i ED_{t+i}$$

S_0^* is the fundamental value. Thus, we can write:

$$S_0^* = \sum_{i=1}^{n} \delta^i ED_{t+i} = \sum_{i=1}^{n} \beta_n . X_{n,j} = \sum_{i=1}^{n} \frac{X_{n,j}}{(1+t)^i}$$

Then the coefficients estimated in the hedonic equation, all else being equal, describe the discount factors. Due to the fact that the fundamental value of a property is unique, the above relationship holds. This implies that the parameters estimated in the hedonic model can approximate the discount rates under the assumption that

$$\beta_n = \sum_{i=1}^{n} \frac{1}{(1+t)^i} .$$

In general, the estimation method adopted in hedonic models is ordinary least squares, since the model is generally linear and satisfies the required conditions. However, real estate is of a specific nature where the valuation of property depends on several parameters in addition to the intrinsic characteristics. Thus, one of the important factors is the value of neighboring properties. In fact, the higher the value of a good, the greater the probability that a neighboring good will have such a high price (phenomenon of real estate mimicry). In this design, it is necessary to take into account the spatial autocorrelation that measures neighborhood effects. House prices depend also on the prices of surrounding dwellings. Spatial autocorrelation is defined as the correlation, positive or negative, of a variable with itself arising from the geographic location of the data[4].

In order to capture this phenomenon of spatial autocorrelation Paelinck and Klaassen (1970) put forward five principles to be respected in the formulation of econometric modeling, which are: the principle of spatial interdependence, the principle of asymmetry, the principle of allotropy, the geographic principle, and the principle of distinction. In the case of Morocco, we tried to take into account the principles of spatial interdependence and allotropy (spatial causality) by adopting a delayed endogenous variable model. This demands to take into account the spatial effects on the behavior of real estate prices.

The adoption of the spatial autocorrelation model makes the ordinary least squares (OLS) method unsuitable: the estimators obtained by this method are not convergent when there is an endogenous offset variable and they are inefficient in the presence of

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4   Julie Le Gallo. Econométrie spatiale (1, Autocorrélation spatiale). [Rapport de recherche] Laboratory of economic analysis (LATEC). 2000. p. 45, Table, ref. bib.: 5 p. <hal-01527290>.

autocorrelation spatial errors (Paelinck and Klaassen, 1970). Other estimation methods are then needed to find convergent and efficient estimators. The most commonly used method is a maximum likelihood regression with complete information but it is also possible to use the instrumental variable method (IV) or the generalized method of moments (GMM). Indeed, the endogenous variable is correlated with the errors and the parameters of the model cannot therefore be estimated in a convergent and efficient way by the LS (Kelejian and Prucha, 1998), then there is an abolition of the hypothesis strict exogeneity. In this respect, Kelejian and Prucha (1998; 1999a) proposed a GMM approach. They develop a set of conditions on the moments allowing the estimation of the equations for the parameters in the model with self-correlated errors[5].

3. Regression results

Before presenting the results of the hedonic regression, some special analyzes are needed to present the behavior of real estate prices in the analyzed region. First, autocorrelation tests are used to take into account the effect of spatial autocorrelation in the Rabat-Témara region. These can be divided into several categories. First, the Moran test is the oldest one and it is still the most used one. It tests the spatial autocorrelation of residuals when errors follow an autoregressive or moving average process. In addition, the Lagrange Multiplier tests have been developed and they can be either unidirectional, when a simple assumption is tested assuming a correct specification for the rest of the model, or multidirectional when more than one type of spatial dependency is tested. To test this spatial autocorrelation we opted for the Geary index (1954) which measures the local spatial dependence between real estate.

Table 1. Spatial test (Geary Test)

Region	Observed	STD	Z	Pr> |Z|
Rabat Centre	0.6752396	0.00255	−127,143	<.0001
Rabat Hay Riad Agdal	0.97504	0.00203	−12,323	<.0001
Témara	0.992505	0.00123	−6,106	<.0001

Source: own study.

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[5]   The tree condition are:

$$E[u'u/N] = \sigma^2$$

$$E[u'W'Wu/N] = \sigma^2 \left(\frac{1}{N}\right) tr(W'W)$$

$$E[u'Wu/N] = 0$$

The value obtained from the Geary index is less than one, making it possible to reject the hypothesis of non-existence of spatial autocorrelation. In this respect, we can say that real estate prices in Rabat-Hay Riad and Témara are autocorrelated in space. In other words, the value of goods is influenced by prices in the neighborhood.

This finding requires one to measure the degree of spatial correlation via geostatistical analysis (Variogram, Figure 2) that will validate and measure the level of correlation in the studied area. The following chart measures the distance between the correlations of real estate price pairs taking into account the distances between the different properties. The price distribution in the region seems to be well arranged describing an increased spatial correlation as it is validated by the Geary test. Analysis of the variogram shows that the spaces between the different points are very small, resulting in a very high level of spatial autocorrelation. This implies that prices in the neighborhood have a mutual influence on price determination.

Figure 2. Variogram of real estate's prices
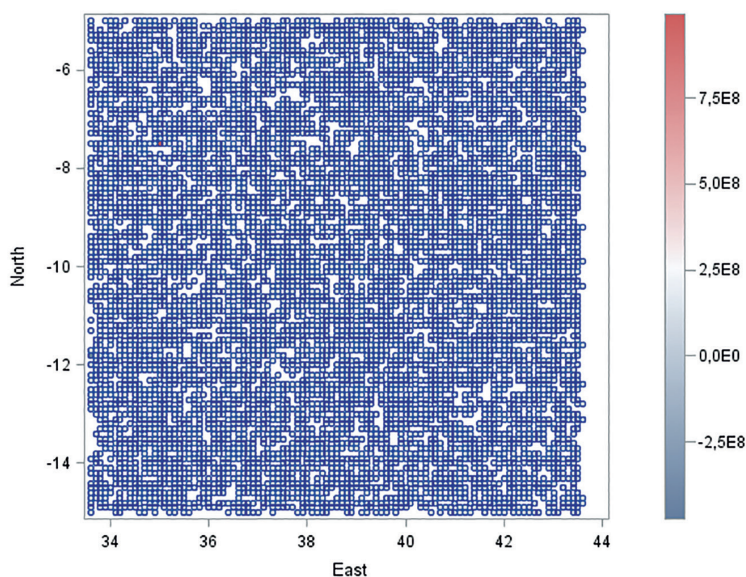
Source: own study.

In addition, the results show that the degree of correlation is as important in the city center as it is in the Hay Riad area or the city of Témara knowing that the latter two are close to the city center.

An examination of the distance distribution in terms of correlation also indicates that properties that are close to 3 to 5, depending on the degree of neighborhood, are

highly correlated. This implies a possible price dependence at the neighborhood level of the Rabat region, Hay Riad and Témara. Thus, the crossover of the pairs of properties studied reflects a dependence on the limit of five neighborhood delays. In other words, their counterparts in up to five neighborhoods (see Figure 3) can influence real estate price in a neighborhood in the area.

Figure 3. Distribution matched delays

(Ordered: number of dwellings, abscissae: number of delays)
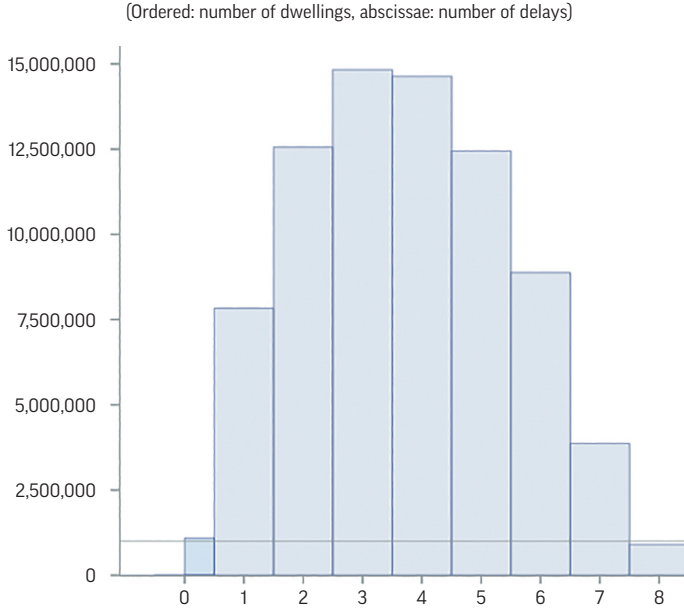
Source: own study.

The existence of the spatial correlation up to the fifth neighborhood in the region corroborates the hypothesis of the influence of the prices in the neighborhood on the real estate sales value. Therefore, we propose a model that takes into account this spatial dependence effect estimated using the instrumental approach to correct the low exogeneity bias. Models were estimated according to the following specification[6]:

$$y_{i,j} = \beta y_{i-t,j} + \sum_{i=1;\, j=1}^{n,m} \alpha_{j+} \beta_{i,j} X_{i,j} + \varepsilon_{i,j}$$

The exogenous variables are: the square meter, the number of floors, the nature of the property, the address, the number of bedrooms, the floor no. of the property if it is an apartment, the existence of a garage, pool or other services. Parameter *i* is

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[6] $\varepsilon_{i,j}$ is a combination of supposedly random residues and effects specific to types of real estate.

the individual dimension describing real estate and *j* is the nature of the property. We have distinguished different categories of real estate (apartment, villa, land, etc.). Therefore, we have 8 property categories and more than 11,000 properties in the region of Rabat-center, 6,500 properties in Hay Riad and 20,400 in the city of Témara.

Table 2. Econometrics Result of Cross section regression (all regions)

Variable	Rabat-Centre7			Hay-Riad			Temara		
	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
LOGPRICE (-1)	0.354	28.00	0.00	0.474	55.7	0.00	0.545	99.77	0.00
LOGMETRE	0.812	37.79	0.00	0.770	46.57	0.00	0.821	54.41	0.00
AGE	0.000	7.44	0.00	0.000	3.47	0.00	0.000	8.21	0.00
BALCON	0.056	1.65	0.09	0.163	1.94	0.05	0.026	1.77	0.07
N°ETAGE	0.042	3.25	0.001						
COURS	–0.026	–2.34	0.01				0.073	4.84	0.00
ETAGE	–0.000	–1.88	0.05				0.000	2.45	0.01
D1	–0.021	–3.80	0.00	0.068	9.25	0.00	0.116	1.95	0.00
D3	–0.060	–1.26	0.00						
D4	–0.056	–2.21	0.02						
Garage				0.100	4.14	0.00	0.025	0.46	0.64
D5							0.157	1.88	0.00
D8							0.114	7.57	0.00
CAVE							0.387	3.01	0.00
Piscine							–0.516	–5.68	0.00
R-squared	0.54			0.66			0.65		
J-statistic	12.647			7.140			1.007		

Source: own study.

In the three models estimated, we considered all the potentially explanatory characteristics of real estate prices, while taking into account the specific effects of each type of property.

It should be noted that the estimation was made via a log-log model, which implies that the coefficient of the metric is a partial elasticity of the price with respect to the size of the dwelling. Thus, for all the zones studied, the coefficient describing the surface area is greater than 0.7, which implies that a 1% change in the footage leads to a 0.7% increase in prices on the market. This indeed affirms the importance of the area in determining

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[7]   Estimates were made using the two-stage instrumental variables approach to correct the low exogeneity bias.

prices. It is the same for the coefficient of inertia, which is also of seminal importance because of its ability to describe the spatial dependence of real estate.

For the central Rabat area, it is estimated that real estate meter is the most influential variable in the formation of real estate prices. Also, we introduced spatial correlation via the autocorrelation effect of endogenous variable in space to demonstrate that the prices in the neighborhood influence the sales price of real estate. Similarly, real estate characteristics can influence the price only marginally, including the 'balcony' and the number of floors of the property's building. These two elements contribute positively to the valuation of goods in the city center of the capital. Moreover, the floor on which the property is located and the courtyard negatively influence the value of the good, the higher the floor is, the lower the price is. In addition, we have chosen to introduce some dummy variables describing the communal zoning of properties and houses located in zones D1, D3 and D4. This may contribute to the fall in real estate prices[8].

In the Hay Riad area, due to the architectural specificity of this area in the capital region, only a few features are significant. Indeed, the level, the age of the real estate, the existence of a balcony, and the garage are the factors that determine the price significantly. Also, being located in the Hay Riad area, influences the price, thus, Agdal area has a positive effect on the real estate valuation.

As for the area of Témara, several characteristics influence the price of real estate, the most important of which are: the size of the properties, the existence of a cellar and being located in some luxury zones of the city of Témara, namely Harhoura and others. It should not be overlooked that the existence of a yard in the house has a positive effect on the selling price of the property unlike in the other areas studied.

In general, the prices of real estate in the Rabat region are determined by several factors in a heterogeneous way, however, the influence of autocorrelation is remarkable in all the areas analyzed. In fact, the neighborhood's price effect has a significant influence on the valuation of real estate. It is sufficient that the neighboring property is valued at an 'x' price so that all neighbors are influenced by this information, which largely explains the price spike in this area in Morocco.

The simulation of real estate prices according to the stochastic approach based on the intrinsic characteristics of the properties would be useful in the determination of the hedonic price index for the region of Rabat and Témara. The simulation is made by assuming that property prices in 2014 follow a stochastic process, so via the Monte Carlo simulation, we were able to set up the possible trajectories of property prices in the region over a 10-year horizon.

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[8]   As an indication, there are 5 communes in the city center of the capital. Three have a negative impact on the value of real estate.

Figure 4. **Histogram distribution of logarithm price simulation**
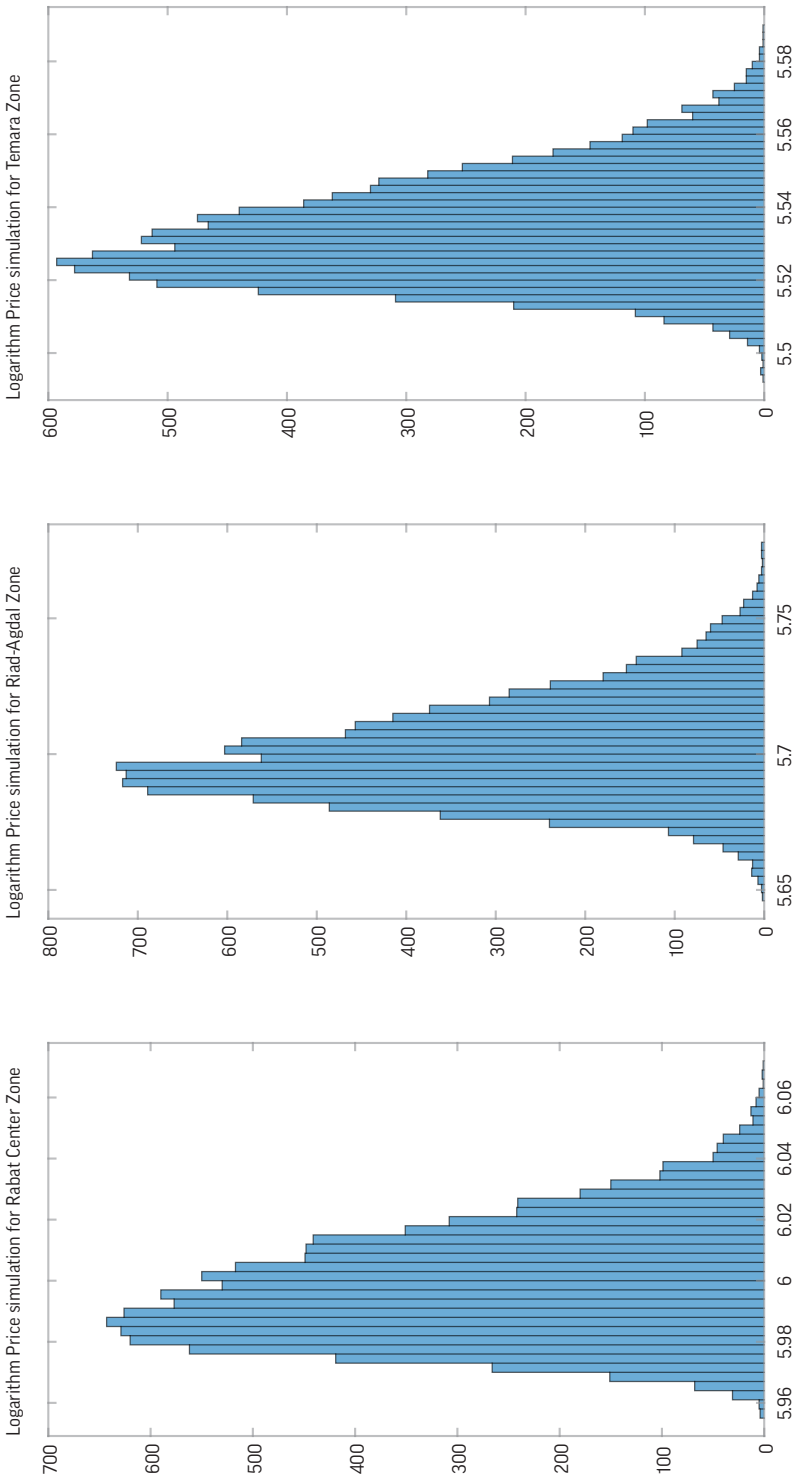
Source: own study.

We need to apply the hedonic regression to the property prices in 2014 in order to get an intrinsic price, which can be used for the simulations. We assume that the characteristics do not change and that house price changes are pure inflation, which we like to model with the Brownian motion.

We applied the standard Brownian motion approach where the price is decomposed into the drift and volatility. This is done by using the discount coefficients from the hedonic regression which allows to define the discount interest rate. Volatility of the Brownian motion is equal to the variance of the parameter estimated as the discount factor in the hedonic regression. Those parameters are calculated based on one-year-data, but the Monte Carlo simulation makes it possible to create predictions for the years following 2014.

We considered that the coefficients explaining the influence of the intrinsic and fundamental variables are the factors of actualization of the Brownian motion. In other words it implies that $\beta_n = \sum \dfrac{1}{(1+\mu)^i}$ if and only if the fundamental value of the real estate assets and equivalent to the prices on the market.

Subsequently, we extracted the different discount rates for the different zones. We will extract the average profitability and variance parameters for each capital region. It made it possible to estimate the drift of the function and allowed to calculate the volatility of the estimated coefficients. Thus, via the equation describing IPHB presented previously, we were able to calculate the index over several periods.

We have the stochastic process:

$$\ln(S_t) = \ln(S_0) + \left(\mu - \frac{1}{2}\sigma^2\right) + \sigma W_t$$

And, the estimation of the hedonic function is made according to the following form:

$$S_0 = \sum_{i=1}^{n} \beta_n . X_{n,i}$$

If the real estate market price is described according to its fundamental value which depends on the characteristics of the real estate assets then:

$$S_0 = \sum_{i=1}^{n} \beta_n . X_{n,i} = \sum_{i=1}^{n} \frac{X_{n,i}}{(1+\mu)^i}$$

With the hypothesis of equalization of property prices with the fundamental value depending on the intrinsic variables we can have $\beta_n = \dfrac{1}{(1+\mu)^i}$ as a discount factor.

Thus the estimation of the β_n in the hedonic equation will approximate the rate of return to be used in the stochastic model and therefore a simple simulation of the Monte Carlo model based on the fact that W_t follows a reduced form of normal distribution will make it possible to forecast property prices in future periods.

For the estimation of the moments, we have considered that the mean is the central estimate of the parameters β and for the variance we have taken into account the variance of the parameters. The basic idea is that the expectation of the returns can be approximated through the use of the expectation of β and also the standard deviation is considered equal to the deviation of the real estate parameters[9]. The table below shows the parameters used to simulate the stochastic process.

Table 3. Initial parameters to simulate Brownian motion (all regions)

	Return Expectation	Standard deviation
Rabat Center	0.19062036	0.02
Témara	0.198697311	0.015
Riad Agdal	0.260860995	0.016

Source: author with Stata.

Figure 5. IPHB vs Central bank index (BKAM)
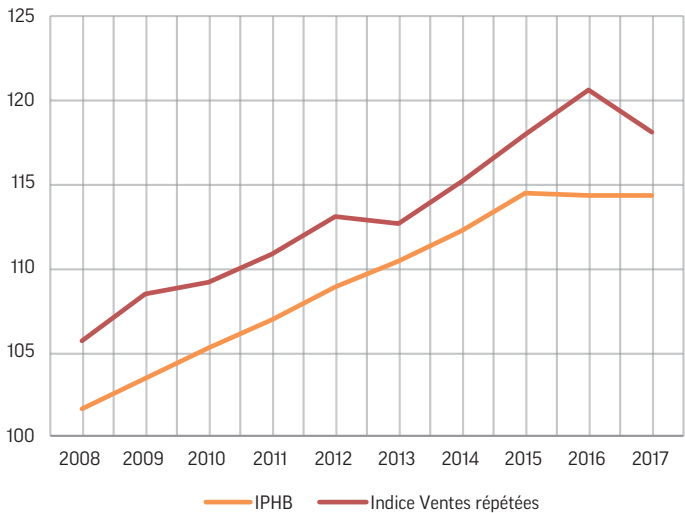
Source: own study.

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9        $\mu = E(\beta) = \hat{\beta} = (X^T . X)^{-1} X^T Y$ and the variance is: $\mathrm{Var}(\mu) = \sigma^2 (X''X)^{-1}$.

In order to validate the results obtained with our new approach, we used the index developed by the Central Bank of Morocco (BKAM), which is based on the repeat sales method.

Figure 6. Variation of BKAM index and hedonic index for Rabat Region
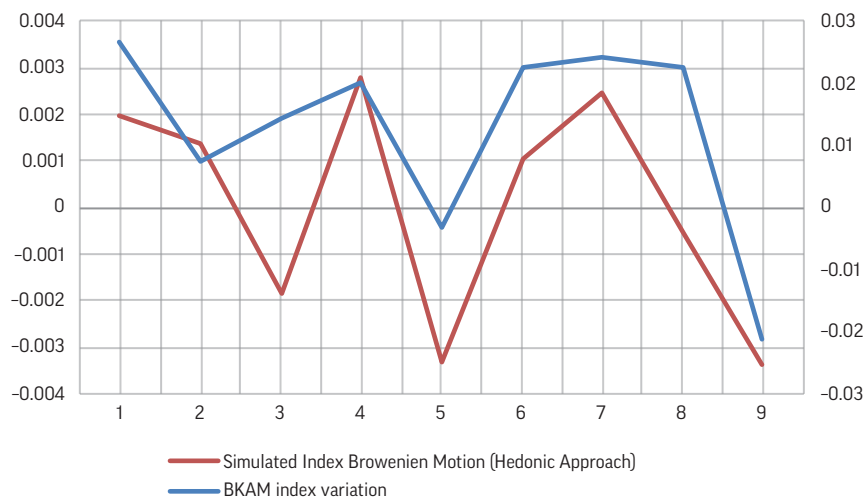
Source: own study.

Hedonic approach and predictive simulation according to the stochastic model provide almost identical results to the official index of Bank al Maghrib. The cycles described by the two indexes are the same. Indeed, the degree of correlation between the two indexes is close to 77%, which reinforces the results obtained with hedonic approach. The identical behavior of index change rates indicates that the determinants-based approach can predict and simulate price fluctuations in the real estate market. This will allow the regulator to more accurately monitor actions of economic agents with respect to speculation and to predict the shape of the price index in order to introduce possible macro prudential regulations.

Conclusions

Due to the importance of the Moroccan real estate market, authorities have focused on the development of a range of indicators for the monitoring of this sector. Two elements are essential from this perspective. First, the need to understand the factors determining property prices in Morocco, and then to implement a new, economic approach to create real estate indexes complementary to those used by the central bank.

The main idea of this paper is to propose a new technique for forecasting the property price index. This approach can be used to supplement the tools already used by the central bank. Our approach is based on two steps: the first step is to determine the intrinsic factors influencing prices in the studied area. On this stage we use hedonic modeling on data in cross section. Then, the estimated coefficients allow us to calculate the parameters essential for conducting a Monte Carlo simulation (the rate of return and the volatility). In this paper, we have developed a hedonic model to identify factors or characteristics that can explain the formation of real estate prices. Our analysis covered the Rabat region where three areas were studied, namely: the center of Rabat, the residential and administrative district of Hay-Riad-Agdal and the city of Témara. The results indicate that the spatial correlation factor and the level are the two major determinants of real estate prices in the Capital Region. Thus, the neighborhood which largely affects real estate prices in the Rabat region and the spatial character described by the square meter are decisive in the negotiations on the market.

The hedonic approach allowed identifying the factors explaining the evolution of the prices, but also it enabled us to simulate the real prices on the Moroccan market. To this end, we used the stochastic approach where prices follow a geometric Brownian motion. The idea is based on the financial theory of markets where prices can be described as an Itô process. We were able to forecast prices between 2014 and 2018 and interpolate for periods prior to 2014. The obtained results and the central bank's official index confirm the same trends. The rates of change of the two indexes have a very important correlation of 77%.

The new real estate price index based on the hedonic and stochastic approach is more user-friendly when analyzing the evolution of the prices on the real estate market and will allow, when used, to examine the intrinsic behavior of the prices and detect possible real estate bubbles. In addition, the IPHB index allows for preventive analyses of the potential evolution of property prices.

Scientific research in the area of house prices is fraught with uncertainty. The approach we propose in this paper can be criticized because of its conception based on the theory of prices in financial markets. However, its use in combination with other approaches can prove being useful for financial and monetary policy makers.

Annexes

Table 1A. Statistics of Rabat Center

Rabat center		Mean	Max	Min	STD	Sum	N
Land	Value	7,646,816	127,000,000	200,000	22,147,212	244,698,121	32
	Superficies (m2)	750	5,105	0	1,095	23,999	32
	Age	64	95	17	27	1,994	31
	Level	0	0	0	0	0	32
	Number of level	0	4	0	1	11	32
house	Value	865,343	18,498,600	24,900	1,431,806	366,040,050	423
	Superficies (m2)	103	1,625	0	128	43,405	423
	Age	42	99	4	23	17,649	421
	Level	0	0	0	0	0	423
	Number of level	1	4	0	1	317	423
Villa	Value	2,309,469	33,498,000	61,000	4,072,378	602,771,495	261
	Superficies (m2)	342	982	0	156	89,159	261
	Age	35	97	7	28	9,045	257
	Level	0	0	0	0	0	261
	Number of level	1	2	0	1	163	261
Apartment	Value	583,660	23,000,000	37,700	853,808	6,492,634,477	11,124
	Superficies (m2)	84	418	0	32	934,647	11,124
	Age	50	118	6	32	553,335	11,057
	Level	3	99	−1	8	31,995	11,124
	Number of level	0	0	0	0	0	11,124
House two level	Value	3,925,000	6,000,000	1,900,000	2,282,360	15,700,000	4
	Superficies (m2)	483	608	318	133	1,933	4
	Age	76	88	42	23	304	4
	Level	0	0	0	0	0	4
	Number of level	0	0	0	0	0	4
building	Value	5,077,156	22,000,000	425,000	4,350,127	304,629,346	60
	Superficies (m2)	395	1,087	56	201	23,689	60
	Age	74	97	19	22	4,358	59
	Level	0	0	0	0	0	60
	Number of level	2	6	0	2	148	60
land with building	Value	1,112,982	77,000,000	24,850	2,908,532	1,036,186,620	931
	Superficies (m2)	140	4,533	0	226	130,021	931
	Age	40	99	4	16	37,363	929
	Level	0	0	0	0	0	931
	Number of level	1	6	0	1	882	931

cont. tab. 1A

Rabat center		Mean	Max	Min	STD	Sum	N
Duplexe	Value	700,000	700,000	700,000	,	700,000	1
	Superficies (m2)	202	202	202	,	202	1
	Age	32	32	32	,	32	1
	Level	1	1	1	,	1	1
	Number of level	0	0	0	,	0	1

Source: Agency of Conservation.

Table 2A. Statistics of Hay Riad Agdal

Zone de Hay Riad		Mean	StdDev	Max	Min	Sum	N
Land	Value	128,370,000	128,148,719	300,000,000	13,480,000	513,480,000	
	Superficies (m2)	7,422	4,926	11,090	674	29,686	4
	Level number	0	0	0	0	0	4
	Age	48	30	77	22	190	4
Maison house	Value	6,213,170	31,911,248	210,000,000	45,000	267,166,300	43
	Superficies (m2)	584	2,253	14,333	49	25,129	43
	Level number	0	1	2	0	15	43
	Age	46	26	95	3	1,982	43
Villa a étage Villa	Value	5,292,625	4,735,156	42,000,000	38,100	3,170,282,100	599
	Superficies (m2)	1,010	1,034	9,986	132	604,858	599
	Level number	0	1	2	0	251	599
	Age	35	18	95	7	21,067	594
Apartment	Value	1,352,768	2,236,432	20,550,000	43,800	8,879,567,500	6,564
	Superficies (m2)	108	48	499	0	710,704	6,564
	Level number	0	0	0	0	0	6,564
	Age	32	29	118	4	204,217	6,325
Villa Deux niveaux	Value	7,200,000	4,986,983	12,500,000	2,600,000	21,600,000	3
	Superficies (m2)	1,122	1,275	2,572	177	3,367	3
	Level number	0	0	0	0	0	3
	Age	69	21	85	45	208	3
House two level	Value	14,311,000	8,745,633	26,000,000	6,555,000	71,555,000	5
	Superficies (m2)	406	99	500	300	2,032	5
	Level number	4	0	4	3	19	5
	Age	82	4	85	76	411	5
Terrain bâtis building	Value	1,761,783	5,252,889	64,000,000	45,000	338,262,400	192
	Superficies (m2)	291	849	8,015	0	55,948	192
	Level number	0	1	4	0	87	192
	Age	41	17	96	12	7,789	192

Zone de Hay Riad		Mean	StdDev	Max	Min	Sum	N
Duplexe	Value	3,168,727	1,719,946	6,163,000	545,000	34,856,000	11
	Superficies (m2)	167	85	323	92	1,841	11
	Level number	0	0	0	0	0	11
	Age	39	25	89	20	429	11

Source: Agency of conservation.

Table 3A. Statistics of Témara city

		Mean	StdDev	Max	Min	Sum	N
Land	Value	2,858,456	6,095,742	26,000,000	100,000	51,452,200	18
	Superficies (m2)	4,507	13,160	52,401	60	81,117	18
	Number of level	0	0	1	0	1	10
	Age	28	17	76	8	508	18
Maison house	Value	1,089,000	115,858	1,220,000	1,000,000	3,267,000	3
	Superficies (m2)	189	142	352	95	567	3
	Number of level	1	1	2	0	2	2
	Age	26	4	29	21	78	3
Villa a étage Villa	Value	1,709,865	2,676,654	40,000,000	59,100	665,137,600	389
	Superficies (m2)	831	3,390	54,998	131	323,269	389
	Number of level	0	0	0	0	0	215
	Age	20	13	84	6	7,269	357
Apartment	Value	433,207	415,704	10,800,000	8,000	8,871,209,100	20,478
	Superficies (m2)	71	65	8,800	0	1,453,726	20,478
	Number of level	0	0	0	0	0	20,328
	Age	17	15	118	3	344,659	20,475
Villa Deux niveaux	Value	3,350,000	,	3,350,000	3,350,000	3,350,000	1
	Superficies (m2)	289	,	289	289	289	1
	Number of level	,	,	,	,	,	0
	Age	33	,	33	33	33	1
House two level	Value	195,000	,	195,000	195,000	195,000	1
	Superficies (m2)	162	,	162	162	162	1
	Number of level	,	,	,	,	,	0
	Age	17	,	17	17	17	1
Terrain bâtis building	Value	707,282	1,067,770	22,650,000	20,000	1,700,305,400	2,404
	Superficies (m2)	162	1,125	43,463	25	389,501	2,404
	Number of level	0	0	1	0	1	525
	Age	21	11	108	4	47,748	2,277
Duplexe	Value	480,000	,	480,000	480,000	480,000	1
	Superficies (m2)	54	,	54	54	54	1
	Number of level	0	,	0	0	0	1
	Age	14	,	14	14	14	1

Source: Agency of conservation.

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III

FUNCTIONING
OF THE REAL ESTATE MARKET
AND THE FINANCIAL SECTOR

III.1

What Came First: Bank Credit or House Prices? Time-Frequency Analysis of the Co-Movements and Lead-Lag Patterns for Poland for the 2010–2019 Time Period

Maciej Ryczkowski[1]

Introduction

The old riddle: 'was it the chicken or the egg that came first?' may be compared to a similar one: 'was it the credit or house prices that came first?'. Both riddles are tricky in the same respect. The reason is that we need a chicken to lay an egg. Similarly, credit is considered to be one of the major determinants of house prices (Dursun-de Neef, 2018). Chickens in turn come from eggs, and so do house prices influence credit conditions (Ramcharan and Crowe, 2013). It leaves us with an infinite circle without a clear starting point[2].

The goal of the chapter is to solve the riddle whether: a) it is the GDP adjusted bank credit that is leading real house prices, or b) real house prices are leading the bank credit in Poland? To robustify the findings I consider a second, alternative definition of credit, namely credit from all sectors to Households & Non-profit institutions serving

[2] Chickens come from eggs, but we need a chicken to lay an egg. Similarly: credit determines house prices, and house prices determine credit conditions. So what came first?

households. To find the direction of causality and to determine the significance of the co-movements between house prices and credit, I apply the continuous wavelet transform (CWT) following Ryczkowski (2019a).

The riddle could have been solved, however, with less sophisticated methods. The most popular would presumably be the Granger causality. Indeed, we may expect that it is a sufficient tool to determine econometrically whether a chicken or an egg comes first (and we would hopefully confirm the findings of evolutionary biology). Nevertheless, the dilemma whether credit or house prices come first is far more complicated. First, the causality may change as time goes by, or during specific subperiods associated, for example, with house price booms (Ryczkowski, 2019b; Goodhart and Hoffman, 2008). Second, the causality may change depending on the time horizon. For instance, in the short-run the joint linkages between credit and house prices may differ from the long-run linkages – similar to the case of the quantity theory of money. The latter is generally considered to be more accurate over the long-term but not over the short term. Therefore, methods such as, for instance, Granger causality, which assumes that a single causal link is present during the entire time period analyzed and at every time horizon would not be sufficient for our goal.

CWT verifies the co-movements across time and disentangles simultaneously the short (high frequency) to the long-run (low frequency) effects. The feature gives CWT an important advantage over pure time-domain or pure frequency-domain methods. CWT is also superior to other standard techniques for characterizing correlated behavior in time or frequency like Fourier transform and band-pass filtering. Fourier transform is not efficient when the frequency content of the signal changes over time. The windowed Fourier transform does not allow an adequate resolution for all frequencies if a broad range of frequencies is considered. As opposed to CWT, band-pass filtering requires arbitrary cut-off of the frequency bands. Ultimately, CWT constitutes a promising tool to solve the riddle by investigating credit and house price dynamics from the short to the longer run and across time.

Unfortunately, the short time series on house prices do not allow us to provide insights into the 'really long-run' understood as several years horizon. In consequence, I analyze the frequency up to 4 years cycle instead. Such a horizon seems sufficient to buy time for policymakers to adjust their decisions accordingly.

The novelty of the chapter lies, to the author's knowledge, in the first application of CWT to analyze the linkages between the dynamics of credit and house prices in Poland. In fact, Ryczkowski (2019b) presents international CWT evidence on the linkages between credit and house prices for a sample of twelve advanced economies from 1970, excluding Poland. Wavelets generally constitute a relatively new tool in economics with a number of applications growing in recent years (Bruzda, 2019; Hkiri et al., 2018).

The chapter is also the first study that applies CWT to analyze the dynamic changes in house prices and credit in former post-socialist countries from Central and Eastern Europe. The case study of Poland is the more interesting as the National Bank of Poland is considered to be a strongly inflation-averse central bank (Ryczkowski, 2016; Sznajderska, 2014; Baranowski, 2011). The joint linkages between credit and house prices have important practical clues for the Polish monetary authorities especially under the new post-crisis circumstances that can be characterized by volatile changes in the expectation formation (Szyszko and Rutkowska, 2019).

The riddle investigated is relevant since the dynamics between credit and house prices have significant implications for policy, monetary theory, and welfare. First, credit (Bleck and Liu, 2018; Brzoza-Brzezina et al., 2015) has re-emerged as an important variable in the conduct and design of monetary policy since the 2007–2009 Great Recession. Second, house prices have a considerable impact on business (Leamer, 2015) and housing cycles (Augustyniak et al., 2014). Finally, a falling price of credit is one of the major determinants of house prices (Leszczyński and Olszewski, 2017). In consequence, monitoring credit is especially useful once nominal interest rates are low and close to their zero lower bound. The monetary mechanism plays a relevant role in understanding the phases of business cycle (Osińska, et al., 2018).

The chapter is organized as follows. The first section discusses the literature on the linkages between credit and house prices. The second section presents the data, followed by a CWT methodology in the third one. The fourth section discusses the empirical findings and policy recommendations.

1. Literature review

Dursun-de Neef (2018) evidenced that the reduction in bank real estate loans decreased house prices in the United States during the 2007–2009 global financial crisis. Cesa-Bianchi, Cespedes and Rebucci (2015) find that the international supply of credit influences house prices much stronger in emerging economies than in the advanced ones. It makes the kind of analyses presented in the chapter particularly interesting for Poland. According to the afore-mentioned findings, we may expect a stronger impact of credit on house prices in Poland than in more advanced economies.

The second group of empirical studies argues that the direction of causality goes the opposite way: that is from house prices to credit (Ramcharan and Crowe, 2013). As follows from the credit price effect, an increase in real house prices stimulates economic activity and a demand for credit by raising the value of collateral and lowering the

borrowing costs. The subject literature typically shows that the wealth effect of housing is greater than in case of financial assets (Wachter and Yogo, 2010; Bostic et al., 2009).

Finally, the third group of studies points to a variable, self-reinforcing or bidirectional linkage between credit and house prices (Ryczkowski, 2019b; Anundsen and Jansen, 2013; Fitzpatrick and Mcquinn, 2007). Ultimately, the three groups of empirical findings point to the diversified directions of causality. The plausible explanation for the allegedly inconsistent findings is that the time and frequency content of credit and house prices changes over time. Therefore, methods like CWT appear to be especially useful to solve the investigated riddle. The reason is CWT's efficiency in identifying damping in the dynamic systems.

The role of credit, money and its creation process has increased in the conduct and design of monetary policy since the 2007 global banking crisis (Ryczkowski, 2019c; Sławiński, 2019; Rzońca, 2014; McLeay et al., 2014). The empirical evidence shows that the volume of credit is not always optimal (Keen, 2015). A suboptimal amount of liquidity may create costs that are not easily detectable by the new Keynesian models (Ciżkowicz and Rzońca, 2017). One of the many consequences includes changes in house prices due to the international supply of credit (Cesa-Bianchi et al., 2015; Belke et al., 2008). Indeed, large and sharp changes in outstanding credit have important implications for financial stability (Cohen et al., 2017).

2. Data

The quarterly data for Poland span from the first quarter of 2010 until the first quarter of 2019. The time series come from the Bank of International Settlements (BIS) (Figure 1). Therefore, the time series are comparable with statistics available for other countries from the BIS Statistics Warehouse.

I use the index (2010 = 100) for real residential property prices. I assume that bank credit is credit from banks to private non-financial sector at market value expressed in percentage of GDP and adjusted for breaks by BIS. To robustify the findings, I define credit as credit from all sectors to Households & Non-profit institutions serving households at market value expressed in percentage of GDP and adjusted for breaks by BIS. To calculate the wavelets, I seasonally adjust the data with X-13 ARIMA and take the natural logarithm of the data.

Figure 1. Time domain representation of a real house price index and credit expressed in percentage of GDP, Poland from 1Q 2010 to 1Q 2019
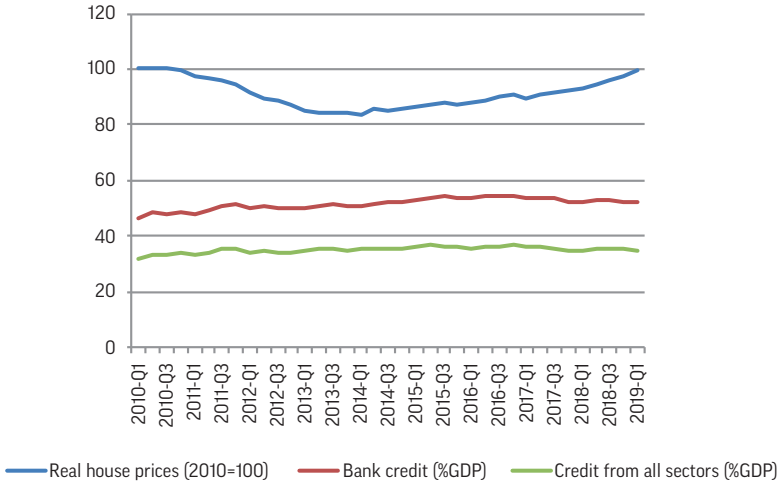
Note: the figure presents seasonally unadjusted data.
Source: own study based on BIS data.

3. Methodology

I follow the methodology of Ryczkowski (2019a). I use modified functions from the ASToolbox (Aguiar-Conraria and Soares, 2013) and the cross wavelet and wavelet coherence toolbox for MATLAB (Grinsted et al., 2004).

CWT of the square-integrable signal g can be defined as (1):

$$CWT_g(a,b) = \frac{1}{\sqrt{a}} \int\limits_{-\infty}^{+\infty} g(t) \overline{\psi\left(\frac{t-b}{a}\right)} dt \ , \tag{1}$$

where ψ is the analyzing wavelet; $a > 0$ is the scale parameter, and b is the translation parameter. I apply the typical complex Morlet wavelet as a mother wavelet (Grossmann and Morlet, 1984). Wavelets are 'small waves' which are specific functions that integrate to zero and have a unit energy (Bruzda, 2013). They can be stretched so that we have an optimal time-frequency resolution with respect to the Heisenberg inequality.

To analyze the co-movements between the dynamics of credit and house prices, I use the wavelet coherency (2):

$$K_{xy}^2(a,b) = \frac{\left| s\left\{ XWT_{xy}(a,b) \right\} \right|}{s\left\{ \left| CWT_x(a,b) \right| \right\} s\left\{ \left| CWT_y(a,b) \right| \right\}}, \tag{2}$$

where S denotes a smoothing operator in time and scale, x and y are two signals standing for house prices and credit, respectively. We have: $x, y \in L^2(R)$ and $XWT_{xy}(a,b) = CWT_x(a,b)\overline{CWT_y(a,b)}$, where XWT stands for the cross wavelet transform.

The wavelet coherency is similar to a correlation coefficient in the time-frequency domain. It can be interpreted similarly to the dynamic conditional correlation analysis and to the conventional correlation coefficient. The coefficient ranges from zero to unity, which stands for no co-movements (blue color) and for perfect co-movements (yellow color), respectively. The co-movements that are statistically significant are marked with black contours. The U-shaped black curved lines mark the interpretable area. The area outside these lines ought to be interpreted with caution because of zero padding (Mallat, 2009).

Finally, I use the wavelet phase spectrum:

$$\phi_{xy}(a,b) = atan \frac{I\left\{XWT_{xy}(a,b)\right\}}{R\left\{XWT_{xy}(a,b)\right\}}, \qquad (3)$$

to visually present the lag between the dynamics of house prices and credit. In equation (3), $\phi_{xy}(a,b) \in (-\pi, \pi\rangle$, I and R are the imaginary and real arts of a complex number, respectively. The function 'atan' is the four-quadrant inverse tangent. An arrow pointing right/left means that we have positive/negative instantaneous co-movements between the changes in house prices and credit. An arrow pointing up/down means that the changes of house prices are leading/following changes of credit by $\pi/2$.

3. Results and policy recommendations

CWT detected significant and strong co-movements between changes in real house prices and changes in both definitions of credit expressed in percentage of GDP in the medium-run that is for about a four years cycle (Figure 2). In other words, significant house prices and credit co-movements appeared in Poland in the middle of a typical business cycle. A typical business cycle usually lasts from 1.5 year to 8 years. In the time horizon shorter than 4 years, CWT found no significant co-movements.

The co-movements are more pronounced in case of bank credit, since they span over the entire investigated time period from 1Q 2010 to 1Q 2019 for the four years cycle. Nevertheless, the interpretable area is limited by the so-called 'cone of influence' to the time period from 1Q 2012 to 1Q 2016. Areas outside the U-shaped lines ought to be interpreted with caution, because of zero padding on the boundaries.

The significant co-movements of real house prices and credit at the four years cycle are positive (arrows are pointing right). The direction of causality goes from

changes in real house prices to credit developments (arrows are pointing up) over the investigated time span (Figure 2).

Figure 2. The direction of causality and the co-movements between house prices and credit in Poland from 1Q 2010 to 1Q 2019

a) Real house prices vs. bank credit

b) Real house prices vs. credit from all sectors
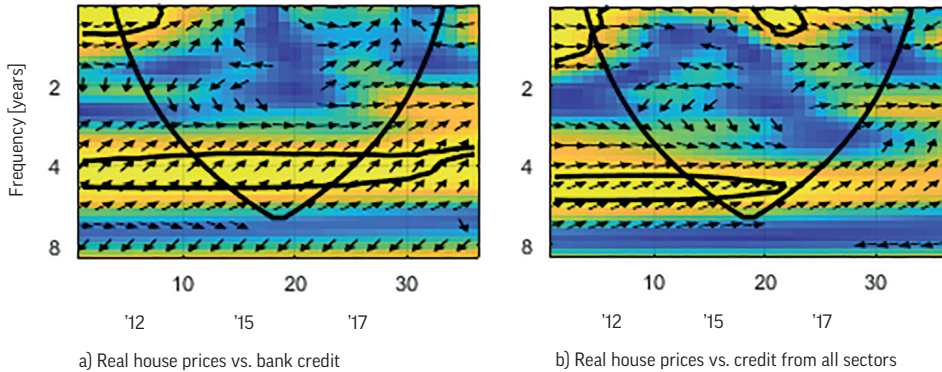
Note: statistically significant co-movements are marked with black contours for a significance level of $\alpha = 0.05$. Strength of the co-movements varies from zero (blue color) to unity (yellow color). Arrows present the relative lag [right arrow: positive instantaneous co-movements; left arrow: negative instantaneous co-movements; arrow up: house prices are leading credit; arrow down: house prices are following credit by $\pi/2$]. Areas outside the *U*-shaped curve may be distorted by zero padding and should be interpreted with caution. In the tests of significance I assume constant AR(2) background spectra. The number of bootstrap samples: 1,000.

Source: own study based on BIS data.

CWT findings suggest that house prices are a good leading indicator of an incoming credit boom. Rising house prices through the wealth effect or through a growing value of a collateral or appreciation of a currency (in case of an inflow of liquidity from abroad) encourage more lending. In Poland, the relative lag between growth of house prices and a growth of credit boom lasts approximately 1/3 of a cycle (four-five quarters). It is a time for policymakers to apply counter measures to avoid uncontrolled credit expansion in the future. Policymakers can use the macroprudential policy to considerably decrease the amplitude of future credit fluctuations (Brzoza-Brzezina et al., 2015). A lower amplitude of future credit expansion will weaken the self-reinforcing effects between credit and house prices. Imposing credit constraints when house prices are booming should, therefore, increase the chances to prevent the build-up of unsustainable house price boom in the medium-run[3].

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[3]   The results of the analysis for M3 and house prices (available upon request) were to a large extent analogous to the ones presented in Figure 2a. The major difference was that broad money is leading house prices at the four years cycle frequency over the entire horizon investigated supporting the medium-run and time-invariant liquidity hypothesis on the Polish housing market. Additionally, positive instantaneous co-movements appeared at the two years cycle from 2015 onwards.

Now, let me explain how the results should not be interpreted. CWT provided no evidence of significant co-movements of real house prices and credit in the horizon shorter than four years cycle. According to the wavelet findings, it is not justified to use solely the short-run dynamics of credit to forecast a house price boom. As presented on Figure 2, the direction of causality goes the other way round and with a lag. A better 'leading indicator' of house price growth would be thus a house price growth itself, and not credit growth. Similarly, as suggested by Woodford (2008), a more preferable leading indicator of rising consumer inflation is growth of consumer inflation, and not a monetary aggregate.

Conclusions

The chapter applied continuous wavelet transform to solve a riddle whether a) it is the GDP adjusted bank credit that is leading real house prices or b) real house prices are leading bank credit in Poland. The analysis spans from the first quarter of 2010 to the first quarter of 2019. The riddle is relevant because credit and house prices have a substantial impact on a business cycle. Additionally, credit and house prices are interconnected and their developments affect welfare. The novelty lies in the first application of the continuous wavelet transform to analyze the linkages between the dynamics of credit and house prices in Poland.

I found significant, positive and strong co-movements between the changes in real house prices and credit at a four years cycle. Real house prices were leading credit developments over the entire time span investigated. I evidenced no significant co-movements for cycles shorter than four years. I interpret the results that rising house prices encourage more lending. The incentive for more lending may come through the wealth effect, a growing value of a collateral or appreciation of a currency (in case of an inflow of liquidity from abroad). However, once house prices accelerate, the credit expansion will not appear simultaneously. Households need time to realize that their wealth has increased and mortgage procedures typically require some time, too. The evidenced lag (that is four-five quarters) between house price growth and subsequent credit expansion buys time for policymakers to avoid uncontrolled credit expansion in the future by using macroprudential policy.

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III.2

European Office Markets, User Costs and Speculative Bubbles

Michael Voigtländer[1], Florian Schuster[2]

Introduction

Prices in European office markets have increased significantly over the last years. Since 2010, prices for offices in London have increased by 43 percent, in Paris by 74, and nearly quadrupled in Berlin. Accordingly, yields – which measure the proportion between rents and prices – decreased to historically low levels.

Against this background, concerns are growing that a speculative bubble could form, i.e., prices could decrease suddenly and heavily. Specifically, since office markets tend to be more volatile than, for example, housing markets and since speculative bubbles occur more often in commercial real estate markets (Benford and Burrows, 2013). Office markets are also very important for the economy as a whole as costs for offices have an impact on location decisions and the profitability of companies.

According to Stiglitz (1990), a speculative bubble is defined as follows: "If the reason that the price is high today is only because investors believe that the selling price will be high tomorrow – when "fundamental" factors do not seem to justify such a price – then a bubble exists".

This definition indicates that a speculative bubble is predominantly a psychological phenomenon. Market participants are too optimistic about future developments and therefore their willingness to pay is irrationally high (Shiller, 2015) as they expect

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even higher selling prices in the future. Hence, this would imply measuring investors' expectations and motivations, which is usually not possible. Thus, most researchers concentrate on the second part of the definition, which implies that prices deviate from fundamentals. Typically, prices in the past are explained by fundamental factors like demand, supply and their determinants, and so the actual price can be compared to a fundamentally derived price. However, in the office market, necessary data for a such kind of analysis is usually missing. Data on office employment, construction activities, vacancies and other explaining factors for prices is only available in transparent markets such as the UK or the United States (see for example Hendershott et al., 1999; or Ibanez and Pennington-Cross, 2013). In most other European countries, like Germany, this data is not available. For instance, there is no official data on office employment and data on office stock is completely absent. In addition, detailed data on financing commercial real estate is missing too, which could also provide valuable insight into investor behavior.

Consequently, an approach is necessary that needs less data. In the housing market, the so-called "user cost of housing approach" developed by Poterba (1984) is a model that fulfils this criteria. Besides rents and prices, only data on interest levels and typical costs for self-occupants is necessary. According to this approach, markets are in imbalance when one kind of tenure is more attractive than another. In the long term, renting and buying real estate should cost the same, since otherwise a shift in demand is expected which would lead to an adjustment of prices. In the following, this user cost approach is applied to office markets – to the best of the authors´ knowledge, this is the first paper that applies this approach to office markets. To do so, PMA, a European market analyst, provided long-term data on rental prices and yields for over 18 European office markets. The main outcome of this analysis is that markets in Europe are mostly sound and that a sudden drop in prices is not likely.

The paper is structured as follows: the next section describes the market development in Europe. The methodological issues are then explained, and the main part presents and discusses the results for the user cost approach. The conclusion provides a summary of the main findings.

1. Data and methodology

The user-cost-of-housing approach originated with James Poterba (1984), who used it to examine the influence of taxation on the way the housing is consumed: by buying or renting. The approach is based on the idea that households are essentially indifferent to whether their home is purchased or rented. When the relative costs change, however, the demand from households for each form of tenure shifts accordingly.

This leads to price adjustments, which then restore equilibrium to the marketplace. For example, Poterba (1984) analyzed the effect of tax relief for house-owners, which reduced the costs of owner-occupancy, making the purchase of a home more attractive than renting. The demand for residential property subsequently increased, driving up prices. In the new equilibrium, the user costs of housing are the same for both forms of tenure, though the number of homeowners has increased relative to the number of tenants. The user-cost-of-housing approach was also used by U.S. and Irish central bankers to successfully identify exaggerated activity in their property markets on the eve of the financial crisis (Himmelberg et al., 2005; Browne et al., 2013), since significantly higher prices for owner-occupiers than for renters imply a disequilibrium. Marked differences in these costs indicate a need for correction and thus provide evidence of a market overheating.

In the following, the user cost approach is applied to office users, which are typically corporates. Like households, corporates have to decide whether they buy or rent an office. Since corporates are cost-sensitive, changing user costs should have an impact on tenure choice. And unlike households, which often face liquidity constraints (Voigtländer, 2019), corporates have better access to credits and they regularly move, so that equilibrium should be restored faster than in the housing market.

Firms' renting costs are simply the annual costs of renting. Since firm's rents are typically subject to tax deductibility, the authors make use of the effective prime rents to measure firms' renting costs. The latter are obtained as

$$ER_{ti} = (1 - \tau_t) \cdot R_{ti}$$

where R_{ti} is the prime rent to be paid by firm i and τ_t denotes the average corporate income tax rate of that country.

With reference to Poterba (1984), the costs of firms possessing their own real estate can be determined by the following equation:

$$UC_{ti} = P_{ti} \cdot \left[(1 - \tau_t \cdot a_t) \cdot (i_t + c) - g_i \right]$$

The annual costs of corporate real estate property in period t faced by a firm i, UC_{ti}, are described as a share of the purchase price, P_{ti}. The size of this share depends on several variables. Firstly, the firm must bear the loss of interest from not having invested in other assets and it could be obliged to pay interest on a mortgage, i_t. For the sake of simplicity, it is assumed that the rates on equity and debt are equal. Also, costs for reparation and maintenance, c, here assumed to be a constant share of the purchase price, have to be included. Both costs together are applicable to capital allowances granted in the respective country, measured by the product of the average corporate income tax rate, τ_t, and the average rate of tax deductibility for firm's buildings, a_t.

Secondly, g_i represents the average growth rate of the value of the firm's property. It reduces the user costs if the real estate gains on value but has an increasing effect if the value drops.

Table 1. Overview of data used

Variable	Data source
Prime net yields	PMA (2019), European Office Service, Forecasts
Prime rents R_{it}	PMA (2019), European Office Service, Forecasts
Purchase prices P_{it}, growth rates g_{it}, effective rents ER_{it}	Calculations based on PMA (2019)
Corporate income tax rates t_t	OECD (2019a), Tax database, Statutory corporate income tax rates
Capital allowances a_t	Tax Foundation (2013), OECD capital allowances
Interest rate i_t	OECD (2019b), Main economic indicators, Long-term interest rates

Source: PMA (2019), OECD (2019a; 2019b); Tax Foundation (2013).

User costs are calculated for 18 European capitals. Therefore, the authors use average data on prime rents and prime net yields for each of the cities involved, stemming from PMA. This company produces detailed analyses of property markets all over the world. As the yields describe the rents as a percentage of the purchase price, the latter can be derived from the data by a simple division. The growth rates of property values are then computed as the average annual rate of change of the purchase prices in each city over the period between 2000 and 2018. In contrast to other papers calculating user costs, we do not use current price rises as a proxy for future developments since recent price increases in most European office markets have been exceptional. In addition, current prices could be the result of a speculative bubble. Therefore, taking current growth rates could lead to misinterpretation. Unlike real estate variables, data on interest rates, tax rates and capital allowances is only available on a country-specific level. Interest rate data is taken from the OECD, and refers to the long-term interest on sovereign bonds. Yields on sovereign bonds are lower than rates on corporate bonds, but the relationship is more or less stable. As mentioned above, the tax rates employed in the calculations represent overall (i.e., central government and sub-central government taxes combined) statutory corporate income tax data, which is also provided by the OECD. The information on capital allowances comes from the American Tax Foundation, a private non-profit organization that offers research and analyses in the field of tax policy. Lastly, the authors assume a constant share of reparation and maintenance costs of five per cent of the purchase price. Thus, we calculate based on a lifecycle of 25 years of offices and maintenance costs of one percent per year (see for example Hughes et al., 2004). The overview shows which data sources were used for the individual variables in the study.

2. Developments in the European office market

Figure 1 displays the development of average prime rents and yields for the average of the 18 European capitals included in the analysis.

Figure 1. Average prime rents and yields across 18 European capitals

Prime rents in € per square meter per annum, prime yields in %, weighted by population size
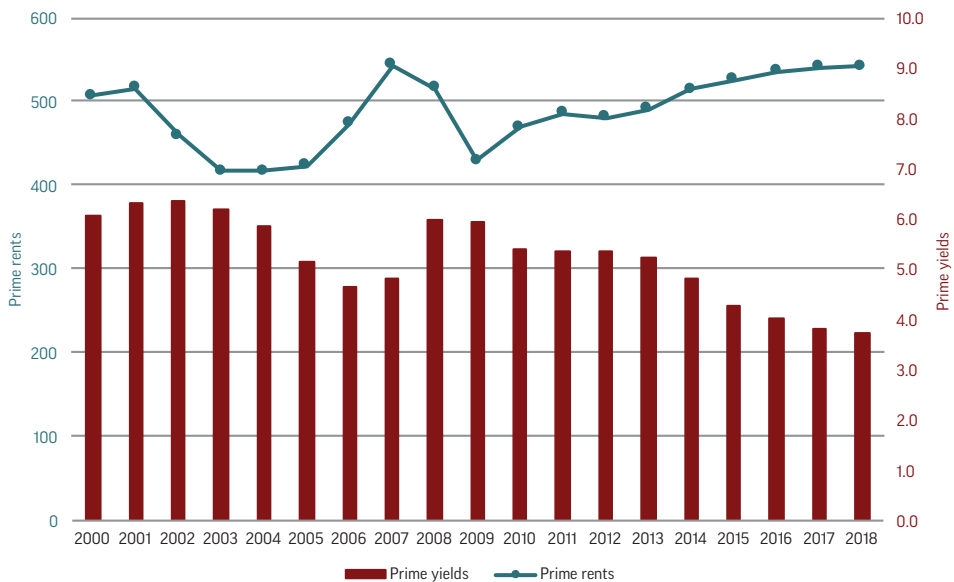
Source: calculations based on PMA (2019).

Prime rents decreased or stagnated between 2001 and 2005 as a result of the New Economy crisis, but increased considerably in 2006 and 2007. Afterwards, due to the financial crisis, prime rents once again decreased. However, since 2009 prime rents have been increasing steadily, although the peak of 2007 has not yet been reached.

Prime yields, capturing the relation between rents and prices, developed more smoothly. Prime yields only decreased significantly between 2005 and 2007, indicating that prices increased faster than rents. As we now know, this was the outcome of a speculative bubble. As of 2013, prime yields fell, and thus adjusted to the prevailing low interest environment, triggered not only by ECB policies but also by the sinking global real interest rate. One reason for falling real interest rates are demographics, as Demary and Voigtländer (2018) point out, as the gap between savers and investors is widening. In 2018, the prime yield was 3.7 percent, while it was 5.9 percent in 2009.

Taking a closer look at Berlin, London and Paris, which rank highest in terms of office investment volumes according to PMA data, reveals differences and convergence. Regarding rents, figure 2 indicates high volatility in London, while rents in Berlin develop more steadily. In addition, Berlin is still cheap for tenants, prime rents in Paris are more than 50 percent higher, and in London, rents are even twice as high as in Berlin. What is even more interesting, although rents in Berlin increased by 67 percent since 2009, rents are only 9.5 percent higher compared to 2000. Likewise, rents in Paris have only slightly exceeded levels compared to 2000. Only in London are rents considerably higher than in 2000. However, in recent years rents decreased, most probably as a result of Brexit uncertainty and the shrinking demand for offices.

Figure 2. Prime rents in Berlin, London and Paris

in € per square meter per annum
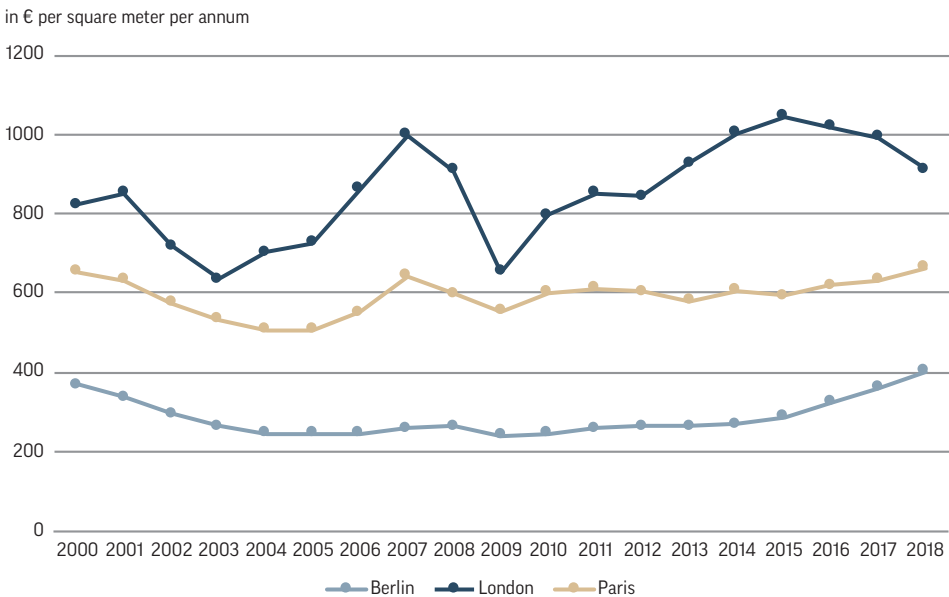
Source: PMA (2019).

With regards to yields, however, convergence is obvious, as can be seen in Figure 3 Prime yields develop in parallel, and levels are quite similar. This mainly indicates that the markets are closely related, primarily because of international investors switching their targets according to yields. Decoupling seldom occurred after 2015, once again rooted in Brexit discussion, as investors seem to demand a risk premium for London.

Table 2 sums up developments for all 18 capitals included in the analysis. Annual growth rates for prime rents and purchase prices in the period 2010 to 2018 outperform growth rates between 2000 and 2018 considerably. There are only two exceptions:

Rome and Warsaw. The office market in Rome suffered from low economic growth in recent years, while Warsaw experienced a long-lasting boom that recently faded out.

Figure 3. Prime yields in Berlin, London and Paris
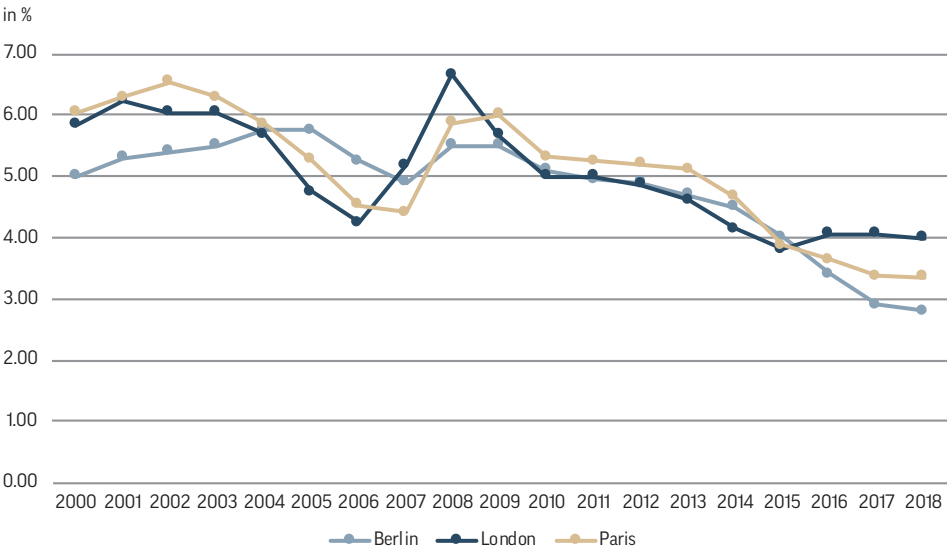
Source: PMA (2019).

Rents and prices increased most in Dublin, Berlin and Stockholm – cities with a booming start-up scene.

Table 2. Average annual growth rates of prime rents and purchase prices

in %

City	Prime rents		Purchase prices	
	2000–2018	2010–2018	2000–2018	2010–2018
Vienna	0.6	0.8	2.6	5.4
Brussels	0.3	0.8	2.4	4.5
Prague	0.1	1.0	4.3	6.2
Copenhagen	0.1	0.7	2.8	4.5
Helsinki	0.2	1.5	3.4	6.9
Paris	0.1	1.2	3.4	7.2
Berlin	0.5	6.3	3.8	14.6
Budapest	–0.1	3.1	2.4	6.6
Dublin	1.0	8.2	1.9	16.6
Rome	0.8	–1.6	2.3	2.3

cont. tab. 2

City	Prime rents		Purchase prices	
	2000–2018	2010–2018	2000–2018	2010–2018
Luxembourg	2.6	3.8	5.6	9.1
Amsterdam	1.4	3.3	4.9	10.6
Oslo	2.2	2.8	6.7	8.9
Warsaw	–0.1	–0.9	4.4	3.0
Lisbon	–1.4	–0.4	0.9	5.3
Madrid	–0.6	3.1	1.5	9.3
Stockholm	1.5	6.4	4.3	11.7
London	0.6	1.7	2.7	4.6

Source: calculations based on PMA (2019).

3. User costs and prime rents in the European office market

In the following, user costs are analyzed in order to detect possible overheating in European office markets. In the first step, user costs are calculated for Berlin; the results can be found in Figure 4. Unlike rents, which have increased with even higher dynamics since 2010, user costs decreased between 2010 and 2016. Since then, user costs have increased, but remain lower than in 2011. The main reason for this can be found in the development of interest rates. Between 2011 and 2016, prices increased but interest rates decreased even more, thus overcompensating office owners. However, in 2017 and 2018, prices increased faster than rents. Nevertheless, prime rents are currently twice as high as user costs, indicating that self-occupiers of offices are better off than office renters. Thus, in order to resume equilibrium, either prices will increase further or mortgage rates will increase without affecting prices – or both. Against this background, the strong price increases in Berlin appear to be economically sound.

In contrast, in London user costs are higher than prime rents, indicating decreasing or stagnating prices. Indeed, in 2014 and 2015, user costs were significantly higher than prime rents, and as theory predicts, prices decreased thereafter. However, since prime rents tend to fall further, prices have to go down even more to reach an equilibrium in the market. The model also predicted a fall in prices before the financial crisis, as user costs outperformed prime rents significantly from 2006 to 2008, thus stressing the usefulness of the user cost approach.

Figure 4. **User costs, effective rents and purchase prices in Berlin**
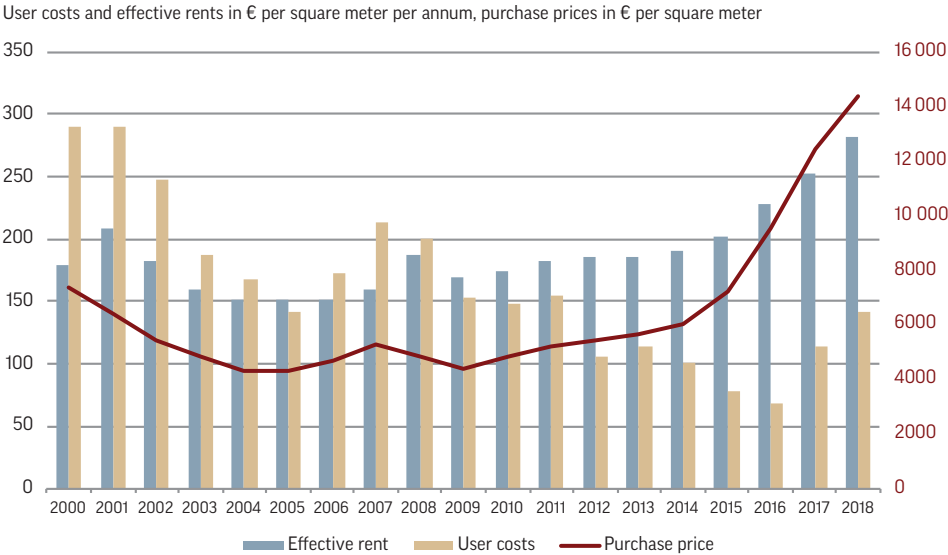
User costs and effective rents in € per square meter per annum, purchase prices in € per square meter

Source: calculations based on PMA (2019), OECD (2019a; 2019b) and Tax Foundation (2013) data.

Figure 5. **User costs, effective rents and purchase prices in London**
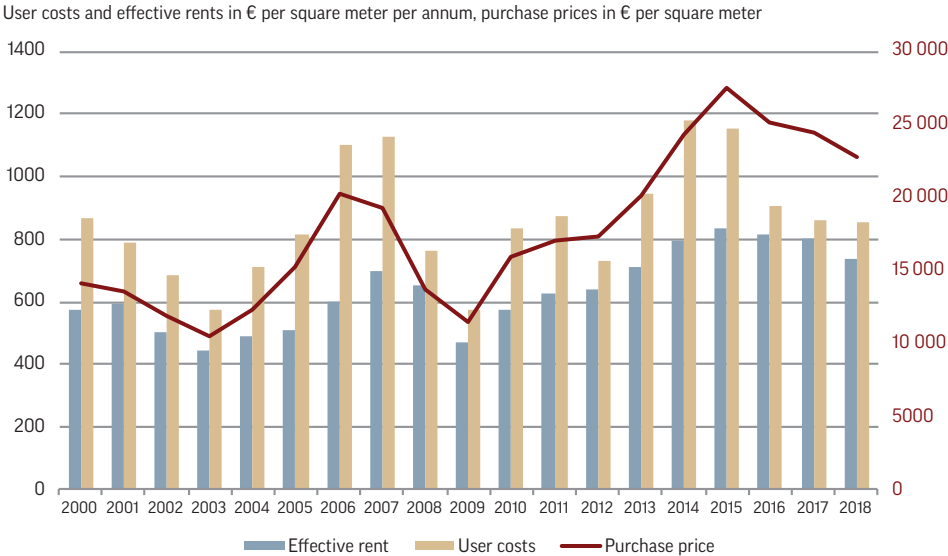
User costs and effective rents in € per square meter per annum, purchase prices in € per square meter

Source: calculations based on PMA (2019), OECD (2019a; 2019b) and Tax Foundation (2013) data.

Figure 6. User costs, effective rents and purchase prices in Paris

User costs and effective rents in € per square meter per annum, purchase prices in € per square meter
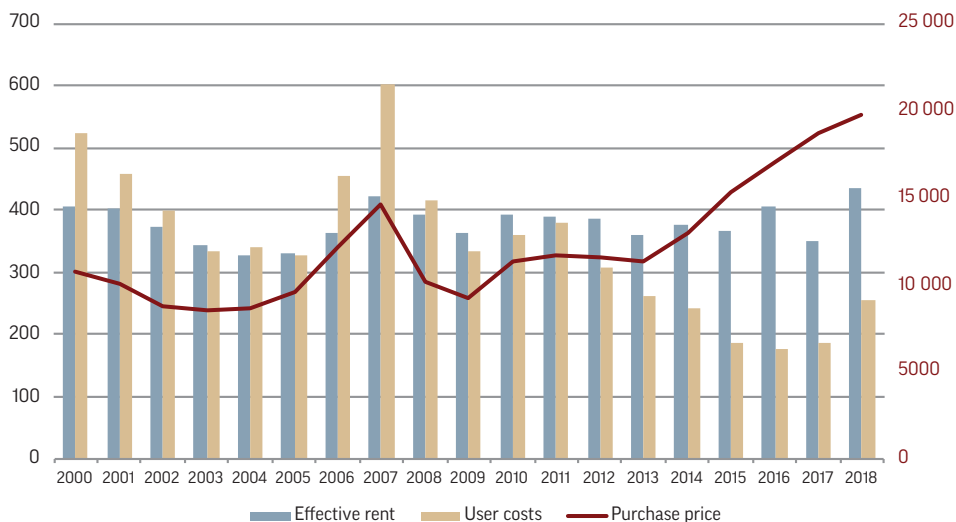
Source: calculations based on PMA (2019), OECD (2019a; 2019b) and Tax Foundation (2013) data.

While London is a special case due to Brexit uncertainty, Paris is similar to Berlin, although the development is less extreme (Figure 6). As in Berlin, the gap between prime rents and user costs grew between 2010 and 2016, and closed slightly in recent years. Currently, prime rents are still more than 70 percent higher than user costs, implying further price increases. Also similarly to London, the extreme divergence of user costs and prime rents in 2007 resulted in a price drop over the following years.

Figure 7 shows the rent cost gap for all 18 cities. The rent cost gap is defined as the relative difference between prime rents and user costs. A negative value implies higher user costs than prime rents, implying the potential of overheating in the market. Positive values, correspondingly, imply that prime rents are higher than user costs, thus prices could increase further.

Given that negative values for gaps indicate potentially overheated markets, investors should avoid purchasing offices in Madrid, Lisbon, Rome, London and Budapest, as in all these cities buying is less attractive than renting. In contrast, in Paris, Helsinki, Prague, Berlin, Stockholm, Amsterdam, Oslo and Luxembourg, prime rents exceed user costs by more than 40 percent, suggesting further price increases. All other markets are more or less in equilibrium.

In order to evaluate the predictive power of this approach, we check for the correlation coefficient between the lagged gap of user costs and prime rents and

the price development. If the gap widens, i.e., if prime rents increase faster than user costs, prices should increase, and vice versa. Of course, correlations are only a preliminary test – more sophisticated approaches are necessary to scientifically prove the relationship. Nevertheless, a high correlation coefficient indicates at the very least a stable relationship.

Figure 7. Rent-cost gaps in 18 European capitals in 2018

in € per square meter, gaps in % of effective rents
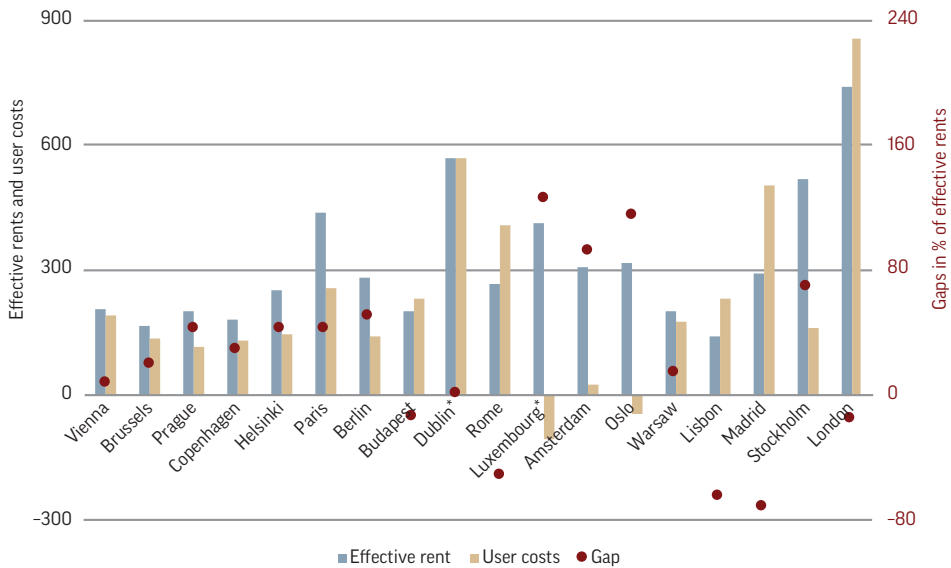
* Data for Dublin and Luxembourg refers to 2017.

Source: calculations based on PMA (2019), OECD (2019a; 2019b) and Tax Foundation (2013) data.

Indeed, the correlation coefficient between the lagged rent gap and the price development is 0.57, indicating a close relationship. In most cities, the correlation coefficient is even higher, with a maximum of 0.92 in Berlin. Only three cities show considerably lower correlations: Oslo, Warsaw and London. With regards to Warsaw and London at least, structural breaks could be a reason. For instance, if investors assume a different long-term growth rate of prices, due to political changes or changing perspectives for the long-term development of the economy, the applied user cost could deviate from the user costs practitioners implicitly apply. In general, real estate prices are primarily the result of expectations of future discounted rents. Such changes in long-term expectations are difficult to account for. Nonetheless, the applied user cost approach was able to predict over- and undervaluation in a high number of European capitals in the past.

Figure 8. Correlations between rent-cost gaps and price increases in 18 European capitals
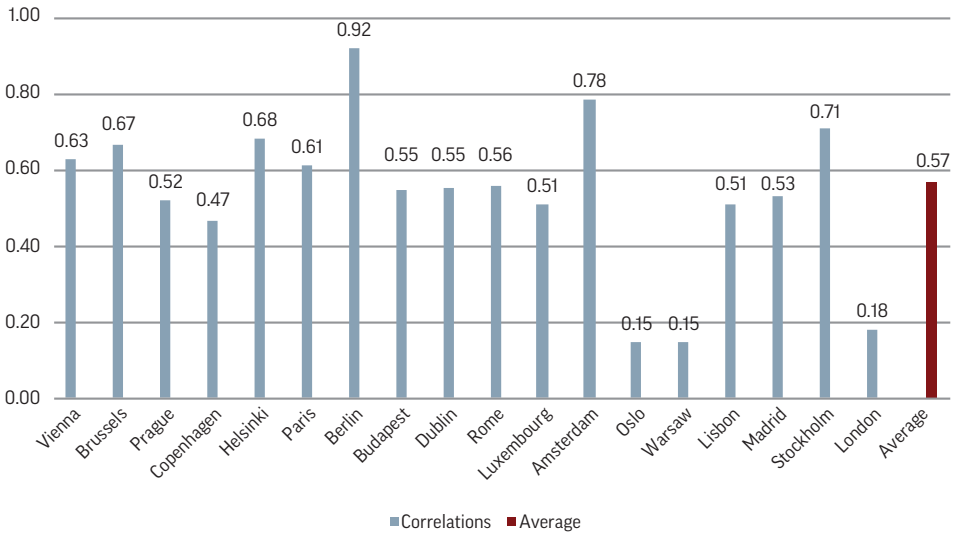
Source: calculations based on PMA (2019), OECD (2019a; 2019b) and Tax Foundation (2013) data.

Conclusions

In the past years, prices for European office space have reached new peaks. This naturally provokes discussion about a possible overheating in the market. One approach to assess price development of real estate markets is the so-called user cost approach. Typically, this approach is applied to housing markets, but it can also be applied to commercial markets. The model follows the idea of no-arbitrage. If one kind of tenure is economically more attractive than another, households or corporates will shift demand, so that both tenures – buying and renting – should equalize over time. Thus, major differences between buying and renting indicate a possible over- or undervaluation of properties. In this contribution, user costs for offices have been calculated for 18 European capitals.

The results indicate that in most European office markets, further price appreciations are likely. In Paris, Helsinki, Prague, Berlin, Stockholm, Amsterdam, Oslo and Luxembourg in particular, huge gaps between prime rents and user costs indicate further price increases, whereas in Madrid, Lisbon, Rome, London and Budapest, further price decreases seem plausible. However, these likely price decreases do not follow the typical pattern of a correction of a speculative bubble, but are more or less the result of falling prime rents that have not been fully captured in prices, yet.

The user cost approach has some predictive power but can only provide an initial pointer towards under- or overvaluations. For instance, structural breaks such as Brexit can change long-term expectations, which cannot be captured properly in a model. However, the approach seems valuable in providing a first assessment. In future, the German Economic Institute will do further research on this topic in order to strengthen its understanding of commercial property markets.

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III.3

The Structures of Real Estate and Financial Sectors with Induced Income Circular Flow – an Intercontinental Study

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Introduction

Knowledge of inter-industry connections is vital in policy implications since the policy makers prefer strongly interconnected sectors to the sectors with poor industry linkages. If the sectors or subsectors are independent, then any shock to a single sector will have little effect on the aggregate. However, if the economy presents inter-industry linkages, for example through input-output relationships, then any perturbation can proliferate through the economy resulting in a significant aggregate change (Roson and Sartori, 2016). The connections are estimated as forward and backward linkages which provide indices to set the criteria for key sectors identification (Cai and Leung, 2004). Input-output multiplier analysis is widely used to study the structure of production and inter-industry linkages of the single as well as multiple economies (e.g Su et al., 2017; Wiebe and Lenzen, 2017). However, the exclusion of income distribution and consumption expenditure in the traditional linkage analysis can be detrimental since endogenous income-expenditure impacts the inter-industry connections (Harada, 2015; Roland-Holst, 1990).

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While induced income-expenditure is imperative, it is also important to consider the fact that the socio-economic and policy dynamics of regions and countries differ from each other and hence the disparities and inequalities exist. Each region presents a set of human, physical, cultural and institutional resources that conjointly make up its development. Hence the role of income distribution in the structure of production could be different in different regions and countries. For instance, most developed countries have experienced increasing income inequality over the three decades since 1980 (Keeley, 2015). Moreover, the traditionally low-inequality countries such as Denmark, Germany, and Sweden also experienced significant increases in income inequality during the 2000 s (Frederiksen and Poulsen, 2016).

The exclusion of income distribution and consumption expenditure may leave the inter-industry analysis with incomplete information about the economy. To include the phenomenon of income-expenditure, SAM provides a comprehensive framework with complete income circular flow (Roland-Host, 1990). The theoretical underpinnings of endogenizing income distribution and consumption expenditure in the structure of production lie at the seminal works of Miyazawa (1960), Miyazawa and Masegi (1963), Miyazawa, (1976) and Pyatt (2001). Moreover, a prominent study with the use of SAM and macro-multiplier (MM) model for inter-industry interactions was conducted by Ciaschini and Socci (2007).

The study aims to include the income distribution and consumption expenditure of the institutional sectors into the structures of production of the economies. The study includes four economies, two developed and two developing, from four continents in order to determine the role of income distribution and consumption expenditure in the production sectors. The study focuses on real estate and financial sectors of the four economies to identify their linkages with other economic sectors.

The real estate sector is defined by National Industrial Classification System (NAICS) as: "establishments that are primarily engaged in renting or leasing real estate to others; managing real estate for others; selling, buying, or renting real estate for others; and providing other real estate related services, such as appraisal services". While the sturdiness of residential real estate is vital, the commercial and industrial real estate sector may matter more in the aggregate economy. Moreover, the level of incomes and access to financing also increases the inter-industry connections. For instance, increase in consumers' income raises the demand for retailing services which leads the firms to increase the number of employees and establish larger facilities to accommodate the amplified demand. This means that the consumers with increased income consume more which motivates manufacturers to increase their output and ultimately the demand for storage and distribution spaces is also

raised. These economy wide induced actions add to the GDP produced by the real estate economy[3] (Bates et al., 2015).

2. Data and method

2.1. Social Accounting Matrix (SAM)

A SAM provides an analytical framework to study the underpinnings of income circular flow that emerge from the inter-industry and inter-institutional interactions (Ahmed et al., 2018a; Ciaschini et al., 2009; Ciaschini et al., 2012). It integrates the production activities, income generation and its distribution, expenditure and investment of economic agents and thereby allows studying the growth of the economy (Ahmed et al., 2019a; Doukkali and Lejars, 2015). It depicts the whole income circular flow in such a way that the final demand determines the production that leads to the value added generation. The value added is the domestic income by factors which is distributed among the institutional sectors and create disposable income. Finally, the income circular loop is closed with the creation of final demand (Ahmed et al., 2018b). The illustration of SAM in matrix form contains a consistent nucleus that is expanded in accordance with the economy-wide policy implementations (Ahmed et al., 2019b; Pyatt, 1999; Pyatt and Round, 1977). Table 1 presents the basic framework of SAM. The current study includes four countries namely U.S. from North America, Italy from Europe, Nigeria from Africa and Pakistan from Asia. U.S. and Italy represent developed economies while Nigeria and Pakistan are developing economies. The SAMs for the four countries are used for the calibration of Leontief input-output model and extended input-output model to identify the key sectors with the exogenous and endogenous income-expenditure phenomenon. Moreover, the forward and backward linkages of real estate sector of the four countries are determined in both exogenous and endogenous setup.

The SAMs for Nigeria for year 2010 and Italy for year 2012 have been developed by Ahmed et al. (2018b) and Ahmed et al. (2019a) respectively. Whereas the SAMs for the U.S. for year 2012 and Pakistan for year 2011 have been developed by Socci et al. (2015) and IFPRI (2015) respectively. The total number of sectors in Italy, U.S., Nigeria and Pakistan is 64, 65, 66 and 63 respectively as depicted in Table A1 in appendix.

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[3] Higher housing values might also lead to increased consumption through a wealth effect. However, Poterba (2000) dismisses this notion by pointing out that while homeowners may have increased wealth they still need a place to stay. But it is now more expensive to stay somewhere because of the higher housing values.

Table 1. Basic framework of SAM

	n.	Commodities C1	Activities C2	Factors C3	Households C4	Firms C5	Government C6	Taxes C7	Capital Formation C8	ROW C9	Total
Commodities	R1		Intermediate consumption		Household consumption		Government consumption		Investment demand	Exports	Total demand
Activities	R2	Domestic supply									Total output
Factors	R3		Value added								Factor income
Households	R4			Compensation of employees		Transfers to households	Transfers to households			Foreign remittances	Household income
Firms	R5			Firms share of profits						Firms incomes from abroad	Firms income
Government	R6			Government share of profits				Direct and indirect taxes		Government income from abroad	Government income
Taxes	R7	Taxes on products	Production taxes		Personal income tax	Company income tax					Taxes
Capital Formation	R8				Household savings	Firms savings	Government savings			Current account balance	Total savings
ROW	R9	Imports		Row share of profits		Payment to ROW					Foreign outflow
Total		Total supply	Total output	Factor income	Household expenditure	Firms expenditure	Government expenditure	Taxes	Total investment	Foreign inflow	

Source: Ahmed et al. (2018b).

2.2. Leontief input-output and extended input-output models

The fundamental underpinnings of input-output model are set forth by Leontief for the analysis of inter-industry dependencies in an economy. The simple Leontief input-output model can be explained by considering that the industry j produces output x_j by using intermediate inputs z_{ij} from industry i. The output is related linearly to the intermediate inputs and the proportional relationships are reflected in the technical coefficients a_{ij} (Vazquez, 2015) given by:

$$a_{ij} = z_{ij}/x_j \tag{1}$$

This leads to;

$$z_{ij} = (a_{ij})x_j; \quad 0 \le a_{ij} \le 1 \tag{2}$$

In an economy with n sectors, the vector of intermediate inputs is expressed by Ax where x is the $(n \times 1)$ vector of industry's output and A is the $(n \times n)$ matrix with input coefficients. Mathematically it is expressed as:

$$x = Ax + f \tag{3}$$

where **f** is the vector of final demands by the institutional sectors. The well-defined Leontief model is derived by reordering equation (3).

$$x = (I - A)^{-1} f = Lf \tag{4}$$

Here $(I - A)^{-1}$ is called Leontief inverse and is denoted by L. It is also called a multiplier matrix whose element l_{ij} gives the additional output of industry i in response to a unit change in the final demand of output of industry j. The Leontief inverse L is used to identify the backward and forward linkages of the sectors of the economy. However, the Leontief model does not include the channel of income generation and its distribution within the economy.

The current study uses a multi-factor, multi-sector and multi-industry model to endogenize the income distribution and consumption expenditure, also referred to as final demand, into the structure of production. The income distribution here includes both the primary and secondary income distribution. The primary income distribution is the factorial distribution, that is to say, the distribution of primary income generated in production activities among the various factors of production and allocation to institutional sectors which provided the factor endowments. On the other hand, the secondary income distribution is the distribution of primary income among various economic agents namely: firms, households and the government. The

study follows the presentation of income circular flow with SAM scheme as presented by Ahmed et al. (2018b).

Figure 1 depicts a feedback loop of income generation and distribution process. It consists of several logical phases. The production process takes place at industry level, to produce output x, and generates gross value added v^{io}. In the next step, this value added is apportioned to the c value added components and is denoted as v^c. The following step of the loop is the distribution of value added by components to s institutional sectors, v^s. The primary income is redistributed among the institutional sectors to generate disposable incomes by the s institutional sectors and is represented by y. Finally, the loop closes with the creation of final demand by institutional sectors, which ultimately characterizes the final demand by I – O industries as denoted by f.

Figure 1. Multi-sector input-output model
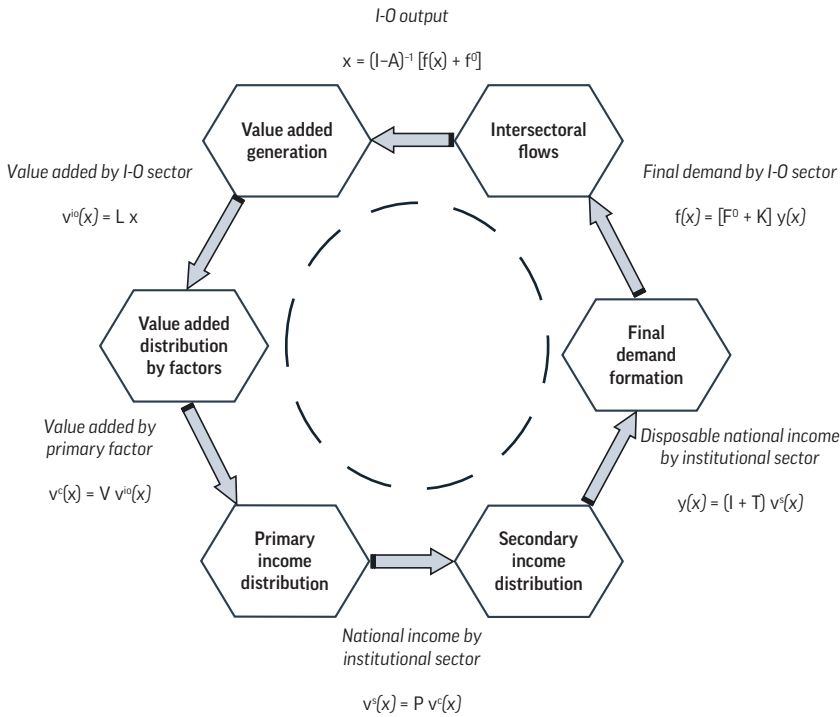
Source: Adopted from Ahmed et al. (2018b).

3. Dispersion analysis

Leontief and extended multisectoral models provide structural matrices $L = (I-A)^{-1}$ and $R = [I-A-F(I+T)PVL]^{-1}$ which are used to identify the linkages among the economic sectors in both exogenous and endogenous setup respectively. It is easy to describe the structure of production of an economy by constructing two indices of dispersion namely index of power of dispersion and index of sensitivity dispersion (Socci et al., 2014; 2015). The index of power of dispersion presents backward linkages and indicates the change in the ith good when a unit final demand shock is performed in other commodities. Whereas, the index of sensitivity dispersion gives forward linkages and appreciates the relevance of a change in unit final demand in the ith commodity in terms of a change in the output of all other commodities.

The power of dispersion index, $\pi_{.j}$, can be defined mathematically as follows:

$$\pi_{.j} = \frac{\frac{1}{m} \cdot r_{.j}}{\frac{1}{m^2} \cdot \sum_{j=1}^{m} r_{.j}}$$

where $r_{.j}$ is the jth sector's backward linkage, $\sum_{j=1}^{m} r_{.j}$ is the sum of all backward linkages and m is the total number of commodities. Likewise, the index of sensitivity dispersion, $\tau_{i.}$, is defined as:

$$\tau_{i.} = \frac{\frac{1}{m} \cdot r_{i.}}{\frac{1}{m^2} \cdot \sum_{i=1}^{m} r_{i.}}$$

where $r_{i.}$ is the ith sector's forward linkage, $\sum_{i=1}^{m} r_{i.}$ is the sum of all forward linkages and m is the total number of commodities.

4. Results of dispersion analysis

Unity is the average value of the index. The sectors are related backwardly and forwardly on the basis of following index values:

Strong   = Linkage index => 1
Intermediate = 1 > linkage index => 0.9
Weak   = 0.9 > linkage index

It is common that a sector may have strong forward linkage having index value greater than 1 but presents a weak backward linkage having index value less than 1. However, the key sectors are those which possess strong backward and forward linkages and the economies are always concerned with their key sectors since they can contribute significantly to the GDP growth by implementing several development policies. Table 2 presents the sectors with forward and backward linkages in the exogenous income setup. Here, the sectors which fall in the intersection of strong forward and backward linkages are considered as key sectors of economies. The real estate sectors of Italy, U.S., Nigeria and Pakistan are here referred to as 44, 45, 60 and 57 respectively in the blocks of forward and backward linkages. Whereas, the financial sectors of the same economies are respectively referred to as 41, 44, 59 and 55.

It is obvious from Table 2 that the real estate sectors of Italy, U.S. and Nigeria possess strong forward linkages but weak backward linkages. Whereas, the real estate sector of Pakistan has a weak forward and backward linkage. The results show that none of the four economies considers real estate sector as a key one in the simple Leontief IO model. On the other hand, the financial sectors of Italy and Pakistan have strong forward linkages but weak backward linkages while the U.S. has a financial sector with strong backward linkage but weak forward linkage. Only Nigeria has the financial sector which possesses a strong forward and backward linkage, thereby considered as a key sector of the economy.

The results of forward and backward linkages after endogenizing income distribution and final demand are depicted in Table 3. It shows that the real estate sectors of Italy and Nigeria have strong forward and backward linkages. The real estate sector of the U.S. has strong forward linkage and weak backward linkage. However, the economy of Pakistan has a real estate sector with weak forward and backward linkage. On the other hand, the financial sectors of Italy and Nigeria possess strong forward and backward linkages, while those of the U.S. and Pakistan present weak forward but strong backward linkages. The results show that the induced income distribution has significantly impacted the production structures of Italy and Nigeria where the real estate and financial sectors have appreciated in both indices and have become the key sectors which was not the case in the simple IO model. However, the indices of the U.S. and Pakistan are also changed albeit neither the real estate nor financial sector of both economies have become the key sector in the endogenous setup. This reveals that the inter-linkages of production sectors with final demand and income distribution are stronger in the economies of Italy and Nigeria as compared to the U.S. and Pakistan.

Table 2. Key Sectors – Leontief IO model

			Forward Linkages		
			Strong	Intermediate	Weak
Backward Linkages	Strong	Italy			
		U.S.			44$_{FIN}$
		Nigeria	59$_{FIN}$		
		Pakistan			
	Intermediate	Italy			
		U.S.			
		Nigeria			
		Pakistan			
	Weak	Italy	41$_{FIN}$, 44$_{RE}$		
		U.S.	45$_{RE}$		
		Nigeria	60$_{RE}$		
		Pakistan	55$_{FIN}$		57$_{RE}$

Source: authors' elaboration.

Table 3. Key Sectors – Multisectoral Extended Model

			Forward Linkages		
			Strong	Intermediate	Weak
Backward Linkages	Strong	Italy	41$_{FIN}$, 44$_{RE}$		
		U.S.			44$_{FIN}$
		Nigeria	59$_{FIN}$, 60$_{RE}$		
		Pakistan			55$_{FIN}$
	Intermediate	Italy			
		U.S.			
		Nigeria			
		Pakistan			
	Weak	Italy			
		U.S.	45$_{RE}$		
		Nigeria			
		Pakistan			57$_{RE}$

Source: authors' elaboration.

The indices of power of dispersion and sensitivity dispersion also provide the ranks of all sectors of the economies along with the index values. The closer view of the real estate and financial sectors of the four economies can be presented with

their index values and ranks in both exogenous and endogenous setup. Tables 4 and 5 present respectively the indices and rankings of real estate and financial sectors of the four economies in forward and backward dispersion. The comparison of both IO and Extended models depicts the impact of induced income distribution and final demand in the production structures of the economies.

The findings of the study reveal that any real-estate public policy initiatives should be cautiously applied given the complex relationships of real estate and financial sectors with other sectors of the economy particularly when it comes to expanding the funding sources for real estate development. Moreover, consideration of income distribution and consumption expenditure in the development policies of the economic sectors is also vital because of their inter linkages.

Table 4. **Forward dispersion**

	I-O Model		Extended Model	
	Index value	Ranking	Index value	Ranking
Italy_Real_Estate	1.57	8	1.6	12
Italy_Financial	1.7	7	1.69	11
U.S._ Real_Estate	1.84	5	6.38	1
U.S._ Financial	0.56	59	0.47	36
Nig_ Real_Estate	3.09	2	3.45	6
Nig_ Financial	1.14	14	3.6	5
Pak_ Real_Estate	0.57	51	0.03	63
Pak_ Financial	1.2	16	0.7	34

Source: authors' elaboration.

Table 5. **Backward dispersion**

	I-O Model		Extended Model	
	Index value	Ranking	Index value	Ranking
Italy_Real_Estate	0.63	59	1.16	3
Italy_Financial	0.72	56	1.02	19
U.S._ Real_Estate	0.78	62	0.88	65
U.S._ Financial	1.07	21	1.00	40
Nig_ Real_Estate	0.69	59	1.10	28
Nig_ Financial	1.03	35	1.12	24
Pak_ Real_Estate	0.62	54	0.74	61
Pak_ Financial	0.73	44	1.00	33

Source: authors' elaboration.

Conclusions

Knowledge of inter-industry connections is always an important concern for policy makers to devise the prudent policies which help boosting the GDP of the economy. However, absence of income distribution and consumption expenditure clearly leaves the system with incomplete information by setting aside the important factors of economy. Moreover, the income circular flow is different in different regions and economies and hence it may impact differently the production activities. The real estate sector is commonly considered as the important sector as it can perturb the other sectors of the economy or it can help raising the economy as a whole. When it comes to real estate sector, the financial market can never be ignored since the real estate sector requires huge investments and financial market provides access to the financing. Therefore, finance sector is also considered an imperative for the economies.

This study identifies if the real estate sector and finance sector are really connected with other sectors of the economy. The study includes four economies from four continents: Italy from Europe, the U.S. from North America, Nigeria from Africa and Pakistan from Asia. The comparison of four economies presents a better picture of income-expenditure phenomenon into the structures of production of different regions and economies. The study calibrated Leontief IO model and extended multisector model to study the dispersion analysis with exogenous and endogenous income-expenditure phenomenon. The results of dispersion analysis confirm that with exogenous income-expenditure, none of the four economies consider real estate sector and financial sector as the key ones except Nigeria where financial sector is a key one having more than one both forward and backward indices.

On the other hand, the induced income-expenditure clearly impacts the structures of production of four economies where the real estate and financial sectors have become the key sectors of Italy and Nigeria. The indices of U.S. and Pakistan are also changed although none of these two economies are characterized by real estate and financial sectors as the key ones in the endogenous setup. The findings of current study are important since it gives insightful information of the economic systems of the four economies which help to identify and determine the strengths and weaknesses in the implementation of different policies.

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III.3. The Structures of Real Estate and Financial Sectors with Induced Income Circular Flow...

201

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Appendix

Table A1. Sectors of economies

	Italy	U.S.	Nigeria	Pakistan
1	Agriculture	Farms	Rice unprocessed	Wheat
2	Forestry	Forestry, fishing, and related activities	Wheat unprocessed	Paddy – IRRI
3	Fisheries	Oil and gas extraction	Maize	Paddy – Basmati
4	Mining	Mining, except oil and gas	Sorghum	Raw Cotton
5	Food and beverages	Support activities for mining	Millet	Sugarcane
6	Textiles	Utilities	Other Cereals	Maize
7	Wood products	Construction	Vegetables	Oilseeds
8	Paper products	Wood products	Bananas	All other crops
9	Printing and recording services	Nonmetallic mineral products	Plantains and others	Potato
10	Refined petroleum	Primary metals	Pineapples	Other vegetables
11	Chemicals and chemical products	Fabricated metal products	Oranges	Fruits & edible nuts
12	Pharmaceuticals	Machinery	Other Fruits and nuts	Cattle, sheep, goats etc.

cont. tab. A1

	Italy	U.S.	Nigeria	Pakistan
13	Rubber and plastics products	Computer and electronic products	Soya beans	Raw milk
14	Other non-metallic mineral products	Electrical equipment	Groundnuts	Poultry
15	Basic metals	Motor vehicles	Oilseeds and oleaginous fruits	Forestry and Hunting
16	Fabricated metal products	Other transportation equipment	Cassava unprocessed	Fishing
17	Computer, electronic and optical products	Furniture and related products	Yams	Mining of crude oil
18	Electrical equipment	Miscellaneous manufacturing	Potatoes	Mining of natural gas
19	Machinery and equipment n.e.c.	Food and beverage and tobacco products	Sweet potatoes	Mining of coal
20	Motor vehicles	Textile product mills	Edible roots and tubers	Other mining
21	Other transport equipment	Apparel and leather products	Stimulant and spice etc.	Meat & meat products
22	Furniture; other manufactured goods	Paper products	Pulses	Milk, cream, ghee, butter, curd, cheese, ice-cream
23	Repair and installation services	Printing and related support activities	Other crops	Vegetable & animal oils & fats
24	Electricity, gas, steam and air-conditioning	Petroleum and coal products	Processed cassava	Wheat milling (Wheat Flour)
25	Natural water; water treatment and supply services	Chemical products	Processed rice	Rice husking & milling – IRRI
26	Sewerage	Plastics and rubber products	Processed wheat	Rice husking & milling – Basmati
27	Constructions	Wholesale trade	Other processed food & beverage etc.	Sugar
28	Repair services of motor vehicles	Retail trade	Livestock & poultry	All other food, beverage and tobacco products
29	Wholesale trade services	Air transportation	Forestry	Cotton ginning (lint)
30	Retail trade services	Rail transportation	Fish-unprocessed-capture	Cotton spinning & preparation of fibres
31	Land transport services	Water transportation	Fish-unprocessed-aqua	Cotton weaving
32	Water transport services	Truck transportation	Fish-processed-capture	Knitted, crocheted textile articles
33	Air transport services	Transit and ground passenger transportation	Fish-processed-aqua	Wearing apparel
34	Warehousing	Pipeline transportation	Coal mining	Manufacture of all other textiles
35	Postal and courier services	Other transportation and support activities	Crude petroleum and natural gas	Leather and leather products
36	Accommodation and food services	Warehousing and storage	Metal ores	Wood products

III.3. The Structures of Real Estate and Financial Sectors with Induced Income Circular Flow...

203

	Italy	U.S.	Nigeria	Pakistan
37	Publishing services	Publishing industries (includes software)	Cement, and minerals etc.	Petroleum products
38	Programming and broadcasting services	Motion picture and sound recording industries	Oil refined	Fertilizers & Pesticides
39	Telecommunications services	Broadcasting and telecommunications	Textile, leather, apparel and footwear	Chemicals (not including: fertilizers, pesticides)
40	Consultancy services; information services	Information processing services	Wood and wood products	Cement, and all quarry-related products
41	Financial services	Federal reserve banks	Pulp, paper and paper products	Glass and glass products
42	Insurance	Securities, commodity contracts, and investments	Fertilizers & chemical products etc.	Iron, steel and nonferrous metals
43	Services auxiliary to financial services and insurance services	Insurance carriers and related activities	Non-metallic products	Metal products (cutlery, buckets, etc.)
44	Real estate	Funds and other financial vehicles	Plastic and rubber products	Domestic appliances and office machinery
45	Imputed rents of owner-occupied dwellings	Real estate	Basic metal, iron and steel	General and specialized machinery
46	Legal and accounting services	Rental and leasing services	Motor vehicles & assembly	Vehicles and transport equipment
47	Architectural and engineering services	Legal services	Other manufacturing	Paper, publishing, furniture
48	Scientific research and development services	Computer systems design and related services	Electricity, water supply and waste management	Electricity generation
49	Advertising and market research services	Miscellaneous professional	Construction	Electricity distribution
50	Other professional services	Management of companies	Trade	Construction
51	Rental and leasing services	Administrative and support services	Accommodation and food services	Wholesale & retail trade
52	Employment services	Waste management and remediation services	Transport road, water, air and rail etc.	Hotels & restaurants
53	Travel agency and related services	Educational services	Telecommunications	Transport, cargo-handling & storage
54	Security and investigation services	Ambulatory health care services	Motion pictures and music production	Telecommunication services
55	Public administration and defense services	Hospitals and nursing facilities	Publishing	Financial sectors
56	Education services	Social assistance	Post	Business services
57	Human health services	Performing arts and related activities	Broadcasting	Real estate
58	Social work services	Recreation industries	Arts, entertainment and recreation	Ownership of Dwellings
59	Arts and entertainment services	Accommodation	Financial institutions, insurance etc.	Public services other than health & education
60	Sporting services	Food services and drinking places	Real estate	Public and private education services

cont. tab. A1

	Italy	U.S.	Nigeria	Pakistan
61	Services furnished by membership organizations	Other services, except government	Professional, scientific and technical services	Public and private health and social work services
62	Repair services of computers and personal and household goods	Federal general government	Administrative & support services	Services of domestic staff
63	Other personal services	Federal government enterprises	Public administration	All other services
64	Services of households as employers	State and local general government	Education	
65		State and local government enterprises	Human health and social services	
66			Other services	

Source: authors' elaboration.

III.4

Evaluation and Analysis of the Value of German Real Estate Following the Financial Crisis of 2007

Volker Arhelger[1], Chong Dae Kim[2]

Introduction

The volatility of housing prices reflects the volatility of the economy as a whole. Growth phases are marked by a positive outlook towards the economy as a whole and rising employment numbers. This outlook leads to a loosening of lending regulations, which in turn leads to a larger supply of credit. Thus, credit becomes available to people with lower credit ratings (the so-called sub-prime borrowers).

The growing supply of cheap credit leads to a rise in housing investment, as housing is generally seen as a safe investment opportunity. Because of this, prices rise until they hit a peak, after which trading in the housing market stagnates. The falling demand leads to job losses in the construction sector, which can then lead to a recession.

Development of large industrial countries in the last fifty years shows that a recession in the housing market leads to a recession in the general economy. Thus, it is only natural to assume that falling investment in the housing market can be seen as the first sign of a recession. What is not quite clear however, is if recession and recovery phases can be forecasted by observing developments in the housing market. Charles Goodhart and Boris Hofmann describe the relationship between the housing

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[1]   ERGO Group AG, product management full insurance, referent
[2]   Technische Hochschule Köln, Faculty of Process Engineering, Energy and Mechanical Systems

market and the general economy in their book "*Housing Prices and the Macroeconomy: Implications for Banking and Price Stability (2007)*". They also show that a correlation between economic performance and housing prices exists. In their opinion, one could weaken future recessions through influencing housing prices (as an additional lever to inflation targeting).

In this paper, we want to analyze the relationship between prices in the German housing market and the yield of ten-year bonds. Section 1, Section 2 and Section 3 formulate and describe the methodological approach used by the Real Estate Valuation Board of the State Capital City of Düsseldorf[3]. Section 4 shows the regression results for our data[4]. Section 5 analyzes the relationship between German housing prices and the yield of ten-year bonds. Section 6 concludes.

1. Multiple linear regression and rating factors

A multiple linear regression is generally an equation with n arguments, which are used to describe a functional relationship of case i between input x and output y:

$$y_i = \beta_0 + \beta_1 \cdot x_{i,1} + \cdots + \beta_n \cdot x_{i,n} + \varepsilon_i = \beta_0 \sum_{k=1}^{n} \beta_k \cdot x_{i,k} + \varepsilon_i \qquad (1)$$

With a number m of cases we receive (in matrix form):

$$\begin{pmatrix} y_1 \\ \vdots \\ y_m \end{pmatrix} = \begin{pmatrix} 1 & x_{1,1} & \cdots & x_{1,n} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{m,1} & \cdots & x_{m,n} \end{pmatrix} \cdot \begin{pmatrix} \beta_0 \\ \vdots \\ \beta_n \end{pmatrix} + \begin{pmatrix} \varepsilon_0 \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

or, in short:

$$Y = X \cdot \beta + \varepsilon \qquad (2)$$

The vector Y and matrix X derive from the data, which means that we must calculate the vector β, or rather its estimated version $\hat{\beta}$:

$$Y = X \cdot \hat{\beta} + \varepsilon \qquad (3)$$

This is achieved by minimizing the total error through a least-squares procedure (with $\varepsilon = Y - X \cdot \hat{\beta}$):

$$\sum_{i=1}^{n} \varepsilon_i^2 = \varepsilon^T \cdot \varepsilon = \left(Y - X \cdot \hat{\beta}\right)^T \cdot \left(Y - X \cdot \hat{\beta}\right) = Y^T \cdot Y - 2\hat{\beta}^T \cdot X^T \cdot Y + \hat{\beta}^T \cdot X^T \cdot X \cdot \hat{\beta} \rightarrow \min! \qquad (4)$$

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[3]   See Mann (2004) and Mann (2005).
[4]   Provided by Empirica AG and Empirica Systems.

Deriving by β and setting the derivative equal to zero we receive:

$$\frac{\partial \sum_{i=1}^{n} \varepsilon_i^2}{\partial \hat{\beta}} = -2X^T \cdot Y + 2X^T \cdot X \cdot \hat{\beta} = 0$$

$$\leftrightarrow \hat{\beta} = \left(X^T \cdot X\right)^{-1} \cdot X^T \cdot Y \tag{5}$$

Thus with the residuals $\varepsilon = Y - X \cdot \hat{\beta}$ and $\hat{Y} := Y - \varepsilon$, the equation

$$\hat{y} = X \cdot \hat{\beta} = \hat{\beta}_0 + \sum_{k=1}^{n} \hat{\beta}_k \cdot \chi_k \tag{6}$$

is satisfied. The columns $X_{i,1}, \cdots, X_{i,n}$ of the data matrix X correspond to the different characteristics of a given house, e.g. location.

$\overline{\chi}_k$ is the mean value of each characteristic (column) in matrix X ($\overline{\chi}_k$) has thus only values in the range $\{0;1\}$), with $k = 1, \cdots, n$ and $\hat{y} = \overline{Y}$ as the mean of the dependent variable vector Y over all observed cases m:

$$\hat{y} := \hat{\beta}_0 + \hat{\beta}_1 \cdot \overline{\chi}_1 + \cdots + \hat{\beta}_n \cdot \overline{\chi}_n \tag{7}$$

In the following, we will differentiate between variables (characteristics) with proportional, nominal and ordinal scaling. Equation (7) can thus be separated into its components as follows (with $\hat{\beta}_0$ belonging to the proportionally scaled characteristics, as well as v_i, o_i and n_i replacing the respective β and $\overline{x}_i, \overline{y}_i$ and $\overline{z}_i$ replacing the respective $\overline{\chi}_k$ for proportionally, ordinally and nominally scaled characteristics):

$$\begin{aligned}
\hat{y} = &\, \hat{\beta}_0 + \hat{\beta}_1 \cdot \overline{\chi}_1 + \cdots + \hat{\beta}_n \cdot \overline{\chi}_n \\
= &\, \hat{\beta}_0 \\
&+ v_1 \cdot \overline{x}_1 + \cdots + v_c \cdot \overline{x}_c \quad \text{(proportionally scaled characteristics)} \\
&+ o_1 \cdot \overline{y}_1 + \cdots + o_d \cdot \overline{y}_d \quad \text{(ordinally scaled characteristics)} \\
&+ n_1 \cdot \overline{z}_1 + \cdots + n_e \cdot \overline{z}_e \quad \text{(nominally scaled characteristics)}
\end{aligned} \tag{8}$$

Proportionally scaled and ordinally scaled characteristics can be further broken down into groups of subcharacteristics (which will be expanded upon later). Thus, the equation becomes:

$$\begin{aligned}
\hat{y} = &\, \hat{\beta}_0 \\
&+ v_{11} \cdot \overline{x}_{11} + \cdots + v_{1c_1} \cdot \overline{x}_{1c_1} \quad \text{(proportionally scaled group 1)} \\
&+ \cdots \\
&+ v_{a1} \cdot \overline{x}_{a1} + \cdots + v_{ac_a} \cdot \overline{x}_{ac_a} \quad \text{(proportionally scaled group a)} \\
&+ o_{11} \cdot \overline{y}_{11} + \cdots + o_{1d_1} \cdot \overline{y}_{1d_1} \quad \text{(ordinally scaled group 1)} \\
&+ \cdots \\
&+ o_{b1} \cdot \overline{y}_{b1} + \cdots + o_{bd_b} \cdot \overline{y}_{bd_b} \quad \text{(ordinally scaled group b)} \\
&+ n_1 \cdot \overline{z}_1 + \cdots + n_e \cdot \overline{z}_e \quad \text{(nominally scaled characteristics)}
\end{aligned} \tag{9}$$

With the above, the total number n of characteristics becomes:

$$n = \sum_{i=1}^{a} c_i + \sum_{i=1}^{b} d_i + e$$

With $c := \max(c_1, \ldots, c_a)$ and $d := \max(d_1, \ldots, d_b)$ we can normalize the regression to (with $v_{ij} = o_{mn} = 0$ where necessary):

$$\hat{y} = \hat{\beta}_0$$

$$+ v_{11} \cdot \overline{x}_{11} + \cdots + v_{1c_1} \cdot \overline{x}_{1c} \quad \text{(proportionally scaled group 1)}$$

$$+ \cdots$$

$$+ v_{a1} \cdot \overline{x}_{a1} + \cdots + v_{ac_a} \cdot \overline{x}_{ac} \quad \text{(proportionally scaled group a)}$$

$$+ o_{11} \cdot \overline{y}_{11} + \cdots + o_{1d_1} \cdot \overline{y}_{1d} \quad \text{(ordinally scaled group 1)}$$

$$+ \cdots$$

$$+ o_{b1} \cdot \overline{y}_{b1} + \cdots + o_{bd_b} \cdot \overline{y}_{bd} \quad \text{(ordinally scaled group b)}$$

$$+ n_1 \cdot \overline{z}_1 + \cdots + n_e \cdot \overline{z}_e \quad \text{(nominally scaled characteristics)} \quad (10)$$

The normalized expression will be used for the rest of this paper. Simplifying the equation, we receive:

$$\overline{y} = \hat{y} = \hat{\beta}_0 + \sum_{i=1}^{n} \hat{\beta}_i \cdot \chi_i \tag{11}$$

and with $P_i := \hat{\beta}_i \cdot \chi_i$

$$\overline{y} = \hat{y} = \hat{\beta}_0 + \sum_{i=1}^{n} \hat{\beta}_i \cdot \chi_i \tag{12}$$

2. Solving the equation for the characteristics

To solve the equation for the influence β of the characteristics, we must first set up a hypothesis test:

1. Null hypothesis: $H_0 : \hat{\beta} = 0 : \left(\widehat{\beta_1} = \cdots = \widehat{\beta_n} = 0 \right)$
2. Alternative hypothesis: $H_A : \hat{\beta} \neq 0 \quad \left(\widehat{\beta_i} \neq 0 \text{ for one or more } i \geq 1 \right)$

The null hypothesis states that the characteristic $\overline{\chi}_i$ has no influence on the price $\hat{y}$. The alternative hypothesis states that the characteristic $\overline{\chi}_i$ does influence the price. The factors we will calculate later are a measure of the relative strength of null hypothesis to alternative hypothesis.

2.1. Nominally scaled characteristics

Nominally scaled characteristics are defined as those that cannot be compared relative to a similar characteristic: the characteristic either exists or it does not. With equations (9) and (12) we receive for the nominally scaled part $\hat{y}^n$ of the normed equation (10):

$$\widehat{y^n} = n_1 \cdot \overline{z}_1 + \cdots + n_e \cdot \overline{z}_e = \sum_{j=1}^{e} n_j \cdot \overline{z}_j = \sum_{j=1}^{e} P_j^n \qquad (13)$$

Step 1

For each characteristic $n_i \cdot \overline{z}_i$ we first calculate the norm value $y_{NO}^{n_i}$, in which the respective characteristic has no influence:

$$H_0^{n_i} : y_{NO}^{n_i} := \widehat{y^n} - n_i \cdot \overline{z}_i = \widehat{y^n} - P_i^n, \quad 1 \le i \le e, \qquad (14)$$

Step 2

Next we calculate the case of full influence of the respective nominally scaled characteristic:

$$H_A^{n_i} : y^{n_i} := y_{NO}^{n_i} + n_i, \quad 1 \le i \le e. \qquad (15)$$

Figure 1. Norming of nominally scaled characteristics
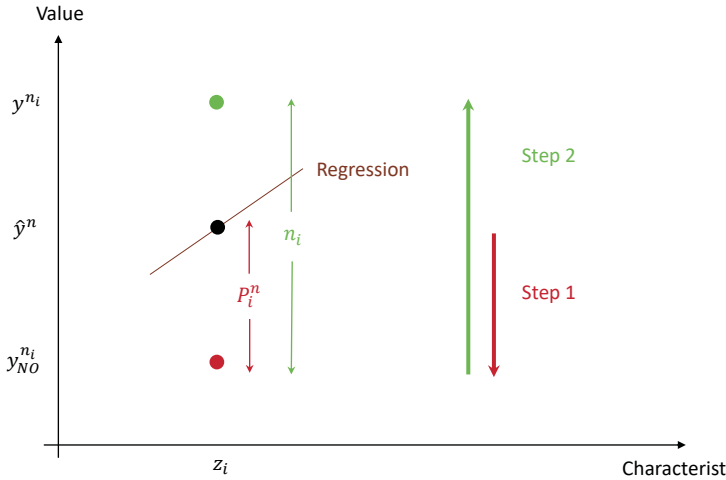
Source: own study.

2.2. Ordinally scaled characteristics

Ordinally scaled characteristics contain those that can be placed in some sort of relation to each other e.g. a ranking of qualities. With equations (9) and (12) we receive for the ordinally scaled part $\hat{y}^o$ of the normed equation (10):

$$\widehat{y_i^o} = o_{i1} \cdot \overline{y}_{i1} + \cdots + o_{id} \cdot \overline{y}_{id} = \sum_{j=1}^{d} o_{ij} \cdot \overline{y}_{ij} = \sum_{j=1}^{d} P_{ij}^o \qquad (16)$$

Step 1

The typical (most common) characteristic $\overline{y}_{im}$ of the respective group is seen as the standard with which the other characteristics of that group are compared. Thus it is not included in the calculation of the norm value $y_{NO}^{o_i}$:

$$H_0^{o_i} : y_{NO}^{o_i} := \widehat{y^o} - \sum_{j=1, j\neq m}^{d} o_{ij} \cdot \overline{y}_{ij} = \widehat{y^o} - \sum_{j=1, j\neq m}^{d} P_{ij}^o, \quad 1 \leq i \leq b, \tag{17}$$

Step 2

Next we calculate the case of full influence of the respective ordinally scaled characteristic (again, disregarding the case $j=m$):

$$H_A^{o_{ij}} : y^{o_i} := y_{NO}^{o_i} + o_{ij}, \quad 1 \leq i \leq b, \quad 1 \leq j \leq d, \quad j \neq m. \tag{18}$$

Fig. 2 shows the principle of the above, with $b=1$ and $d=4$. Equation (16) has thus the following form:

$$\widehat{y_1^o} = o_{11} \cdot \overline{y}_{11} + o_{12} \cdot \overline{y}_{12} + o_{13} \cdot \overline{y}_{13} + o_{14} \cdot \overline{y}_{14} = P_{11}^o + P_{12}^o + P_{13}^o + P_{14}^o$$

Figure 2. Norming of ordinally scaled characteristics
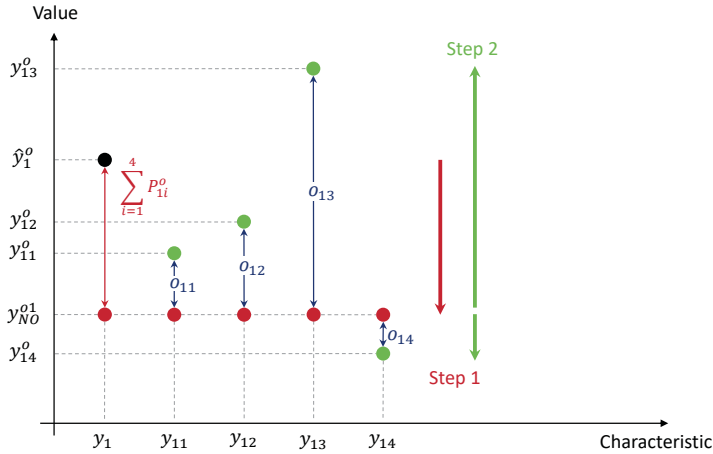
2.3. Proportionally scaled characteristics

Proportionally scaled characteristics (such as the temperature) are defined by a continuous function, usually a polynomial. Thus, they can be solved traditionally, meaning that there is no need to use the hypotheses defined above.

Using equation (9) and setting the nominal and ordinal influences to zero, we receive:

$$\widehat{y_i^v} = \widehat{\beta_0} + v_{i1} \cdot \overline{x}_{i1} + \cdots + v_{ic} \cdot \overline{x}_{ic}$$
$$= \widehat{\beta_0} + \sum_{j=1}^{c} v_{ij} \cdot \overline{x}_{ij} = \widehat{\beta_0} + \sum_{j=1}^{c} P_{ij}^v, \quad i = 1, \ldots, a. \tag{19}$$

which will be used to calculate the rating factors in the next section.

3. Calculation of rating factors in a group of characteristics

Using the previously derived equations, we can create rating factors that show the relative strength of each characteristic to others in the same group.

3.1. Nominally scaled characteristics

Using equations (14) and (15) we receive the factor F^{n_j} for nominal characteristics:

$$F^{n_j} := \frac{y_{NO}^{n_j}}{y^{n_j}}, j = 1, \ldots, e. \tag{20}$$

Since each nominal characteristic $j = 1, \ldots, e$ is its own group, we receive a simple correlation table:

	y^{n_j}
$y_{NO}^{n_j}$	F^{n_j}

Thus, follows:

$$y^{n_j} \cdot F^{n_j} = y_{NO}^{n_j} \Leftrightarrow F^{n_j} = \frac{y_{NO}^{n_j}}{y^{n_j}}, \quad j = 1, \ldots, e. \tag{21}$$

3.2. Ordinally scaled characteristics

As described above, the most common subcharacteristic, e.g. a house standing in the city center instead of the suburbs, is set as the standard and thus ignored. Following equations (17) and (18), we receive for the rating factor $F^{o_{ij}}$:

$$y^{n_j} \cdot F^{n_j} = y_{NO}^{n_j} \Leftrightarrow F^{n_j} = \frac{y_{NO}^{n_j}}{y^{n_j}}, \quad j = 1, \ldots, e. \tag{22}$$

Thus, follows for the correlation table:

	$y^{o_{i1}}$	$y^{o_{i2}}$	$\cdots$	$y^{o_{id}}$
$y^{o_i}_{NO}$	$F^{o_{i1}}$	$F^{o_{i2}}$	$\cdots$	$F^{o_{id}}$

With $j \neq m$ follows:

$$y^{o_{ij}} \cdot F^{o_{ij}} = y^{o_i}_{NO} \Leftrightarrow F^{o_{ij}} = \frac{y^{o_i}_{NO}}{y^{o_{ij}}}, \quad i = 1, \ldots, b, \quad j = 1, \ldots, d. \tag{23}$$

Also, with $j, k \in \{1, \ldots, d\} \setminus \{m\}$ we have two subcharacteristics in the same group:

$$y^{o_{ij}} \cdot F^{o_{ij}} = y^{o_i}_{NO} \text{ and } y^{o_{ik}} \cdot F^{o_{ik}} = y^{o_i}_{NO} \tag{24}$$

These can be put into relation via $y^{o_i}_{NO}$:

$$y^{o_{ij}} \cdot F^{o_{ij}} = y^{o_{ik}} \cdot F^{o_{ik}} \Leftrightarrow y^{o_{ij}} = \frac{F^{o_{ik}}}{F^{o_{ij}}} \cdot y^{o_{ik}}, \quad i = 1, \ldots, b \tag{25}$$

Thus, the correlation table for an entire group of ordinally scaled characteristics is created:

	$y^{o_i}_{NO}$	$y^{o_{i1}}$	$y^{o_{i2}}$	$\cdots$	$y^{o_{id}}$
$y^{o_i}_{NO}$	1	$F^{o_{i1}}$	$F^{o_{i2}}$	$\cdots$	$F^{o_{id}}$
$y^{o_{i1}}$	$\dfrac{1}{F^{o_{i1}}}$	1	$\dfrac{F^{o_{i2}}}{F^{o_{i1}}}$	$\cdots$	$\dfrac{F^{o_{id}}}{F^{o_{i1}}}$
$y^{o_{i2}}$	$\dfrac{1}{F^{o_{i2}}}$	$\dfrac{F^{o_{i1}}}{F^{o_{i2}}}$	1	$\cdots$	$\dfrac{F^{o_{id}}}{F^{o_{i2}}}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\ddots$	$\vdots$
$y^{o_{id}}$	$\dfrac{1}{F^{o_{id}}}$	$\dfrac{F^{o_{i1}}}{F^{o_{id}}}$	$\dfrac{F^{o_{i2}}}{F^{o_{id}}}$	$\cdots$	1

The table above can now be used to compare any combination of subcharacteristics within an ordinal group i.

3.3. Proportionally scaled characteristics

The rating factors for proportionally scaled characteristics will be calculated using equation (19). We linearize around the mean value $\hat{y}^v_i$ for each influence factor v_{ij} (with i representing the characteristic and j representing a polynomial[5] term of that characteristic), using the linear equation (26):

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[5]   The polynomial usually being degressive.

$$y^{v_{ij}} = f(x_{ij}) = \hat{\beta}_{ij} + v_{ij} \cdot x_{ij}, \; i = 1, \ldots, a, \; j = 1, \ldots, c \tag{26}$$

Figure 3. Norming of proportionally scaled characteristics
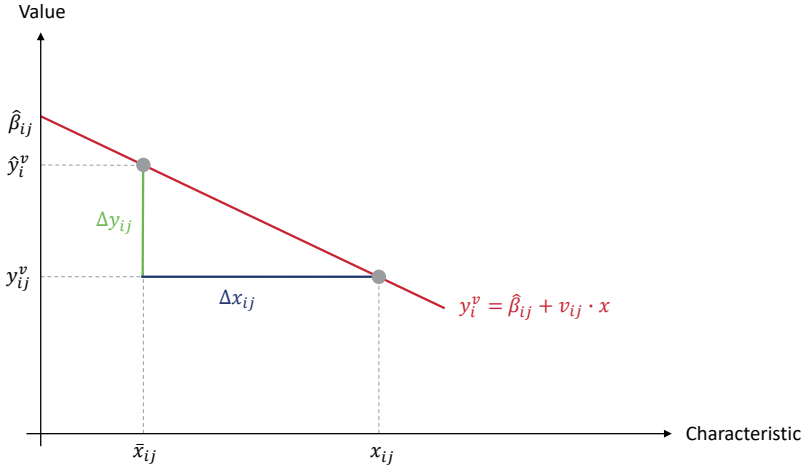
Source: own study.

Linearizing between the points $(\overline{x}_{ij}, \hat{y}_i^v)$ and (x_{ij}, y_i^v), we receive:

$$\Delta x_{ij} = x_{ij} - \overline{x}_{ij}, \; \Delta y_{ij} = \hat{y}_i^v - y^{v_{ij}}$$

$$v_{ij} = \frac{\Delta y_{ij}}{\Delta x_{ij}} \Leftrightarrow \Delta y_{ij} = \Delta x_{ij} \cdot v_{ij} \text{ and thus}$$

$$y^{v_{ij}} = \frac{\Delta y_{ij}}{\Delta x_{ij}} \cdot x_{ij} + \hat{\beta}_{ij} \text{ . Furthermore}$$

$$\hat{y}_i^v - y^{v_{ij}} = \Delta y_{ij} = \Delta x_{ij} \cdot v_{ij} \Leftrightarrow$$

$$y^{v_{ij}} = \hat{y}_i^v - \Delta y_{ij} = \hat{y}_i^v - \Delta x_{ij} \cdot v_{ij}, \quad i = 1, \ldots, a, \; j = 1, \ldots, c$$

The rating factor is calculated as follows:

$$F^{v_{ij}} = \frac{\hat{y}_i^v}{y^{v_{ij}}} = \frac{\hat{y}_i^v}{\hat{y}_i^v - \Delta y_{ij}} = \frac{1}{1 - \dfrac{\Delta y_{ij}}{\hat{y}_i^v}} = \frac{1}{1 - \dfrac{\Delta x_{ij} \cdot v_{ij}}{\hat{y}_i^v}} = \frac{1}{1 - \dfrac{(x_{ij} - \overline{x}_{ij}) \cdot v_{ij}}{\hat{y}_i^v}}$$

$$= \frac{1}{1 + \dfrac{(\overline{x}_{ij} - x_{ij}) \cdot v_{ij}}{\hat{y}_i^v}}, \; i = 1, \ldots, a, \; j = 1, \ldots, c \tag{27}$$

Thus follows for the correlation table:

	$y^{v_{i1}}$	$y^{v_{i2}}$	$\ldots$	$y^{v_{ic}}$
$\hat{y}_i^v$	$F^{v_{i1}}$	$F^{v_{i2}}$	$\ldots$	$F^{v_{ic}}$

For each factor follows:

$$y^{v_{ij}} \cdot F^{v_{ij}} = \hat{y}_i^v \Leftrightarrow F^{v_{ij}} = \frac{\hat{y}_i^v}{y^{v_{ij}}}, \quad i = 1,\ldots,a, \quad j = 1,\ldots,c. \tag{28}$$

Also, with $j,k \in \{1,\ldots,c\}$ we have two subcharacteristics in the same group:

$$y^{v_{ij}} \cdot F^{v_{ij}} = \hat{y}_i^v \text{ and } y^{v_{ik}} \cdot F^{v_{ik}} = \hat{y}_i^v \tag{29}$$

These can be put into relation via $\hat{y}_i^v$:

$$y^{v_{ij}} \cdot F^{v_{ij}} = y^{v_{ik}} \cdot F^{v_{ik}} \Leftrightarrow y^{v_{ij}} = \frac{F^{v_{ik}}}{F^{v_{ij}}} \cdot y^{v_{ik}}, \quad i = 1,\ldots,c \tag{30}$$

Thus, the correlation table for an entire group of proportionally scaled characteristics is created:

	$\hat{y}_i^v$	$y^{v_{i1}}$	$y^{v_{i2}}$	$\ldots$	$y^{v_{ic}}$
$\hat{y}_i^v$	1	$F^{v_{i1}}$	$F^{v_{i2}}$	$\ldots$	$F^{v_{ic}}$
$y^{v_{i1}}$	$\dfrac{1}{F^{v_{i1}}}$	1	$\dfrac{F^{v_{i2}}}{F^{v_{i1}}}$	$\ldots$	$\dfrac{F^{v_{ic}}}{F^{v_{i1}}}$
$y^{v_{i2}}$	$\dfrac{1}{F^{v_{i2}}}$	$\dfrac{F^{v_{i1}}}{F^{v_{i2}}}$	1	$\ldots$	$\dfrac{F^{v_{ic}}}{F^{v_{i2}}}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\ddots$	$\vdots$
$y^{v_{ic}}$	$\dfrac{1}{F^{v_{ic}}}$	$\dfrac{F^{v_{i1}}}{F^{v_{ic}}}$	$\dfrac{F^{v_{i2}}}{F^{v_{ic}}}$	$\ldots$	1

$$\tag{31}$$

The table above can now be used to compare any combination of subcharacteristics within a proportional group *i*.

4. Calculating rating factors

The following example will show the calculation and evaluation of the rating factors.

4.1. Some rating factors

We will calculate the factors for the year 2013. For this we will use nominally scaled data for *equipment* and ordinally scaled data for *housing type* and *condition* of the building.

Figure 4. Raw data

EGT	RH	EZFH	extras	no extras	new	maintained	redeveloped	price per m²
0	1	0	1	0	0	1	1	1,607.14
0	0	1	0	1	1	0	0	1,795.42
0	0	1	1	0	1	0	0	2,499.29
0	0	1	1	0	0	0	0	1,375.00
0	0	1	1	0	0	0	0	2,009.34
1	0	0	1	0	0	0	0	1,554.69
0	0	1	0	1	1	0	0	2,489.83
0	1	0	1	0	0	0	0	2,032.26
0	1	0	1	0	0	0	0	2,500.00
1	0	0	1	0	0	1	1	2,355.77
1	0	0	1	0	0	1	1	2,355.77
0	0	1	1	0	0	1	0	2,388.89
1	0	0	1	0	0	1	0	1,766.67
1	0	0	1	0	0	0	0	1,766.67
1	0	0	1	0	0	0	0	1,766.67
1	0	0	1	0	0	1	0	1,766.67
1	0	0	1	0	0	1	0	1,619.63
0	1	0	1	0	0	0	0	1,615.76
0	0	1	1	0	1	0	0	1,645.96
0	1	0	1	0	0	0	1	3,131.87
0	0	1	1	0	0	0	0	1,605.88
0	0	1	1	0	0	0	0	1,702.22
0	0	1	1	0	0	1	0	1,868.75
0	0	1	1	0	0	0	0	1,737.86
1	0	0	1	0	0	0	0	2,401.23
0	0	1	1	0	1	0	0	3,032.00
0	0	1	1	0	0	0	0	2,172.73
1	0	0	1	0	0	1	0	1,863.64

Source: own study.

Equipment (Extras) in this example means that the house has at least a *balcony/ patio*, *garage* or *fitted kitchen*. *Housing type* contains *condominiums* (EGT), *townhouses* (RH) or *one and two family homes* (EZFH). *Condition* of the building contains *newly built, redeveloped* and *well maintained* homes.

Figure 4 shows the raw data for the example, with the dummy variables one and zero meaning a Boolean value (or rather a yes or a no for the respective characteristic). After defining the standard for the ordinally scaled characteristics (in this case: *condominiums*, *equipment present* and *redeveloped*), we calculate the influence strengths $\hat{\beta}_i$ via regression:

$\hat{\beta}_0$	1,595.75
townhouse ($\hat{\beta}_1$)	3.52
one and two family home ($\hat{\beta}_2$)	−50.93
no equipment ($\hat{\beta}_3$)	−260.53
newly built ($\hat{\beta}_4$)	696.59
maintained ($\hat{\beta}_5$)	−48.61

The rating factors for 2013 are then calculated using the above values and the share of applicable cases (the mean $\overline{\chi}_i$ of the dummy variables), which is shown in Figure 5.

Figure 5. Calculation of price factors

Building type

				Mean price	Price factor
			normed sales price per m² of living space	1,665.31	
class	No. Observations	Mean (DUMMY)	Parameter	Base value (EGT)	1,640.42	Factor
EGT	40,176	0.4202	3,695.19	EGT	1,640.42	**1.000**
RH	9,358	0.0979	3.52	RH	1,643.94	**1.002**
EZFH	46,084	0.4820	−50.93	EZFH	1,589.49	**0.969**
Total	95,618					

Building type

				Mean price	Price factor
			normed sales price per m² of living space	1,665.31	
class	No. Observations	Mean (DUMMY)	Parameter	Base value (EGT)	1,761.84	Factor
Extras	76,703	0.8022	1,935.49	Extras	1,761.84	**1.000**
No Extras	18,915	0.1978	−260.53	No Extras	1,456.32	**0.848**
Total	95,618					

Condition

class	No. Observations	Mean (DUMMY)	Parameter	Base value (redeveloped)	Mean price	Price factor
				normed sales price per m² of living space	1,665.31	
				Base value (redeveloped)	1,476.88	Factor
new	22,603	0.2866	696.59	new	2,173.46	**1.472**
redeveloped	38,130	0.4834	3,211.83	redeveloped	1,476.88	**1.000**
maintained	18,145	0.2300	−48.61	maintained	1,428.27	**0.967**
Total	78,878					

Source: own study.

4.2. Evaluation of rating factors

Analysis of the year 2013 gives us the results on the following page.

1. **Housing type**
   Condominiums (EGT) and townhouses (RH) are equal in pricing.
   One and two family homes (EZFH) are around 3% cheaper per square meter.

2. **Equipment**
   Homes without any of the equipment defined above are around 15% cheaper.

3. **Condition**
   (a) Newly built homes cost about 50% more than redeveloped and maintained homes.
   (b) The difference between maintained and redeveloped homes is markedly smaller, with the former being 3% cheaper than the latter.

**Figure 6.** Graphic representation of relative factors

Characteristic	EGT	RH	EZFH
new	1.635	1.639	1.584
redeveloped	1.111	1.113	1.077
maintained	1.074	1.076	1.041

Characteristic	redeveloped	new	maintained
EGT	0.900	1.324	0.870
RH	0.902	1.327	0.827
EZFH	0.872	1.283	0.843

Source: own study.

The factors are a strong indicator for the evaluation of housing. Of course, many more characteristics than the above, such as geographic features, are considered during an actual evaluation.

Figure 7. Graphic representation of relative factors

(a) Normed to EGT   (b) Normed to redeveloped
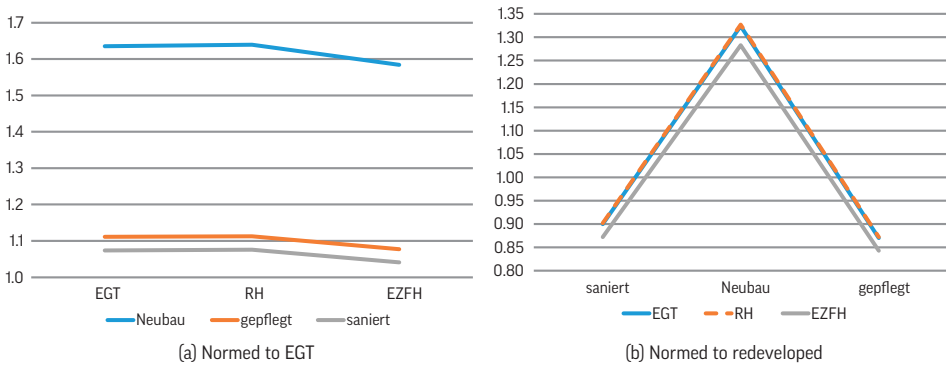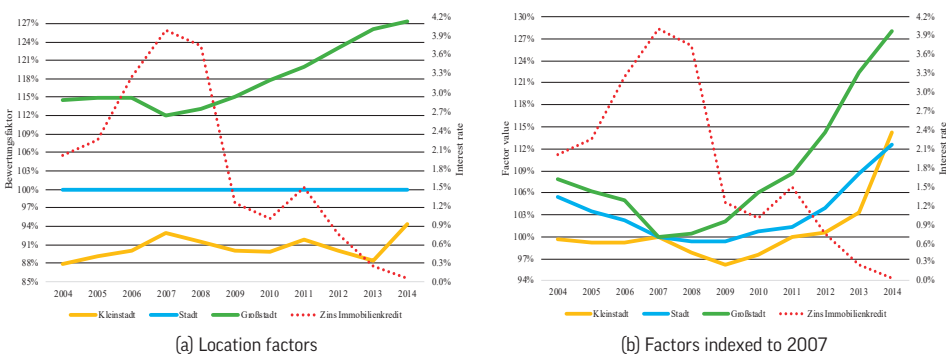
Source: own study.

5. Evaluation of rating factors and interest rates

In the following section we will evaluate the rating factors in the context of interest rates. First we will make observations of the long-term development (ten years) in the housing market, then we will make observations on the development in the last three years.

5.1. Long-term analysis of selected characteristics

5.1.1. Location

Figure 8. Development of location factors over 10 year

(a) Location factors   (b) Factors indexed to 2007

Source: own study.

Location is strongly correlated with the development of interest rates (red) over the last ten years. The factors converge towards each other up to 2007 (left figure), while the interest rate rises. This effect becomes stronger in the year prior to the crash. After the crash the factors grow apart again, with the factor for large cities growing particularly strongly. The falling interest rate in 2013 (with a value near zero), however is correlated with a change in the factor for small cities.

Normalizing the factors to 2007, we see that the falling interest rate leads to an immediate reaction of the rating factors: large (green) and middle-sized cities (blue) fall slightly while small cities (yellow) remain stable.

All three rise following the crash, with large cities growing faster. Smaller cities remain stable for a while, but they change abruptly in 2013: prices begin to grow faster than in the large cities, while prices in large cities begin to stabilize.

The delayed growth of prices in small cities could be connected to the low attraction of this kind of location for investors. They often have lower quality infrastructure (meaning less convenience for an eventual owner). With this in mind, it becomes apparent that there exists an hierarchy of demand: buyers prefer more attractive locations until the price level becomes too high. Then they start to look for housing in slightly less attractive locations. Homes in these locations have a higher risk of not being bought, but the yield is likely to be better (since prices are lower).

5.1.2. Housing type

Figure 9. Development of housing type factors over 10 years

(a) Housing type factors   (b) Factors indexed to 2007
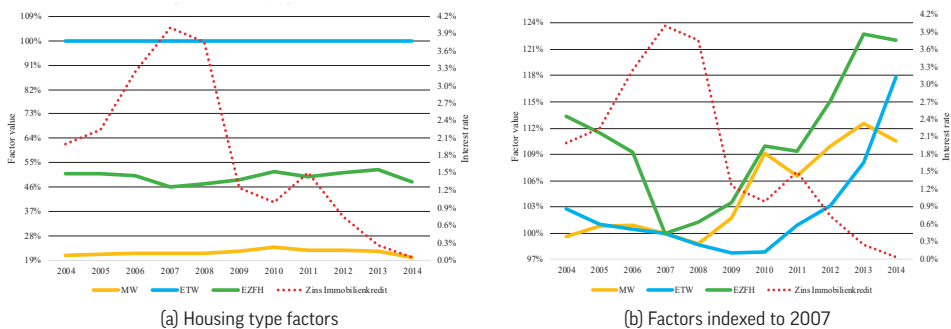
Source: own study.

The relative factors of housing types (with condominiums in blue as the base) show relatively constant values. Condominiums are the most expensive, independent of the development of the interest rate and rental homes (yellow) are the cheapest.

Rental homes as well as one and two family homes (green) show a falling trend from 2013 onwards.

The figure on the right with indexed values shows that condominiums and rental homes are relatively stable before the crash, while one and two family homes depreciate in value. The expected fall in interest rate (red) after the crash has, however influenced the prices of rental homes and one and two family homes positively, while the prices of condominiums remain unchanged.

The demand for condominiums rose after 2010, since buyers have become accustomed to low interest rates and did not expect any change in the short term. The rising demand for condominiums finally leads to a fall of the demand for rental homes as well as one and two family homes from 2013 onwards.

5.1.3. Districts and East-West comparison

**Figure 10.** Development of district factors over 10 years

(a) Districts factors   (b) Factors indexed to 2007
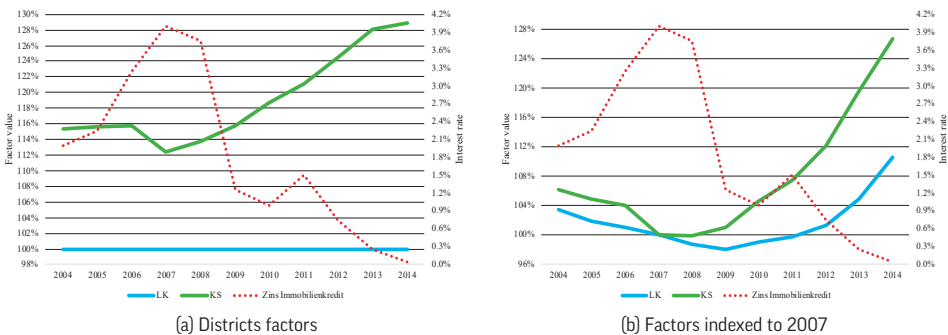
Source: own study.

Prices in both kinds of districts converge with the rising interest rate shortly before the crash (left figure). However, as soon as the interest rate falls, prices in the districts begin to diverge, with prices in county towns rising strongly.

Indexing the factors to 2007 shows that the development in both district types is very similar, almost mirroring each other. This can be perceived as another indication of the demand shift mentioned above: county towns generally have better infrastructure, making them more attractive for investors. However, when prices become too high, investors expect higher yield from investments in "lesser" locations.

Comparing the development in east (green) and west Germany (blue) in Figure 11, we see that there is not much difference between the two up until 2010. From that point onward, there is a distinct divergence of the two. However, demand grows slightly stronger in the western part of Germany while the interest rate falls.

Figure 11. Development of rental rates over 10 years
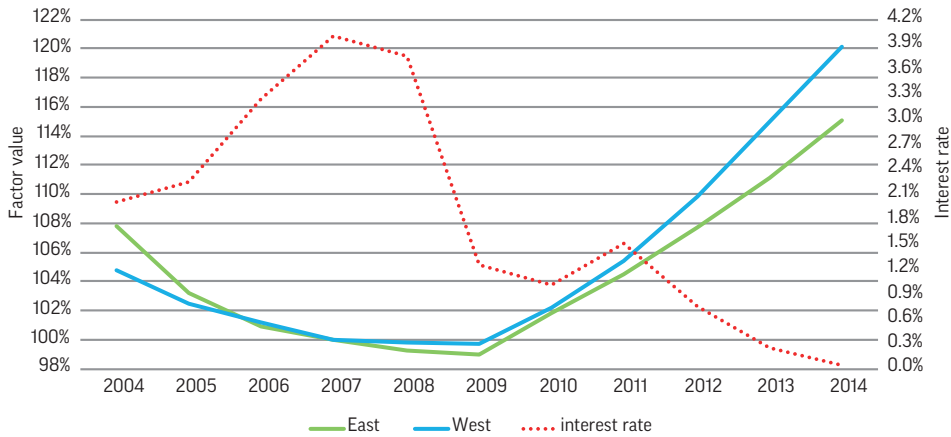
Source: own study.

5.2. Short-term analysis of the last three years

In the following subsection, we will evaluate the last three years for small (population of up to 20,000), middle-sized (population of up to 100,000) and large cities (population of over 500,000) as well as North-Rhine Westphalia as a whole.

5.2.1. Housing type

Prices of townhouses, condominiums and one and two family homes (blue, yellow and green respectively in Fig. 12 and 13) are mainly correlated with location, rather than interest rates. The following figures clarify this by showing the development of townhouses and one and two family homes in relation to the development of condominiums.

Small cities show a stable development, with condominiums being markedly cheaper than other types of housing. One and two family homes in middle-sized cities are cheaper than condominiums and townhouses (which have similar prices to each other).

In large cities, condominiums are the most expensive form of housing, while townhouses are cheaper than one and two family homes. However, the latter two switch positions in 2014.

Observing North-Rhine Westphalia as a whole, we see that townhouses and one and two family homes noticeably depreciate in value, compared to condominiums.

Figure 12. Housing type factors for small and middle-sized cities

(a) Small cities   (b) Middle-sized cities

Source: own study.

Figure 13. Housing type factors for large cities and NRW

(a) Large cities   (b) North-Rhine Westphalia
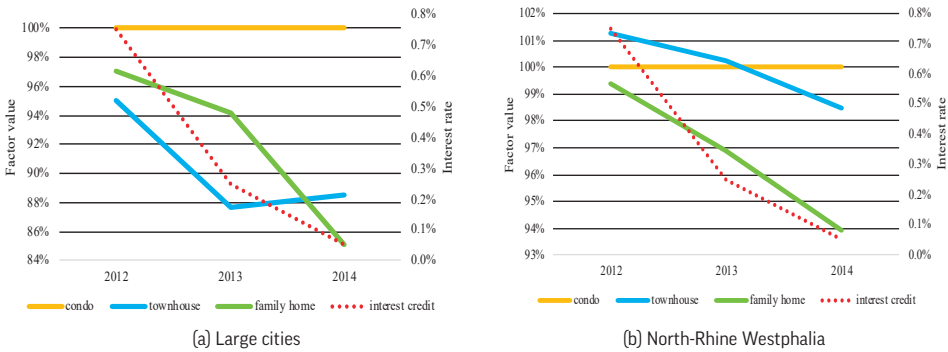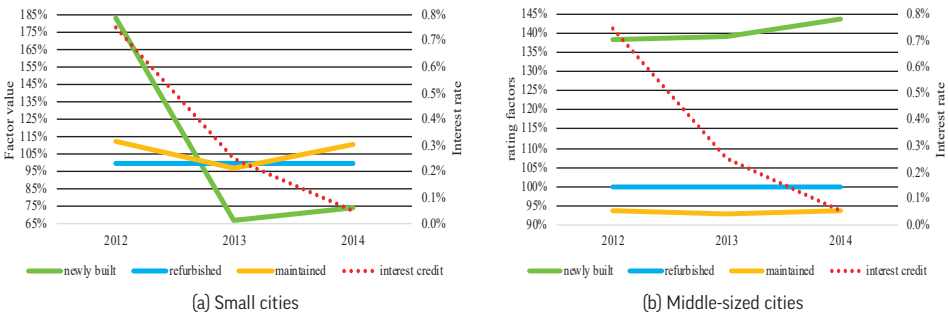
Source: own study.

5.2.2. Condition of the building

The condition of the building has a strong influence on the price. In the following subsection we will compare newly built (green) and redeveloped buildings (yellow) to maintained buildings (blue).

After depreciating massively in value in 2012, newly built and redeveloped buildings stabilized in 2013, which seems to correlate with even small changes in interest rate (Fig. 14, left section). Housing prices in middle-sized cities were stable during this time (right section).

Large cities (Fig. 15, left section) show a similar development to small cities, though not as pronounced. The described effects become much weaker when observing North-Rhine Westphalia as a whole (right section).

Figure 14. Condition factors for small and middle-sized cities

(a) Small cities

(b) Middle-sized cities

Source: own study.

Figure 15. Condition factors for large cities and NRW

(a) Large cities

(b) North-Rhine Westphalia
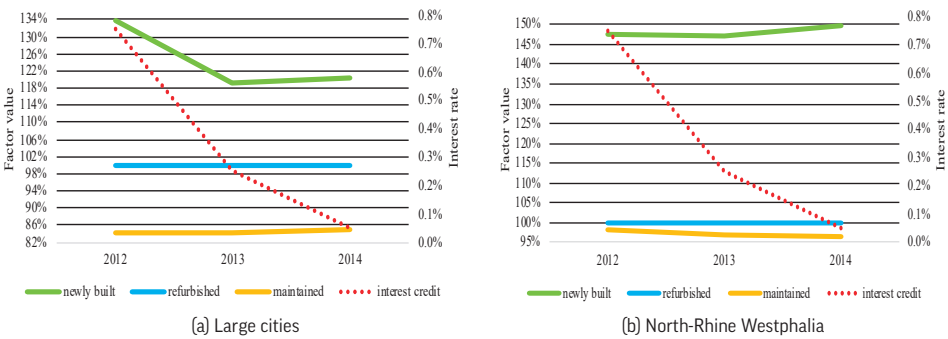
Source: own study.

Figure 16. Condition factors for NRW, indexed to 2013
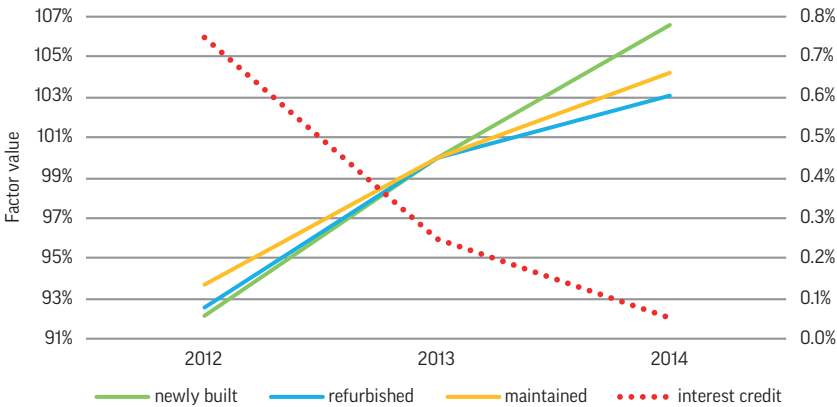
Source: own study.

The reason for the weaker reaction of newly built homes in middle-sized cities becomes apparent when normalizing the data to 2013: all three condition types have similar curves, with newly built homes having slightly stronger growth.

Conclusions

The falling interest rate has left its mark on the German housing market. The demand for housing in large and district cities has increased significantly. The demand for housing in large (more than 100,000 people) and middle-sized cities (between 20,000 and 100,000 people) was falling before the financial crisis in 2007. However, this trend has changed with the fall of the interest rates, with prices rising strongly. Even the demand for housing in small cities has increased since 2013. At the same time, demand for housing in large and middle-sized cities has stabilized to some extent.

By observing types of housing, a strong increase in the demand for condominiums is visible, likely because of better financing conditions. The price of townhouses and one and two family homes rose until 2007. However, their prices have been falling since 2013.

Differentiating additionally by location (small, middle-sized and large cities) shows the following results:

- **Large cities**
  Condominiums show large gains, with the demand for townhouses stabilizing since 2013. One and two family homes depreciate in value.
- **Middle-sized cities**
  Townhouses and condominiums are more or less equal. One and two family homes depreciate in value.
- **Small cities**
  Townhouses and one and two family homes have gained in value substantially. Condominiums do not record any major gains.

Newly built homes are preferred by buyers, as shown by observing North-Rhine Westphalia in general. However, redeveloped and well-maintained older homes have gained in value significantly in small cities, with newly built homes depreciating in value. The low interest rates have changed this trend though.

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III.5

ECB Policy Consistency: Loss of Independence and the Real Estate Bubble?

Jakub Rybacki[1]

Introduction

The aim of this paper is to measure an adverse impact of European Central Bank (ECB) policies on the real estate market in the major European capitals. We proposed a method of calculating the discretionary bias based on the residuals of the modified Taylor rule, developed with Wu-Xia shadow rates and the Holston-Laubach-Williams natural rate. We also excluded potential distortions related to unconscious mistakes of monetary authorities, e.g. due to errors in inflation forecast and imperfect information about output gap. Therefore, we achieved the series, which reflects a conscious discretionary policy stance. The calculations were done for the U.S. Federal Reserve, ECB, and Bank of England for the period 2004–2019. We found that the Governing Council of the ECB eased their policy considerably stronger compared to other central banks after the introduction of the public sector purchases program in 2015.

Second, we used VAR analysis to measure whether the ECB's dovish bias inflated real estate bubbles in major European cities. Our analysis was based on indices prepared by the UBS investment bank for Frankfurt, Munich, Paris, Milan, and Amsterdam in the years 2004–2018. We found that a discretionary bias of monetary policy played a major role in increasing imbalances in the majority of the mentioned cities (expect for Milan and Amsterdam).

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Finally, we presented the conclusions of our research in the context of the debate about central bankers' independence. An adverse impact of the ECB policy on housing affordability could lead to a deterioration of confidence in the central bank. In the case of Europe, we see a problem of transparency in the public debate. There was practically no discussion on whether a strong discretionary bias of the European Central Bank monetary authorities is a sign of going beyond their mandate based on Google Trend web searches. In comparison with the ECB, the Fed is much more often accused of a loss of credibility (for example, the U.S. bank is often criticized due to the Twitter comments of Donald Trump). The highlighted problems are fueling support for populism in Europe.

This paper is structured as follows. Section 1 describes the academic literature regarding distributional effects of accommodative monetary policy and adverse impacts on the real estate market. Section 2 presents a brief revision of ECB unconventional monetary policies. Section 3 introduces a measurement of monetary policy discretion, concepts of Wu-Xia shadow rates, and natural rates. Section 4 provides information about UBS real estate bubble indices and presents the methodology of our research. Section 5 discusses the models' output. Finally, section 6 concludes the paper with the discussion about institutional consequences of the adverse impact of the large-scale asset purchases (LSAP) policies.

1. Literature review

Typically, time-inconsistency bias in monetary policy has been described as a temptation of increasing present activity at the cost of future inflation (Surico, 2008). However, in the previous years, the increase of consumer prices in the developed economies was lower than the central banks' inflation targets; also, economic activity remained moderate. Greater attention is dedicated to a problem of secular stagnation (Summers, 2014; Baldwin and Teulings, 2014); the idea assumes that hysteresis occurred in the global economy, which lowered the natural rate of interest and inflation. In such an environment, the accommodative policies, including large scale asset purchases (LSAP) and negative real rates reinforced by the forward guidance, actually did not generate the desired outcome, as inflation is much less responsive compared to the past. Some authors started to highlight the inefficiencies of such policies, stating that asset purchases did not alter long-run inflation expectations (Eusepi et al., 2018).

Given the lack of inflationary pressures, the adverse effects of monetary policies are likely to be omitted. The new phenomenon highlighted by the authors is a social problem of increasing inequality due to the change of financial assets' valuations

and real estate prices. The impact of unconventional LSAP and forward guidance policies is heterogeneous across the households, and divided by the income groups. The research on the distributional effects of monetary policy does not have a single conclusion. Saiki and Frost (2014) analyzed the case of Japan and showed that LSAP policies resulted in an increase of inequality measured by a simple Gini coefficient. A more complex study by Coibion et al. (2017) provided a similar conclusion in the United States. The authors showed that the response of consumption and expenditures by high net-worth households to contractionary monetary shocks is larger than that of low net-worth households in the data.

The contradictory outcomes are visible in cases of research from the eurozone (Selezneva et al., 2015; Hohberger et al., 2019). DSGE models, especially, suggest that wealth increases related to financial assets are mitigated by labor income increases. However, the picture is much more complicated. Other authors point out that there exists a heterogeneity between the countries of the eurozone block depending on household saving structure and redistributable fiscal policies (Guerello, 2018). The Italian case is even described as reverse Robin Hood policy (Casiraghi et al., 2018), i.e., it transfers wealth from households in lowest income quartile to those in the highest one.

Our analysis is focused on the interconnected problem of housing affordability. There is a relatively strong consensus that the low-rates policy of the U.S. Federal reserve resulted in the housing market bubble (e.g. Dokko, 2011; McDonald and Stokes, 2013). The recent situation of Europe is different. While the problem of excessive households' leverage seems to be contained, e.g. by the macro-prudential policies, the new dilemma is related to wealth effects and housing affordability.

In recent years, housing prices in European capitals and other major cities increased excessively compared to labor incomes and inflation. The possibility of migration is scarcer compared to, e.g. the United States, given that the availability of land in Europe is much lower. Therefore, in 2018, we observed civil unrest in France, such as Yellow Jacket movements protesting against the increasing inequality between major cities and other areas. We argue that these protests have a strong foundation in the unconventional policies of the European Central Bank. A further expansion of such monetary policies would likely intensify riots in the less developed areas.

## 2. ECB Experiences with Unconventional Monetary Policy

This section briefly summarizes unconventional policy instruments introduced by the ECB after the global financial crisis of 2008–2009. Such activities have a twofold character. First of all, the central bank introduced new liquidity – providing open

market operations – called LTRO or TLTRO. Second, the ECB started conducting large-scale asset purchases.

The unconventional refinancing operations started in December of 2011. First, the ECB announced refinancing operations with a three-year maturity, called LTRO. Later, the central bank extended duration of the operations for up to four years to stimulate credit activity. A first series of extended programs, called TLTROs, was announced on 5 June 2014. The second series (TLTRO II) started from 10 March 2016. The maturity of operations from the second package and slowdown of European economies forced the ECB to start a third package from September 2019.

The history of asset purchases started with three phases of Covered Bond Purchases (CBPP). The first tranche started in 2009, and the ECB purchased assets approximately worth 60 billion EUR. The second phase (CBPP2) was conducted in late 2011, and resulted in an increase of the central bank's monetary portfolio by an additional 16 billion EUR. Finally, the ECB's Governing Council announced a final tranche of purchases in 2014 (CBPP3). At the moment of this writing, the ECB maintains assets worth 260 billion EUR related to the CBPP3 program and an additional 20 billion EUR in asset-backed securities.

Figure 1. Monetary portfolios of the ECB (billion EUR)
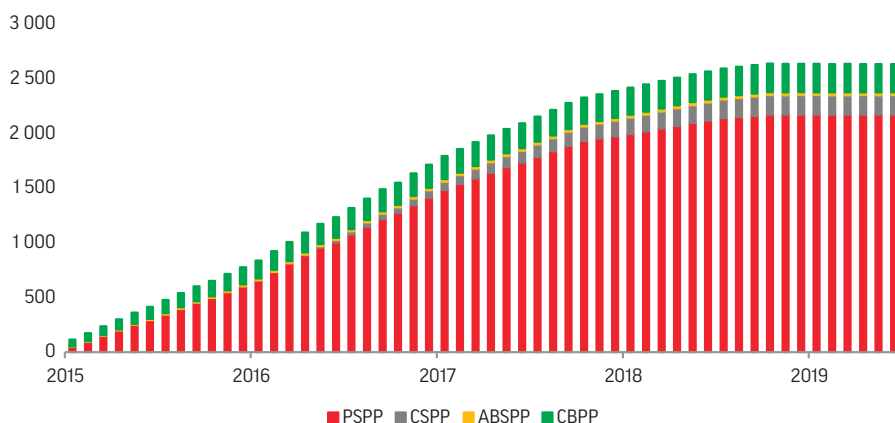
Source: ECB (2019a).

Probably the most pronounced decision of the ECB Governing Board was to introduce sovereign bond purchases in March of 2015. The public sector purchases program (PSPP) lasted for nearly three years and resulted in the acquisition of assets worth 2.08 trillion EUR. Simultaneously, from 18 July 2016, the Governing Council launched a new program of corporate sector purchases (CSPP). In December 2018, the Governing Board decided to stop purchases and maintain monetary portfolios at a stable level.

The central bank is reinvesting maturing assets. The evolution of monetary portfolios from the ECB is presented in Figure 1.

During the ECB Sintra Conference in 2019, President M. Draghi announced the consideration of launching another phase of purchases in the second half of the year. Therefore, the degree of policy accommodation is likely to increase further in the future. Meanwhile, the European Systemic Risk Board (ESRB, 2019) warns that residential prices are likely overvalued or even strongly overvalued in the major eurozone countries expect in Italy. In March 2015, prior to the introduction of the PSPP program, reports presented no systemic imbalances.

3. Monetary rule, shadow and natural rates in European economies

This section explains policy rule, which is used to determine the discretionary bias of monetary authorities. We apply the modified Taylor rule with two additional concepts used in the estimation: the Wu and Xia shadow rate (2016), and the Holston-Laubach-Williams natural rate (Laubach and Williams, 2003; Holston et al., 2017, further HLW).

The generalized policy rule proposed by John Taylor (1993) is given by the following formula:

$$i_t = i_t^* + \beta_1 * (\pi_t - \overline{\pi}_t) + \beta_2 * (y_t - \overline{y}_t) + e_t \tag{1}$$

where i_t is the central bank policy rate, i_t^* is the long-run equilibrium natural rate perceived by monetary authorities, $\pi_t - \overline{\pi}_t$ denotes the difference between the current inflation annual dynamics and the central bank inflation target, $y_t - \overline{y}_t$ is the difference between the log of the current GDP level and its potential and unobservable level, and, finally, β_1 and β_2 are the estimated parameters.

We aim to incorporate the effect of the zero-lower bound in these policy considerations. Therefore, we will use the Wu-Xia shadow rate ($WXSR_t$) instead of the classical policy rate. Wu and Xia assume that the key central bank short-term interest rate remains at a maximum of shadow rate s_t and realized effective lower bound $\underline{r}_t$. The shadow rate s_t is described as an affine function of some state variables X_t following a first order vector autoregressive process. The authors proposed a method of derivation based on a factor-augmented vector autoregression with 97 macroeconomic variables in order to compute the level of policy accommodation.

The estimates of the shadow rates provided by the authors can be treated as an indication of the level the rates will be lowered to, if there are no limitations regarding easing. We are using the series provided by Wu and Xia as an explanatory variable of

policy rule without any modifications to the series. The discrepancy between the key rate of the ECB and the Wu-Xia shadow rate for the eurozone is presented in Figure 2.

Figure 2. Eurozone policy rate, Wu-Xia shadow rate, and HLW natural rate
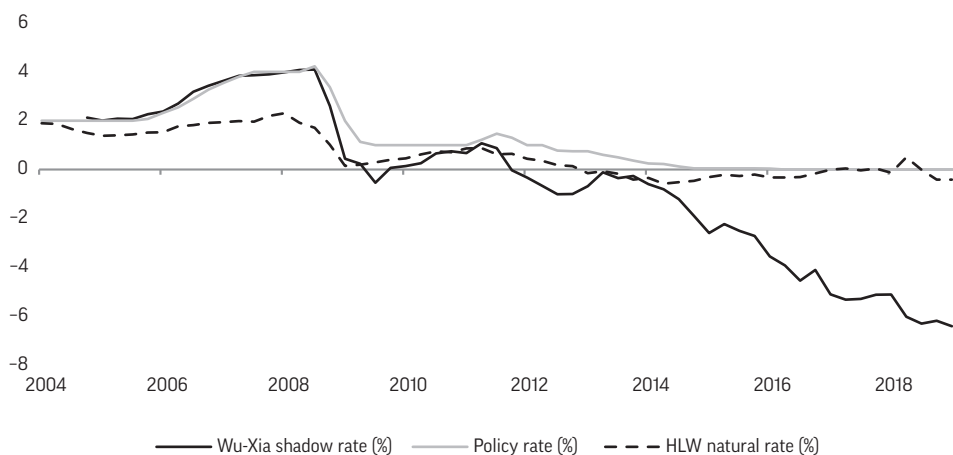
Source: ECB (2019b), Wu and Xia (2016), Holston et al. (2017).

Our policy rule will assume a time-varying level of the natural rate i_t^*. The natural rate can be described as a level of interest rate, which allows maintaining inflation at the central bank's target with the zero-output gap. According to HLW, the natural rate $HLWNR_t^*$ can be described by the following equation:

$$HLWNR_t^* = \frac{1}{\sigma} * g_c + \theta \tag{2a}$$

where σ denotes the intertemporal elasticity of substitution in consumption, g_c is the growth rate of per capita consumption, and θ is the rate of time preference. HLW substituted the consumption growth rate with the potential output trend growth rate (g_t), and also included international shocks (z_t):

$$HLWNR_t^* = g_t + z_t \tag{2b}$$

Again, we are using the data directly provided by the authors without any amendments. By doing that, we assume a few simplifications. The unobservable level of rates perceived as natural by monetary authorities may be different due to the discrepancies regarding the potential growth rate, e.g. the difference between the estimates for the euro area made by HLW and the International Monetary Fund (IMF) was equal nearly by 0.5 pp. To partially mitigate this phenomenon, we decided to add an estimated constant to the estimated equations.

The final shape of the Taylor-rule formula is given by equation 3:

$$WXSR_t = HLWNR_t^* + \beta_0 + \beta_1 * (\pi_t - \overline{\pi}_t) + \beta_2 * (y_t - \overline{y}_t) + e_t \tag{3}$$

where $WXSR_t$ stands for the Wu-Xia shadow rate, $HLWNR_t^*$ is a natural rate estimated with the mentioned model, $(\pi_t - \overline{\pi}_t)$ describes deviation from the inflation target and $(y_t - \overline{y}_t)$ output gap. β_1 and β_2 are estimated parameters based on the ordinary least squares method, and e_t is an equation residual. We are using cubic interpolated output gap data from the IMF, as there exists a full history of data revisions. This is another small simplification, but we do not expect it could derail the research conclusions, as the dynamics of change in output gap tends to be similar in both cases with minor discrepancies. On the contrary, the greater uncertainty is related to the future re-estimations of the trajectory, and the revisions can bring strong changes, especially in the turning points of the business cycle. The estimation is done using the simple OLS approach with the Newey-West correction for the standard errors.

The next step of our analysis is to decompose residuals obtained in equation (3). We attempt to explain it by the forecast error of central banks macroeconomic projections regarding GDP growth, inflation, and, for open economies, assumptions about foreign interest rates or exchange rates (if applicable). Second, we describe discretionary impact as an unobservable latent variable following a random walk process.

$$\begin{cases} e_t = \alpha_0 + \alpha_1 * Fcast_t + a_2 * disc_t + u_t \\ \qquad disc_t = disc_{t-1} + v_t \end{cases} \tag{4}$$

where $Fcast_t$ is a vector of forecast errors from macroeconomic projections, $disc_t$ is a latent variable, α_x are estimated parameters, u_t and v_t are random disruptions. The estimation is done with a Kalman filter. The smoothed series should provide better indications of discretionary bias, not distorted by random errors related to, e.g. macroeconomic forecast errors.

4. Methodology and UBS real estate bubble index construction

This chapter presents the methodology of our research on the real estate market. Our aim is to verify whether pursuing the LSAP and forward guidance increased the bubble risk. We use residuals of the Taylor rule described in the previous section to characterize dynamics of the UBS real estate bubble indices.

The mentioned indicators tend to describe the relative valuation of residential prices in the major European, American, and Asian capitals and major cities. Our analysis is focused on Amsterdam, Frankfurt, London, Paris, and Milan.

The headline index is described as a weighted average of five standardized components. The first two, price-to-income ratio and price-to-rent ratio, describe housing affordability. The numerators in both cases are derived using transactional prices of 60 m2 flat located near the city center. The denominators, i.e., values of earnings and rents are survey based. Another two indicators, mortgage-to-GDP ratio and construction-to-GDP ratio, measure cyclical shifts in the economic activity related to the real estate sector. Finally, the last component compares relative prices in the city to the ones achieved in the countryside. The weighting system is derived based on the factor analysis and differs between the locations.

The index spans over nearly 30 years of activity from 1990 to 2018. Data is reported quarterly. According to the authors, values below –1.5 denote that the real estate markets are depressed; values from –1.5 to –0.5 mean they are undervalued. Fair valuation spans over the 0.5 to 0.5 range. Finally, values ranging from 0.5 to 1.5 suggest overvaluation. A higher level of index denotes a bubble risk.

We propose the following VARX equation:

$$\begin{bmatrix} \Delta disc_t \\ \Delta bbl_t \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} \alpha_{1,1} & \alpha_{1,2} \\ \alpha_{2,1} & \alpha_{2,2} \end{bmatrix} * \begin{bmatrix} \Delta disc_{t-1} \\ \Delta bbl_{t-1} \end{bmatrix} + \begin{bmatrix} \alpha_{1,3} \\ \alpha_{2,3} \end{bmatrix} * (y_t - \overline{y}_t) + \begin{bmatrix} e_{1,t} \\ e_{2,t} \end{bmatrix} \quad (5)$$

where Δbbl_t denotes change of lagged UBS index value, $\Delta disc_t$ is the change of discretionary bias, and $(y_t - \overline{y}_t)$ is the output gap. $\begin{bmatrix} c_1 \\ c_2 \end{bmatrix}$, $\begin{bmatrix} \alpha_{1,1} & \alpha_{1,2} \\ \alpha_{2,1} & \alpha_{2,2} \end{bmatrix}$, and $\begin{bmatrix} \alpha_{1,3} \\ \alpha_{2,3} \end{bmatrix}$ are estimated parameters, and $\begin{bmatrix} e_{1,t} \\ e_{2,t} \end{bmatrix}$ are equations' residuals. The model will be expanded with additional autoregressive components if needed.

We expect to observe a negative relationship between discretionary bias in monetary policy and the bubble risk measured by the UBS index.

5. Estimation Results

The first step of our analysis is to compute the Taylor rule parameters in line with the methodology presented in section 4. The estimates are presented in Table 1.

The estimation suggests that both the ECB and the Fed believe that the natural rate is close to the HLW model level. There is a stronger discrepancy in the case of the Bank of England. The evidence is consistent with the market long-term inflation

expectations. 5Y5Y swap measuring CPI is persistently hovering around 3% (the upper bound of the inflation target).

Amongst the three central banks, the ECB tends to be the strongest focused on inflation, while the Bank of England reacts strongly on changes in the output gap. Our Taylor rule confirms the Fed is pursuing a dual mandate. Mentioned policy rule has the weakest explanatory power in the case of the ECB – the equation explains only 48% of variance. The statistically higher residuals tend to occur after the introduction of the LSAP program in 2015.

Our analysis suggested that the more accommodative policy of the ECB was intentional. The Kalman filter estimations showed that forecast errors or output gap revisions did not have systematic impact on the monetary authorities' behavior. All parameters turned out to be statistically insignificant. Therefore, the procedures concluded with simple trend smoothing. The estimated series are presented in Figure 3.

Figure 3. Conscious discretionary bias derived for the Taylor rule residuals
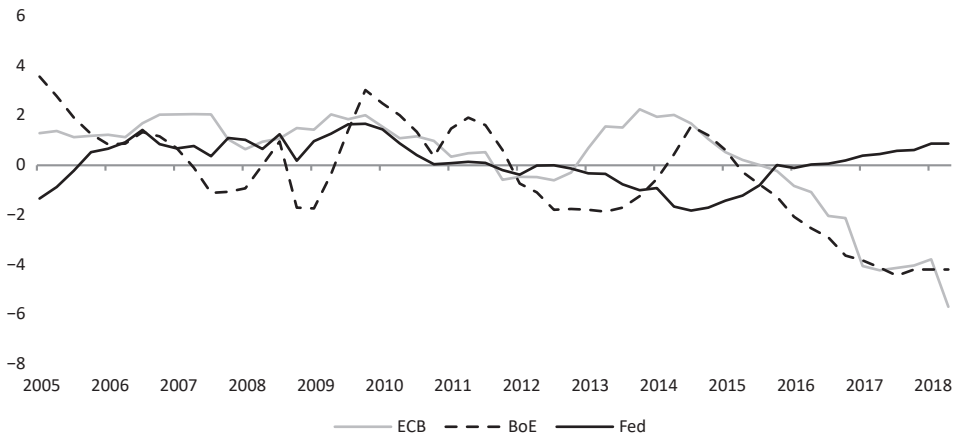
Source: authors estimation.

There is a clear downward trend in the ECB and BoE data from March 2015, when the ECB governing board inaugurated the public sector purchase program. Since then, values of both series became lower by, respectively, 600 bp and 400 bp.

We imputed the estimated series in the VARX models. The analysis of impact of the more accommodative approach in monetary policy on the real estate bubble risk shows a heterogeneous response. There was a visible coincidence in the cases of Frankfurt and Munich. Some negative but more benign tendencies have been also seen in case of Paris, though neutral in Milan, but the parameters describing the impact of change in the ECB turned out statistically insignificant at the significance level (e.g. 5%). On

the other hand, the response from Amsterdam was positive – the research literature explains that the Netherlands is the single country amongst those selected where the lowest 20% benefit the most from residential price increases and its distribution differs significantly from other peers (Adam and Tzamourani, 2016).

The detailed parameters of the estimated models are presented in Table 3. The charts with cumulative impulse response functions of selected models are presented in Table 4. According to the models, a 100 bp permanent decrease of ECB bias results in a 7 pp increase of the UBS index for Frankfurt, 9 pp for Munich, and 6 pp for Paris. The reaction for Milan is equal to 0.

The monetary policy contributed to the increasing risk in the real estate market, but has not played a decisive role. The variance decomposition shows that only 15% of the forecast errors could be explained by a monetary policy shock in Munich, 10% in Frankfurt, and 5% in Paris. There was no evidence on the impact in Italy.

An imperfection of the two models (for Frankfurt and Munich) are the low-test statistics related to the autocorrelation of residuals. Detailed test statistics are presented in Tables 4 and 5. On the other hand, the selected models presented the most desirable levels of information criterion. There were also no significant changes in the impulse response in the case of adding another lag.

Conclusions

Our research confirmed that monetary policy contributed to the problem of increased real estate bubble risk/lower housing affordability. However, European central bankers played only a supplementary role it is not true that they were a major culprit.

The adverse social effects of accommodative polices have institutional implications. Former governor of the Royal Bank of India Raghmuran G. Rajan (Rajan, 2019) highlights the risk of loss of central banks' independence, when their policies are perceived as supporting country elites only. In such a case, politicians then find it easier to pursue excessive accommodative policies. Governor Rajan recommends a greater transparency and clarification of the central bank's goals.

As our research showed, negative symptoms that damage credibility are visible in the European Union, i.e., the Governing Council presently maintains excessively accommodative policies, and the deterioration of housing affordability could be perceived as a policy that supports elites against the average household. Unfortunately, Rajan's recommendations have not been followed: there is no transparency in the decision-making mechanism. For example, similar macroeconomic forecasts were used to introduce and taper the PSPP program, and the ECB president communicated

a propensity to ease the policy just two weeks after the introduction of forward guidance, stating there will be no change in interest rates. There is practically no discussion about whether a strong discretionary bias of the European Central Bank monetary authorities is a sign of going beyond their mandate or silently breaching the independence of the central bank. The number of Google searches asking about ECB independence is far lower compared to the Fed, despite the former maintaining a discretionary dovish bias, and the latter a hawkish bias (Figure 4). Furthermore, the comments of dovish candidates, suggesting a case for greater stimulus for the economy, are passively or even positively welcomed in the major media outlets (e.g. Politico, 2019).

Figure 4. Web search results for Central Bank independence
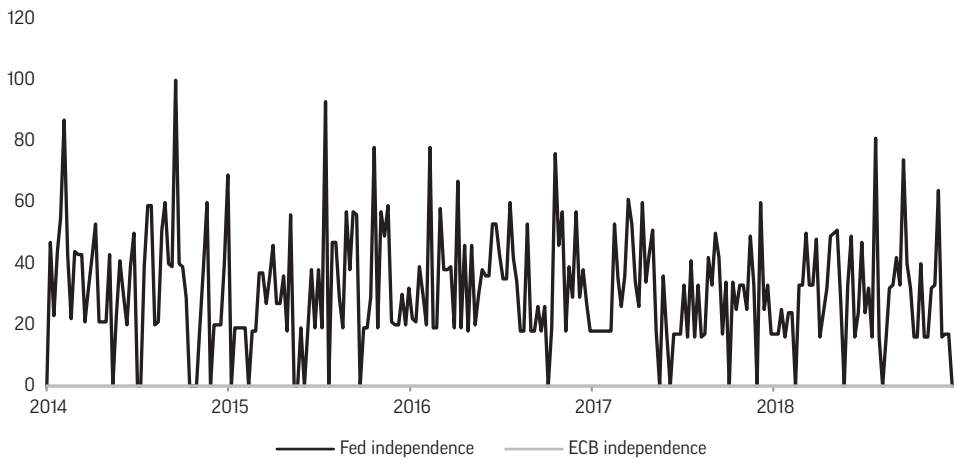
Source: Google Trend.

This study does not answer the question about the reasons of such preferences – we are rather focused on the consequences of its maintenance. The continuation of the asset purchases program in its current form is likely to further stimulate the growth of asset prices on real estate, equity, or sovereign and corporate bond markets. Elevated social and economic anxiety builds up social support for revolutionary parties (Inglehart and Norris, 2016). Therefore, the further continuation of accommodation may result in greater risks of extreme events, e.g. Brexit, which are not or weakly tractable by standard econometric models.

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Table 1. Modified Taylor Rule Parameters

	ECB	Fed	BoE
Constant – deviation of natural rate from HLW	–0.65 (0.58)	–0.04 (0.26)	–2.69 (0.51)
Deviation from inflation target	0.72 (0.34)	0.39 (0.19)	0.49 (0.25)
Output Gap	0.22 (0.29)	0.60 (0.12)	1.62 (0.18)
R^2	0.48	0.83	0.75

Source: author's estimation.

Table 2. VAR estimation: Impact of discretionary bias on real estate markets

City:	Frankfurt		Munich		Amsterdam	
	ΔBbl Ind.	ΔECB bias	ΔBbl Ind.	ΔECB bias	ΔBbl Ind.	ΔECB bias
ΔBubble Ind. (-1)	1.16 (0.14,8.07)	–1.48 (2.61, –0.57)	0.89 (0.09, 9.81)	–0.89 (1.68, –0.53)	0.57 (0.14, 4.00)	–2.18 (2.13, –1.02)
ΔBubble Ind. (-2)	–0.46 (0.14, –3.21)	1.01 (2.59, 0.39)			0.46 (0.15, 3.12)	–1.16 (2.22, –0.52)
ΔBubble Ind. (-3)					–0.27 (0.14, –1.96)	1.89 (2.11,0.9)
ΔBubble Ind. (-4)			–0.15 (0.07, –2.12)	–0.03 (1.31, –0.02)		

cont. tab. 2

City:	Frankfurt		Munich		Amsterdam	
ΔECB bias (-1)	0.01 (0.01, 1.43)	0.08 (0.16, 0.49)	0.00 (0.01, 0.29)	0.14 (0.15, 0.95)	0.00 (0.01, 0.17)	0.03 (0.17, 0.2)
ΔECB bias (-2)	–0.03 (0.01, –2.98)	0.20 (0.16, 1.24)			0.02 (0.01, 1.55)	0.16 (0.16, 0.97)
ΔECB bias (-3)					0.01 (0.01, 0.72)	0.07 (0.17, 0.43)
ΔECB bias (-4)			–0.02 (0.01, –2.23)	0.01 (0.17, –0.05)		
ΔOuput gap	–0.01 (0.01, –0.75)	–0.15 (0.16, –0.93)	0.00 (0.01, –0.17)	–0.2 (0.15, –1.32)	0.02 (0.01, 1.16)	–0.18 (0.2, –0.86)
Constant	0.01 (0.00, 1.98)	–0.04 (0.08, –0.54)	0.01 (0.01, 1.88)	–0.03 (0.11, –0.3)	0.01 (0.01, 1.8)	–0.06 (0.08, –0.7)
R-squared	0.77	0.11	0.77	0.07	0.66	0.13
Adj. R-squared	0.75	0.01	0.75	–0.03	0.60	0.00

Source: author's estimation.

Table 2 (Cont.). VAR estimation: Impact of discretionary bias on real estate markets

City:	Milan		Paris	
	ΔBbl Ind.	ΔECB bias	ΔBbl Ind.	ΔECB bias
ΔBubble Ind. (-1)	0.68 (0.11, 6.45)	–0.14 (2.06, –0.07)	0.34 (0.15, 2.18)	0.41 (1.1, 0.38)
ΔBubble Ind. (-2)			0.08 (0.16, 0.52)	–0.07 (1.13, –0.06)
ΔBubble Ind. (-3)			–0.31 (0.14, –2.21)	0.47 (1, 0.46)
ΔBubble Ind. (-4)				
ΔECB bias (-1)	0.00 (0.01, 0.28)	0.06 (0.16,0.39)	–0.02 (0.02, –0.74)	0.11 (0.15, 0.74)
ΔECB bias (-2)			–0.02 (0.02, –0.96)	0.19 (0.15, 1.32)
ΔECB bias (-3)			0.00 (0.02, 0.08)	0.07 (0.15, 0.48)
ΔECB bias (-4)				
ΔOuput gap	–0.01 (0.01, –0.65)	–0.32 (0.17, –1.9)	0.07 (0.04, 1.66)	–0.34 (0.29, –1.15)
Constant	0.00 (0, –1.12)	–0.13 (0.08, –1.6)	0.01 (0.01, 1.22)	–0.07 (0.08, –0.95)
R-squared	0.47	0.09	0.34	0.12
Adj. R-squared	0.44	0.03	0.24	–0.01

Source: author's estimation.

Table 3. Accumulated impulse response functions: Selected models

Model 1. Accumulated response to non-factorized one unit innovations for Frankfurt
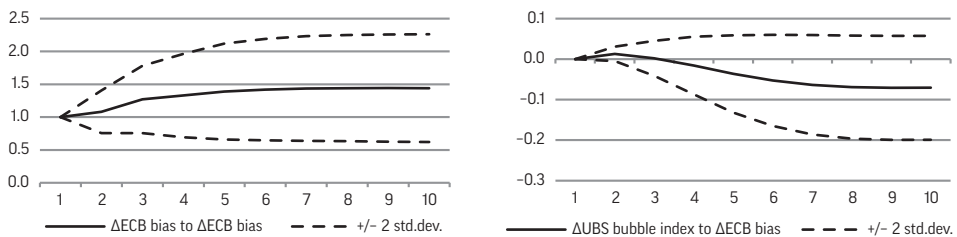
Model 2. Accumulated response to non-factorized one unit innovations for Munich
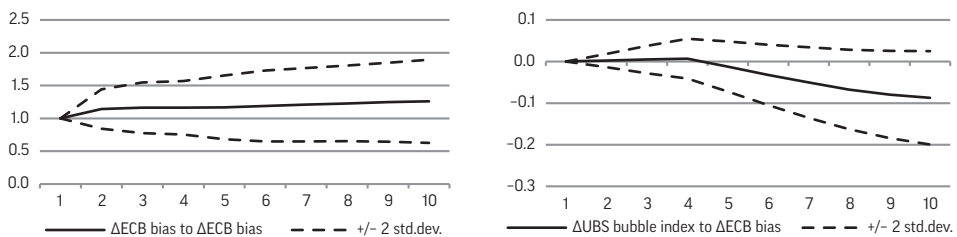
Model 5. Accumulated response to non-factorized one unit innovations for Paris
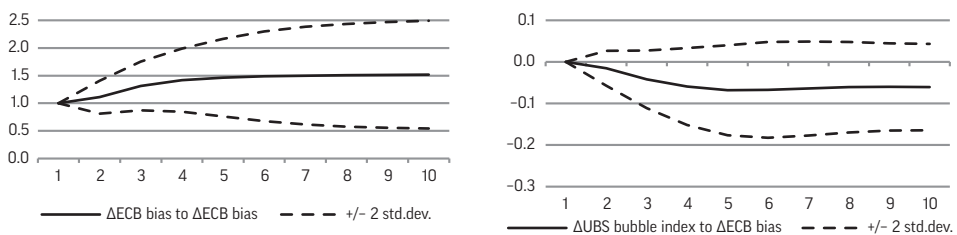
Source: author's estimation.

Table 4. Portmanteau test for VAR autocorrelation

	Lag (h)	Q-Stat	Prob.	Adj Q-Stat	Prob.	Df
Amsterdam	4	5.58	0.23	5.92	0.20	4
Frankfurt	3	7.59	0.11	7.89	0.10	4
Milan	2	3.39	0.50	3.51	0.48	4
Munich	5	24.07	0.02	25.71	0.01	12
Paris	4	2.12	0.71	2.26	0.69	4

Source: author's calculation.

Null Hypothesis of the test assumes no residual autocorrelations up to lag h.

Table 5. LM autocorrelation tests

Lag (h):	Amsterdam	Frankfurt	Milan	Munich	Paris
1	4.72 (0.32)	9.18 (0.06)	2.1 (0.72)	3.25 (0.52)	1.53 (0.82)
2	2.42 (0.66)	15.33 (0.01)	3.01 (0.56)	12.23 (0.02)	3.13 (0.54)
3	8.66 (0.07)	2.36 (0.67)		5.63 (0.23)	4.97 (0.29)
4	1.53 (0.82)				1.33 (0.86)

Source: author's calculation.

Null Hypothesis of the test assumes no residual autocorrelations up to lag h.

III.6

New Housing Construction in Poland and Regional Differences in Its Determinants

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This article presents the opinions of its authors and not necessarily
the official position of the Narodowy Bank Polski

Introduction

The supply side in the housing market is still not adequately explained, in both the national and international literature. Especially, the aggregation of local economic factors and the decisions of local housing developers. This paper provides a preliminary exploration of the dynamics of new housing starts in 16 major cities in Poland in order to help to fill the gap in our knowledge of new housing supply.

There is a structural shortage of housing in the major Polish cities, measured not only in terms of the current stock, but also by the quality and size of existing accommodation. This shortage is especially visible in the major cities, where new work places are created, whereas it is less so evident in smaller cities. In the smaller cities and rural areas flats can be substituted with detached houses, as land is relatively cheap. However, in the major cities flats are the only affordable alternative and rising demand leads to price increases. The rising demand for flats can be only satisfied with new construction, which is mostly generated by housing developers.

An initial visual inspection of the data for the biggest 7 cities in Poland shows that the aggregate housing supply reacts quite flexibly to changes in aggregate demand,

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which is approximated by the credit availability of housing. The aggregate supply also reacts flexibly to aggregate house price changes. This could be wrongly interpreted as a sign that the aggregate market is close to an equilibrium. Significant issues arise when we move from aggregates to specific local markets where two phenomena are observable: discontinuous supply and continuous demand. The aggregated time series are quite smooth, but the supply side, especially in the smaller cities, shows strong fluctuations. Usually, few developers operate in a single market, and each starts relatively large construction projects. Once a developer starts a large project, he then waits until a significant share of housing is sold. At the same time, demand grows in a continuous way, which leads to excessive demand and price increase. In reaction to such price increases, other developers enter the market and the supply jumps to a new level. Such a construction cycle (not housing cycle) continues until demand significantly exceeds supply, or drops significantly due to a crisis.

In examining the elasticity of supply, i.e., developer behavior in the 16 cities, we have to rely partially on indirect evidence. As will be explained, we analyze construction starts, not housing sales. We do not observe the supply and demand curves, only the number of construction starts and transactions. Research on the developer market in Poland by Łaszek et al. (2016) shows that developers use a 'unified technique', and deliver mostly the so-called developer basic standard flats. The developer chooses the quantity, not the quality, of the dwellings he starts to build. The decision is based on knowledge of the local market, local wages, prices and country-wide interest rates, which allows an estimate of the potential credit availability for housing, which is a main demand-side determinant.

Even though buyers treat housing as a consumption and an investment good, the purchase decision is determined by their financial situation. In our analysis we focus on the differentiated composition of factors determining local housing demand. Therefore, the starting point for the aggregation of local markets should be based on similar house price trends, thus reflecting broadly similar demand-side factors. One would anticipate that housing developers react in a similar fashion to house price increases in all the cities. Even though house price increases in most of the 16 largest cities are similar, the dynamics of supply of new housing differ significantly. We first estimate a panel regression on the whole panel and do not obtain significant results regarding house-start determinants. However, once the full sample is segregated into 'Clubs' of cities which exhibit price convergence, as determined by Matysiak et al. (2020), significant results are obtained. This demonstrates that 'local' housing markets can be aggregated into homogeneous clusters and that the supply-side (new construction starts) reacts to demand factors with different elasticities in different regions.

Why do we focus on new construction and not on the entire housing stock? When the housing market is analyzed and modeled, in many developed countries the entire available housing stock is considered to be the housing supply[5], new construction being a relatively small component of this. As such, the share of new housing in the housing turnover in a given year is rather low. However, in the case of Poland we estimate that around 50% of house purchases in the largest cities are in the primary market, which slowly helps to close the significant housing shortage. The Polish housing market is also rather thin, which means that only a small portion of the market is traded each year. The difference between demand and supply translates into house price growth, which in turn encourages housing developers to increase their production, and which, in the long run, constrains house price growth. Consequently, we put the emphasis on new construction in this paper.

The question arises, which measure of new housing supply should be analyzed? The potential candidates are: construction starts, new construction permits and newly delivered housing. Whilst delivered housing can be considered as the most appropriate measure of the situation in the housing market, it is not, however, that useful when trying to understand developers' decisions. The developer process can take around 3–4 years from the initial planning to the delivery of constructed housing, once the development land has been acquired. However, depending on economic conditions, the developer can speed up or slow down the construction process[6]. Furthermore, one could also argue that as construction permits are needed in order to start the construction process, this aspect should be taken into consideration. However, once the developer obtains a building permit, it is possible to exercise the option to use it for up to 10 years. The permit is an inevitable determinant but developers, who have a significant stock of development land and related building permits projects, can wait for the 'best' moment to commence the construction process. Therefore, in our view, the number of construction starts is the appropriate measure of developers' activity.

The paper is organized as follows. Following the Introduction, Section 1 provides a brief literature review of relevant supply-side aspects, Section 2 presents a contextual overview of the Polish housing market, Section 3 looks at the framework rationalizing the subsequent empirical analysis and the results are presented in Section 4. The Conclusions are provided at the end of the chapter.

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[5] Also, usually when commercial real estate is analyzed, the whole available space for rent is taken into account, not just the currently delivered buildings.

[6] If the market is booming, developers are willing to spend more on workers and equipment to finish one project and start another one. Contrary, during a downturn, they will slow down the production. It should be pointed out that due the accounting system applied in the development business, gains or losses are only accounted for once the full investment project is delivered.

1. Literature review of the supply side in the housing market

Housing supply is delivered mainly by housing developers[7] who react to changes in prices and start new construction projects. In many studies the supply side is neglected or implicitly assumed to be inelastic, while the demand side has been studied extensively. DiPasquale and Wheaton (1992) and Fisher (1992) provide a holistic framework which explains the life cycle in the real estate market. Although the model is framed in terms of the office rental market, it can readily be adapted for the owner-occupied housing market. We provide an overview of the model in Section 2. Essentially, the model indicates that in the short-term the market is in a state of imbalance, with supply and demand converging in the long-term. The mutual interactions between the real estate market and the real economy that underly the DiPasquale-Wheaton-Fisher model, were further analyzed by DiPasquale (1999), Wheaton (1999) and McDonald and McMilen (2010). Adams and Füss (2010) undertook an empirical analysis applying the DiPasquale-Wheaton model using international data. They found that it could take up to 14 years for the housing market to reach equilibrium after a disturbance to the underlying economic fundamentals. Stover (1986), Epple et al. (2010), Phang et al. (2010) and Steiner (2010) found that macroeconomic factors have a significant effect on the demand and supply side in the housing market.

The housing market and developer behavior have been studied at the local level. Capozza and Helsley (1990) present a model of a growing urban area. They showed that developers who face uncertainty are less willing to buy farmland and convert it into development land, which is an irreversible action. In consequence we observe that both development land prices and house prices increase. That growth could be mitigated if developers were willing to convert more farmland into development land. The housing development process in Poland is analyzed and explained by Augustyniak et al. (2012). They point out that developers offer pre-sale contracts and use little equity. Buyers have to pay in tranches once a given stage of the construction process is finalized. This allows developers to react more flexibly to demand shocks, more-so than if they were selling ready-finished flats. Łaszek and Olszewski (2015) present a theoretical model of the housing market for Warsaw, in which sharp increases in demand allow developers to use monopolistic price setting strategies to increase their profits. An analysis of individual selling prices for Warsaw undertaken by Łaszek et al. (2016) shows that during the 2005–2007 boom,

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[7]   Detached houses are also constructed by private households, but those are ignored in our analysis.

developers were able to sell similar flats to different buyers at different prices. However, after demand stabilized in the following years, the price dispersion for similar flats decreased significantly.

2. Polish housing market

We provide a brief overview of the evolution of the Polish housing market. For a substantial period of time, i.e., the post WWII period, Poland had a socialist economy and housing was constructed by state owned housing cooperatives. The system was notoriously inefficient. Individuals had to wait for considerable periods of time for a new flat in large cities, and needed a permit in order to buy one. In a sense, this was a control mechanism for internal migration and also a kind of non-monetary benefit for those who behaved in a 'proper way' towards the ruling communist party. When the political system changed after 1989, housing was still constructed by cooperatives, but more on market-oriented terms. However, the system still remained inefficient and slow, and consequently, private developers slowly emerged. Meanwhile, much of the existing stock was privatized as a social shock absorber during the economic transition to a free market economy.

New housing was unaffordable for most of the population in the 1990 s, especially as inflation was high (around 20–30% per annum), with nominal interest rates being of a similar order of magnitude. Only when wages started to increase around 2000 and interest rates and inflation fell below 10%, people were able to take-out mortgages and buy more housing. Developers started to extend their production. But there was an economic slowdown in 2001 and, with the introduction of regulations which cancelled tax benefits in 2003, individuals postponed the purchase of housing. Many developers were left with unfinished housing and, with no liquidity, thus went bankrupt, resulting in a slowdown in the new housing supply.

When Poland joined the EU in 2004, wages increased and interest rates on mortgages declined, which allowed many people to materialize their housing desires. Especially around 2006–2007, when foreign currency mortgages were available on a large scale (mostly CHF related), demand increased to the extent that developers were unable to keep up with it. Consequently, house prices doubled over that short period of time. Such price increases encouraged firms that operated in other fields of the economy to become active in the developer business, thereby increasing the number of construction starts.

The effects of the global financial crisis of 2007 became perceptible in Poland only around 2009, but on a relatively small scale. There were no significant negative

effects, but fears of a recession arose, and so, housing consumption was briefly curbed as were development projects. Fortunately, Poland was not hit by the crisis, and wages continued to increase. Developers resumed production of new housing, thereby meeting a growing demand. Prices remained relatively stable over the period 2009–2015. An important contributing factor was the expansion of factories producing building materials, together with an increased workforce of construction workers. The private rental market in Poland was for a long time underdeveloped, but with the relaxation of tenant protection introduced in 2016, private investors became encouraged to enter the rental market on a larger scale[8]. This increase in the purchase of housing for investment purposes initiated a trend in rising house prices.

To illustrate the history of the housing market described above, we take a look at the construction starts and availability of loan-financed housing[9]. Mortgages play a significant role in flat purchases, and the availability of loan-financed housing expressed in square meters is a good proxy for the purchasing power on the housing market. We calculated this measure for Warsaw, the biggest market, and jointly for the next 6 largest markets (Gdańsk, Katowice, Kraków, Łódź, Poznań and Wrocław). As developers have to buy land and obtain building permits, which can take around one to two years, we lag the construction starts by two years to visualize the reaction of the developers. The left panel in Figure 1 shows the values for two-year lagged construction starts and the availability of loan financed housing for Warsaw, the right panel for the other 6 largest cities. We see that in Warsaw developers followed quite closely the availability of loan-financed housing in their investment decisions. Developers bought land and acquired the needed permits to start new construction after some two years. For the aggregate data in respect of the other 6 cities we also find a close link, but not as strong as for Warsaw. The figure for Warsaw shows that when the loan availability increased, developers started new projects. They were quite certain that people would buy new housing and started to acquire land and obtain the permits. Two years later we observed the lagged construction starts as shown, both series being closely related. However, in the remaining cities (right panel) we do not observe such a relationship. During 2002–2007, the construction starts increases were weaker than the growth of mortgage availability, and later, since 2011, construction starts have increased, while the loan availability was a flat line. We infer that prospective

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8   The development of the rental market in Poland is described in more details in Chapter 13 of this book.
9   The availability of loan-financed housing is calculated in the following way. We take 65% of the average monthly disposable income in a given city, divide it by the mortgage constant, and thus obtain the total available mortgage which can be paid back over a 25-year period, given income at given interest rates. This value is divided by the current price per square meter of an average flat, and so we obtain how many square meters of a flat can be purchased with a mortgage, under a given income and interest rate.

purchasers had accumulated wealth and thus could buy more housing in the years following 2011. The faster growth of new construction than of housing availability after 2011 can be explained by the rising share of cash financed house purchases for investment purposes in those cities.

Figure 1. Lagged construction starts by two years (left axis) and availability of loan-financed housing (right axis)

Warsaw

6 biggest cities

— construction starts (lagged by 2 years)
— availability of loan-financed housing
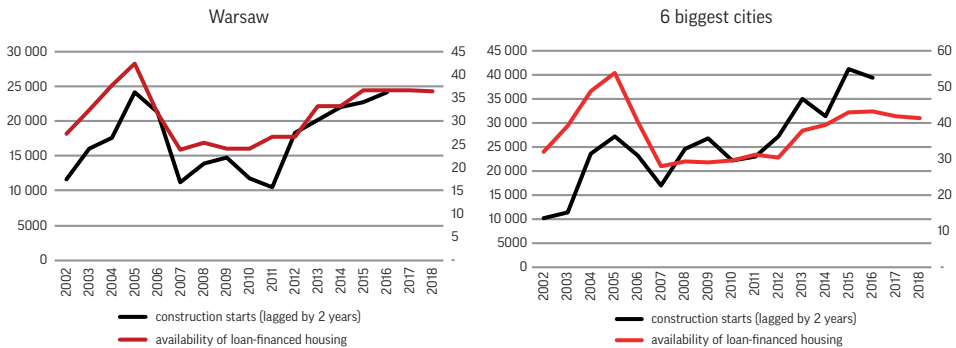
Source: authors' own calculations.

3. Housing supply analysis using the DiPasquale-Wheaton (1992) model

In order to analyze the reaction of house developers empirically, we briefly outline the DiPasquale-Wheaton (1992, DPW henceforth) model in order to provide a theoretical background to the housing market. We make a few adjustments to their model, which was developed to explain the commercial property market, where, on the one side are owners of assets (buildings) and on the other side firms which rent space. In the owner-occupied housing market, the investor and the tenant are the same and their respective functions overlap.

In the original DPW model the supply side reacts to increases in rents, and so we should look at imputed rents that a household would be willing to pay for a given property. Those, in turn, translate into prices which a household is willing to pay for the property. The link between a constant flow of rents and the price that is paid is the monthly payment of the mortgage. In the owner-occupied housing market, the household does not only consider which potential imputed rent it could pay, but asks itself, which monthly mortgage payment it could afford. This mortgage payment is directly related to prices and to the interest rate of the mortgage. When wages increase and/or interest rates decrease, individuals can afford more housing and house prices increase.

We explain the original DiPasquale and Wheaton model (1992, pp. 186–190), in Figure 2. The upper and lower right-hand side quadrants cover the property market (the relationship between the housing stock and rents), the upper and lower left-hand quadrants cover the asset market (the relationship between house prices and new construction). Those two markets are connected through two channels. The first is the rental level, which determines the demand for assets, as rising rents induce investors to enter the market and buy more space. The other link is the construction sector, which responds to the demand for assets and provides more space, which in turn lowers the rents.

Quadrant I of the DPW model covers the property market, in which the rents of the property stock are determined. The rents decline with the amount of available stock. Under favorable economic conditions, there is increased demand for space and rents therefore increase. The rent level is transformed in the asset market (quadrant II) through the discounted stream of rents into a price the investor (household) is willing to pay. The interest rate has an adverse effect on the price. The lower the interest rate, the more are investors/households willing to pay for an asset that provides a fixed rental income. A Lower interest rate results in a lower monthly payment if the property is purchased with a mortgage. Quadrant III shows the construction sector. There is a minimum price, that is equal to the construction costs, above which developers or construction firms are willing to deliver new properties to the market. And finally, quadrant IV shows the stock adjustment. The real estate stock depreciates at a given rate, and increases when new properties are constructed and delivered to the market. However, in situations when the demand starts to decrease, for example due to a crisis, the ongoing construction of new housing leads to an excessive supply and results in a fall in prices. When the demand increases again, the price decline stops and prices start to increase again. This situation was observed in Poland after the outbreak of the global financial crisis.

The DPW model is usually applied to a specific market, and we consider 16 major cities in Poland. In which case, we have to take into account the land rent, which explains why there are significant and persistent differences in house prices among the cities, and related differences in new housing starts. The wage differences result from productivity differences amongst the cities. When wages increase in one city, the demand for housing in good locations and of good quality increases. People who want to live in a given city start to compete for the best locations, and house prices start to increase. Increases in the land rent lead to a rise in the price of development land. Development land is usually available in the outskirts of the city and regulated by zoning plans. Developers buy farmland or industrial land at low prices, and transform it into development land, obtaining the lion's share of the land rent. The land development

and the housing development process are risky, and therefore developers like to start new construction in the largest cities where they expect a continuous demand. The construction process in smaller cities can be delayed even when price growth is observed, if the developers are willing to take the less risk to enter the smaller markets.

Figure 2. The DiPasquale-Wheaton model
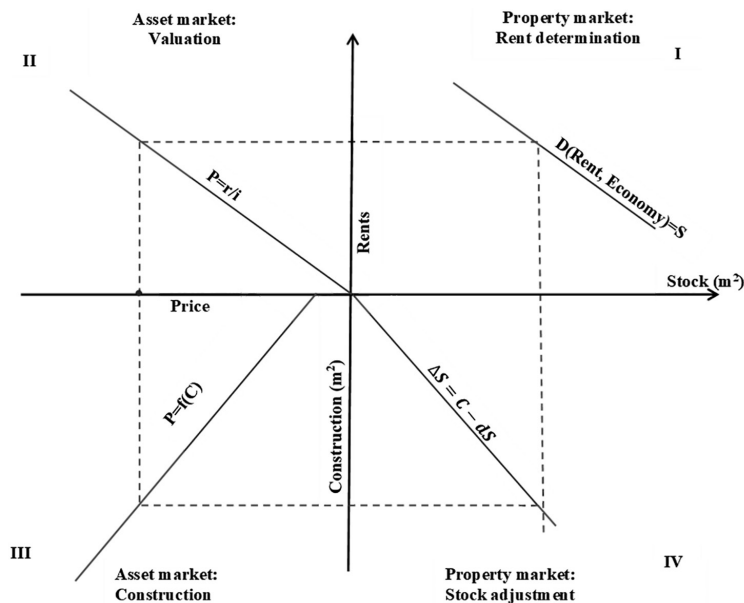
Source: DiPasquale Wheaton (1992) and authors' own modification.

We can expect a strong impact of wages and house prices on construction starts. This can vary through the cycle, especially if different distortions, such as subsidy programs or changes of zoning plans, are introduced. The DPW model appears to provide a suitable framework to explain the development of the housing market and the housing stock in cities. We analyze empirically new construction starts in Section 4.

4. Empirical analysis of construction starts

We analyze the growth rates of annual construction starts over the period 2002–2018 in 16 major Polish cities. The data on construction starts, wages and CPI originates from Statistics Poland, house prices and interest rates are derived from the Narodowy Bank Polski (NBP), while the data for house prices for the 2002–2006 period were extrapolated on the basis of offer price dynamics coming from the PONT Info database.

Developers try to maximize profits, and so they commence new housing construction when the expected price exceeds the expected construction cost. It should be noted that in Poland mainly pre-sale contracts are traded, which means that new flats are offered on the market when the construction has just started. Essentially, the potential purchaser is buying 'a hole in the ground' based on attractive visualizations of the project. This is important, because the developer faces relatively little perceived risk that more properties than can be sold[10] will be constructed. During the construction process buyers are asked to pay in tranches every time a specific phase of construction is completed. The developer has a continuous cash flow over the horizon of the project. Still, the buyer can cancel the pre-sale contract for a relatively small withdrawal fee. This means that when demand drops, clients can withdraw and the developer is left with a significant stock of unsold housing and less liquidity.

Before the introduction of an Act protecting real estate developers' clients[11], a lot of the risk was shifted towards the client, i.e., they paid in tranches in the hope that the developer would deliver the dwelling. We can conclude that the financing of developer projects is somehow similar to closed contractual saving schemes. The clients are by law protected against developer frauds, but are not fully protected against their bankruptcy. However, clients accepted this fact, as bankruptcies of developers were very rare and this selling scheme has made housing supply much more elastic. The developer also has a contract with the construction company, which allows the developer to have a clear picture about the potential construction costs.

We now motivate the choice of the explanatory variables that explain the construction starts. New house construction, unlike housing demand which is a continuous process, is initiated by developers in a given city in large batches. Developers have a known production capacity and a constrained amount of equity. Although they increase the production in the medium-term, we can observe short cycles in the production process. This means that after a significant increase of new housing starts in one year, we observe a smaller volume of new construction in the following year. In order to study this effect, we consider lagged construction growth in our regression formulation.

Developers in Poland use a mark-up on construction costs and thus are able to transfer any cost increases through prices to the buyers. Therefore, house prices should be an important explanatory variable. We would like to analyze medium-

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[10] In cases where the developer can only sell finished housing, there is a long period between the construction start and the sale of the property. It is more likely that the developer overestimates the future demand and generates an excessive supply of flats.

[11] The Act on the protection of real estate developers' clients was published in the Official Journal, 28 October 2011, No. 232, item 1377, and came into force on 29 April 2012.

term adjustments of housing starts and need to take into account the longest data set available. Reliable house price data for the primary market are available since 2007, while the house price data for the secondary market (properties in the existing stock) can be traced back to 2002. The prices in the primary market and the secondary market in Poland are strongly correlated (see Łaszek et al., 2020), so we use the longer price series for the secondary market as a proxy for the primary market data.

We employ real values with the usual demand variables, real wages and real interest rates, in the regression-based formulation. If real wages grow faster than real prices, housing becomes relatively cheaper and more houses are bought. The real interest rate determines how costly a mortgage is, and together with wages and prices, the real interest rate allows us to calculate the housing availability in square meters. Furthermore, the real interest rate is a measure of alternative costs foregone for individuals who buy housing for investment purposes. As explained in Section 1, there was a significant slowdown of new housing starts in 2009 which cannot be explained from a local economy perspective. The economy was basically in a good shape, the one-time slowdown in construction starts was observed most likely due to the fear of the potential impact of the global financial crisis. We therefore add a dummy variable that captures this specific year effect.

We test for stationarity, and, where necessary, form stationary time series by applying first differences to the variables, represented by the prefix D in the reported regression output. The names of the variables are represented as follows: *ln_rprice_existingstock* is the natural logarithm of the real price of housing in the existing stock, *ln_rwages* is the natural logarithm of the real wage, *real_intrate* is the real interest rate and *shock_2009* is a Dummy variable for 2009.

We estimate the following equation on annual data for the years 2002–2018:

$$D.ln\_constarts(t) = \alpha_0 + \alpha_1 * D.ln\_constarts(t-1) + \alpha_2 * D.ln\_rprice\_existingstock(t) + \alpha_3 * \\ * D.ln\_rwages(t) + \alpha_4 * D.real\_intrate(t) + \alpha_5 * shock\_2009 + \varepsilon(t)$$

We first run the regression on the full sample of 16 cities and find a significant negative lag for the annual construction growth rates. As previously noted, developers cannot start the housing construction piece by piece[12], but have to start a block of dwellings which contains dozens or hundreds of flats[13]. In order to commence new

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[12]   However, they sell or try to sell houses piece by piece in order to make monopolistic profits, a practice which is described by, among others, Łaszek et al. (2016) for the Polish housing market. More on price setting strategies of developers can be found in Wong et al. (2019).

[13]   On the demand side we can also observe that larger groups of people decide to buy housing, but usually the purchase decision is made by individual consumers and the selling process is rather a continuous one.

projects, developers require land and capital. Once developers have commenced big projects, they wait until they sell a significant quantity of flats before they start a new big project.

The regression results in Table 1 show All cities combined and cities grouped by Clubs (Matysiak et al., 2020). For the combined All cities group, the one-year lagged growth in constructions starts is significant as is the positive impact in the growth of house prices. Interestingly, neither the growth of real wages nor the growth or real interest rates has a significant effect on the growth of new construction starts. The time dummy for 2009 captures the significant drop in new construction starts in that year.

Table 1. Regression results of growth in construction starts

	All	Club1	Club2	Club3
VARIABLES	D.ln_constarts	D.ln_constarts	D.ln_constarts	D.ln_constarts
LD.ln_constarts	−0.4309***	−0.4117***	−0.4679***	−0.3960***
	(0.04)	(0.05)	(0.09)	(0.13)
D.ln_rprice_existingstock	1.2226***	0.7475***	2.0791***	1.6253***
	(0.25)	(0.27)	(0.54)	(0.46)
D.ln_rwages	0.6602	1.9618**	−0.6544	−1.8310
	(1.37)	(0.95)	(3.57)	(1.17)
D.real_intrate	−0.6951	1.0665	−1.5215	−4.8571***
	(1.44)	(2.17)	(3.71)	(0.60)
shock_2009	−0.3252***	−0.2047***	−0.6093**	−0.3513***
	(0.10)	(0.06)	(0.31)	(0.12)
Constant	0.1033***	0.0502	0.2130**	0.1365***
	(0.04)	(0.04)	(0.09)	(0.04)
Observations	237	133	59	45
Number of cities	16	9	4	3
Adjusted R-squared	0.2372	0.1626	0.2881	0.5929

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: authors' own calculations.

This result is not fully satisfying as we would expect wages and interest rates to play a role in the decision-making process of developers. We therefore analyze the same variables, this time considering groups of cities as reported in Table 1. The groups of cities, the so-called convergence Clubs, were identified by Matysiak, Łaszek and Olszewski (2020) and are reported in Table 2. They found that there are three main price convergence Clubs. The first, Club 1, consists of Białystok, Bydgoszcz, Katowice, Kielce, Łódź, Lublin, Olsztyn, Szczecin and Zielona Góra which have the

lowest house prices, and are also relatively small regarding their population and wage levels. The second group, Club 2, consists of medium sized cities, with average house prices and average wages (Opole, Poznań, Rzeszów and Wrocław). Finally, Club 3 consists of the cities of Gdańsk, Kraków and Warszawa, which show the highest property prices and highest wages. Table 3 summarizes the key statistics. While the official statistics show the highest volume of dwellings per 1,000 people in Club 3, it is possible that the 'effective' population is higher than the officially reported figures. It should be pointed out that people from other Polish cities, including foreign purchasers, buy housing in Club 3 cities, partially for their own consumption but also for investment purposes.

Table 2. House price convergence Clubs as determined by Matysiak, Łaszek and Olszewski (2020)

Club	Cities in the Club
Club 1	Białystok, Bydgoszcz, Katowice, Kielce, Łódź, Lublin, Olsztyn, Szczecin and Zielona Góra
Club 2	Opole, Poznań, Rzeszów and Wrocław
Club 3	Gdańsk, Kraków and Warszawa

Source: authors' own study based on Matysiak, Łaszek and Olszewski (2020).

Table 3. Club features summary statistics, averages for 2002–2018

Club	Population (000's)	Unemployment rate (%)	Monthly real wage (PLN)	Housing stock per 1000	Real house price
1	328	8.96	3800	412	3727
2	372	6.16	3960	407	4640
3	980	5.14	4583	445	6421

Source: compiled by the authors.

Looking at Club 1 in Table 1, we find the lagged negative impact of construction starts is significant, as is the growth rate of house prices. The positive effect of wage growth is significant only for this Club. The negative lagged impact of new construction starts remains similar for all Clubs. The growth in the price of property in Club 2 shows the highest impact of price growth on construction starts, whilst there is no effect due to wage or interest rate changes. Interestingly, the relative drop of new construction in 2009 was most severe in this Club. Finally, Club 3, which has the highest prices, shows a highly significant and strong impact of house price growth on new construction starts, but no impact of wage growth. Moreover, it is the only Club that shows a significant and important negative impact of real interest rate changes on new construction starts.

The significant differences in the regressions results across the Clubs show us that developers react differently in different groups of cites. Our results reflect the local nature of the real estate market. Not only housing demand is local, so is the decision of developers to construct new dwellings in a given location, even though many of the developers operate in more than one city.

All Clubs have two things in common: the negative lagged impact of new construction starts growth and the positive effect of house price growth in the secondary property market. The negative lagged impact leads us to the conclusion that housing developers have a very short cycle, which should not be confused with the house price cycle, which is much longer. The finding suggests that in many convergence Clubs developers observe the evolution of house prices in the secondary market, and most likely this information allows them to make inferences about demand in the primary market. Interestingly, the other economic variables have quite different impacts, are negligible or non-existent across the Clubs. This fact supports the argument in favor of analyzing local markets, rather than analyzing the aggregate housing market across the whole country.

Conclusions

In this paper we have analyzed the determinants of new housing starts initiated by developers for the 16 largest cities in Poland. It is important to undertake the analyses at the local level, as not only do the elasticity responses vary but so does the significance of the driving variables. Our empirical analysis shows that there are significant regional differences in the determinants of construction starts. We find a strong lagged impact of growth rates in construction starts, which can be explained by the fact that developers start new construction in large batches of dwellings. Once they start such a project, they subsequently delay the commencement of a new development. The regression results also show that developers pay attention to the growth of real house prices in the existing stock. Most likely, they infer from those prices the demand for newly constructed housing.

However, other variables such as real wages and real interest rates seem not to play a significant role across all local markets. Only in the lowest priced cities, Club 1, we find a positive response to real wage increases. Developers in the largest cities with the highest prices react in a negative way to the growth of real interest rates. However, the results should be interpreted with caution as they are based on a relatively short time period of available data. The Figures A1 – A4 in the Appendix show a good fit of the factual and predicted growth rates of construction starts. It seems that the

estimated model is useful in explaining new construction starts, and may provide useful information for policymakers and housing researchers who require some insight into the functioning of the Polish housing market.

An analysis and understanding of the factors determining new housing construction is important for housing policymakers, as in many cases new supply helps to satisfy the increasing housing demand and can mitigate the impact of house price increases.

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Appendix

Figure A1. Construction start growth rates, all cities

Graphs by city
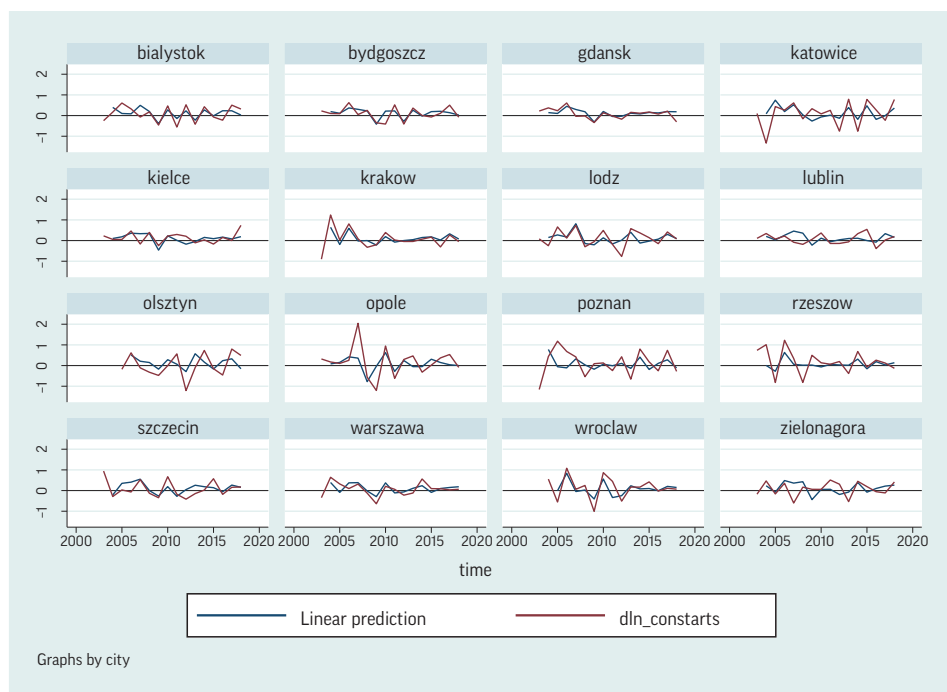
Source: authors' own calculations.

Figure A2. Construction start growth rates, Club 1

Source: authors' own calculations.
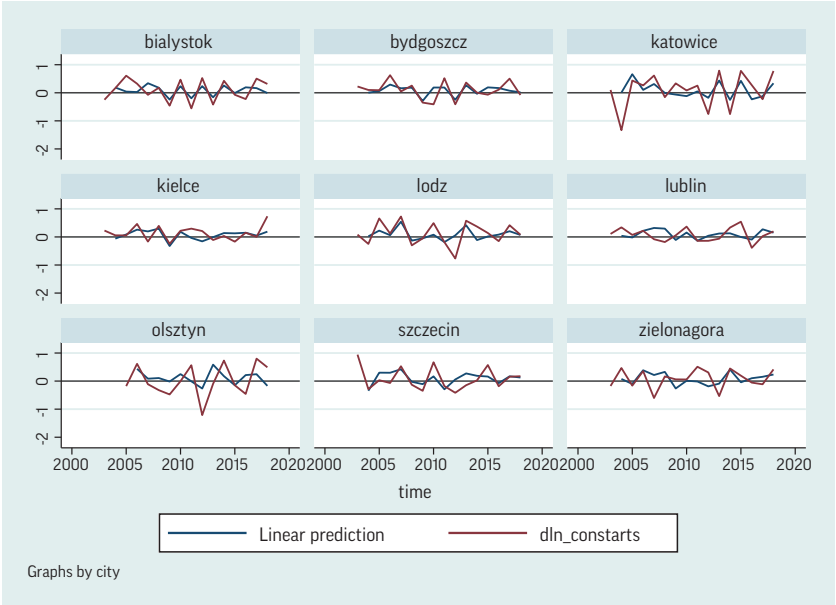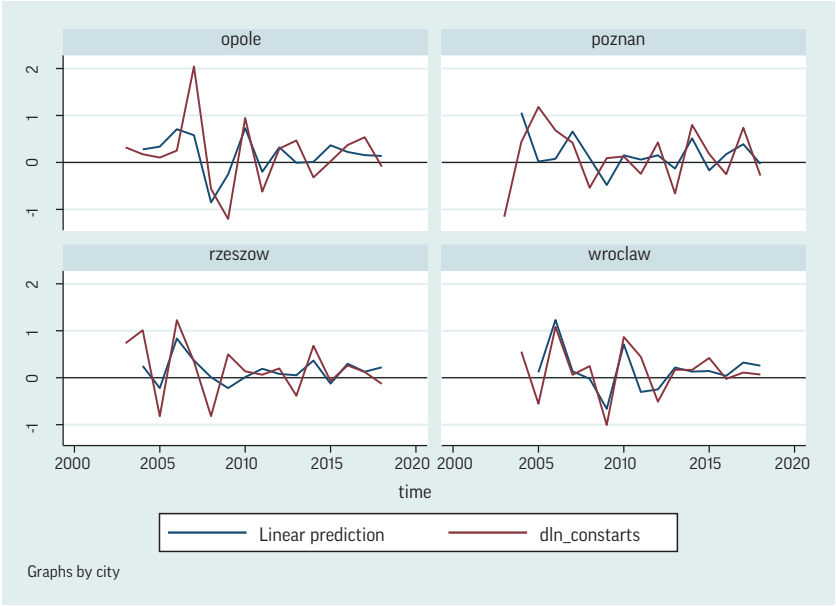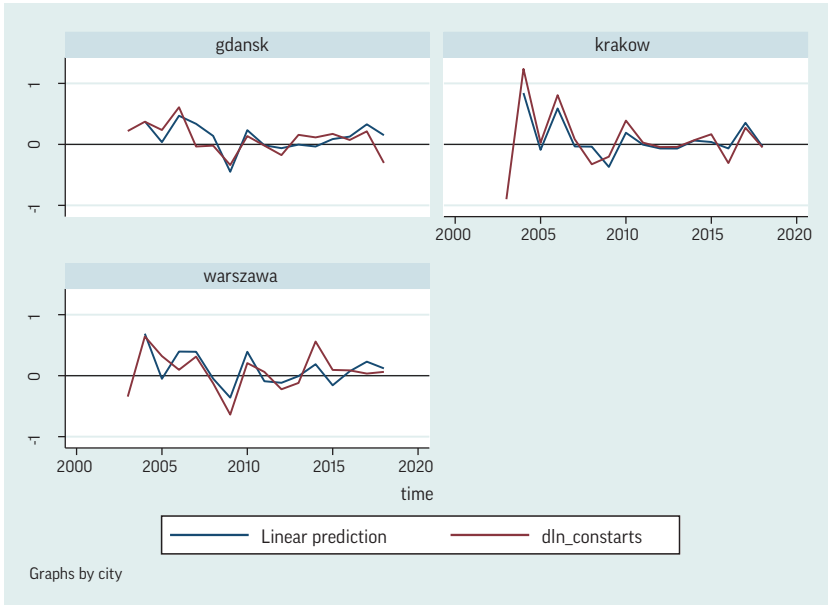
Figure A3. Construction start growth rates, Club 2

Source: authors' own calculations.

Figure A4. Construction start growth rates, Club 3

Source: authors' own calculations.

IV

SOCIAL AND INSTITUTIONAL ISSUES OF THE SECTOR

IV.1

The Development of the Rental Market in Poland

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This article presents the opinions of its authors and not necessarily
the official position of the Narodowy Bank Polski

Introduction

The rental market plays an important role for the mobility of the labor market, as it facilitates a quick change of place of residence. The mobile labor market, in turn, is the basis for an effective economy, especially for a rapidly growing economy, where allocations of qualified workers are needed. Also the rental at market rate is very important. Historically, the European housing system began to develop from rental housing, when it accelerated the processes of urbanization in connection with the industrial revolution. The rather bad experience of the unregulated rental market in the absence of housing caused the reaction of the state and housing policy in the form of supporting the development of rental housing with regulated rents and the promotion of owner occupied flats financed by a loan. Restrictive relationships were regulated between tenants and apartment owners. As a consequence, the share of market rents in European countries began a long-term decline up to the 1960 s. During this period, Western European countries have reached a state of prosperity. The high saturation with apartments made the governments to limit its involvement in this sector. The housing situation that we observe at the beginning of the 21st century

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is, to a large extent, determined by historical experience and is very diverse between European countries.

Based on Eurostat data, it can be noted that countries with lower GDP per capita have a higher share of ownership flats (see Figure 1). The levels of GDP per capita have not been shown, as the chart becomes illegible. Augustyniak et al. (2013) analyzed the tenure choice determinants in Europe and found that the history, the current economic situation, the financial sector and demographic situation have a strong impact on it. Similar results were found by Andrews and Sanchez (2011a) for OECD countries. Figure 1 shows that the highest share of ownership (mostly without debt) is in the CEE countries, and the second group, with a certain share of indebted dwellings, are the countries of Southern Europe. The main reason for the dominance of owner-occupied dwellings in the countries of Central and Eastern Europe was the privatization carried out in the 1990 s, which transformed municipal, cooperative and company resources into privately owned flats. In Poland, the sale of premises on preferential terms was a form of compensation for very low wages in socialist times, but also a shock absorber for social shocks, acting against high unemployment and other costs incurred by the society during the transformation period (Augustyniak et al., 2013).

Figure 1. Distribution of the population by tenure status in 2011 (left bar) and 2016 (right bar)
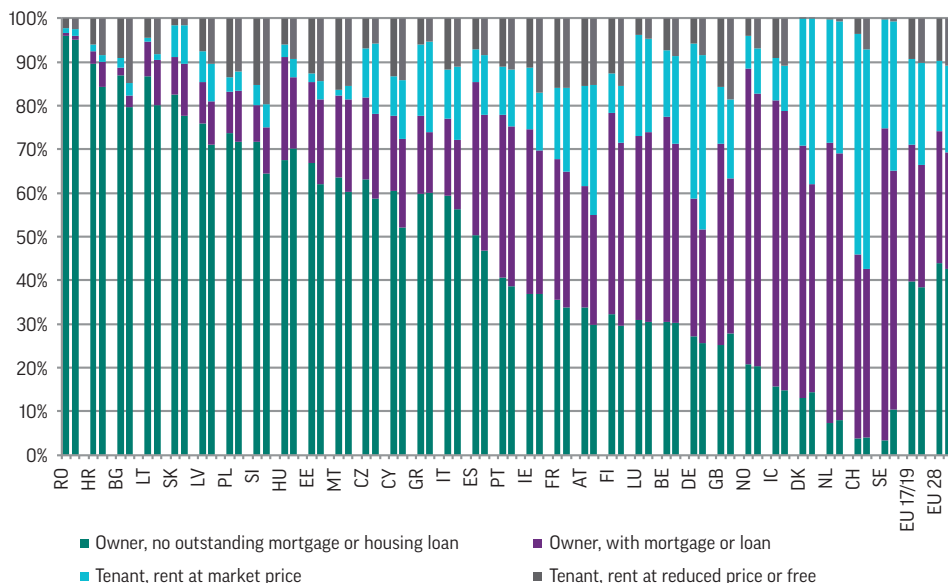
Source: Eurostat (2016).

Hegedüs et al. (2018) provide a good overview of housing policies in Eastern European Countries, while in a companion paper Haffner et al. (2018) show how private rental housing in Western European countries works. Andrews and Sanchez (2011b) point out that the housing policy in various OECD countries has a common feature, namely that in general owner occupied housing is supported through tax subsidies and eased access to mortgages. A detailed overview of social housing policies in Europe is presented in Scanlon et al. (2015). We refer to those papers for further reading. Historical experience shows that a good system of satisfying housing needs should be diverse and adapted to regional requirements. Young people who are studying or entering the job market need cheap rental housing. Only with time will they be able to rent more expensive apartments, or decide to purchase one, which requires a significant down payment. Privately owned flats are a very important financial asset of households, they are also a method of securing savings for the future. Especially for older people, it becomes a financial security for the rest of their lives, because they do not need to pay a rent, while they can rent them to others and earn some money, or take a reverse mortgage. The flat can also be passed down to the family, especially children.

Blanchflower and Oswald (2013) demonstrate for the U.S., that an excessively high share of owner-occupied housing can have a negative impact on the level of employment. The authors show that regions with a higher share of owner-occupied housing usually have a higher unemployment rate, which results from less mobility of employees and problems with commuting. Also the structure of the lease has an impact on labor mobility. Barcelo (2006) shows that people in France, Germany, Italy, Spain and Great Britain that rent at market rates are more willing to move to find a new job than people who rent at subsidized rents or are owners. Moreover, owners who had to pay a mortgage were more willing to move than those who were not indebted. We interpret this in the following way. Those who rent at reduced rates are worried to lose this subsidy and are less willing to move. Those who have a mortgage need to find a new job quickly, as otherwise they can have problems to pay back the mortgage and risk a foreclosure. It should be added that selling a flat requires some time and involves costly fees. Secondly, the problem of unemployment affects usually a given location, and when many people are willing to migrate, house prices in this location fall. Selling a house under such a situation generates a loss.

Most houses are purchased with the support of loans, which have a significant impact on the banking sector. The recent global financial crisis was triggered by excessive purchase of housing, including assets that exceeded the financial capabilities of borrowers. In most OECD countries, there was a long-term discrepancy between prices and rents or income (see André et al., 2014). Such a phenomenon can be interpreted as a bubble indicator, as the no-arbitrage condition between renting and buying does

not hold. Theoretically, when prices are too high, the demand for flats for rent should increase, which would reduce the demand for ownership (drop in prices) and increase the demand for rental (increase in rents). The price in the long run should be equal to the discounted rents, therefore the price-to-rent ratio should fluctuate around a certain level. However, recently there has been no balancing for two reasons. The first, purely economic factor are low interest rates in developed countries (see for example the analysis of the UK housing market in Aoki et al., 2004). The second, more complex factor is the fact that the flat is both a durable consumer good and an investment object (Łaszek, 2013). Interlacing these two functions is enhanced by the desire to buy, especially in the conditions of price increases. It seems that only a sufficiently large amount of flats for rent, constituting a viable alternative to the consumer, is able to mitigate the demand for owner occupied housing. However, cyclical and strong changes in prices and demand for housing, especially those related to loans, should be subject to state intervention.

1. Development of the housing market in Poland since the transformation

Similarly to other post-socialist countries, owner occupied housing dominates in Poland. Ownership gives the owner a sense of security, but hinders work mobility. In Poland, in 2016, approx. 83% of flats were owner-occupied, while approx. 17% of flats were rented (including approx. 12.5% flats rented at a preferential, reduced rate). In recent years, the mortgage cost was falling, and incomes were constantly growing. Moreover, since April 2012 the act on the protection of the house buyer's rights has reduced the risk of the buyer associated with the purchase of real estate at different stages of construction (i.e., also pre-sale contracts) from the developer. All these factors contributed to purchases of apartments, including newly constructed ones.

Since the beginning of the transformation, there is a shortage of flats for rent at market prices in Poland, and for a very long time the market functioned in a non-professional and informal system, where private persons who have an additional flat were landlords. The rental was expensive because the owner asked for a risk premium to cover the excessive protection of the tenant (see inter alia Gromnicka and Zysk, 2003). Often, older apartments of a lower standard were rented. Some people inherited such flats, some changed the old ones to the new ones, and rented the first ones.

The second segment of the rental market is social housing, directed to the poorer part of the society. This segment usually includes apartments with moderate rents, directed to economically weaker groups and social apartments that are directed to the poorest. In Poland, such housing was municipal, owned by large state owned

companies and cooperative housing. Most of them are privatized by now, while the rest remains fully occupied.

Previous government programs aimed at the construction of new apartments focused mainly on private housing. This was the consequence of social preferences that resulted from many years of socialism and the domination of social or cooperative ownership. In addition, the governmental programs Rodzina na swoim (*Family on its own*, operating in the years 2006–2012) and Mieszkanie dla Młodych (*Housing for the young*, operating in the years 2014–2018) had a large, positive impact on the housing sector. These programs were aimed at the middle class, who needs help in a smaller extent (see NBP, 2011 for a detailed analysis). However, this is characteristic for many developed countries, where the middle class has a big political power. Consequently, these programs have weakly supported both the labor market and the needs of weaker economic groups. The new governmental program Mieszkanie plus (*Housing plus*), which is described in more detail in Chapter 3, attempts to develop more socially oriented flats.

The idea of constructing rented flats with moderate rents for middle-income people was brought to life by the Towarzystwa Budownictwa Społecznego (*Social Housing Associations*) established by the Act of October 26, 1995. However, this program did not bring the expected results due to design errors of the program. Private housing investments were burdened with high rental risk (risk of vacancy, broken contracts and the risk related to the unregulated problem of evicting unwanted or non-paying tenants). Rental rates are unregulated, although they are at a relatively stable level.

The rental sector began to develop structurally in Poland only after 2013, when the protection of tenants was reduced and at the same time the demand for labor in large cities increased. However, this market still cannot be considered as professional. In the case of professional rental, the entire building or even the estate is bought by investors, which allows for the diversification of risks and through the economy of scale, reduces costs.

The situation of the rental market in major Polish cities can be analyzed on the basis of information presented on Figure 2, 4 and 5, which are borrowed from the NBP (2019a) report, and with information shown on Figure 4, which was based on data published by the NBP (2019a). The rental market consists of two participants and both the tenant and the landlord need to have economic incentives to stay in the market. For the first one, the flat must be available physically and economically affordable, for the second one rental must be economically viable. Rental rates are slowly increasing (see Figure 2), which may result from the improvement of the quality of rented apartments. The rate of return of the landlord exceeds slightly the cost of buying a flat with a mortgage (see Figures 2 and 4), which means that investing in rental housing is profitable. Estimates of the number of flats purchased for rent in the primary

market of the 7 largest cities in Poland (no official data is available so far) shown in Figure 5, indicate an increase in the share of such flats since 2013. Low credit costs, low alternative costs and the relaxation of the previously very strong protection of the tenant have a positive impact on the development of the rental market. The analysis of the availability of sq. meters of flats purchased with a mortgage or acquired by renting in Warsaw and the 6 largest cities (see Figure 3) shows that a buyer can get a larger flat than a renter. This analysis did not take into account the high purchase costs that apply both during the purchase and also during the later sale, when one wants to move. Further on, apartments for rent can be entered almost immediately, and in most cases they are fully furnished. Contrary, a newly purchased flat usually requires significant repairs and furniture and other equipment needs to be acquired, which generates costs.

Figure 2. Average transaction rent per sq.m. on the secondary market in selected cities
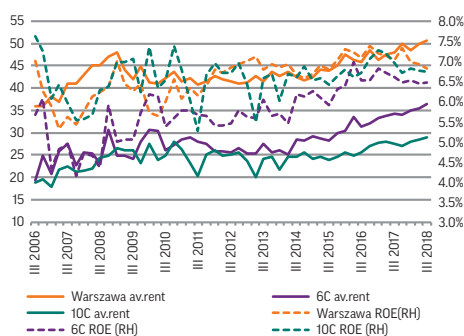
Note to Figure 2: "Price per square meter of housing 40% SM and 60% SM; the price per square meter of housing in the PM was increased to include the average costs of home finishing; the analysis does not take into account the high transaction costs in the housing market and the potentially long time needed to exit from such an investment".

Source of the figure and the note: NBP (2019a, p. 13), source of the data: NBP.

Figure 3. Estimated availability of mortgage financed or rented housing in sq.m., for Warsaw and 6 biggest cities
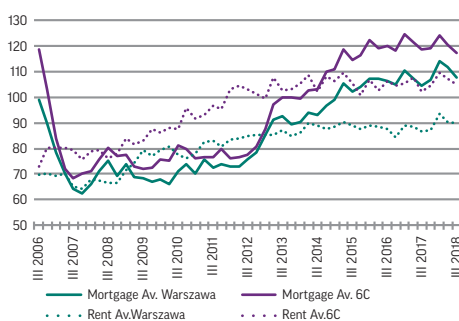
Note to Figure 3: "Availability of loan-financed housing – a measure specifying how many square meters of housing may be purchased with a housing loan obtained basing on the average monthly wage in the enterprises sector in a particular market (GUS), in view of bank's lending requirements and loan parameters (interest rate, maturity, minimum wage understood as the minimum income after payment of loan instalments) at an average transaction price of housing (40% in the primary market and 60% in the secondary market) in a particular market (BaRN)". (this description bases on information provided by NBP (2019a), p. 14). In case of renting, the monthly wage is divided by the rent.
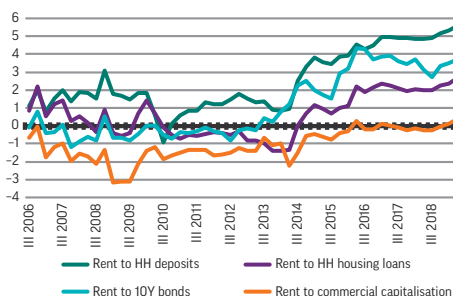
Source: authors' own calculations based on NBP (2018) and GUS (CSO) data.

The analysis did not take into account the costs of water, heating and electricity etc., and the payments made to the cooperative or the manager of the flats (maintenance, insurance, renovations, etc.), as they are practically the same, regardless of the form of

tenure status. It should also be added that the owner of the flat, especially the one who rents his flat to others, must take into account renovation work. In a slowly growing rental market, including a professional one, the landlord needs to modernize his flat to make it competitive, which also generates costs.

Figure 4. Profitability of home rental (average in Warsaw and 6M) as compared with alternative household investments

Figure 5. Estimated housing demand on the primary market (in Warsaw and 6 biggest cities) and its components

Note to Figure 4: "Values exceeding 0 denote higher profitability of purchasing property for rental to third persons than other household investment. This analysis does not take into account high transaction costs in the housing market and potentially long payback periods".

Source of the figure and the note: NBP (2019a, p. 15). Source of data: NBP, GUS (CSO).
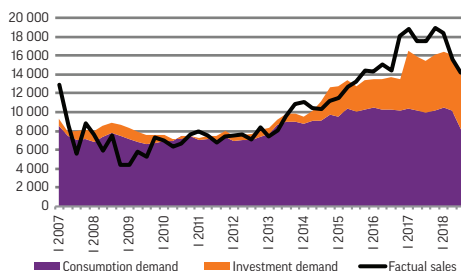
Note to Figure 5: "It is assumed that demand is composed of consumer and investment demand, speculative demand is ignored. Consumption demand is the number of housing units sold per quarter on average in 2010, multiplied by the dynamics of the mortgage availability. Investment demand is the number of housing units sold per quarter on average in 2010, multiplied by 10% (for I 2007 – II 2013), 20% (III 2013 – IV 2016) and 30% (after I 2017), multiplied by the dynamics of the profitability of housing investment in comparison to cash investments (90% deposit rate and 10% government bonds rate)".

Source of the figure and the note: NBP (2019a, p. 15), Source of the data: NBP, REAS/JLL, ZBP, GUS (CSO).

The profitability of investment into rental housing can be also analyzed in a similar way to the commercial property market, that is by calculating the yield and the ROE – the return on equity. Yield is simply the annual rental income to the price of housing per square meter. The ROE is calculated in the following way. First, we need to assume different levels of financial gearing. For simplicity we assume an investment fully financed with cash (the LTV is 0%), one where the LTV is 50% and also a highly leveraged investment with a LTV of 80%. In order to calculate the financial profit we take the rental income, subtract the tax of 8.5%, the interest payment and also the amortization of 1.5%. Unlike in case of commercial real estate, the tax is paid on the whole rental income, before the deduction of any costs[4]. The results are presented in Table 1. The

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[4] However, in case of commercial real estate investment firms pay a higher tax, namely the CIT which is 19%.

calculated yield or capitalization rate was around 6 to 7%, a figure that is also found in commercial property investments[5]. But the ROE is significantly lower. When the whole investment is financed with cash, the ROE is around 4%, a value that only slightly exceeds the risk free return on government bonds. When a financial leverage is used, we get even lower rates of return. For a LTV = 50% the ROE is by nearly 1 percentage point lower, in case of a high gearing where the LTV = 80%, the ROE is even below 1%. This might be surprising, as gearing should increase the ROE. The reason is the tax which is paid upfront on the whole rental income. In case of a commercial property, all expenses are deducted from the rent and the tax is paid only on what is left. This also explains why in the case of residential real estate investment financial leverage decreases the ROE.

Table 1. Estimated rate of return on investment in housing of 50 sq.m. in Warsaw

Date	Transaction rent (PLN/sq.m.)	Transaction price PM (PLN/sq.m.)	Calculated capitalization rate	ROE when LTV = 0%	ROE when LTV = 50%	ROE when LTV = 80%	Average market rates of return on 10-year Treasury bonds
2013 Q4	43.5	7989	6.4%	3.8%	2.4%	–0.4%	4.4%
2014 Q2	43.4	8132	6.3%	3.6%	1.6%	–0.7%	3.4%
2014 Q4	41.4	8187	5.9%	3.4%	1.5%	–0.5%	2.6%
2015 Q2	43.8	8108	6.3%	3.7%	2.6%	0.3%	2.8%
2015 Q4	45.0	8201	6.4%	3.8%	2.7%	0.3%	2.8%
2016 Q2	46.4	8155	6.7%	4.0%	3.0%	0.5%	3.0%
2016 Q4	48.4	8356	6.8%	4.1%	3.3%	0.7%	3.3%
2017 Q2	47.9	8621	6.5%	3.9%	2.9%	0.5%	3.3%
2017 Q4	49.7	8854	6.6%	3.9%	3.1%	0.6%	3.4%
2018 Q2	51.2	9120	6.6%	4.0%	3.2%	0.6%	3.2%
2018 Q4	52.2	8259	6.8%	4.1%	3.4%	0.8%	3.1%

Assumptions: Transaction price per square meter of housing in the primary market increased by finishing costs (+PLN 800.00/sq.m.). Loan in PLN granted for 25 years, equal instalments payable four times a year. Amortization of 1.5% (two complete renovations in the period of 100 years). Occupancy 95%.
Taxable with lump-sum tax of 8.5%. The calculated capitalization rate includes amortization costs. CIT. ROE – net income/equity.
Source of the table and the note: NBP (2019b, p.28), source of data: NBP (data and calculations), MF (rate of return on 10-year bonds).

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5   Currently, the yields in the prime commercial real estate investments are even lower, see NBP (2019) for more details.

2. Overview of the current housing program, which focuses on rental housing

The analysis of the latest housing programs in Poland is based on NBP reports (2017; 2018) and on information from the website of the Ministry of Investment and Development[6].

In September 2016, the Council of Ministers adopted the National Housing Program, which aims to: *) increase access to housing for people with incomes that currently prevent the purchase or renting of a flat on a commercial basis (the aim is to increase the number of flats per 1,000 inhabitants from 363 currently to 435, which is the EU average), *) increase the possibilities of meeting the housing needs of people at risk of social exclusion due to low income or a particularly difficult life situation (the aim is to reduce by the year 2030 the number of people waiting for communal rental housing to zero, while the current figure is around 162 thousand households), *) improve housing conditions and technical condition of the housing stock and increase energy efficiency of housing (the aim is to reduce the number of people that live in substandard conditions[7] from approx. 5.3 to approx. 3.3 million by the year 2030).

This housing program is evolving, but originally it was based on four principles:

1) Widespread availability of low-rent housing (including rental with the option to claim ownership), in favor of large families and families with low incomes (all citizens will have the right to apply for rent). It is assumed to increase support for social housing construction, including those built by housing cooperatives, social housing associations or other entities (e.g. developers). The support instrument will be a subsidy for municipalities (20% of investment costs), which will build with the investors the apartments with a low rent for a specific group of people (selected among others by income criteria). The rent for such a flat should not be higher than 4% of the replacement value. The program assumes the possibility of saving for the purchase, construction and renovation of an apartment or a single-family home with the use of the so-called housing sub-accounts. The funds are to be collected on Individual Housing Accounts, established in banks and cooperative savings and credit unions. Savings are to be exempt from income tax on capital gains. It is assumed that some housing goals will be supported by a premium paid

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6   Ministry of Investment and Development. Available at: https://www.miir.gov.pl/strony/zadania/mieszkanie-plus/ (Access Date: 15.11.2018).

7   As substandard are considered buildings with poor technical condition, with missing technical installations, and the overcrowded ones.

from the state budget, the amount of which will depend, among others, on the size of the family. In addition, municipal companies as well as housing cooperatives and social housing associations will be able to apply for preferential loans (with a budget subsidy) at the state development bank Bank Gospodarstwa Krajowego for the construction of social rental apartments or cooperative housing. In this case, the rent should not exceed 5% of the replacement value.

2) Stable and effective financing, using land belonging to the Treasury for the construction of apartments for rent, which will increase their availability. The land will be transferred to the National Housing Operator and other entities with the status of housing operators for the construction of apartments for rent, including the option to claim ownership.

3) Modern, economical and safe living conditions. Provision is made for instruments to improve the technical standard of existing housing stock, thus improving housing conditions. National and European funds will support renovations and thermo-modernization investments. Support for the revitalization processes in degraded areas will be continued. It is assumed to support the creation of technical infrastructure accompanying housing construction.

4) A good law. New regulations are planned, which will cover the functioning of the rental market, the organization of the investment and construction process, as well as the functioning of housing cooperatives, communes and social housing associations in order to facilitate the construction of housing and the management of the constructed resource. The basic action will be the preparation of a new Urban Planning and Construction Code. Regulations of the functioning of the rental market will be changed. Rationalization of the principles of managing the housing stock is planned. The development of housing cooperatives in the segment of available apartments was assumed. An amendment to the Act on housing co-operatives will be prepared.

Currently, as part of the commercial pillar of the "Mieszkanie Plus" (housing plus) package, BGK Nieruchomości (BKG real estate) is carrying out investments on land owned by local government units and private entities. In July 2018, a new element was introduced – "Mieszkanie na start" (housing for the start), which aims to subsidize the rent for new apartments. So far, the proposals of the national housing program had little impact on the housing market. However, they contain incentives for the future. In order to obtain tax discounts, there is an obligation to sign official agreements and pay taxes. Such incentives force landlords out of the gray zone, moreover they can help to make the rental market work in a proper, transparent way. In the future the program may simplify the access to rental housing.

Conclusions

In Poland, owner occupied housing still dominates, which results directly from the privatization of housing during the transformation of the system. In addition, also the housing programs in the years 2000–2018 supported ownership housing. A factor that prevented the creation of a significant rental market was the excessive protection of the tenant, which was changed in 2016. In recent years, low mortgage costs and low alternative costs motivate a part of the society to invest in rental housing. Private landlords increase the amount of flats for rent, but they also carry a risk. Especially, when the flat was bought with a mortgage and it was assumed that the mortgage would be repaid with the rental income. Another risk factor may be the demographic changes, i.e., a decrease in the number of young people, with a simultaneous increase in the number of people over 60, which will shift the demand for housing in terms of size and location. It is necessary to observe the impact of the government program for the construction of apartments for rent, which can alleviate the problem of shortage of flats for rent.

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IV.2

Social Rental Agency in Warsaw – a Program Increasing Access to Affordable Housing Run by Habitat for Humanity Poland

Agnieszka Głusińska[1], Katarzyna Przybylska[2]

Introduction

Social Rental Agency (SRA) is a housing-led model of social services, combining rental housing support, employment services and social work within a single institutional framework.

SRA acts as a middle man between property owners (public and private) and households in need of housing. It provides access to affordable housing, offering the tenants, e.g. good quality accommodation, ongoing support and debt management mechanisms. As for the landlords, SRA asks for lowering the rent by circa. 20%, offering good quality property and being open to all candidate-tenants. In return it offers for example guarantee of rent payment and tenancy management.

This solution was tested in Poland by Habitat for Humanity Poland (Habitat Poland) during a pilot project HomeLab, that was preceded by a research project on feasibility of SRAs in Poland. Habitat Poland established SRA in Warsaw offering support to 41 households (including 30 who received effective housing service). The pilot project

was thoroughly monitored and evaluated by Metropolitan Research Institute. The final results proved the model to be effective in improving people's housing situation along with other aspects of their life, e.g. employment.

The article presents SRA model and its Polish implementation with reference to housing situation in Poland posing a question whether this model should be introduced in Poland on a broader scale. After analysis of the positive results of the HomeLab pilot project, and listing challenges along with possible solutions thereto, a positive answer is presented. Social rental agencies with their potential of being an innovative solution (at least in Poland and CEE region) should be incorporated into housing policies as a mechanism responding to housing problems.

The main objective of this article is to present a social rental agency model in the context of Polish housing situation. The article aims at responding to the question whether, after the introduction of the pilot project of a social rental agency in Poland and given the results of the project, social rental agencies should be implemented on a broader scale.

The article focuses on the analysis of the most vulnerable groups of Poles who struggle to meet their housing needs. This group comprises mainly people suffering from or at the risk of homelessness or housing exclusion. Also a group falling into a rent gap is taken into account, namely people who do not meet income criteria for social housing and, at the same time, cannot afford renting or buying a flat in the private market. Some of the people falling into the rent gap could also be deemed as falling into the category of housing exclusion, however it is not always the case.

The paper is organized as follows. The first section presents general overview of the housing situation in Poland. In section two one of solutions, namely social rental agency model, is described. In the next section, the history of the implementation of this model in Poland within the HomeLab project framework is presented and the results of this research pilot project are discussed. Finally, the authors would like to propose an answer to the question posed above in more detail – analyzing the outcomes of the pilot project and knowing the obstacles, should the model of a social rental agency be implemented on a national scale in Poland, introduced in various Polish cities and granted public funding? Would it improve the housing situation in Poland?

1. Housing situation in Poland – general overview

The housing situation in Poland can be regarded problematic from many aspects. "*The Polish population remains largely housed inadequately with a rate of overcrowding and severe housing deprivation that is among the worst in Europe* [...]" (Feantsa, 2019).

Approximately 14% of the population lives in poor housing, defined as living under substandard conditions (National Housing Program, 2016), and almost 40% of Poles live in overcrowding (the EU average is 15.5%) (Eurostat, 2018). The deficit of affordable housing units is estimated on alarming level between 600,000 and 2 million. The diagnosis of the housing situation for many years remains the unchanged and underlines **the necessity to develop the sector of affordable housing** (in particular dwellings for rent with a moderate rent rate) (Muzioł-Węcławowicz and Nowak, 2018).

Poland has a greatly underdeveloped rental housing sector: due to the massive privatization of the housing stock starting by the early 1990 s, currently almost 85% of the housing stock is owned by private individuals (Eurostat, 2017a). Private rental is very small: less than 5% people live in properties rented in the private market at market price while 11,5% of Poles rent flats at reduced rent prices or fees (Eurostat, 2017b).

Slightly less than 6% of the total housing stock is publicly owned (belongs to municipalities or State Treasury) (National Statistics Office, 2019). At the end of 2018 there were 149,329 households waiting for allocation to municipal housing (National Statistics Office, 2019). The average waiting period for allocation of social housing in Poland in large cities is between 2–7 years, and in smaller cities up to 20 years.

When it comes to assessing the situation of homeless people, it is quite difficult as "*there is no systematic strategy at national level for collecting data on homelessness in Poland*". (Feantsa, 2019). The Ministry for Family, Labor and Social Assistance conducts a periodic survey counting homeless people over one night. The result of this survey for 2019 was 30,330 homeless people (Ministry for Family, Labor and Social Assistance, 2020). This number refers only to homeless people living in shelters and facilities or in public places and non-habitat spaces while it doesn't include all of the groups indicated in ETHOS definition of homelessness and housing exclusion. According to the ETHOS definition there are four categories of living situation:

- roofless, e.g. living in public spaces / night shelters,
- houseless, e.g. living in transitional supported accommodation / women's shelter accommodation / people due to be released from institutions,
- insecure [housing], e.g. living temporarily with family or friends / no legal (sub) tenancy / living under threat of eviction / living under threat of violence,
- inadequate [housing], e.g. non-conventional buildings / dwellings unfit for habitation / living in extreme overcrowding (Feantsa, 2017).

The 'National Housing Program', introduced at the end of 2016 by the Polish government, set positive goals for the development of the Polish housing market, addressing the housing needs of low-income households. According to the assumptions made for this program, 40% of Polish households (and 50% of those under 34 years old) cannot afford buying or renting a flat adequate for a multi-person family (National

Housing Program, 2016). This corresponds with another statistic, according to which circa. **40% of Poles fall into the so-called "rent gap"**. They do not meet income criteria for municipal housing and, at the same time, cannot afford renting or buying a flat on a private market.

It was stated in the 'National Housing Program' that mechanisms supporting people in meeting their housing needs should be introduced. However, the Program implementation is not as successful as planned and it cannot be observed that the number of affordable housing units is raising rapidly.

As for the labor market situation, in Warsaw the registered unemployment rate remains very low, standing at 1.3% in February 2020 (National Statistics Office, 2020). However, since the employment of numerous groups (e.g. unqualified employees, immigrants, young people entering labor market) is not very stable and salaries are low, the barriers to renting accommodation in Warsaw are still in place. In numerous cases, landlords are reluctant to rent flats to certain groups of tenants, e.g. individuals/ families with low-income, single mothers and immigrants. In general, the lack of affordable rental accommodation in cities offering employment opportunities is considered the main barrier for interregional migration, an obstacle to labor mobility and a deciding factor in family planning process.

Having all that in mind and being aware of the difficult housing situation in Poland, Habitat for Humanity Poland ("**Habitat Poland**") was looking for opportunities of implementing new solutions that would be housing-led. The main goal was to **test a solution within a pilot project frame, and in case of positive results, advocate for scaling up and implementing the solution as one of national mechanisms**.

The solution sought-after should give the possibility to (i) create more affordable housing units – focus on rental more than on private ownership, (ii) respond to the needs of both, people suffering from homelessness and housing exclusion and/or at the risk thereof, (iii) use the existing housing stock to provide a faster and more cost-effective solution. It should be underlined that with such assumptions, the solution itself would not respond to all of the housing problems in Poland (there would still be a pressing necessity to build thousands of new affordable housing units and implement a comprehensive system of housing support addressing many different problems). However, it should become one of the components of the system.

After considering different options Habitat Poland took their interest in testing the model of a social rental agency.

2. Social rental agency model as a solution to a problematic housing situation in Poland

The social rental agency (**"SRA"**) combines rental housing support, employment services and social work within a single institutional framework. It addresses the issue of **housing shortages/poverty and unequal work opportunities, based on the evidence that these issues should be addressed in an integrated approach**. It provides access to affordable housing for people in housing need, e.g. those who are excluded from the private market, cannot afford the mortgage, do not qualify for social housing or are on a long waiting lists for municipal housing and/or their housing needs are not met.

SRA acts as a not-for-profit intermediary that negotiates between property owners and households in need of housing. In other words, it is a middle man.

In the general model, SRA provides the tenants with (i) affordable and safe rent, (ii) good quality accommodation, (iii) ongoing support, (iv) debt mechanisms, (v) no fees. In return it asks the tenants to (i) pay the rent on time, (ii) take good care of the property and (iii) communicate openly.

Landlords, generally, are guaranteed (i) payment of rent, (ii) tenancy management, (iii) legal documentation preparation, (iv) handyman service and (v) no fees. Instead, they are asked for (i) lowering the rent by circa. 20%, (ii) offering good quality property (or arranging for a renovation), (iii) being open to all candidate-tenants.

Figure 1. SRA model

Source: materials of Habitat Poland.

The model of a social rental agency seems beneficial for all parties involved. Firstly, the tenants may satisfy their housing needs even though their income is not significant (a general guideline is that the rent and additional payments for the flats they are offered should not exceed 40% of their total income). Secondly, private owners – especially those who do not want to invest their time searching for the tenants, managing the flat or taking the risks associated with leasing their apartments, benefit. As a result – the whole society benefits – there are more flats on the rental market (assuming that there are people possessing flats but not interested in managing rental, thereof who decide to rent the flats to SRA). With a significant scale SRAs could influence local rental market. Additionally, if individuals have their housing needs satisfied, they can focus on and improve other areas of life – look for a better job, get involved in community life and consequently, contribute to the society.

SRAs operate on a not-for-profit basis. To cover the costs of its operations, stable public funding is necessary (as for example in Belgium or France). Otherwise, SRA needs to obtain private financing (e.g. through donations) and/or charge some moderate fees from the clients to cover at least the operational costs (e.g. employees' salaries) and establish guarantee fund for situations when tenants do not pay their rent.

3. Initiating SRA in Poland

While SRA model has a long history and is well embedded in homelessness policy in countries such as Belgium or Great Britain, in Poland the introduction of such a housing-led solution is still regarded as a true novelty and considered to be at the pioneering stage.

Habitat Poland became acquainted with the social rental agency model at the Housing Forum in Geneva in 2013. As a result, a decision was made to review it and verify the possibility of implementation in Poland.

A research project to examine the feasibility, fine-tune and pilot the model was carried out between May 2015 and January 2017 in partnership with the University of Warsaw and the University of Silesia. It was funded through a grant provided by the Polish National Center for Research and Development (as part of the "Social Innovations" program).

Research found that the a social rental agency model is feasible within the Polish legal environment via the Tenants' Rights Act and that a local municipality can coordinate the SRA via its departmental structure. In addition, the economic feasibility of the model was assessed, determining the target tenant groups and the level of the required income. Following target beneficiaries were identified:

- people threatened with homelessness,
- people threatened with exclusion (single parents, migrants, refugees),
- people living in substandard conditions,
- low and medium income earners.

According to the research, in Poland SRA could be run by non-governmental organizations, municipalities or a consortium of the above. It was recommended to use the combined model in order to benefit from municipal resources (including stable financing) and non-governmental organization's flexibility and openness to innovation (Muzioł-Węcławowicz, 2017).

HomeLab project in Warsaw

Turning theory into practice, and starting the actual social rental agency in Poland, became possible thanks to the HomeLab project („*HomeLab – Integrated Housing and Labor Services in the Social Rental Enterprise Model*"), funded under the EU Program for Employment and Social Innovation (EaSI).

The project run between 2016 and 2019, and included 5 pilot projects implemented by a consortium of NGOs in four Central European countries: Poland, Slovakia, the Czech Republic and Hungary. Polish pilot was run in Warsaw. The lead applicant and leader was Metropolitan Research Institute (MRI), based in Budapest in Hungary.

MRI was responsible for overseeing and coordinating the pilot operations and also for carrying out the evaluation. In the latter the work was shared with Budapest Institute (BI), which provided both analytical and methodological support in the process, focusing more on the employment aspects, whereas MRI concentrated on housing. The two of them made up together the Central Monitoring Team of the project.

Focusing on vulnerable and marginalized groups and those at the risk of losing their homes, the project aimed at **establishing and institutionalizing the social rental agency model**, with the goal of creating an adaptable and scalable solution that can break the vicious circle of poverty and the constant danger of eviction for the selected target group households. The project's starting point was the need to provide affordable housing for those who cannot enter the housing market, have no or restricted access to municipal housing and due to their precarious financial situation are unable to maintain their homes even if they have one (Szemzo et al., 2019).

Clients of the SRA in Warsaw

The HomeLab project supported 41 households (30 of which received effective housing service – clients who stayed in SRA's flats), who were in danger of poverty

and social exclusion, characterized by three features: poor housing conditions, i.e., living in institutions (refugee centers, shelters, etc.) or in overcrowded, substandard houses, bad employment situation, i.e., unemployed (getting income from benefits) or working in bad conditions, e.g. black market, unsafe civil contract, very low income, migration – external migrant (e.g. refugees) or internal migrants (those not born in the town in which they reside).

Clients of SRA in Warsaw included, for example:

- a family of four from Chechnya who used to live in a molded 14 sq.m. room paying 400 EUR. They (sub) rented a two room flat for 380 EUR from SRA. Additionally, with the support on labor market, they changed jobs and their family income grew up to 1,800 EUR / month;
- a single mother who was a victim of domestic violence. After (sub) renting a flat from SRA, she was able to leave a shelter for single mothers and improve her life. At this point she is involved in supporting other vulnerable mothers;
- a family of six from Uzbekistan was able to improve their living conditions and find schools for their children. They were waiting for a municipal flat, where they finally moved early 2020.

Employees of the SRA in Warsaw

In order to operate and sustain the SRA, Habitat Poland has created a team of **specialists in social rental management – combining rental administration and social work** (in a form of employment counseling and orientation to other assistance services), whose work is coordinated by a project manager and supported by a finance specialist. Social rental specialists assist clients in engaging in the job market and maintaining secure tenure. They also ensure that clients are taking full advantage of social services available to them from the government, e.g. housing allowances and public employment agencies. They do it either directly, if they possess required skills or refer their clients to respective partner organizations (with whom Habitat Poland has signed partnership agreements) or other third parties. Each of the three social rental specialist handles 13–15 clients over 2 years.

Dwellings operated by SRA in Warsaw and rental model applied

The agency procured **14 flats from the municipality of Warsaw** (12 of which were renovated by Habitat Poland) and **16 flats from the private market**. Procuring flats from the private market required verification of different strategies – it was observed that the best strategy was to combine social and economic arguments.

Within economic arguments it was underlined that SRA guarantees rent payment, manages the property and can arrange flat renovation, whereas the latter was referring to the social sensitivity of landlords, emphasizing the importance of helping the vulnerable.

As 12 municipal dwellings were renovated for the project, the same possibility was offered to the private landlords. The renovations were conducted by Habitat Poland at the expense of the owner (a small loan with no interest was offered). Costs of adaptation of the flats amounted, at average, to: 4,000 EUR for the renovation and 780 EUR for the equipment.

Habitat Poland applied **the subletting model of the social rental agency** for municipally owned housing (entirely) and for most of the rentals from the private market.

In this model Habitat Poland rents the apartment from landlords (either private or public) and sublets it to the clients. This model provides guaranteed rent towards landlords – Habitat Poland is a party to the agreement with a landlord and is obliged to pay the monthly rent and utility costs (even in case of potential voids or when the tenant does not pay the rent duly). Habitat Poland collects the rent and other payments from the tenants. Therefore Habitat Poland bears the risk of non-payment, taking it over from the landlord.

To **mitigate the risk of financial loss**, Habitat Poland implemented a system of debt prevention based on regular monitoring of tenants' payments as well as checking the condition of the dwellings to avoid damages. If any tenant falls into arrears with payments, Habitat Poland takes an immediate action and discusses the situation with the tenant asking for reasons and agreeing a repayment schedule with the tenant. Until the full payment by the tenant is regulated, Habitat Poland covers the costs towards the owner from a guarantee fund (which Habitat Poland was successful to establish from fundraising). However, this guarantee fund will not be sufficient to manage a broader portfolio or in case of a crisis (especially economic crisis that would impact the majority or even all of SRA's clients).

As far as housing distribution is concerned, **flats were offered based on tenants' housing needs and financial possibilities**. SRA's flats were sublet on a short-term basis (contracts for up to two years with a possibility to extend after the project was over), so such a solution did not provide enough housing security. Therefore, lots of the clients (with a help from social rental managers) were applying for social housing. Throughout the HomeLab project four households have been granted social housing and so it was possible to rotate some properties and sublet them to the clients who were on a waiting list. There are still 2 households in need of privately rented flats awaiting social rental managers' action.

While the impact of this project was limited to 41 households (30 of which received effective housing service – clients who stayed in SRA's flats), once proven successful and once the structure is in place, it presents a high potential to scale. Sustainability and scalability were prerequisites in order to receive the initial EU funding.

4. Way forward – should the model be upscaled?

Habitat Poland's assessment of the project implementing SRA in Warsaw was positive – after the project came to its end (30 September 2019), Habitat Poland decided to turn SRA into its constant program. After a few months, the official results of the HomeLab project were presented confirming that the model proved successful in Poland. However, a decision to continue SRA in Warsaw brought new challenges.

Results of the pilot project

The HomeLab project was thoroughly monitored and evaluated because of its experimental character. To carry out the in-depth analysis a sophisticated methodology was developed, incorporating the system of process monitoring – where implementers registered the services provided and the main results of their interventions – and three rounds of quantitative and two qualitative surveys. The main goals of the research were to (i) compare changes in living conditions / opportunities between the Treatment and the Control Group during the project and (ii) establish if there was a causal link between integrated services and outcome differences under the HomeLab project.

"[Metropolitan Research Institute] *gathered survey data and developed composite housing and employment indices to measure client and control household position at the start and final phase of the project. Housing indices measured change in three dimensions (quality, affordability, security); and employment indices followed two main factors (employment status and income level)."* (Szemzo et al., 2019).

According to the results of the HomeLab project, **the social rental agency model proved successful** in Poland. A table below presents the summary of the outcomes provided by the Metropolitan Research Institute.

As clearly visible, the outcomes in the **Treatment Group showed greater improvement** in comparison with the outcomes in the Control Group:

- in 80% of the final indices the Control Group achieved worse results than the Treatment Group (the only exception was Employment Status);
- **in all of the indices the Treatment Group achieved higher increases**;

- Housing Security index increased more in the Treatment Group between the Baseline and the Final Survey. For the Control Group it also increased, however on a smaller scale. It indicates that within the Treatment Group more households secured legal title to their premises during the project;
- Housing Affordability index increased for the Treatment Group, while it decreased for the Control Group between the Baseline and the Final Survey – housing affordability improved for the Treatment Group, while it declined for the Control Group;
- Housing Quality index was higher for the Treatment Group in the Baseline Survey and the difference increased in the Final Survey. Therefore, it was the Treatment Group, whose housing quality improved more;
- Employment Status index improved more for the Treatment Group. However, due to the initial worse position of this group, the increase was not sufficient enough to compensate for the worse position at the beginning of the project;
- Income decile index increased more in case of the Treatment Group adding to initially better position than the Control Group had.

Table 1. Treatment group vs Control group: average of housing and employment related indices at the time of baseline and final surveys (Polish pilot)

Indices	Housing Security	Housing Affordability	Housing Quality	Employment Status	Income deciles
Treatment Group					
Baseline	1.89	2.00	1.97	2.58	2.39
Final	2.71	2.45	2.71	3.03	3.26
Differences between Final and Baseline	0.82	0.45	0.74	0.45	0.87
Control Group – weighted					
Baseline	2.35	2.08	1.92	2.93	2.14
Final	2.49	1.87	2.55	3.08	2.75
Differences between Final and Baseline	0.14	–0.21	0.63	0.15	0.61

Source: Szemzo et al. (2019).

Summing up, the model proved beneficial for its participants (the Treatment Group). They were able to improve their housing stability, housing affordability and quality as well as their employment situation.

Given the above, after the end of the HomeLab project, **Habitat Poland decided to continue SRA's operations**. The clients (beneficiaries) of SRA decided to continue their involvement in the project that was turned into a permanent program. Also the landlords (both public and private) decided to prolong lease agreements (that were initially concluded for the time of the HomeLab project). It indicates that all of the actors involved in the pilot project found it to be beneficial, useful and worth continuing.

Sustainability of SRA

Sustainability and scalability were prerequisites in order to join the HomeLab project and receive the initial EU funding. Based on the experience with SRA to date, in Habitat Poland's opinion, this solution has a great potential as it was also proven by the success of SRAs in Belgium, UK and France. The HomeLab pilot's results evidently showed that SRAs could be implemented in the CEE region, especially with appropriate governmental involvement.

At this point, SRA in Warsaw is facing several challenges. **It is crucial to obtain sustainability of the agency and secure financing of the operations.** To achieve that, a sound and realistic business and operational plan needs to be established.

One of the first goals would be for SRA **to balance the group of its beneficiaries**. In order to provide sustainability, this group should be diversified in terms of needs and incomes. The results of the research project (run between 2015 and 2017) indicated that the group of beneficiaries should combine people with high needs and low income (20%) with those having medium or low needs and medium or high income (80%) (Muzioł-Węcławowicz, 2017).

Theoretical assumptions were confirmed during the realization of the pilot. It became apparent that renting to people with relatively high needs and low income left SRA exposed to significant risk of making a loss which could have quickly made the venture no longer financially viable. Diversification of the client group could help to generate some additional income from lower risk rents to mitigate any potential losses when renting to higher risk groups. At this point, SRA takes efforts to reach to people in slightly better (financial) situation.

Secondly, **the scale of operations should be increased**, new flats procured and lease agreements should be concluded for longer periods of time. Having more flats in the SRA's portfolio could lead to offering a range of tenures and rent levels, thus serving more people in need. This combined with long-term contracts would provide the tenants with stable, sustainable accommodation in which they could improve their lives. As a result, a well-developed SRA has a big potential to contribute towards reducing social and housing exclusion.

In order to be able to serve a diversified group of clients, flats should still be procured from both the private market and the municipality. There are several incentives that should be underlined to prospective landlords, such as: (i) guaranteed rent, (ii) providing tenancy paperwork (tenancy agreement, management agreement, etc.), (iii) regular management visits and management of tenancy issues, (iv) maintenance services and (v) possibility of refurbishment (a small loan with no interest for the private landlords).

Last but not least, **securing financing of the Social Rental Agency** beyond the EU funding is of a crucial importance. At this point Habitat Poland is financing SRA's operation mostly from private donations. However, in order to scale-up this solution it seems essential to secure public financing. Such a support could be realized in several ways or forms:

- subsidies covering operational costs (especially employees, administration and a guarantee fund);
- housing supplement that could be effectively used on the private market. In this case, supposing the beneficiary could cover standard or only slightly lowered rent thanks to the supplement and SRA could negotiate with the landlord to lower the rent significantly, the difference could be used to cover SRA's costs and/or to establish a guarantee fund. Beneficiaries and landlords would still be interested in SRA's services, such as tenancy management or social and employment services;
- subsidy for a guarantee fund. As SRA guarantees rent to the landlords, it is highly exposed to a financial loss when tenants are unable to cover their rent / other payments. To mitigate such a risk SRA should possess a guarantee fund that could be used to cover those losses. If such a fund was publicly subsidized, it would allow SRAs to operate with more financial security. The practice shows that it is uncommon for SRA's tenants to run into significant debts, but they are regularly in arrears for a few weeks.

In order to scale up the model, there are also **certain competencies and services that should be included within SRA's operations** (some of the specialists could be external service providers), such as:

- real estate agent: in order to grow and generate revenue, SRA needs a new pool of privately rented flats. Therefore, the need for an expert in negotiating and finding best deals on the highly competitive market;
- handy man: a person who will be supporting SRA with urgent and other repairs that could not be arranged differently. It would be an added value especially from the landlord's perspective in the process of flat management;
- monitoring and evaluation system: regular reports of SRA's performance to present its value to the decision-makers, municipal partners, beneficiaries and NGOs;
- appropriate communications / marketing: regular and consistent advertising for recognition growth, which as a result would ensure service's growth;
- IT system: to monitor and record basic property and tenancy details;
- team supervisor (psychologist): such a specialist would be of great value for SRA team when dealing with complex cases. It could improve client care by allowing the employees to gain more insight and understanding as well as developing

adequate strategies. As a result the employees could become more professional in their methods and attitudes;

▪ legal services provided on regular (rather than ad hoc) basis to review documents, procedures, agreements, process maps to ensure more professional client service (including tenants and landlords).

Advocacy

Habitat Poland undertakes intense activities in order to promote the model of social rental agencies and to **advocate for the implementation of specific legal regulations that would facilitate establishing and financing of SRAs in Poland**.

Firstly, an informal campaign increasing awareness of the housing situation and positive effects of the social rental agencies are being run. This includes providing decision makers with information on the housing situation and the idea of social rental agency as well as informing society about housing issues.

Secondly, there are certain legal regulations and incentives which would facilitate operations of SRAs that Habitat Poland is presenting. Those include:

▪ a necessity to introduce regulation of social rental agencies on national level legislation in order to encourage local governments to use this mechanism,

▪ presenting local governments (municipalities) with information on SRAs with the aim of establishing social rental agencies by those municipalities (preferably in cooperation with NGOs),

▪ amendment of regulation on housing allowances / providing housing supplement (in particular for people renting flats on the private market),

▪ providing long-term financing for social rental agencies (subsidies, guarantee fund),

▪ providing tax incentives for landlords, for example tax-free income when renting a flat for a social rental agency.

According to Habitat Poland, if the above recommendations (or some of those) are implemented, social rental agencies would be an interesting tool responding to housing deficits in many municipalities. As this mechanism could be used to support different groups of people, it may be very effective strategy for many local governments.

Conclusions

Answering to the question posed in this article whether the model of a social rental agency should be implemented on a national scale in Poland, Habitat Poland would firmly say "yes". To those who have seen the effects of the project, who have met the

families, who have witnessed how people's lives could turn around thanks to a stable housing situation, the answer is obvious.

Habitat Poland answered this question when making the decision to maintain SRA in Warsaw even after the funding for the HomeLab project finished.

Setting aside emotions, also **the outcomes of the pilot project proved the model to be successful.** The results of thorough analysis evidently showed that the Treatment Group in the project achieved better results and was able to improve their housing and employment situation to a bigger extent than the Control Group. One of the main factors contributing to such positive outcomes is that **SRAs have potential to facilitate the integration of housing and support services, where housing, labor and social aspects are considered together**.

Taking the above conclusions further, **the potential for social change presented by SRA model seems vast**. It presents new opportunities for filling in the gap in providing alternative sources of housing for people whose housing needs cannot be met by other means, therefore offering new and flexible solutions to tackle a dire housing situation in Poland. With appropriate involvement of public authorities and stable financing, SRA model could become one of the most sought-after housing-led solutions for reducing homelessness and housing exclusion in Poland and other CEE countries.

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Photos of beneficiaries

Photos of flats before and after renovation performed by Habitat for Humanity Poland

IV.3

Financial Forecast 2017–2057 for the French Social Housing Sector, Hopes and Uncertainties

Jean-Pierre Schaefer[1]

Introduction

This paper describes briefly the French social housing sector and discusseshow the financial forecast 2017–2057 will most likely affect it. The French social rental sector consists of 5 million homes managed by public and private non profit organizations. For more than a century, most of these properties have been financed through off-market funds provided by private savings gathered in a special fund "Fond d'Epargne" managed by a public financial institution Caisse des Dépôts (CDC). A regular survey regarding the financial soundness of the social rental housing organizations is published by the Economic Department of CDC (Fonds d'Epargne). The loans enjoy a duration of 40 years or more and reach an average total of 14B EUR per year. According to widely acknowledged macroeconomic variables, the survey simulates the financial balance of 565 social housing organizations for the next 40 years. As usual in such bold exercises, the main purpose is to test the variation of the long-term trends according to some strategic variables. The present time of low interest enables to accelerate the redemption of the capital, which might guarantee that the social sector could deal with its growing debt (146 bln EUR in 2018) while delivering good services to its tenants and keeping a steady level of investment suited to the need of low-income households.

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Social rental housing is owned and managed through a network of various organizations, Public Office (OPH), Social housing companies (ESH), Cooperatives and Local semi-public companies (SEM-EPL). This sector includes more than 5 million dwellings DHUP, 2019).

Social housing has a share of 18% of the total housing stock in France (29.8M dwellings). The total housing stock includes 58% of owner-occupied and 24% private rental and miscellaneous.

Most of the social housing stock is owned by 253 OPH and 220 ESH. It consists of 84% flats and 16% houses, with an average area of 69 m^2. 39% of the buildings are in energetic class A, B or C and 61% are class D or less. Average monthly rent is 400 EUR (580 EUR average private rental) or 5.69 EUR per sq.m. These averages include four different categories of social homes with rents ranging from 4.94 EUR per sq.m. to 8.28 EUR per sq.m.

The social housing stock increases yearly through new construction or buying and refurbishment of existing buildings, 74,000 new units in 2017. It decreases with demolitions (10,000) and sales to sitting tenants (9,000). Some dwellings encounter commercial vacancy, in areas with a lot of affordable homes, or technical vacancy for low quality buildings. Average vacancy rate is 3% (8% average rate for the entire housing stock in France). The demand for social rental housing is strong in large cities and in areas with a steady economic growth (Hoorens, 2019).

Turnover rate is 9.2%, higher than owner-occupied (3%) and lower than private tenants (>20%). This rate is lower in areas of high demand and higher on balanced markets.

1. Retrospective financial analysis of social housing stock 2012–2017

Social housing organizations (SHO) are not for profit bodies and were created with a very low level of equity. They are exempted from the company tax and from tax on benefit. The turnover (24 bln EUR) mainly consists of rents from their housing stock. Some extra income is provided from renting garages, parking lots, commercial premises and from supplementary activities like land development or housing development for sale.

Loan instalments absorb 40% of the receipts and management fees amount to 25%. Maintenance costs constitute 3.6 bln EUR, 15% of the receipts. There is a constant debate if this amount is enough for keeping a good quality of service for the tenants.

Land tax costs 10% of the receipts as social housing enjoys land tax exemptions only during the first 25 years after completion.

Self-financing funds from operating rental property accounts up to 9% (of the turnover 2017), increasing from 7.5% in 2012. It is completed by extraordinary revenues. These non-recurring revenues are provided by the sales to sitting tenants.

The financial balance of this rental activity (receipts 24 bln EUR) is very sensitive to:

- Change of rents which should vary according to a rental index linked with inflation;
- Change of rate of interest of the loans, which varies as well according to the inflation rate.

Loans to SHO are mostly (80%) provided by a financial institution (CDC) which manages private demand savings ("Livret A") up to 240B EUR. These funds are partly invested on the financial market and partly lent to SHO long term (40 years) at off-market rate. These savings enjoy a rate of interest which should be between inflation rate and market rate (EONIA). The interest of the loans granted to OHS will vary according to the same rules.

Debt repayments have been decreasing for the last five years with the general trend of low rate of interest. The strategy of the SHO and CDC has been to decrease the share of interests meanwhile accelerating the reimbursement of capital. This should be profitable in the long term for the SHO.

The mechanism could be considered as consistent if the inflation rate decreases, the rent increase is slow, and the interest of the debt as well. The international financial situation is now paradoxical with the market rate being below inflation.

With a self-financing above 2.1 bln EUR for the last ten years, SHO have been providing enough equities for building 100 000 dwellings a year, one fourth of the total housing construction in France (Hoorens, 2019).

Each social dwelling (average cost of 145,000 EUR in 2018) is financed up to 80% with loans (40 years, variable rate), 8% with public subsidies (Central government, local authorities, Action Logement) and 12% with equities.

Global balance sheet of SHO in 2017 reached 96 bln EUR of equity capital and 169 bln EUR of long-term debt.

2. Financial forecast 2017–2057

SHO receive loans with duration of 40 years (or more). For each building a financial simulation of operating cost during 40 years is calculated. This approach might be adapted for the entire social housing sector. CDC, as the main baker of social sector since 1896 provides such forecast, according to hypothesis which is discussed with the Ministry of Housing, the SHO and other partners.

Apart from the macroeconomic constraints, social sector must comply with the rules enacted by the Ministry of Finance.

The Government has required the SHO to lower down the rent of some category of (very) low income tenants, in order to reduce the expenses of personal aids. Demand-side allowances have a budget cost of 18 bln EUR, one of the highest budgetary expenses for the Ministry of Housing. 8 bln EUR are paid to social housing tenants and cover one fourth of their housing expenses. The balance (10 bln EUR) is paid to tenants housed in the private sector and to elderly homes. A reduction of 1.3 bln EUR of the housing allowances, without any cost for the tenants, obliges the SHO to lower their rent by a similar amount each year.

SHO used to pay a lower rate of VAT, 5.5%, for their construction. The rate has been increased up to 10% but except for products dedicated to very low-income tenants and for building in urban renewal neighbourhood. An increase of VAT will translate into higher costs of 850M EUR in 2019 and the following years with a steady pace of new production.

The new governmental rules are partly counterbalanced by various financial measures granted by CDC to its customers: Equity capital grants (lack of interest for 20 years), extension of duration for some loans, debt restructuring, interest rebates for buildings to be demolished, fixed interest loans and zero interest loans for thermal insulation. Similar financial aids are developed by Action Logement, a specialized institution for housing, financed by private employees.

Parameters:

- The demand saving ("Livret A") rate of interest is estimated at an average of 1.7%, inflation rate 1.5% and EONIA 1.9% until 2028. The rate of interest of the loans to SHO is calculated according to the rate of "Livret A" (plus 0.6%).
- The rate of interest of "Livret A" is equal to max [(1/2 inflation+1/1 EONIA); 0.5%]. Its present value is 0.75%, and should probably be cut to 0.5% in 2020. The macro-economic hypothesis is a slow growth of this rate up to 1.7% with EONIA 1.9% within 20 years.
- Rent should increase according to the rent index by 1.5% a year.
- From 2020 to 2022 SHO should keep a stable rhythm of production of 100,000 dwellings per year and renovate 125,000. This level of production should decrease after 2026 by an average of 63,000 units per year.
- Sales to sitting tenants should be increased from 9,000 up to 12,000 per year and an additional share of 5,000 units may be sold through special bodies. Demolitions should decrease from 11,000 units per year to 9,000 per year.

Assuming the fact that the global rhythm of construction in France could stay similar to the present one, social housing stock should represent 20% of the total housing stock in 2038 reaching a figure of 7 million of dwellings.

The detailed financial forecast provides the following results (Gilquin, 2019):

- Lowering the rents will reduce self-financing which should remain at 8% (of the total turnover) from 2020 to 2027, thanks to low rate of interest and the abovementioned countermeasures.

- It will then decrease to 2% (of the receipts), 1 bln EUR, until 2040 due to the hypothesis of increase of the rate of interest. After 2040, the debt should decrease and self-financing could reach 6% and more than 2 bln EUR).

- The low level of equities could be partly counterbalanced by exceptional income from sales to sitting tenants. But the two mechanisms are linked as selling assets decreases the volume of rent especially from high quality buildings.

- The cost of the debt (12 bln EUR) is 40% (of the receipts) from 2020 to 2027. It will increase up to 45% (25 bln EUR) from 2028 to 2039. The debt should decrease after 2040.

The financial income per dwelling enables to calculate the financial efficiency of the sector notwithstanding its growth. The financial income per dwelling will be growing from 2017 (1,500 EUR) to 2035 (2,500 EUR) and will strongly decrease until 2045 (<1,000 EUR), increasing only after 2050.

Conclusions

The main question is to know if the social housing sector will be able to supply the needs of the low-income groups with a new production of good quality while renovating its existing stock. The forecast is done using a «voluntarist» hypothesis of production of 100,000 dwellings per year.

A 40 years forecast is a daring exercise. It is necessary and quite common for infrastructure construction and management. Perhaps one could consider that the main banker of the social sector is rather optimist for its customers, considered as a whole. CDC concludes that SHO should manage both a growing outstanding debt and a growing housing stock.

- The global forecast doesn't provide information about the future of some organizations, especially the more fragile ones.

- The growth of the social housing stock might be unequal between the various local markets, and might be difficult in the most expensive markets.

- The forecast is sensitive to the hypothesis made for different parameters. A growth of the inflation should be linked with a growth of the rent. And hopefully with income of the tenants. It should increase the equities. An increase of short-term market rate (EONIA) will increase the instalments and deteriorate the financial balance. The gap between inflation rate and EONIA will be a decisive variable.

- A rate of interest of "Livret A" at 0.5% should be a strong improvement of the financial burden of the SHO. Rent freezing will conversely affect their capacity of production and renovation. Whatsoever the future of the economy in France and the Union, there will be a significant share of households with low income in need of cheap housing. At any time, as it happened in the past, the Government might decide a rent freeze for the social tenants.

Some variables could be more deeply scrutinized. Is it possible to decrease the cost of management of social housing, without harming the social support for the tenants? Could economy of scale reduce the cost of maintenance for the SHO? Since 2017 French SHO have been invited to merge for reaching a minimal size of 12,000 dwellings or becoming members of organizations reaching this scale. The Ministry of Housing estimates that organizations above 12,000 dwellings have management costs slightly above smaller organizations. The statistics might be distorted as SHO situated in the capital region are larger and have higher costs of management. Van den Broeck and Winters (2019), studying SHO in Flanders conclude that "*the effect of scale enlargement is not unambiguous*". Altogether, it is not sure that a significant decrease of the cost of social housing management could be expected.

For years, the Ministry of Finance has been expecting that more sales to sitting tenants should bring to the SHO enough equity to keep a high level of production. Such an approach has limits as mentioned in the CDC survey. The sales reduce future rents, especially on amortized dwellings which are the more profitable ones. CDC forecasts take into account level of sale which might be reasonable according to the local markets.

Optimistic or realistic, this exercise of long-term simulation is done for opening the path to more analysis and dialogue on housing policies between the social partners.

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IV.4

Housing Wealth in Hungary: From Subsidized Stability to Inherited Tensions?

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Introduction

In 2018, a team of researchers from six Member States of the European Union finished a project titled "Promoting the contribution of private savings to pension adequacy: Integrating residential property with private pensions in the EU". The result looked quite respectable: several hundred pages of comparative analysis, a vast amount of data amassed, taken from the usual suspects, e.g. statistical authorities, national banks and the OECD, as well as some painfully collected from databases or among countless interviews with focus groups and experts. Each member of the consortium had committed themselves to a three-year period of complicated close cooperation, and after publishing the results (see, synoptic, Eckardt et al., 2018; Al-Umaray et al., 2017a; 2017b), every member was justifiably proud of the outcome. However, at the end of the day, regarding the implications of the newfound insights, they had even more questions than at the start of the project. Certainly, this is not unusual and may only underline that the team was upon a longer stretch of thorough research, but this did not calm anyone. Quite the opposite, having cleared a couple of details, some problems seemed to loom even more seriously. This paper attempts to shed light on one of these problems, with a focus on one of the participating countries.

More exactly, the following sections present considerations regarding the long-term development of the housing market in Hungary. The topic is of great importance

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for the majority of Hungary's inhabitants. At present, as it has been for several decades, nothing else causes them as much economic concern. There is no kind of economic investment, no form of savings, and regarding the simple scale, there is not any kind of economic decision that could be compared to the importance of housing property. Hungary, a post-communist economy with low average wages and modest material expectations in general, is a "homeowner society". This much we can say: This characteristic will not change quickly. Recent policy shows a whole arsenal of tools to stabilize the current state. Regarding the last decades and embedding the recent Hungarian situation in the European context, one may get the impression of an idyllic stability: high ownership-rates, low household indebtedness, family allowance-programs. This brings us here at the core of the unrest that sparked off at the end of the project: What does that all mean in the long term?

Stating anything regarding long-term developments of highly complex phenomena, e.g. the housing market, rarely proves reliable. We do not claim to have a crystal ball either and will intentionally try to avoid concrete projections in the far future. However, the Hungarian housing market has some immutable characteristics which in turn imply consequences. And in Hungary's society there are inevitable developments that will cause a deep change of market structures. We will focus on three which with certainty are progressing: First, *demography* will unavoidably change; second, *regional disparities* within the country will continue to grow; and third, partly because of the first two, *inequality* will grow unceasingly as well. Of course, we cannot precisely predict the exact evolution of these factors, let alone their interconnection. But we can demonstrate quite clearly that quite large problems lie ahead. This paper does not claim to provide systematic answers to these complex problems, but it tries to outline them systematically. Surprisingly, no comprehensive analysis has yet been published, rather a couple of dispersed open questions (and of course, a wide range of specific analyses).

Some key findings of the international research project mentioned above provide starting points for the considerations. The European Commission financed the project concerning the question of how residential property can be used to ensure liquidity in old age by means of "equity release schemes". Considering these findings, the next section focuses on the recent situation of the Hungarian residential property market, covering economic and social factors as well as housing policies, especially subsidies and taxation. A short survey of the prospective shift in the ownership structure due to the demographic change and expectable social tensions is presented in the next step.

IV.4. Housing Wealth in Hungary: From Subsidized Stability to Inherited Tensions?

301

1. The basic problem: Old age and liquidity

1.1. Background

The background of the following considerations is provided by a research project financed by the European Commission and conducted between 2015 and 2017 covering six Member States: Germany, Ireland, Italy, the Netherlands, the United Kingdom and Hungary[2]. Facing demographic changes in all European Member States and being aware of the weakening public pension systems in the long run, the project tried to find answers to the question of how residential property could be used to ensure liquidity in old age by means of equity release schemes. Obviously, this aim had to cover a vast range of much diverse, though intertwined aspects, and assembled researchers of different areas of interest.

Basically, the project could be roughly segmented into two areas of research. The first mainly covered economics and especially economic policy. Its aim was to investigate the fiscal incentives and other public policy options which affect people's decisions to invest in private pensions and home ownership. The second covered financial modeling, because in the end, the aim was to develop a financial product which would be appropriate for use in at least all six Member States.

Experts of each participating country were responsible for their own workstream. The overall coordination was led by the Institute for Financial Services in Hamburg, Germany. The task of the Hungarian team was to coordinate the analysis of all aspects regarding economic policy and to evaluate it comparatively. The outcomes of the whole project work have been documented in a final report which provides freely accessible material of more than two hundred pages, complemented by an annex of more than three hundred pages (Al-Umaray et al., 2017a; 2017b). Focusing on the public policy aspects, we additionally published a denser, analytically focused volume which assembled the comparative work conducted under the project in a roughly commented form (Eckardt et al., 2018).

Even regarding only the public policy aspect, the project had to cover a wide range of different aspects: pension systems and pension policy, mortgage markets and housing markets had to be analyzed comparatively. The importance of the basic problem – the link between an ageing population, private savings and/or private assets – was in fact actually nothing new, only slowly becoming more urgent. However, the

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[2]   "Promoting the contribution of private savings to pension adequacy: Integrating residential property with private pensions in the EU" (European Union's EaSi Grant Programme, agreement No. VS/2015/0218).

approach to find an overarching solution for a common problem in different European countries was new.

The solution is still very theoretical. At least for the experts consulted at financial providers or interest groups though, a vast amount of new empirical material and comparative insight has been worked out which shed light on a couple of specific problems in the Member States.

1.2. The "Hungaricum"

When collecting the factors important for the correlation between liquidity and old age provisioning, Hungary seemed particularly striking among the countries examined in the project. To put it in a nutshell: not only is its population quite old (see Eurostat, 2020a), not only are its resources for public pension services relatively fragile (see European Commission, 2018, p. 60), but the share of residential property is also strikingly high at 91.7% (Eurostat, 2020b; see also Dötsch et al., 2018, p. 179). At the same time, Hungary is reminiscent of Italy, and the social importance of residential property is enormous. This was underlined all too clearly by the surveys conducted in the project (more on this later). In the perspective of the relatively low mortgage burden on residential property – both in terms of the value of the property and the individual income situation – the snapshot of Hungary gave the impression of a broad and stable basis for property-based pension provision. But this is deceptive. On the one hand, the model of property-based pension schemes faces massive psychological hurdles. But beyond that, the Hungarian market for residential property as a whole appears to be slipping into a precarious situation in the long term. This differs from the situation in Germany where home ownership pension schemes have been a lucrative business to this day and are therefore sustainable in the medium term since the overall share and relative distribution of home ownership assets, the relative security of the pension system and the general level of wages together create a corresponding environment. The aim of this article is to outline this problem.

2. Homeownership in Hungary – a snapshot

2.1. A homeowner society: Driving forces and short term prospects

Among the countries participating in the research project, Hungary revealed a couple of striking characteristics. With 91.7% in 2019 (Eurostat, 2020b), Hungary shows one of the highest rates of ownership occupation among the Member States.

IV.4. Housing Wealth in Hungary: From Subsidized Stability to Inherited Tensions?

303

This comes as very striking in a European comparison; only in Croatia, Lithuania and Slovakia are similar ratios observed within the EU (Eurostat, 2020b, but here the ratios have only been worked through to 2018).

Indeed, home ownership plays a prominent role in the Hungarian economy and society: "In Hungary (…) buying is what you do when you want a house to live in" (Dolling and Elsinga, 2013, p. 38), Csizmady et al. (2017, p. 250) speak of the "Hungarian housing system as a 'super-homeownership' model". The importance that most Hungarians attach to the ownership of property assets can hardly be overestimated. As Dolling and Elsinga (2013) formulate very clearly, residential property is considered the "ultimate precautionary fund" (p. 142). The focus group interviews carried out as part of the above-mentioned project confirmed this finding evidently. What seemed to border on irrationality for the project partners from other countries was no surprise for the Hungarian team: Attendants of the focus group workshops "…showed a determined and general distrust both in financial providers and in regulators / the state. Neither the regulatory framework nor the institutions are perceived to be trustworthy on the long run" (Al-Umaray et al., 2017b, p. 129).

The importance of this psychological factor is not only significant at the individual level, but should not be underestimated in terms of the policy affecting the residential property market. It is not far-fetched to assume that the current Hungarian government is first and foremost concerned about citizens' votes when it links its support programs for one of the most pressing social problems, namely population decline, with incentives for the construction, renovation or expansion of residential property (see Section 2.2). The choice of this instrument is not unwise in terms of the objective of gaining more votes, but it is problematic in view of the overall development mentioned in section 1. More on this later.

This special attitude of the Hungarians is quite understandable due to the historical experience of a large part of the population (see for example Katzenbach and Osvath, 2012, p. 289f). At the latest, the birth cohorts from the 1970 s onwards have a good memory of the drastic socio-economic upheaval of the last century (see, brief and comparative, Wind et al., 2017), so that owner-occupied property is perceived in the widest circles as the only tangible, secure asset. This is an impression that even younger generations have been able to gain in recent years, when the global financial crisis destroyed other forms of savings and brought the feeling of material insecurity to all parts of society again. Against the background of the Hungarian public finances which had been completely run down by the socialist governments under Megyessy and Gyurcsány, the second Orbán cabinet in 2010 did not shy away from cashing in on private pension insurance in a coup d'état to save the state budget (see OECD, 2016, p. 270; Freudenberg et al., 2016). This only made home ownership

appear more important as a form of investment. Trust in financial service providers – banks, insurance companies, funds – and their products, in other words basically all intangible forms of investment, is not the least present in the general population (Al-Umaray et al., 2017b, p. 129; also: Dolling and Elsinga, 2013, p. 64). And one has to admit to the Hungarians: historical experience does not exactly advise this.

The crisis caused by private debt in foreign currency loans – once again mainly for real estate – which ruined many Hungarian households due to the devaluation of the forint, had a possibly paradoxical effect for outsiders: the argument used by the second Orbán cabinet that the banks were mainly to blame for the misery further enhanced the value of the home in the perception of many. The facts are of course more complex (see e.g. Kovács, 2013; Pitz, 2012) and the packages of measures in the wake of the crisis cannot be discussed here. But it is still the primary strategy of most Hungarians to buy their own homes (Csizmady et al., 2017, p. 265). Either way, the policy has made use of the home ownership fetish and has further promoted its importance.

Irrespective of these historically important breaks in socio-economic development in Hungary, real estate ownership is an important factor in intergenerational wealth planning. Similar to Italy, real estate is the most important factor in intergenerational transfers in Hungary and is certainly understood as a family-wide relevant security or project (see, e.g. Toussaint et al., 2012, p. 78; Dolling and Elsinga, 2013, p. 93). Here, an investment behavior can be observed that is certainly motivated by the above-mentioned factors, but goes beyond this. The average Hungarian pensioner is literally prepared to die of hunger in order to bequeath his property completely to the next generation – nota bene: free of inheritance tax (NTCA, 2016). Here the profile of the current regulatory environment fits perfectly with the disposition of a crucial group of voters.

The multitude of historical, social and economic aspects cannot be dealt with in detail here, but their overall psychological impact is relevant, as the field research carried out in the context of the above-mentioned project has confirmed only too clearly. One thing is decisive at this point: There is nothing to indicate that Hungarians will change their attitude to the investment form of real estate assets. It is by far the most important form of investment.

In view of the prognostic content of this paper, three assertions can be made for the near future without speculation: 1) Those who can increase their assets in Hungary will most likely invest in "concrete gold" first. 2) Due to the existing asset and income situation in Hungary (more on this in section 3.3), only an extremely marginal stratum of relatively rich people will be able to accumulate wealth to the extent that it can be deliberately diversified into various forms of investment. In this context, this means: 3) the current wealth situation is and will remain family concentrated. It would border

on esotericism to make plausible factors that would turn Hungary's homeowner society into one in which property ownership would play a much smaller role for much broader circles in the foreseeable future.

Accordingly, the market for rental housing is weak and has developed only very inadequately since the change in systems (see Hegedűs and Horváth, 2017). In view of the special income situation in Hungary, the distribution of wealth, the differences and relative size of social classes and also the large regional disparities, the implications of this constellation are already not without social problems and have been discussed in detail by Hegedüs et al. (2018). Hungary's housing stock is by no means a unified whole; there are considerable differences in the size, condition and value of the properties, which in turn are revealing with regard to the country's social structure.. Again, reference should be made to Hegedüs et al. (2018), who described this very clearly in their study by depicting the distribution of residential property in terms of social stratification.

If, without going into the details, we start from the above-mentioned argument that those who have sufficient sources of income to invest in long-term assets are primarily active in the real estate market, then this will have a corresponding impact on the rental market. Section 3 of this article deals with the long-term explosiveness of this constellation. At this point, it should be noted that investments relevant to the real estate market, whether made for speculative reasons or for long-term motives, are not an answer to the growing social differences in the country, but merely serve the interests of the already relatively better-off social strata.

With regard to individual budget debt, Hungary offers a fairly stable picture by European standards. Outstanding residential loans per capita of those over 18 in Hungary average 1,687 EUR, less than one-tenth of the European average (Bertalot et al., 2019, p. 77). This means that the share of outstanding residential loans is very low compared to GDP, and that the share of housing loans is even below 10% (Bertalot et al., 2019, p. 77). This seems all the more remarkable given that outstanding loans are also quite low in relation to disposable household income, averaging 81.1% (Bertalot et al., 2019, p. 77). In addition, after the dramatic impact of the global financial crisis in 2008 on Hungary – especially with regard to households with foreign currency debt mentioned in the previous section – extensive macroprudential regulations were introduced to deal with credit risks at household level (see, e.g. Balog et al., 2015). As a *snapshot*, therefore, it is entirely justifiable to attest the stability of the residential property market in Hungary.

2.2. Incentives to invest in homeownership

Due to the psychological sensitivities briefly mentioned above, it is not surprising that Hungary's post-transition policy has always been to encourage investment in home ownership. In this respect, three formats are particularly noteworthy:

Based on Act CXIII of 1996 on Home Savings, the state aid for home savings ("lakástakarék") was one of the most important incentives until 2019. Savers had a choice of four providers, but the construction principle of this savings format was basically the same everywhere. To conclude a contract, a tax number had to be presented in Hungary (i.e., contracts could also be issued in the name of newborns, as tax number is issued at birth) and the declared intention to use savings exclusively for the purchase, extension or renovation of a home (Bankmonitor, 2020). "Whose dwelling is acquired or improved does not matter, only the evidence that the contractor invests the saved money in anyone's real estate is relevant. The state supports 30% of the monthly payments, capped at a maximum of 72,000 HUF/year. Furthermore, the interest is free from capital gains tax." (Dötsch et al., 2018, p. 200). These contracts can also be used for the repayment of real estate loans.

After 2000, interest rate subsidies and tax exemption for housing loans existed for half a decade (Hegedűs et al., 2014, p. 45). After 2009, the Hungarian government then extended the subsidization of housing loans again (Dötsch et al., 2018, p. 200).

Without going into the details at this point, it is a particular peculiarity that the Hungarian government has used housing (construction) policy as an instrument of family policy since the second Orbán cabinet. It has set up a family housing allowance program ("CSOK", with various variants), which is intended to provide incentives to start a family with the help of extensive transfer options such as interest-free or reduced loans or the transfer of lump sums for "nest-building" (see Banai et al., 2019 for the effects; Bertalot et al., 2019, p. 36). In this way, the government is making use, not unwisely, of the specific psychological potential of home ownership in Hungary: Only those who are willing to start a family will be supported, but generously. At the same time, of course, this program is also an indirect promotion of the construction industry. However, the housing situation as a whole is not the decisive factor in the decision to have children and it is, for good reasons, problematic to make predictions about demographic effects (see Kapitány, 2016). In any case, the sectoral developments of recent years seem to confirm the effect on construction activity, the residential housing market has been growing continuously since 2013, and between 2013 and 2018 the demand for housing loans – in a more strictly regulated environment – has risen accordingly (Fellner et al., 2018, p. 28).

IV.4. Housing Wealth in Hungary: From Subsidized Stability to Inherited Tensions?

307

One of the central political messages of the government in office since 2010 is to strengthen the middle class of Hungarian society. This is neither a reprehensible intention nor are the chosen instruments fundamentally wrong. Nevertheless, this goal must be assessed against the background of the given social conditions in the country. Hegedüs et al. (2018) have described this problem very clearly with regard to social stratification. This article focuses on the long-term implications for the housing market without being able to specifically examine the many social problems associated with it. Accordingly, the connection with the envisaged "middle class", and what this means in Hungary, is dealt with in a separate paragraph. However, one turns it around: even if the snapshot provides relative stability in relation to other European states, it is already possible to say that in the medium term we are dealing with massively subsidized stability, a structure that is quite elaborately cemented. Its durability is essentially based on the existence of three factors, namely appropriate demographic trends, a reasonable distribution of the share of wealth in the form of home ownership and a tolerable degree of socio-economic convergence among the country's regions. These factors are dealt with in the following section.

3. Inherited tensions

Looking at the distribution of home ownership, individual household debt and current Hungarian family policy, one gets the impression of relative stability compared to other countries. However, this is an illusion, as the given structure will inevitably become a considerable explosive for Hungarian politics, economy and society over the course of a few decades. Hungary is facing serious upheavals that cannot be absorbed by the usual instruments of housing, pension or economic policy. There are three main factors or developments that are decisive for this, which – just like the special role of home ownership in Hungary outlined above – can only be changed from today's point of view by events bordering on miracles. In the following, these three factors will be briefly discussed, namely 1) the growing social inequality with a special focus on property investment, 2) Hungary's demographic decline and finally 3) the growing regional disparities within the country. All three factors are already present, but they are growing more significant over time and are literally and inevitably "inherited". All three are interrelated and will be considered separately here for analytical reasons only. Minor redundancies are unavoidable and serve to make the presentation more comprehensible.

3.1. Inequality

At first glance, this may also give the impression of relative stability. Compared to other OECD countries as a whole, inequality in Hungary is not excessively pronounced (Balestra and Tonkin, 2018, p. 15). Shorrocks, Davies and Lluberas (2019) also attest to relative stability. The current complex problems of social inequality related to home ownership as a whole cannot be sufficiently discussed in this place. Hegedűs et al. (2018) provide a clear account of their causes. The aim here is to point out the dangers for further development arising from the given distribution of wealth in the country.

But first to the present. Estimates of the distribution of wealth are always burdened with uncertainties. However, if one takes into account the special nature of Hungary's "homeowner society", there are a number of striking features. One of Hungary's peculiarities is that a relatively large proportion of its assets are invested in equity (CSRI, 2019, pp. 148, 151). According to studies by Kolosy and Fábián (2016, p. 105), over 70% of estimated household assets in Hungary are real estate. About 90% of this portfolio consists of residential property. Other forms of investment are conspicuously insignificant. Financial assets totaling 8.6 billion forints are nearly twice as much as investments in other properties, but are relatively low compared to the 47.9 billion forints in residential property. These amounts appear explosive when they are related to social stratification. For example, it is striking that in Hungary a relatively thin stratum of very rich and wealthy people have very large assets, while the middle class is relatively poorly endowed. Kolosi and Fábián (2016, p. 103) even summarize 50% of the population under the label "penniless". Based on Kolosi and Fábián's (2016, p. 107) estimates of the distribution of wealth in Hungary, 78% of the assets of these "penniless" are "invested" in residential property; among the middle class, this figure is 75% and among the rich, 60%. With regard to the distribution of the investment forms, the first two groups do not differ significantly. Among the rich, a higher share of financial assets is not surprising, but only half of the still quite large share of real estate assets consists of residential property. It seems that this layer is also strongly influenced by the investment strategy of a homeowner society.

In themselves, the observable inequalities are not necessarily a cause for concern. Observations such as this, that a relatively large amount of wealth is in relatively few hands, or that income levels and prices for housing or rents can only to a very limited extent meet the mobility requirements that would be socially desirable, can be read as current and not obvious challenges for the respective policy areas *per se*. Admittedly, the latter are then faced with conflicts of interest that are as insoluble as is common in other countries (with admittedly different problems). In Hungary,

however, the existing problem of the very pronounced unequal distribution of wealth, only sketchily outlined here, seems to be explosive when set in relation to the other two factors discussed here because it seems hardly possible to maintain the current stability with the usual means. It will require a great deal of ingenuity. The next two subsections will deal with those factors.

3.2. Demographic decline

Social science forecasts are always highly problematic or rather uncertain. However, this is least true for forecasts of demographic development. In the following, we will take a brief look at the demographic outlook for the Republic of Hungary and then combine this with the characteristics of the property market outlined above.

Without going into the details of developments in recent years, the following three factors must be considered: Hungary combines low fertility rates with a high mortality rate and a negative migration balance. Even in optimistic scenarios, this leads to a rather rapidly shrinking population. This has been happening since 1981, currently by more than 15% (Juhász et al., 2018, p. 5; Eurostat, 2017). This is quite fast in comparison with the European Union Member States. In all probability, the population will fall by about two million by 2060. This means a population decline of about 20% (Földházi, 2015, p. 212). Certainly, there is room for maneuver up or down – but certainly not much.

The instruments that have been used so far – primarily to promote home ownership – have by no means have had such an impact that a decisive turnaround can be expected, at least not to date. And there is initially no reason to assume that this could change so soon. Certainly, the development could theoretically take a different course. One could consider other, much more drastic factors and events, such as a radical, long-term consistent change in tax policy, expropriation, international migration, the next crisis in the EU, the next crisis in the forint or a fertility miracle through new policy instruments (as already seen in the early 1950 s – another question arises in whether anyone will want to put up with such instruments). However, it is difficult to make plausible that any factor highly likely to occur will lead to a reversal of the demographic trend.

If the natives cannot be persuaded to reproduce more quickly, a look at the fastest-acting means, international migration, must also have a sobering effect. For only working immigrants could be part of the solution. However, the requirements for vacancies on the Hungarian labor market do not differ significantly from those of Western European countries, while the salary level in Hungary is still exceptionally low (OECD, 2018). For this very reason, many Hungarians have already emigrated and a relatively large number of Hungarians are planning long-term labor emigration

(Hárs, 2018; Hegedüs, 2015, p. 85), while EU immigration to Hungary does not make much sense. There is no plausible reason why this should change in the foreseeable future. However, the mass immigration of low-skilled workers, as currently experienced by the welfare states of Western Europe, cannot be a recipe for Hungary's upcoming problems, nor is there any incentive for immigrants of this kind to stay in Hungary at all.

Whatever the scenario, Hungary's population decline is certain. This will have fatal consequences for the residential real estate market. As briefly outlined above, this results from the fact that assets within the country are invested with a decisive weight in real estate. This means that in the foreseeable future the concentration of real estate assets will only become more pronounced among a few, very wealthy people. In this context, it must also be taken into account within which segments of Hungarian society the importance of real estate for intergenerational transfers will remain or become important.

Let us consider a few more social factors. For example, it is easy to assume that the already broad stratum of the haves, who have to live in relatively poor housing conditions, will increase relatively strongly, and will therefore inherit relatively fewer and also relatively poorer residential properties. It should also be noted that the expected automation will primarily lead to a loss of access to the labor market for the relatively low-skilled workers, while they will largely be unable to benefit from the above-mentioned family support programs (see Hegedüs, 2017, p. 98; the support programs have always targeted the stronger middle class, ibid.) Whether these support programs will exist at all in the near future is another matter. One way or another, relatively more people will live in relatively poorer housing with relatively less income and assets.

The number of relatively wealthy people will shrink, but more wealth will be distributed among fewer people. One can soberly assume that neither the relevant (housing) policy environment nor individual investment strategies will change in such a way that that stratum would not become active as an actor in the housing market of all places (where it is already active). Depending on the region in which relatively wealthier people will now find themselves, they will be able to decide – of course in addition to the option of even greater living comfort of their own – whether they want to invest in lower- or higher-priced rental properties. In view of the growing differences in wealth, the concentration on the capital (more on this in the following section), it will be most plausible for this group of investment-ready people to orient themselves to the uppermost, if possible international, class of tenants in the event of an involvement in the rental market.

The current distribution of wealth in Hungary has already resulted in the lower edge of the thin middle class orienting itself upwards in fear of relegation, while the upper

edge of the same class will do its utmost to belong to the upper class. This will not be easily changed – for how should a policy be designed in view of these circumstances that would broaden a viable middle class? It can also be assumed that the rich will diversify their assets more and thus increase the share of financial assets, for example to cushion the effects of taxation or other mitigating measures in the real estate market. However, this means that assets will be collected at the 'upper end' of society in one way or another and are less likely to be invested to benefit the growing number of have-nots.

At this point, all this can only be hinted at. Nevertheless, the tensions that can be expected due to the given circumstances are hardly mere speculation. This constellation will certainly lead to literally inherited, but very profound tensions in the Hungarian society. It is of course impossible to foresee what concrete political consequences this will have. But it seems inevitable that the tensions will grow. This problem appears even more explosive if one also takes into account the unequal distribution of wealth between town and country.

3.3. Regional disparities

The very uneven distribution of assets among different groups of society in Hungary is reflected in the marked regional differences. At this point, let us briefly consider just four aspects: the asset situation, construction activity, price trends and population development.

Based on the characteristics described above, it is not surprising that the wealthiest of the Hungarian population are concentrated in the capital. This can be easily observed by examining social strata of varying wealth (estimates by Kolosi and Fábián, 2016, p. 108). The statistics of the Hungarian central bank also support this finding. For example, at the beginning and end of the period under review from 2014 to 2017, total per capita wealth was highest in the region around Budapest (MNB, 2019, p. 9). The discernible differences appear to increase over time, as they have grown relatively quickly during this (relatively short) period (MNB, 2019, p. 9). In the real estate market, this trend towards greater disparity can be seen even more clearly: If we look at the number of construction permits between 2014 and 2018 per 10,000 inhabitants, it is striking that only five of Hungary's 19 counties show a lesser deviation than 20% from the average of 58.9 permits, two of which, it should be noted, are below this figure; the capital Budapest has 76.2 permits per 10000 inhabitants, the county of Pest surrounding Budapest 108.0 and the county of Győr-Moson-Sopron close to the border – which also benefits from the automotive sector, which is extremely important for the Hungarian economy, especially from the investor Audi – stands out with 197.0 permits (Vukovich, 2019, p. 191).

The recovery process in the real estate market observed after the global financial crisis (see also Philiponnet and Turini, 2017, p. 27) thus took place primarily in these economic epicenters, while all other areas fell back relatively. This must have resulted in corresponding aftereffects.

This development can also be clearly seen in other indicators and is also particularly striking in comparison with other countries in Hungary. For example, if one looks at the development of the capital's house price index in relation to that for the country as a whole, Hungary shows by far the most striking price development in Europe when focusing on the capitals (Bertalot et al., 2019, p. 33). Bertalot et al. (2019, p. 35) document the same tendencies quite clearly in a long-term comparison of the price to income ratio deviation in capital cities between 2000 and 2016 with the price to income ratio deviation in the country. Hungary's capital shows a quite outstanding affordability evolution in the European context. If we observe the price increases for real estate on the real estate market, which has been recovering overall since 2013, by comparing the capital city with other cities and municipalities, a clear investment-driven trend becomes apparent (LITT, 2020, p. 8). These processes can thus be explained by the argument presented in Section 3.1. The Hungarian central bank also reports a 40% share of housing purchases over the last eighteen years due to investment motives in the capital compared with 25% in the countryside (Fellner et al., 2019, p. 10). In the recent past, new dynamics can indeed be observed in some cities (ibid. 14), but firstly, this will only affect certain centers and overall it will not be possible to deduce a reversal of the generally observable trend.

Recent statistical estimates, such as the extremely revealing one by Lennert (2019), show that this process of growing regional disparity will only be furthered by demographic developments. Without going into the problem that this is of course also a chicken-and-egg problem, even in optimistic scenarios the population will grow primarily in and around Budapest and certainly also in some regional centers; in large parts of the countryside of Hungary, however, the population will continue to shrink (Lennert, 2019, pp. 513, 520). This in turn will only further accelerate the processes of concentration described above and the associated social fragmentation. If one estimates only over the period of a single generation, i.e., about 30 years, then major changes can be expected in any case. These changes will include a further decline in the value of real estate assets in rural regions and a rise in vacancies, as is already being observed in part today due to construction activity (for the relatively wealthy, mind you) (Vukovich, 2018, p. 7). The consequences in detail are of course not foreseeable. There is no doubt that there is a mismatch between the investment-driven developments in the capital and the expected housing needs of a growing stratum of have-nots and impoverishing.

Conclusions

What can be learned from the observations briefly outlined here? Possibly only to the extent that the currently subsidized stability of the Hungarian housing market will not be sustainable if the trends in population development, the distribution of wealth with regard to wealth differentials and the corresponding regional characteristics do not change. It seems, however, that current policies have more the effect of a hopeful sedative for the Hungarian homeowner society, where family thinking is still very important in terms of investment strategies, but where the population has not been growing for a long time. It reminds one a little of *Death Becomes Her* – everything may continue somehow for a long time, but at some point everything falls apart.

Unfortunately, there is no recipe – there are probably too many cooks. For example, the government would set incentives in vain to keep the assets of the rich in the country in order to help the materially worse-off strata of society with tailor-made forms of redistribution. This will not work in a Europe of fundamental freedoms any more than it will prevent negative net migration among the well-qualified. Moreover, Hungarians have always been very inventive, especially when it comes to their own homes. Of course, sooner or later the introduction of appropriate inheritance tax rates would actually become inevitable – but at what point would this be politically feasible in a homeowner society? And it would probably solve less than necessary. Viewed over the course of a generation, free movement of factors and democratic co-determination are sufficient to generate a rather precarious situation. And the expected effects of digitalization or foreseeable change within the international division of labor have not even been taken into account. These problems are predictable because they are simply inherited. And there will be no simple solution. But such things happen in the best families.

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IV.4. Housing Wealth in Hungary: From Subsidized Stability to Inherited Tensions?

315

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